WHAT ARE WE MISSING?

AN ARCHAEOTHANATOLOGICAL APPROACH TO LATE ANGLO-SAXON BURIALS

By:

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Abstract

Archaeothanatology, a holistic approach conceived in France, examines detailed observations of the spatial positioning of skeletal elements in a grave, to characterize taphonomy and reveal funerary practices that would otherwise be archaeologically invisible. However, archaeothanatology suffers from a lack of comparative case studies exploring the effects of different burial environments upon the decomposition and disarticulation of a human corpse in the grave. Furthermore, investigations into funerary practices applying a taphonomic approach are seldom contained in published reports for burials in England. This has resulted in potentially valuable evidence for funerary practices being overlooked.

This study evaluates the utility of archaeothanatology as a tool for reconstructing original burial form from an archaeological grave context, with specific focus on the identification of wooden containers from the late Anglo-Saxon period (c.A.D.650-1100). Recent data suggests a variety of different containers for the body were commonly used but identifies so-called ‘plain-earth graves’ as the norm. Many containers will have been constructed entirely from wood, decomposing completely, rendering them archaeologically invisible confounding attempts to explore their prevalence. Presently various inconsistent evidence is used to identify possible wooden containers.

A taphonomy-based analysis of skeletons from graves where preserved wood and metalwork provided conclusive evidence for coffins was undertaken. This information, as well as adding to our overall knowledge about decomposition in a wooden container, has been used to develop a tailored method to assist in identifying coffined burials. The method was applied to three cemeteries containing burials without surviving evidence for coffins.

The results indicate that the prior default determination of ‘plain-earth’ in a substantial number of burials was flawed. From the sample studied, 41% were identified as decomposing in a void, 28% more than originally identified through evidence from funerary architecture alone. Thus, confirming archaeothanatology can improve burial interpretations and is beneficial to funerary archaeology.

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County names

England		Other UK counties mentioned in text	
Bedfordshire	Be	Scotland	
Berkshire	Ber	Dumfries and Galloway	DG
Bristol	Br	Fife	Fi
Buckinghamshire	Bu		
Cambridgeshire	Ca		
Cheshire	Ch		
Cornwall	Co		
County Durham	CD		
Cumbria	Cu		
Derbyshire	Db		
Devon	Dev		
Dorset	Do		
Essex	Es		
Gloucestershire	Gl		
Greater London	GL		
Greater Manchester	GM		
Hampshire	Ha		
Herefordshire	He		
Hertfordshire	Hrt		
Kent	Ke		
Lancashire	La		
Leicestershire	Le		
Lincolnshire	Li		
Merseyside	Me		
West Midlands	WM		
Norfolk	Nf		
Northamptonshire	Nh		
Northumbria	Nb		
Nottinghamshire	Nt		
Oxfordshire	Ox		
Rutland	Ru		
Shropshire	Sh		
Somerset	So		
Staffordshire	St		
Suffolk	Sf		
Surrey	Sr		
Sussex	Sx		
Tyne and Wear	TW		
Warwickshire	Wa		
Wiltshire	Wi		
Worcestershire	Wo		
North Yorkshire	NY		
East Yorkshire	EY		
South Yorkshire	SY		
West Yorkshire	WY		

Primary sources

ASC	Anglo-Saxon Chronicles (Garmonsway 1972)
HE	Bede's Historia Ecclesiastica (McClure and Collins 1969)
LS	Ælfric's Lives of Saints (Skeat 1881)
RC	Regularis Concordia (Symons 1953)
WMGP	William of Malmesbury Gesta Pontifica (Winterbottom 2007)

Chapter 1 - Introduction

This thesis applies and evaluates an archaeothanatological approach to archaeological funerary evidence.[1] Although commonly employed in French archaeology it is an under-utilised approach in funerary archaeology outside France. Archaeothanatology is the archaeological (archaeo) scientific study of the biological and social elements of death (thanatology) (Duday 2009: 3). Archaeothanatology is a method for reconstructing funerary practices and attitudes to death in the past by studying the spatial configuration of the skeletal remains in the grave and analysing the treatment of the corpse (Duday 2009: 6). The key underpinning concept is that the positions of skeletal remains revealed in the grave are the result of numerous interrelated natural and anthropogenic post-mortem processes which have been acting upon the corpse since the time of death. This transformation of a once-fleshed corpse into bones can alter the position of the remains, meaning that what we see upon excavation is unlikely to be a direct representation of the body's placement at the time of burial (Knüsel 2014: 27). By understanding the post-mortem processes acting on the body, characterising their effects and differentiating between them, archaeothanatology aims to reconstruct the original position of the body and therefore provide a detailed and accurate insight into funerary practices employed in the past. The technique relies upon the recording of detailed observations concerning the spatial relationships between skeletal elements and other features, in their *in-situ* locations in the grave. The interpretation of these data works backwards in time from the excavated skeletal remains to their original positions, by reconstructing the effects of changes undergone by the corpse. Thus,

[1] This approach is also known by other names – field anthropology and *anthropologie du terrain* – however the term archaeothanatology is used in preference here following Duday's (2009) clarification.

archaeological observations can then be interpreted to reconstruct the original burial (Duday *et al.* 1990: 30). In undertaking an archaeothanatological approach, practices related to the ritual treatment of the corpse are revealed that might otherwise go undetected, particularly where they leave no tangible archaeological evidence. As rituals are one route through which societies express values and beliefs (Metcalf and Huntingdon 1991: 5, 25), increasing identification of ritual practices will enable a greater understanding of past societies to be achieved from their funerary remains.

While the archaeothanatological approach presents an opportunity for human skeletal remains to reveal previously unidentified information about funerary practices, rituals and socio-cultural values and behaviours, the uptake and application of an archaeothanatological approach has been slow outside the Francophone literature from which it originated. Investigations applying a detailed analysis of bone positions within the grave are seldom contained in published archaeological reports of burials in the UK. The result of this apparent disinclination to use archaeothanatology is a situation where potentially valuable evidence for funerary practices continues to be overlooked. Knüsel (2014: 26), who has worked both within the UK and France, commented that English-language researchers may have limited linguistic skills and were therefore restricted in their access to the predominantly-French archaeothanatological literature. Further potential barriers to the use of taphonomy-based approaches were raised by Schotsmans, Mickleburgh and Gerdau-Radonic in their session abstract for the 2017 European Association of Archaeologists (see Chapter 2). For example, there are no fixed methods, standardised approaches or universal terminology, which makes initial methodological decisions complex and comparisons between studies difficult. This absence of guidance serves to perpetuate variation in methods, as researchers formulate their own approaches, which in turn may further weaken the position of archaeothanatology as a tool. Moreover, a lack of comparative case studies and experimental research limits the resources available to researchers wishing to utilise archaeothanatology. Most significantly, this shortage in data impedes a thorough and explicit testing of the underpinning principles of the method. Duday (2006: 52; 2009: 154), one of the pioneers of the approach, acknowledges that methods and procedures have yet to be refined; archaeothanatology has to establish its foundations through observations made at each new site. Yet there has been no significant attempt to address these problems in the UK. This has led to questions concerning how accurate and reliable archaeothanatological methods are in providing reconstructions of original burial form and revealing funerary practices, and whether a standardised approach can ever be employed. To address these problems, further work needs to be undertaken which examines the archaeothanatological approach and its application as a tool for the reconstruction of the original burial form from archaeological sites. This is the intention of this thesis.

This chapter initially defines the research aims, approach and objectives for this thesis. Second, the nature and formation of the burial record is reviewed and the implications for funerary archaeology considered. Third, the role and purpose of funerary archaeology is introduced, establishing the funerary record as a valuable evidential source. This is followed by an introduction to the chronological and geographical focus of this project. Finally, a brief outline of the structure of the remainder of the thesis is provided.

1.1 Research Aims, Approach and Objectives

The primary aim of this thesis is to examine the utility of an archaeothanatological approach as a tool for the reconstruction of original burial form from archaeological evidence. This aim could be addressed in different ways, for example, through experimental studies of decomposition using modern cadavers or via development and testing of methods on archaeological data. Using archaeological material, in the form of photographs and documentation from previously-excavated sites, as the main source of evidence this project takes the latter approach. While its value to archaeothanatological studies is explicitly acknowledged here (see Chapter 2), this project does not undertake experimental research utilising human cadavers to investigate and test corpse taphonomy. Employing this type of approach would require experimental work conducted over many years, perhaps even decades, and is therefore outside the scope of a PhD project.

Having decided to use an archaeological data set for this project, the additional decision was made to focus the research on the provision of late Anglo-Saxon (9^{th} – 11^{th} centuries A.D) wooden coffins. Direct archaeological evidence for coffins, including preserved wood, soil stains from decomposed wood, and metal work (straps, brackets and nails), further supported by documentary sources, has shown that interment of the body inside a wooden coffin was part of the suite of funerary elaborations which became more common during the late Anglo-Saxon period (see Chapter 3). There is also reason to hypothesise that many more individuals were interred in coffins than has been previously identified. Indeed, archaeological evidence has shown that many coffins would have been constructed entirely from wood (see Chapter 3), resulting in their complete destruction in anything other than the most waterlogged soils. This would render them archaeologically invisible and confound our attempts to explore their provision.

Excavation reports show that direct evidence of wooden coffins is not found in all graves at a site and is potentially absent across a whole site. It seems unlikely every grave originally housed a coffin. For sites where no evidence has been recovered for the use of wooden coffins it raises the question of whether the practise of using containers was not employed at all, or whether it is just the case that no evidence of them remains. Gilchrist (2015: 385) highlights this when writing about changing funerary practices in the late Anglo-Saxon period. She directly calls into question the under-representation of wooden coffins based on a comparison of the prevalence rates of archaeological determined wooden coffins between the late Anglo-Saxon Worcester Cathedral cemetery (Wo), where she states 60% of burials were coffined, and rates found in later medieval cemeteries of only between 4-34%. Researchers are using variations in late Anglo-Saxon funerary practices to explore social and cultural aspects of populations, for example the impact of Christian doctrine on attitudes towards death and burial. But, if as is suspected, the number of wooden containers is being under-represented by the archaeological evidence (wood and metal work) the conclusions of studies based on the frequency of funerary practices will be flawed. The context and rationale for this choice is discussed further in Section 1.4 below and developed in Chapter 3.

The identification of this issue led to a secondary research aim; to identify late Anglo-Saxon wooden coffined burials using skeletal positioning analysis to explore if the direct archaeological evidence (wood and metal work) is under-representing coffin provision.

The objectives for this thesis are:

1. To critically appraise the value of current archaeothanatological approaches to the reconstruction of past burial forms and funerary rites from their archaeological residues

2. To develop and refine an archaeothanatological method for the identification of wooden coffins from their archaeological residues
    a. To analyse skeletal positioning of burials with confirmed archaeological evidence of wooden coffins to assess the impact of burial form on decomposition and disarticulation
    b. To develop an archaeothanatological methodology aimed at the identification of burial within a wooden coffin from skeletal positioning

3. To apply the method created in objective 2 to three cemetery sites containing burials with undetermined burial form

4. To evaluate the findings from the skeletal positioning analysis conducted in objective 3 to assess the effectiveness of a standardised methodological approach.

5. To re-evaluate the frequency and extent of coffined burial during the late Anglo-Saxon period.

1.2 Now You See Me, Now You Don't - The Nature of the Archaeological Burial Record

> "Reconstructing human behaviour from physical evidence is a multidimensional jigsaw puzzle. Pieces …. are missing, damaged and some are even camouflaged" Scott and Connor (2006: 27)

To reconstruct human behaviour from archaeological evidence of funerary practices, we first must understand how the burial record – what is found upon excavation – was created and how it has been altered over time (Chapman and Randsborg 2009: 13). Intentional actions dominate the creation of the majority of the burial record, with humans deciding and enacting all aspects of the treatment of the deceased. In contrast, non-cultural processes are rarely instrumental in the formation of the burial record. For example, while processes for deposition could result from natural disasters such as volcanic eruptions and mud slides, or from coincidental or accidental inclusion of objects in the grave (O'Shea 1984: 23-26), such events are a comparatively rare means by which materials enter the funerary record. Schiffer (1996: 83-85) concluded that the anthropogenic treatment of the dead body manifests in four types of archaeologically-visible variables: (1) the location of the grave, (2) the type of grave, (3) the handling of the corpse and (4) in any inclusions in the grave accompanying the corpse. This variety in forms of funerary expression immediately creates bias in the burial record. Not all locations, types of grave, treatments of the corpse and accompanying inclusions have an equal chance of being preserved (Chapman and Randsborg 2009: 12). Thus, some practices will leave no evidence at all. For example, not all corpses are inhumed in the earth and, in consequence, are subject to more varied and potentially destructive processes of decay (Parker Pearson 1999: 5). Using ethnographic evidence Weiss-Krejci (2013: 281-283) discusses examples of non-burial practices such as: leaving the deceased on the ground, unburied; cremation and a subsequent scattering of the remains over wide area; or deposition of the corpse or cremated remains into water. These practices may leave no archaeologically-identifiable evidence yet have been as purposeful and meaningful as any burial. It must also be remembered that there are constituents of the funerary process that will never be captured in the archaeological burial record because they are not tangible (Chapman 2013: 22). Funerals in the past, as today, might have included elements of spoken and/or sung words, processions and meals. These events in response to death were processes, a gradual accumulation of separate actions and events which included, but were not limited to, deposition of the body (Hadley 2001: 56). Only a part of the overall funerary process is being captured in the archaeological record, and this will obviously create a bias in what inferences can be made from the excavated grave (Cherryson 2005: 21).

Despite the vast range of funerary practices adopted by past societies, some characteristics are frequently encountered. An archaeological funerary context is most often represented by an inhumation, where the body is either buried directly in the ground or interred within a purpose-built container (Weiss-Krejci 2013: 281). The burial of a corpse and associated burial furnishings leads to a higher chance of survival and recovery than many other forms of burial treatment (Weiss-Krejci 2013: 281). In consequence, the majority of studies that have explored the processes of decay and decomposition that occur after death have focused on inhumation burials. The factors involved in altering the original funerary deposit, including the act of excavation itself, are termed post-depositional processes and derive from two sources: anthropogenic, those pertaining to the actions, whether intentional or not, of humans; and those which are non-cultural or natural in origin (Schiffer 1996: 7). These processes interact to transform the original deposit; with the potential to not only destroy and obscure but to distort the evidence by introducing new patterns (O'Shea 1984: 25). These transformation processes will be, to a certain extent, dictated by the deposited items.

Cultural transformation processes can be intentional or accidental. Intentional acts include deliberate intercutting of graves, exhumation, grave robbing (Aspöck 2011) and the reuse of items such as stone grave markers in the construction of churches (Hadley 2000: 208). Secondary burial practices represent an interaction distinct from the original burial, which can result in movement or partial or complete removal of bones or objects from the grave. As well as displacing items from the original deposit, secondary burial processes also alter the original deposit through disturbance and damage. This potentially obscures the rites and actions pertaining to the original practices, overwriting them with a different set of actions and intentions (Metcalf and Huntington 1991: 84). It may also prove difficult to differentiate primary and secondary rites, both physically or conceptually, as funerary practices could extend over weeks or even years (Chapman 1987: 198). Disturbance caused by activities such as ploughing, digging pits and foundations, land clearance, levelling and trampling can alter a burial deposit. These interactions are unintentional, and any effect on the burial purely accidental. Nevertheless, they are still important, as disturbance does not just alter the burial context but potentially exposes the displaced material to new and possibly different transformation processes (Schiffer 1996: 121).

Natural transformation processes act differentially on the various materials and objects in the funerary record. Thus, they introduce further bias into the survival of the burial record by occasioning differential preservation of the burial deposit, with some materials, and therefore funerary practices, more susceptible than others. This results in the situation where not all forms of funerary practice are equally represented in the archaeological record. Rodwell (1989: 160) comments that “one of the most interesting aspects of burial investigation is the differential survival of the evidence”. The survival of materials in the grave is dependent on the interaction between its composition and treatment and the immediate and wider environment (Cronyn 1990: 14). The agents involved in controlling the survival of an object can be grouped by their actions into physical, chemical and biological (Cronyn 1990: 14; Schiffer 1996: 148-49). These may act singularly or in combination and are controlled by the burial environment. The survival of materials in the grave is the result of either the absence of agents which would otherwise destroy them and/or the presence of agents which are conducive to the preservation (Cronyn 1990: 14).

The effects of physical agents include erosion and dissolution by the movement of water, mechanical breakage resulting from freeze/thaw action and destruction ensuing from natural disasters such as earthquakes. A common physical process is soil consolidation, whereby the effect of gravity on the overburden of soil results in a compressive reduction in sediment volume, causing rearrangement and downwards displacement of both soil and anything buried within it (Andrews 2006: 461). As well as resulting in damage to materials, this action will lead to a distortion of the original burial deposit by altering the vertical stratigraphy. An extreme example of this would be seen when a wooden coffin lid collapsed into a coffin.

Chemical agents affect an object's survival by changing the chemical composition of the composite material/s (Goffer 2007: 211) and include the action of acids, alkalines and salts. Examples of chemical reactions include the corrosion of metals in acidic soils, in which the sulphide of the metals becomes oxidised (Kibblewhite 2015: 251) or the oxidation of proteins in alkaline soils such as those in textiles (Janaway 1987: 134). Biological agents are related to chemical agents in that they will also alter the chemical composition of an object (Cronyn 1990: 14), but the process is driven by living organisms, which range from bacteria and fungi to burrowing mammals and scavengers (Schiffer 1996: 149). Organic materials are especially vulnerable to attack from biological agents as the decomposition of these once-living materials is part of the natural order of decay and reuse (Cronyn 1990: 240-1). Blanchette (2000: 191-2) provides a summary of the microorganisms and their effects on wood, with fungi and bacteria eroding the cell walls and attacking the lignin and carbohydrates, resulting in the degradation of the wooden object. Chemical and biological processes are governed by wider environmental factors such as temperature, water, pH and oxygen levels, that affect the rate at which reactions take place (Mays 1998: 21).

The range of objects which might be incorporated into a burial is wide and, therefore, so are the component materials. Along with the corpse, burial contexts might include: disarticulated human bone; animal bone; shells; textiles, in the form of wrappings, linings, covers and clothing; objects and structures made of wood; plant matter; structures made of stone; accoutrement made of glass, metal and leather, and ceramics such as tiles and pottery. The nature of the object itself – its material, size, shape and how it has been utilised – will all affect its survival, as will any treatments applied to it (Goffer 2007). For example, charring wooden boards or planks prior to burial will help preserve them (Rodwell 2012: 317) and firing temperatures of ceramics affect their robustness to physical stresses (Kibblewhite *et al.* 2015: 250). Inorganic materials such as stone, glass and ceramics, although not immune to biological, chemical and physical attack, are more likely to be preserved within the burial record compared to organic materials (Schiffer 1996: 147-177). Therefore, funerary practices involving stone, such as stone grave linings or pillow stones will survive well in the buried environment, with little difference between wet and dry conditions. But in contrast, organic materials, such as wood and textiles, have been found to decay in dry environments, with better survival rates seen in wet conditions (Bleicher and Schubert 2015: 278). It can therefore be inferred, that the preservation of funerary practices involving items made with wood and textiles will be lower and more variable between environments. The survival of bone appears intermediate, which may not be surprising as it is comprised of inorganic hydroxyapatite embedded in a matrix of organic collagen fibres (Mays 1998: 1).

The processes involved in the alteration of the corpse within the burial environment are studied under the banner of human taphonomy. Schotsman *et al.* (2017: 2) recently defined taphonomy as the interdisciplinary study of what has happened to an organism [in this case a person] between death and recovery. This sums up succinctly a number of definitions that have emerged over the past few decades, since the term's introduction by Efremov in 1940, as a method to control for the processes involved in an organism's passage from the biosphere to the lithosphere in palaeontology. Extensive research both archaeological and forensic in nature has been, and continues to be, carried out to explore the range of taphonomic or post-mortem processes that are involved in the survival and destruction of the corpse, and specifically of bone (see, Waldron 1987; Bell *et al.* 1996; Cox and Bell 1999; Bello 2005; Noto 2009; and the edited volume by Schotsmans, Márquez-Grant and Forbes 2017). Of importance to this project is the fact that human bone has the potential to survive in environments where many materials including wood and cloth may not, meaning it has the potential to be recovered in situations where funerary practices employing such organic materials would have been removed from the archaeological record.

If transformation processes are altering the original burial tableau, there is a need to understand their nature, so their actions can be accounted for and the relationship between original practices and the recovered evidence understood. Then, the intentional human practices that archaeologists wish to reveal can be identified (Chapman 1987: 199). Only by exposing these repeated patterns of human practices can ritual behaviour be explored (see below, 1.3). O'Shea (1981: 40) rightly notes that we may never be able to characterise what has been lost from the funerary record, only recognise that *something* has been lost, but that we can enhance our reconstructions just by acknowledging the existence of numerous taphonomic processes. For example, if environmental conditions at a cemetery site were not conducive to organic preservation, the survival of practices utilising organic components should not be expected, rather than the assumption be made that they were not employed at all. In doing this we may then get closer to reconstructing Scott and Connor's (2006: 27) multidimensional puzzle.

1.3 Funerary Archaeology

> "The dead do not bury themselves."
> Parker Pearson (1999: 3)

Funerary or mortuary[2] archaeology is the branch of archaeology which attempts to understand past communities through their treatment of the dead (Giles and Williams 2016: 12). The universality of death necessitates that past societies had to make decisions about how to deal with their dead. Responses to death are rarely passive – both individuals and communities actively made choices regarding the handling, manipulation and disposal of corpses (Williams 2010: 67). Lucy (1999: 16) contends that if such decisions are active, they would be subject to change. Indeed, there is variation apparent in funerary rites adopted by societies across both time and space on a global scale (Chapman and Randsborg 2009: 1), but also at a more local level, with differences in practice also evident between communities and individuals. Funerary contexts are therefore important in archaeology as they are understood to be the direct culmination of conscious behaviour rather than, as found in other areas of archaeology, incidental residues (O'Shea 2009: 39). Thus, it has been inferred that funerary archaeology is exploring an intentional, and potentially closed context, in which artefacts created by people are combined in contextual association with the remains of the people themselves (Williams 2007a: 1).

If we argue, as funerary archaeologists do, that the practices which created the funerary record are intentional, then variation is not random and must have meaning (Chapman and Randsborg 2009: 2). The diversity of human funerary practices evidenced through ethnographic studies supports this assertion (Metcalf and Huntingdon 1991). Ethnographic studies have identified a plethora of

[2] The terms funerary and mortuary are used seemingly interchangeably. Both terms can be defined identically as 'relating to the dead'. For the purposes of this thesis the term funerary will be used in preference.

responses to death and dying from around the world. Examples include signalling death with a gong, mandatory ritual crying, the cutting or shaving of hair, beating of drums, dancing, speechlessness, self-mutilation by slashing, gouging and burning and the attacking of others (Metcalf and Huntingdon 1991: 44-70). Treatment of the corpse can include washing and dressing before storage in sealed jars in which it decomposes, the sealing of the bodily orifices with beads and coins, or painting the corpse yellow to ward away evil spirits (Metcalf and Huntingdon 1991: 73; Hertz 1960: 32-33; Van Gennep 2004: 215). In ethnographic studies, the meaning behind such practices can be explored directly, through conversation with those who practice them. For example, among the Candoshi community, in the province of Alto Amazonas, Peru, the corpse is placed into an above-ground wooden structure called a Kavonima (Kolp-Godoy *et al*. 2017). The Candoshi believe that the dead can leave and return at will from the Kavonima. After a number of years, the corpse, in a partially-preserved state, is removed and buried close to the family home. This secondary practice allowed for separation between the initial rite, one of liminality, and the reburial close to the home which supports communal memories and social kinship (Kolp-Godoy *et al*. 2017). Parker Pearson (1999: 21-27) discusses how by comparing ethnographic studies, a number of reoccurring themes become apparent: death as a rite of passage, death as a display of social identity, the relationship between the danger posed by the dead – both figuratively and literally – and the purification process, fear of the dead and the resultant separation, both spiritually and physically, of the dead from the living, or conversely, how ancestors remain an active part of day to day life. Thus, we begin to understand why variation in funerary practice may exist.

Variation in funerary practices through time is made more than evident by archaeological research which has exposed a profusion of different ways of treating the dead. Huge effort may have gone into preserving the corpse; the Egyptians had complex preparations for the dead cumulating in the preservation of the corpse by desiccation and embalming, wrapping the deceased and placing them in a sarcophagus (Giles 2013). At the opposite extreme funerary practices such as cremation, involved the almost-complete destruction of the body. Williams (2002) discusses the practice in early Anglo-Saxon cemeteries, such as Spong Hill (Nf) and Sancton (EY) where cremated remains were placed into urns and buried. Burials have been classified as primary, where the deceased is placed into their final resting place and no intentional disturbance occurs, for example, vast numbers of individuals buried in medieval monastic cemeteries (see Gilchrist and Sloane 2005). Whereas, there is evidence in the Neolithic period for both primary and secondary rites, where burial within barrows and causewayed enclosure maybe followed by a rearrangement of the skeletal remains and/or removal of specific bones such as the crania (Beckett and Robb 2006). The Neolithic burials are also examples of the same space being reopened and reused for multiple individuals, the skeletal remains appear comingled indicating they were not perhaps separated from each other. Another example of collective burial, but where individuals were separated from previous interments, by the provision of coffins, is the family vault built in 1743 at the Quaker burial ground in Kinston-upon-Thames (GL) (Bashford and Sibun 2007 :104). The dead are frequently found buried individually, as seen across Roman and Anglo-Saxon cemeteries in England, for example Lankhills (Ha) where the majority of graves contained a single inhumation (Booth *et al.* 2010: 17, 33). There is diversity in the grave itself; graves can be cut into the earth, embellished with linings or other structural features, under mounds and barrows, within cairns, inside churches, beneath houses, or reuse previous features such as store pits as seen in the Iron Age (Whimster 1981). Graves have been found containing a vast array of grave goods, including jewellery, weapons, food offerings, animals, vehicles, ranging from Iron Age chariot burials such as at Garton Slack (EY) (Brewster 1971), to the “princely” lavish burials of the 7th century in England, for example at Sutton Hoo (Sf) (Carver 1998). Corpses have been wrapped in shrouds, buried in clothes, placed into containers, of wood, lead and stone and placed on boats and beds, such as the bed burial at the middle Anglo-Saxon cemetery at Shrubland Hall Quarry, Coddenham (Sf) (Penn 2001: 41-50). Some burials also appeared to contain only the deceased with no elaborations, for example as evidenced in many late Anglo-Saxon cemeteries (Hadley 2001: 92-97).

Funerary studies are based upon the paradigm that societal beliefs, whether political, scientific, customary or personal, are expressed in the treatment of their dead, and evidenced from the ethnographic and archaeological evidence (Metcalf and Huntington 1991: 25, 71; Tarlow 2013: 617). Moreover, that we can go beyond a description of the physical evidence excavated within the grave, through understanding of the ritual behaviours which created them, to knowledge of, not only death and the dead, but also the living (Nilsson Stutz and Tarlow 2013: 1, 2). Beliefs are a way of understanding and interpreting our world, not bound by experiences, but developed directly and indirectly from a shared social knowledge (Tarlow 2013: 617). Beliefs underpin actions; what someone believes causes them to react in a certain way, and therefore by understanding their beliefs sense can be made of their actions, rather than rationalising their behaviour in terms of our own perceptions (Parker Pearson 1999: 33). Archaeology works in reverse, by identifying repeated patterns of behaviour – rituals and practice encoded in funerary features, to interpret the framework of beliefs in which they were enacted (Nilsson Stutz 2010:36). Burial practices provide a unique insight into beliefs, through ritual practice, i.e. they reflect views of past people in a more direct way than other sources of archaeological evidence can; they are intentional actions, carried out by people in response to death (Williams 2007a: 2). Funerary archaeology is then of an even greater importance for understanding periods where no written records exist (Duday *et al.* 1990: 29, Daniell 1998: *vii-viii*). In such cases, the absence of funerary data may make understanding past societies beliefs systems more difficult.

There is a need to determine and understand the relationship between variation in funerary practices and the wider socio-cultural environment. What was the reason behind the decision to afford an individual, or a community, a certain treatment (Chapman 1987: 198)? However, the relationship between the archaeological evidence and the beliefs and behaviours of a society is not straight forward. Both Härke (1997: 25) and Sayer and Williams (2013: 1) make the comparison between graves and a hall of mirrors. The choice of a "hall of mirrors" rather than just a mirror is deliberate, with Härke (1997: 25) qualifying his choice of words by explaining that graves are not a direct reflection of a society's beliefs and behaviours, but rather that they present a distorted picture. The decisions taken in response to death will have been made within the social construct of a community/population, and as such will be influenced, whether consciously or not, by factors such as religious/spiritual beliefs, wealth, political affiliation, tradition and practical considerations such as availability of resources (Thompson 2004: 29, Cherryson 2005: 21). Thompson (2002: 229) considers that these are not isolated aspects of society, but instead the overlap of several developments within it. These responses to death will also be affected by personal feelings, emotions, and therefore will not have been made completely objectively (Nilsson Stutz and Tarlow 2013: 7). It is difficult, but potentially not impossible, to interpret someone's feelings from archaeological residues, and as such we may not fully understand their decisions (Nilsson Stutz and Tarlow 2013: 7). In having to consider all of these factors, it means that we cannot infer a direct causal relationship between grave provision and society; any representation in the burial of identity or social situation is not direct between the living and the dead but will have been altered to fit an ideal or expected persona (Hodder 1980: 165). Chapman (2013: 27) agrees, stating that the relationship between life and death is uncertain and therefore no direct inferences about social attitudes and beliefs can be made from the material culture that remains of the treatment of the dead. It also must be remembered that not all of a society's characteristics will be represented within the funerary arena adding to the complexity of the relationship between material culture and social climate (Boddington *et al.* 1987: 4). Consequently, there is no one overarching explanation with which to understand funerary rites (Metcalf and Huntingdon 1991: 74). Furthermore, as discussed above (1.2), not all aspects of the funerary rites will be represented in the archaeological record, or survive, creating interpretational bias. The way in which funerary practices are interpreted today may not relate to how they were intended. As such, Chapman (2013: 28) and Williams (2007a: 4) both assert that burials should be viewed within a social context, considering the religious, political and social environment of the time, so the correct inferences are made from the burial data. Nevertheless, with these provisos in mind, it can be inferred that burials can provide both direct and indirect evidence about the individual they were created for, the people they were created by and the society they were created in.

While each facet of a burial can be analysed independently, illuminating different aspects of the whole, for example analysis of human skeletal remains can provide an understanding of an individual's age at death, biological sex, mobility, health and diet (Gowland and Knüsel 2006: xi-xiii, Roberts 2009:103-216), or the analysis of any items of adornment can inform about how the dead were prepared (Gilchrist and Sloane 2005: 78-100), a greater depth of understanding can be achieved by combining different evidential sources. Complex multidisciplinary approaches are possible due to the wide and varied nature of funerary evidence. Biological data obtained from the analysis of the human skeletal remains in conjunction with the location of a grave, its structure and any elaborations, can offer an insight into gender, status and wealth of an individual (Lucy 1998: 32-34). More still has been achieved by utilising theoretical constructs to help explore and interpret the archaeological evidence (Arnold and Jeske 2014: 327). For example, Williams (2007b) investigated the link between commemoration using cairns and mounds and social memory and aspects of personhood such as gender at Lundin Links, Lower Fargo (Fi), an early medieval cemetery. He found that gender appeared to influence both the location and form of the monument. Studies such as this facilitate an understanding of a more holistic picture of past societies beliefs and as such are key in exploring the burial record.

In sum, the funerary record is a highly valuable resource for providing information upon which inferences can be made about past societies. Burial evidence is plentiful by virtue of the fact the everyone dies, and past societies have tended to mark this event through a suite of activities that leave archaeological traces. Indeed, for some periods the archaeological record is dominated by funerary evidence, making funerary archaeology the main source of information about past societies (Beckett and Robb 2006: 57; Chapman and Randsborg 2009: 4). In archaeology, burial evidence is unusual for its comparative value in reflecting aspects of ritual and belief. Nevertheless, there are multiple reasons why the burial record does not provide an unambiguous picture of past behaviour, and consideration must be given to how we interpret the burial record based on the evidence we have. Any attempt to increase the information obtained from them is to be welcomed.

1.4 The Case Study – Late Anglo-Saxon Funerary Practices

This thesis applies an archaeothanatological method to one specific body of evidence – archaeological material from English cemeteries dating to the late Anglo-Saxon period. In England, the Anglo-Saxon period is synonymous with the early medieval period, and extends from the mid-5th to the mid-11th century A.D. It is common to separate the period, based upon major social, religious, political and economic events, into early (A.D. 450-650), middle (A.D. 650-850) and late (A.D. 850-1066) (Craig 2010: 2), although there is some overlap and variation in the dates assigned to these three subdivisions between scholars. Buckberry (2004: 4) notes a need for a degree of flexibility, as these periods are just divisions applied to assist in research; the cemeteries and practices being studied do not necessarily conform to these boundaries. For example, cemeteries, such as Black Gate Newcastle (TW) (Nolan 2010) and Wells Cathedral (Dev) (Rodwell 2001) were established in the 7th century, or before, but continued in use until the 11th century, and sometimes beyond, thus spanning the divisions of middle and late Anglo-Saxon. For the purposes of this study an inclusive approach has been taken to include cemeteries encompassing the whole of the 9th century until the end of the 11th century. The rationale for this relates to the focus of the study on funerary practices and specifically upon wooden coffin provision, which is a characteristic funerary practice of this period, and the methodological requirement to compare contemporaneous burials (discussed in Chapters 3 and 4). Burial practices of the 9th to 11th centuries are characterised by burial in graveyards associated with churches, an overall decline in grave good provision, an apparent increase in containing the body within a lined grave or a coffin, the use of elements to support the corpse such as stones placed around the head, evidence for shrouds/wrappings, the introduction of above ground grave markers and a move towards a more structured cemetery layout

(Gilchrist (2015: 381), for a full discussion see Chapter 3). However, practices were not uniform, with differences in treatment of the dead visible both within, as well as between, cemeteries.

Documentary sources provide evidence for huge socio-political and religious changes across the late Anglo-Saxon period, with the growing expansion of the Christian Church, raids and subsequent settlement of the Vikings, the unification of England by the royal house of Wessex and, in 1066, the Norman conquest (Hadley 2001: 11). The investigation of funerary practices is considered to be important when researching periods affected by a changing socio-cultural climate (Williams 2006: 5) as funerary variation is thought to reflect past populations beliefs, with beliefs influenced by social and cultural factors (see above 1.3). Several key social and cultural transitions which characterise the late Anglo-Saxon period have been illuminated by funerary studies, emphasising the value of archaeological data from the burial record for our understanding of the period as a whole. The impact of Christianity, social constructs such as identity, status and deviancy, and the impact of the Scandinavian settlers, have been researched using burial data (see Halsall 2000, Thompson 2004, Reynolds 2009, Craig 2010, Hadley 2010, O'Sullivan 2013, Buckberry *et al.* 2014 and Gilchrist 2015).

As noted in section 1.2, above, the effects of differential preservation will have altered, to varying degrees, the original burial tableau visible upon excavation. This presents a fundamental issue for the interpretation of variation in the archaeological burial record, including that of the late Anglo-Saxon period: If the frequency of any particular variation in burial practice cannot be determined, how can its use be accurately explored, and the true meaning of its deployment understood? It is apparent that previous studies which sought to characterise burial variation in late Anglo-Saxon graves and go on to interpret this within the wider context of religious belief, status and other aspects of individual and group identity, have assumed too readily that the archaeologically-recoverable residues of burial variation provide an unambiguous reflection of the original forms and contexts of graves. Thus the designation of burials with no preserved elaborations or grave goods as “plain-earth” graves is particularly problematic and is discussed in Chapters 3 and 4. The choice in this study to focus upon the identification of wooden coffins in late Anglo-Saxon graves, rather than other forms of funerary practice, is a direct response to the need to re-examine the category of plain-earth burials from a perspective that offers new insights into interpreting their original form at the time of interment. Archaeothanatology provides this perspective.

The decision to focus on wooden coffins in this thesis was also a practical one, as there are a number of examples of preserved wooden coffins dating from the late Anglo-Saxon period available for study. The ability to analyse burials with confirmed archaeological evidence of wooden coffins is considered important for the approach taken in this study, as set out in objective 2a, as assessing the impact of burial in a wooden coffin on decomposition, disarticulation and the resulting skeletal positioning is a vital step towards developing a method to assist in the identification of wooden coffins in the absence of any direct archaeological evidence for their presence (see Chapters 4 and 5). Thus, examples of surviving wooden coffined burials were considered a necessity.

1.5 Thesis Structure

The reminder of this thesis is broken down into a series of eight chapters. Chapter 2 examined how “the body” has been utilised in archaeology and how this has led to the development of taphonomy-based approaches such as archaeothanatology.

This leads into a critical review of archaeothanatology and its principles, so an understanding is reached before these principles are applied later in the thesis.

Chapter 3 provides a detailed review of variation in funerary practices during the late Anglo-Saxon period. In doing so, it establishes why the focus taken by this study on wooden coffin provision is an important one.

Chapter 4 presents information pertaining to the study sample of late Anglo-Saxon burials in which wooden coffins survive, outlining why their examination is a necessary step in this research and how they were chosen, alongside information about their context.

Chapter 5 first reports on the findings of the skeletal positioning analysis of the burials described in Chapter 4. These results are then developed into a taphonomy-based methodology which is outlined in detail.

Chapters 6, 7 and 8 present the results of the application of the taphonomy-based method outlined in chapter 5 to three case-study sites: Worcester Cathedral (Wo), Black Gate, Newcastle (TW) and Elstow Abbey (Be).

Chapter 9 provides a discussion and conclusions encompassing a critique of the methodology developed in this study and the implications of the results of the case study analysis presented in Chapters 6, 7 and 8 for late Anglo-Saxon funerary archaeology. The thesis then ends with avenues for further research.

Chapter 2 – The Body in Archaeology

Archaeothanatology: The Why and How

Chapter 1 has served to introduce why the burial record is a valuable, albeit challenging, source of information regarding past societies. When discussing burials as a resource, Richards (2002: 156) likens them to books – they need to be read to be understood. Common sense dictates that to fully understand a book you need to read it all, in detail, cover to cover. So, to continue the analogy; in order to fully understand a burial, to reap the maximum information on the lives, deaths, rituals and beliefs of an individual and population, we need to utilise all avenues of evidence and explore that evidence to its fullest extent. Why then do we appear to have marginalised one crucial source of evidence – the body (Duday 2006, 2009: 12-13; Nilsson Stutz 2008, 2010; Gowland and Knüsel 2006: *xiii*; Sofaer 2006: 10)? The chapter title "The body in archaeology" was chosen in preference to "Human remains in archaeology", in order to emphasise that the skeletal remains found upon excavation were once a whole body, a complete person. Research has, in general, focused upon skeletal remains as biological entities or, to a lesser extent, on theories based around the more abstract views of the body, rather than bringing together all aspects that make up the archaeological body and looking at the body in its entirety (Martin *et al*. 2013: 71). One conspicuous absence, until fairly recently, has been the role that corpse taphonomy has to play in revealing information pertaining to funerary treatment and practices (Graham 2015: 4-5). Focus of taphonomic research has, instead, rested on the changes affecting bone rather than beginning with those wrought as the soft tissue of the corpse decomposes.

In order to appreciate the current situation of the body in archaeology, and to understand why many argue we have failed to fully integrate it into our thinking, this chapter will begin with a review of the history of the body in archaeology in section 2.1. This review will also emphasize the need for an approach to the archaeological body that encompasses strands from all avenues of research, so that we may fully appreciate what the body can tell us about not only itself, but of the population it once belonged to. There is now a move attempting to redress this imbalance and place the body back at the centre of funerary archaeology. Through the integration of knowledge from other disciplines, such as biology, zooarchaeology and forensic science, it has come to be understood that the transformations undergone by the decomposing corpse can assist in the identification of cultural phenomena (Duday 2009: 3). Nilsson Stutz (2010: 34) identifies Duday's archaeothanatological approach as one taking forward theories about the body and translating them into practice; being developed as a response to the seemingly indifference of the potential and insight human remains can give to social theory. Section 2.2 concentrates upon the origins and development of archaeothanatology and taphonomy-based approaches, exploring what archaeothanatology is, its aims and objectives and how it has advanced. This leads into section 2.3, which provides the underpinning principles to the practice of using skeletal positioning for the reconstruction of funerary practices.

2.1 Historical Perspective

The body has not always been held in high regard as a source of evidence for funerary studies. Indeed, many early studies of archaeological cemeteries conducted by 18th and 19th century scholars treated human remains with limited interest. Human remains would frequently remain unanalysed and, in some cases, were discarded as worthless (Brothwell1981: *x*; Stirland 2009: 5), while a greater emphasis was placed on the artefacts in burials (Duday *et al*. 1990: 30, Waldron

2001: 11). Taking one paper as an illustration, Wickham Flower (1872), reporting the excavation of an Anglo-Saxon cemetery at Farthing Down, Coulsden (Sr), devotes more words to the description of two small pins than on the remains of the person they were found associated with.

This general disregard of human remains in the 19th and early 20th centuries can be explained, in part, by looking at the early origins of archaeology. Shapiro (1959: 373) alludes to this, pointing out that archaeology is founded on hobbyists motivated by a search for treasure, with little interest in looking for evidence of past populations to further our understanding of them. Roberts (2009: 6-7) advances that another factor influencing practice was that physical anthropology was only in its infancy. Therefore, it seems reasonable to suggest archaeologists would have little understanding that the remains of people could potentially provide as much information as material objects could about the past. This is implied by Dorsey (1897: 109) when he specifically states that physical anthropology has “nothing to do with man as a social being ... it treats of man as an animal”. This statement reflects the development of the specific function of human remains in archaeology related to answering the pertinent questions of the day. Papers focused on race analysis using biometrics, especially of the cranium, normal versus abnormal variation and disease (Stout 2013: 19-20). Papers studying diseases were firmly anchored in a medical framework, showing off pathologies as curiosities and often focussing on single individuals (Manchester 1989: 6). Papers discussing race, to further the study of human migration, did assess the osteological data at population level, albeit for a limited set of osteological features (Stout 2013: 20-22).

The analysis of human skeletal remains in the early part of the 20th century continued down a biological route. Reports now contained osteological data produced by a specialist, at this time usually a medical practitioner (Roberts 2006: 417), which included age at death, biological sex, minimum number of individuals, stature, pathologies and trauma. But human remains were either consigned to short summaries or long lists in appendices rather than included in the main report (Borić and Robb 2008: 1). Reports were informing the reader of what had been found, but as seen by the segregation of information, there was no attempt to connect the data obtained from the human remains with the other archaeological evidence. Human skeletal remains were being viewed as fixed and static, capable of providing only information relating to facts about a deceased individual. A rationale for this specificity in treatment is that in the laboratory the specialist knew what information they were expected to obtain from analysing the skeletal remains, as most were medically trained, but had limited or non-existent knowledge of archaeology and thus were unable to contextualise the data they were producing (Manchester 1989: 5, Roberts 2006: 417, Duday 2009: 6). Conversely, archaeologists may not have fully understood how they could situate the osteological data they were provided with in their reports to fully exploit its potential.

The assimilation of biological data into archaeological reports appears to commence with the adoption of processual or New Archaeology at the beginning of the 1960s. This new movement in archaeology had the goal of explaining the past, not just to describing it, by the testing of data against predetermined questions and theories (Hodder 1999: 3, Gowland and Knüsel 2006: *ix*). Osteological data obtained from human skeletal remains was now seen as offering more than just biological facts about a person, it was being used in combination with other archaeological evidence to infer social and cultural information about populations (Brown 2009: 30). There had not been a radical change in the data being obtained via skeletal analysis, rather the change was a result of how the existing data was employed and combined.

With the incorporation of methods from other disciplines, especially palaeontology and zooarchaeology, came the interest around the processes involved in the transformation of the burial deposit, the study of taphonomy. Researchers began to seek to identify taphonomic processes and their effects. Unfortunately, these studies had a tendency to concentrate on factors affecting skeletal remains rather than of the corpse as a whole (see Brehrensmeyer *et al*. 1979; Armour-Chelu and Andrews 1994; Andrews 1995; Denys 2002; and Bello and Andrews 2006). However, the integration of forensic science advanced decomposition of soft tissue into archaeological thinking, with research that enabled observations to be made which were outside the scope of archaeological research. Publications such as the edited volumes, *Death, decay and reconstruction* (Boddington *et al.* 1987), *Forensic taphonomy: The post-mortem fate of human remains* (Haglund and Sorg 1997, 2006) and *Advances in forensic taphonomy: Method, theory and archaeological perspectives* (Haglund and Sorg 2001), firmly established the link between archaeology and forensic science.

Concurrent with this scientific explosion within archaeology, and possibly as a reaction to it, there began an emergence of theories which mirrored major topics in the Humanities and Social Sciences (Hamilakis *et al.* 2002: 1; Gowland and Knüsel 2006: *x*), which saw the body as a representation or metaphor of social and cultural factors (Borić and Robb 2008: 2, Hamilakis *et al.* 2002: 1). Studies began to focus on theories based around two developing sub-themes: one viewing the body as a social construct with cultural and/or symbolic meaning, the other experiential, seeking to see the body through its lived experiences - phenomenological (Hamilakis *et al.* 2002: 1, Sofaer 2006a: *xiii*). Rather than introducing new ways of thinking about the body in archaeology, the introduction of these theoretical approaches appeared to have the effect of further separating skeletal remains in archaeological research instead of integrating the remains of the physical body into these new theories (Sofaer 2006a: *xiii*). Harris and Robb (2013: 213) purport that some theorists even argued that the body is a product of cultural discourse with the physical remains holding little relevance. None of the theoretical approaches appeared to effectively synthesize into their interpretations the physical body itself, even though they drew on “the body” as the source of evidence (Nilsson Stutz 2008: 19, 21). This separation is highlighted by Sofaer (2006b) when discussing the apparent dichotomy between sex and gender. Sofaer (2006b: 156) discusses how sex, as attributed to an individual by biological characteristics, generally through osteological analysis, is taken to be distinct from gender, a culturally defined characteristic usually inferred using patterns of grave goods which is then ascribed to an individual. Yet, sex is not a fixed biological characteristic, but also a culturally defined property, and binary male/female division possibly a reflection of our society today rather than any true representation of past cultures (Sofaer 2006b: 157). There are numerous suggestions for why this disjuncture in approaches to the body arose in archaeology, mainly focusing on the erroneous belief that the human body is purely physical, of the material world, and therefore only of use for scientific research and how can it be of relevance to body theories grounded in the subjective (Gowland and Knüsel 2006: *ix;* Crossland 2010: 387)

This lack of integration of all aspects of “the body” in archaeology is, in all probability, a result of a combination of many methodological, theoretical and historical traditions in our subject. No matter what the cause, there remains a need to employ a body-centred approach in funerary archaeology, that connects material culture, environmental archaeology and physical anthropology (Gowland and Knüsel 2006: *ix-xii*). Amid numerous calls for an integrated archaeology of the body (Sofaer 2006a: 11; Nilsson Stutz 2008; Nilsson Stutz and Tarlow 2013; and Graham 2015: 6), the body is beginning to be placed back where it once was – central to the event which was taking place. One way in which this is taking place is through the development and application of archaeothanatological approaches.

2.2 Origins and Development of Archaeothanatology and Taphonomy-based approaches

Archaeothanatology is an approach championed by Duday that places the archaeological body central to funerary analysis; justifying the value of such an approach by emphasising that, “the body is the central element around which and in function of which [funerary] acts were performed” (Duday 2009: 6). The focus of archaeothanatology is on developing a full understanding of the changes the corpse undergoes and using this knowledge to reconstruct original funerary practices from the partial and much-altered evidence encountered at excavation. Key to a taphonomic approach is knowledge of the processes of decomposition and disarticulation and how the corpse undergoing these natural changes interacts with its surrounding burial environment (Schotsman *et al.* 2017: 2). The challenge though, is to untangle those changes wrought by natural processes and accidental human actions from the deliberate acts performed in relation to the deceased – the funerary practices we are trying to reveal. The focus on corpse taphonomy means that even in the absence of any direct archaeological evidence for funerary practice, inferences can still be made about treatment of the dead (Castex and Blaizot 2017: 277). By exposing and interpreting funerary practices the aim is to not only reach an understanding of the attitudes of past societies towards dying and the dead, but to access the wider social and cultural beliefs of a population through their ritual treatment of the dead.

Archaeothanatology emerged during the late 1970s and early 1980s in France as a field method, whereby the biological/physical anthropologist was brought out of the laboratory to begin analysis of the human remains *in situ* in the grave (Duday 2009: 3).[3] These “field anthropologists” made observations that went

[3] At this time this approach was known as *l'anthropologie du terrain*. The re-labelling to archaeothanatology was undertaken later to avoid confusion which could have occurred

beyond the recording of the basic orientation of the body and overall placement of the arms and legs, which were already frequently recorded, to capture the relationship between each bone and its surrounding environment (Duday 2006: 30). Duday *et al.* (1990: 30) asserted that the details recorded should include the identification of each skeletal element and its exact position, orientation and relationship to all other components in the grave, linking the human remains with their burial environment. This recording should be carried out *a priori,* not thinking what is/is not important, but focussing on making accurate detailed records of all aspects of the grave (Duday and Guillon 2006: 119). The importance of this detailed *in-situ* recording is that the remains are in the original burial context (Scott and Connor 2006: 27), allowing for a better understanding of the associations between the human remains and the other features of the burial environment (Dirkmaat and Adorasio 2006:40; Knüsel 2014: 27). A number of researcher's stress that if skeletal positioning is not recorded accurately at the time of excavation it is virtually impossible to recover afterwards, with the loss of important evidence and consequently the failure to fully interpret funerary practice (Duday *et al.* 1990: 30; Duday and Guillon 2006: 118; and Nilsson-Stutz 2006: 217).

Papers published in French have dominated the available reference material for corpse taphonomy in archaeology, for examples see Duday (1990); Duday *et al.* (1990); Guillon (1990); Blaizot (1996); Maureille and Sellier (1996); and Birocheau *et al.* (1999). The use of archaeothanatology is common place in French archaeology. Nevertheless, the use of skeletal positioning and corpse taphonomy was not, and is

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when the French name was translated into English, field anthropology, due to differences in the meaning of anthropology and that the English word field was considered not specific enough to relate to excavation (Duday 2009: 3). Nilsson Stutz (2006), Willis and Tayles (2009) and Williams (2015: 78) use the term *l'anthropologie du terrain* to refer specifically to the detailed recording and interpretation of the skeletal remains, possibly remaining more in-line with the French origins. Other published papers appear to use *l'anthropologie du terrain,* archaeothanatology or field-anthropology to mean an approach which focuses on the use of corpse taphonomy and the analysis of the position of skeletal remains in the grave to infer original burial form (see Harris and Tayles 2012; Zeitoun *et al.* 2012; Knüsel 2014; Knüsel and Robb 2016).

not, restricted to the French. As early as 1917 a paper by Wilder and Whipple identified that the skeletal remains found at excavation would not display a true representation of the corpse at burial due to post-mortem factors.

> One may study the various mechanical causes of the displacement of the bones, differentiating the natural results of decay, with the dropping and sagging of the parts, and the complications due to the retentive force of the ligaments, from such external forces as frost, the action of earthworms, and the displacement caused by the larger burrowing animals. This being possible, the position of the body at burial, even to certain exact details, may be estimated.
>
> Wilder and Whipple (1917: 373).

Moreover, Cornwall (1956: 238), although beginning by discussing animal remains, suggests that the study of skeletal remains should begin *in situ*, stating "there is much to be gleaned from an examination of the material while it is still in position". This is qualified in the subsequent paragraphs, where she discusses how information gained from the positioning of the bones and from signs of disturbance can be used to make conclusions, such as the state of the body at burial and when it was disturbed. Mirroring the developments in France in the 1970/80s of incorporating *in-situ* analysis of skeletal remains in the grave, publications in English began highlighting the importance of decomposition and taphonomic processes in relation to funerary archaeology. For example, Reynold's 1976 paper – *The Structure of Anglo-Saxon Graves* – discussed bone movement in burials from a 6^{th} to 7^{th} century at Empingham (Ru). Brothwell (1987) also discusses skeletal displacement at the Jewish burial ground of Jewbury, York, (NY), which was in use between 1177-1290 A.D. By comparing the pattern of displacement visible at Jewbury with that of radiographic studies of Egyptian mummies, Brothwell concluded that the displacement probably resulted from partial decomposition and subsequent handling and movement of the corpses inside coffins (Brothwell 1987:

25-26). One site in particular drew attention to how analysis of skeletal positioning when viewed in relation to taphonomic factors could provide a new insight into funerary treatment and practice. Raunds Furnells (Nh), a late Anglo-Saxon cemetery, was excavated between 1975 and 1984 and the subsequent publications by Andy Boddington employed corpse taphonomy and skeletal positioning to make inferences about the treatment of the corpse and the burial forms in use (Boddington 1987; 1996). At excavation a distinct group of burials displayed a "parallel-sided effect" whereby the humeri were adjacent to the thorax, the forearms and hands placed adjacent to or resting over the pelvis and/or lower limbs and the lower limbs displayed a degree of adduction (Boddington 1987: 36). As the skeletal elements appeared to present a linear lateral alignment Boddington (1987: 36) suggested these were coffined burials. The extensive displacement of the skeletal elements of the thorax, termed by Boddington (1987b: 37) "bone tumble", occurred in 79% of the parallel sided burials. As was considered by Brothwell, Boddington (1987: 41) took this as further evidence for a coffin, where the skeletal displacement extended outside the area originally occupied by the soft tissue of the corpse. While none of these English-language papers referred to their methods as archaeothanatology or *l'anthropologie du terrain*, they were employing approaches bearing similarities to those carried out in French archaeology.

Over the last 15 years publications in the English language, utilising both more general taphonomic approaches as well as those specifically employing archaeothanatological principles, have increased in frequency (e.g. Nilsson Stutz 2006; 2007; Aspöck 2011; Armentano *et al.* 2012; Gerdau-Radonic 2012; Zeitoun *et al.* 2013; and Williams 2015). Still, a key concern is that, despite this rise in the use of taphonomic approach, there is still no over-arching standardised method in the English-speaking world. While the freedom to interpret is not necessarily a bad thing, it created problems with making comparisons between studies. There appears to be no written guidance in English instructing how to undertake an archaeothanatological investigation, no set recording form and no clear set of terminology for which to describe observations. There are French versions (for example see Duday *et al*. 1990) but none have been translated into English. Rather, in English we have a set of principles (see 2.3 below) which are to be applied as the excavator or researcher sees fit. For example, variation in method is evidenced by comparing studies by Willis and Tayles (2009) and Harris and Tayles (2012). Both utilised flowcharts in their archaeothanatologically-based approach exploring funerary practices in Bronze Age Thailand, in efforts to standardise their methods for use across a large number of burials. However, these charts presented in the two papers were different, using slightly different skeletal criteria to reach similar outcomes for burial form and group the burials into categories. These approaches used in these two papers differ from that used by Nilsson (1998) in which every burial was described and a burial form determined burial by burial. Variation in terminology can be evidenced with reference to how parts of the body are referred to, or the position of the body at burial. Papers discuss “leg” position, even though, in standard anatomical terms the leg only refers to the part of the limb below the knee (tibia and fibula bones) not the femur. Instead the term lower limb should be used.

It may be due to this variation in methodological approaches that a criticism directed at archaeothanatology has been that it is, “nothing more than the application of careful excavation techniques” (Knudson and Stojanowski 2008: 407). By having no set direction for how archaeothanatology should be conducted, it has led to a misunderstanding of its aims and objectives and thus, not considered as a useful tool for funerary archaeologists. A lack of use means that there have been limited opportunities in English-language publications for a testing of archaeothanatological principles, or indeed to expand on current knowledge;

something that needs to occur in order for archaeothanatology to continue to develop. A potential solution to this paucity in both the testing and collection of data has been the integration of forensic science. The discipline of forensic science has made a valuable contribution to understanding of corpse taphonomy by providing experimental research that illuminates the processes of decomposition in different situations. The body farm at the University of Tennessee, alongside other more recently-established taphonomic research facilities, have enabled controlled experiences on the relative timing and sequence of disarticulation. Nelson (1998), for example, uses this forensic research into decomposition and disarticulation rates (e.g. Galloway *et al.* 1989; Bass 1997), to aid in the interpretation of funerary practices at a Moche burial site (450-750 A.D.) at San José de Moro, Perú. He concluded that the disarticulation and displacement in evidence could not have resulted from natural post-mortem disturbances or relate to post-mortem treatment of the body such as deliberate disarticulation or dismemberment (Nelson 1998: 198-200). Instead, the patterning of the skeletal remains led to the conclusion that wrapped bodies already in an advanced state of decomposition were placed into the tombs, as evidenced by the disarticulation of skeletal elements such as the ribs, clavicles, and cervical and thoracic vertebrae, but the relative maintenance of original position of the upper and lower limbs (Nelson 1998: 200-203). Using forensic data, Nelson interpreted the Moche funerary rites taking place at San José de Moro were carried out over an extended period, and could have included the mummification of the corpse, whether natural or not, or transportation over a long distance before burial (Nelson 1998: 205-207). Even so, forensic research is often undertaken to answer slightly different questions to those posed in archaeology; it is aimed at criminal investigations and not the discovery of socio-cultural patterns and variations (Knüsel and Robb 2016: 655-656). As a consequence, forensic studies may not be able to demonstrate the wide range of burial contexts displayed in the archaeological burial record (Roksandic 2002: 2). Nevertheless, it cannot be overlooked that interpretations made in funerary archaeology are strengthened by the inclusion of forensic data (Williams 2015: 79).

As more research incorporates archaeothanatological principles, new methods and approaches have begun to be tested. One such development has been a move towards utilising photographic images and excavation documentation of burials for archaeothanatological analysis in place of direct observation in the field, something that was not originally intended by Duday. Nilsson Stutz (2006: 218), for example, acknowledges that ideally archaeothanatology should begin in the field with detailed recording; yet, it is possible to retrieve the required information retrospectively from photographs and excavation documentation. Others are beginning to follow suit employing a retrospective approach (e.g. Willis and Tayles 2009; Harris and Tayles 2012; and Jackes and Lubell 2014). In her doctoral research, Tracey (2013) applied a retrospective archaeothanatological approach to Iron Age pit burials from six southern British sites. Her aim was to reveal whether the taphonomic evidence supported the current theory that the dead were left exposed. Tracey was able to distinguish clear differences in deposition of individuals from the image data. For example, an adult male (WD500) from Winnall Down (Ha) was determined to have been buried in a pit and soil immediately deposited over the corpse, as there had been limited skeletal movement during decomposition (Tracey 2013: 142). This example contrasted with an adult female (WD574) whom appeared to have decomposed surrounded by space, as there was evidence for disarticulation and displacement of skeletal elements (Tracey 2013: 143). This difference was inferred by Tracey (2013: 143) as indicating differences in the funerary treatment of the two individuals, with evidence for a deliberate in-filling of the male grave, whereas the grave of the female had remained uncovered and had been left to naturally fill over time.

Utilizing photographs and excavation documentation for archaeothanatological analysis appears to be providing acceptable results and has a number of advantages over the traditional approach of *in-situ* examination. There is the potential for the assessment of large numbers of previously excavated burial sites which did not benefit from this type of analysis at the time of excavation, unlocking information on funerary practices which would otherwise have been lost. The use of images also overcomes a problem that pervades archaeology – that of time constraints. Many excavations are now carried out commercially, under financial constraints that reduce time available for excavation. The ability to perform in-depth archaeothanatological analysis at the post-excavation stage would serve to increase the likelihood of these methods being employed. The main disadvantages lie with the potential for poorly-recorded or missing data which was not necessarily recorded with a taphonomy-based analysis in mind, alongside the inability to recover or request additional data (Duday *et al*. 1990: 30; Nilsson Stutz 2006: 218).

2.3 Corpse Taphonomy - Archaeothanatology in Practice

Archaeothanatology works backwards from the excavated spatial distribution of the skeletal remains, through the transformations undergone by the corpse, towards a reconstruction of the original burial form (Duday 2009: 12). To accomplish this interpretation, an understanding of the inter-related post-mortem or taphonomic processes affecting decomposition, disarticulation and displacement is required (Armentano *et al*. 2012: 112). Appendix A contains a glossary of terms.

2.3.1 Decomposition

Decomposition of organic matter is a biological process. The human body is comprised of soft tissue – fat, ligaments, tendons, muscle and organs – and skeletal material. As soon as death occurs, the cessation of respiratory and circulatory systems, decomposition begins and there follows a sequence of changes undergone by the corpse (Nafte 2000: 39) (Table 2.1). The rate and extent of soft tissue decomposition is known to be affected by a number of variables – intrinsic (related to the individual) and extrinsic (external to the individual) in origin. Those intrinsic in nature can include body mass, for example a corpse with less body fat will decompose relatively quicker than one with a larger amount, or injuries sustained ante- or perimortem that rupture the skin, as these may allow for quicker access by insects and result in an increase in decomposition rates (Barker *et al.* 2017: 259). Environmental conditions have been found to be significant in controlling the rate of decomposition, and in some situations, they can halt progression indefinitely. In a retrospective study, utilising data obtained from autopsy and forensic anthropological reports, Galloway (2006) found that in the prevailing climate in Southern Arizona, arid with high temperatures and low humidity, decomposition was initially accelerated, however, the corpses generally became rapidly dehydrated, which led to the preservation of any remaining soft tissue. At the body farm in Tennessee, a region of high day-time temperatures and high humidity, decomposition was rapid. The body took as little as two weeks in the summer to reach skeletonisation due to the temperatures being conducive to accelerated putrefaction and insect activity (Bass 2006: 183-185). Lower temperatures reduce the rate of decomposition (Mann *et al*. 1990: 105; Bass 2006: 185) as bacterial action is slowed below 12 degrees Celsius and ceases below 4 degrees Celsius (Micozzi 2006: 172). Micozzi (1986; 2006) has evidenced that while freezing or freeze-drying will preserve soft tissue, in seasonal climate a subsequent thaw can accelerate decomposition related to external decomposition by insects.

Table 2.1: *Stages of decomposition for a human body (Garland and Janaway 1989: 22; Nafte 2000:47; Chamberlain and Parker Pearson 2001:13; Byers 2002:105; Clarke et al. 2006; DiMaio and Dana 2007: 27-28; Duday 2009: 52).*

Stage	**State of remains**
Initial decay	Autolysis begins – the breakdown of soft tissue structures by enzymes from within/around cells Putrefaction begins – the internal microorganisms i.e. digestive tract bacteria move through the gut wall to breakdown soft tissue Flesh is still intact, if not previously ruptured Attracts insects
Putrefaction	Microbial activity intensifies producing gases and liquids The gases produced bloat the corpse Purge fluid leaks out of bodily orifices Skin slippage occurs Insect activity increases Gases and purge fluid escape from ruptures as body collapses
Dry Decay	Remaining soft tissue dries out to a leathery texture
Skeletonisation	Most soft tissue is now decomposed Bone becomes exposed

Human activity impacts upon corpse decomposition, as it can alter both the environment in which decomposition occurs and the corpse itself. Decomposition of a corpse in water was found by Rodriquez (2006: 461) to take place at a slower rate to a body in air, as a result of reduced temperature inhibiting putrefaction and the aqueous environment acting as a barrier to insects. The time period between death and burial has a significant effect on the extent and rate of decomposition (Mant 1987: 67; Pinheiro 2010: 87). If burial takes place before putrefaction has begun, the corpse will remain better preserved (Pinheiro 2010: 101). Research has shown that burial of a body leads to a slower rate of decomposition when compared to a corpse left exposed on the surface (Prieto *et al*. 2004: 920; Rodriquez 2006: 459).

In the burial environment the corpse is exposed to different variables then when on the surface. For example, fluctuations in ground water levels, soil type and oxygen levels (Henderson 1987: 46-49; Junkins and Carter 2017: 145-148). The depth of a burial will also have an effect on decomposition. The deeper a corpse is buried the more constant the temperature and the less access available to carrion-feeding insects (Rodriquez and Bass 1985: 849-850; Rodriquez 2006: 459).

The treatments applied to the corpse will also affect decomposition. As evidenced from ancient Egypt and pre-Conquest Latin America, cultures have harnessed chemical and environmental factors to help arrest decomposition by mummification (Piombino-Mascali *et al.* 2017). The use of chemical means to retard decomposition are well known in ancient Egypt and continue today with modern forms of embalming (Berryman *et al*. 2006: 169). Conversely, practices such as dismemberment and excarnation may accelerate decomposition. Clothing and other textiles such as wraps/shrouds have been found to delay decomposition. Mant (1987: 68-67) when studying world war two burials noted that those individuals buried without coffins, wearing clothes, even just underwear, were well preserved in the areas of the body covered by the clothing. He considered this delay in decomposition the result of the clothing both limiting access by organisms in the soil and an increase in the formation of adipocere (a by-product of the breakdown of body fat) where the clothing had absorbed the decomposition fluids (Mant 1987: 69). However, Mann *et al.* (1990: 107) found the presence of clothing increased decomposition of bodies at the surface, as the clothing provided shelter against the sun for maggots.

A coffin provides a barrier for the corpse against some of the effects of the burial environment e.g. insect/animal activity (Nawrocki 1995: 54). Conversely, the environment created by the coffin may also be detrimental to bodily preservation. Mant (1987: 67-68) described the coffins from World War Two as being crudely constructed from unseasoned wood, which had warped, and as a consequence of ill-fitting lids, were not airtight. The rapid rate of soft tissue decomposition, he suggested, was due to the presence of a large empty space in the coffin which would have been filled with air supplying oxygen for aerobic bacteria, retention of decomposition fluids within the coffin and the inclusion of wood shavings, which acted as an insulator retaining the heat produced by the process of decomposition (Mant 1987: 68, 71). At Castle Green Hereford (He) skeletons appearing to be buried without coffins were better preserved than those found in conjunction with the remains of coffins. Indeed, Shoesmith (1980: 49) reports bones from the latter had disintegrated completely to a white powdery substance. The pattern observed led to the conclusion that air-tight coffins had trapped the acidic decomposition fluids which had attacked and destroyed the bones.

Soft tissue decomposition in a corpse creates the potential for movement of skeletal elements in two ways. As the soft tissues associated with joint articulations decomposes, they disarticulate such that bones are no longer held in anatomical connection (Roksandic 2002: 101). These skeletal elements are then free to move into any available spaces under the force of gravity or pressure of other taphonomic processes. Moreover, decomposition of soft tissues creates new spaces within the burial environment once occupied by the original volume of the corpse itself (see 2.3.3).

2.3.2 Disarticulation

The disarticulation of all of the joints in a corpse does not happen simultaneously. The relative decomposition rate of a joint is related to the soft tissue associated with the articulation, i.e. the number, size and strength of the ligaments present, and the amount of soft tissue surrounding the joint (Roksandic 2002: 103). Joints have been categorised into those that appear to breakdown rapidly, known as labile articulations, and those which appear to breakdown more slowly, known as persistent joints (Duday 2006: 33-34) (Table 2.2).

Table 2.2: *Examples of articulations considered to be relatively labile and persistent in a supine human body (Duday 1990: 195; Duday 2009: 17-18, 25-27)*

Labile articulations **Rapid breakdown**	**Persistent articulations** **Slower to breakdown**
Cervical vertebrae C1-C2 and C2-C3	Occipital-atlas (C1)
Scapula-thoracic	Lumber vertebrae 5-sacrum
Lumbar vertebrae L1-L2	Sacroiliac
Hand - all joints	Knee femur-tibia
Foot Tarsal-metatarsal Metatarsal-phalangeal Interphalangeal	Ankle tibia-talus

The relative timings of joint disarticulation are fundamental to reconstructing the taphonomic history of the corpse (Maureille and Sellier 1996: 314). For example, the chronology of joint disarticulation is frequently employed to identify primary burials. Primary burial, where the corpse is deposited in the final resting place in which decomposition fully takes place, is commonly identified by the presence of anatomical connection of labile articulations (Duday *et al.* 1990: 31). There is no expectation, however, for all labile articulations to be maintained. The combination of gravity and soft tissue decomposition will allow some movement of skeletal elements (Duday *et al.* 1990: 31). Nevertheless, the presence of labile articulations demonstrates that the corpse was laid to rest when the articulations known to rapidly breakdown were still intact (Duday 2006: 33). The patterning of articulation/disarticulation of joints can then provide information as to the relative timings of any exogenous disturbance of the corpse.

Research is showing, however, that the sequence of disarticulation can vary. Archaeological studies have shown that the position of the corpse and preparation of the body can affect the disarticulation sequence. Gerdau-Radonic (2012) investigated the funerary treatment for pre-Columbian collective burials from Tablada de Lurín, Peru, dated to between 1 and 200 A.D. The analysis of four adult burials buried in sitting/squatting positions found this produced a differing pattern of disarticulation to recumbent burial (Gerdau-Radonic 2012: 155-157). The results of the study, while corroborating previous research in regards to certain articulations, such as the breakdown of C1-C2 vertebrae, showed that burial in a seated position increased the disarticulation of the joints of the upper body due to the effect of gravity and that the feet, due their position on their plantar surfaces, retained articulations. Another finding was that the knee joint appeared more persistent than the ankle and hip articulations, contrary to what had been observed in other studies (Gerdau-Radonic 2012: 157). Experimental data has evidenced that natural factors such as differences in the decompositional environment and animal activity can influence disarticulation sequences. For example, Haglund (1993: 811) reported marked differences in disarticulation between corpses on land and in aqueous environments, whereby the appendicular skeleton and head are subjected to movements in the water which weaken the articulations such as the elbow and knee, joints usually considered relatively persistent. Ongoing experimental taphonomic research in the USA on a seated corpse by Mickleburgh (2017) has evidenced not only variation in disarticulation from the prior reference material, but that some joints displayed disarticulation only to re-connect a few days later.

2.3.3 Displacement

Fundamental to taphonomic approaches are the observations made on the presence or absence of skeletal displacement in a burial (Harris and Tayles 2012: 227). Displacement is recorded by analysing the spatial distribution of bones and assessing if these are evidence of movement of the skeletal element from an original position. The timing and extent of skeletal movement of elements freed by decomposition and disarticulation is dependent on the stability of their original positions and the availability of space for them to move into (Roksandic 2002: 103). The type of burial environment, the presence or absence of space, therefore has an important effect on the amount of displacement that can occur.

2.3.3.1 Original voids

An original void is empty space outside, external to, the volume of the corpse present at the time of burial (Roksandic 2002: 105). The size, shape and location of space will be dictated by the source of the void. This can be as simple as the corpse being left to decompose on the ground, unburied, or placed within a cave and provide a non-delimited space around the decomposing corpse (Roksandic 2002: 105). In buried archaeological contexts an original void is determined by the form of the grave or enclosed funerary structures employed, a delimited space. For example, tombs and individual burial containers, such as wooden coffins and stone sarcophagi, or lined graves with covers. These structures or containers are creating space and forming a rigid barrier between the sediment and the decomposing corpse. Nonetheless, other burial practices have to be considered. Tracey's (2013) research, for example, into Iron Age pit burials identified individuals who had decomposed in an empty space as the pits containing their corpses had not been immediately in-filled (discussed in 2.2, above).

2.3.3.2 Secondary voids

Internal secondary voids

As introduced above (2.3.1), the decomposition of soft tissue creates voids – internal secondary voids – that provide the potential for displacement of skeletal elements within the original volume of the corpse (Bocquentin *et al.* 2013: 186; Duday 2009: 32-35). Studies indicate that natural decomposition of a corpse will always result in some generic movements of skeletal elements within the original soft tissue volume (Table 2.3). These movements involve bones that become unstable through the decomposition of the surrounding soft tissue structures and are therefore expected. Thus, rarely are excavated skeletal remains found in positions resembling the absolute original position at burial (Bocquentin *et al.* 2013: 185). The extent of this natural movement will depend on the amount of soft tissue originally present (body mass), which varies between individuals (Roksandic 2002: 106).

Table 2.3: *A summary of expected skeletal movements frequently observed during decomposition (Duday 2006)*

Skeletal element	Displacement observed
Ribs	Breakdown of the intercostal, costosternal and costo-vertebral articulations allows the sternal (anterior) ends of the ribs to move in a posterior/inferior direction. The heads of the ribs move in a superior direction, resulting in a flattening and reduction of thoracic volume.
Sternum (includes both the manubrium and body)	The breakdown of the costosternal cartilage results in a posterior and inferior fall, usually accompanied by a movement to the right or left.
Vertebrae	The asymmetrical breakdown of the anterior and posterior longitudinal ligaments and the accompanying breakdown of the intervertebral discs results in the vertebrae disarticulating into segments containing 2-4 vertebra. Movements include rotation and lateral displacement.
Pelvis (Ossa coxae and sacrum)	The breakdown of the sacroiliac joints results in the anterior movement of the sacrum into the area previously containing the pelvic viscera. The *ossa coxae* moves posteriorly, into the space previously occupied by the three gluteus muscles and the sacrum.

External secondary voids

Through decomposition of objects external to the corpse in the grave, new spaces can be made available into which disarticulated skeletal elements can potentially displace either under gravity alone or as the result of another taphonomic agent (Duday 2006: 40-41). These spaces were not accessible to skeletal elements at the time of burial and are therefore termed secondary to denote the difference in origin from original voids. Extensive displacement of the cranium, mandible and cervical vertebrae in four burials at Les Ruelles, Seine-et-Marne, France, was probably related to the decomposition of an organic pillow on which the corpse's heads had rested (Blaizot 2014: 280, 282). Alternatively, the decomposition of a grave feature could allow access to a previously inaccessible external void. An example of this was also seen at Serris, Les Ruelles (Seine-et-Marne) France, where the decay and collapse of the base board of a wooden coffin allowed skeletal elements to move into a void that was present beneath the coffin (Duday 2009: 36-37). Furthermore, external secondary voids can be introduced into the grave through the action of burrowing animals or human activity, for example the truncation of a grave by a newer one (Bocquentin *et al.* 2013: 186-187). Thus, the emergence of secondary external voids can occur in either the presence of an existing external void or by their creation at a later time in an otherwise filled-space burial environment.

2.3.3.3 Speed of sediment in-filling

An important, but often overlooked, consideration inextricably linked to bodily disarticulation and the decompositional environment is the process of in-filling of sediment (Duday 2009: 52). At excavation, unless surrounded by an intact and durable barrier, such as a stone sarcophagus or tomb, skeletal elements are encased by sediment (Duday 2006: 41). This sediment has fixed the skeletal elements into the position they were found in at excavation. Bodies placed in direct contact with the soil, in so-called plain-earth graves, will be surrounded by sediment during back-filling of the grave, whereas corpses buried in a non-durable container may become surrounded by sediment at an indeterminate time after burial and at a slowed rate, both determined by the decay process of their container and sediment type. Furthermore, the internal secondary voids will be vulnerable to in-filling by sediment following the decay of soft tissues (Roksandic 2002: 5; Duday 2009: 52-54).

Duday (2009: 52-57) considers two types of in-filling, delayed and progressive. Evidence for delayed in-filling frequently involves the natural displacement into internal secondary voids within the initial volume of the corpse of the ribs, sternum, vertebrae and clavicles, falling downwards under gravity into the area once occupied by the soft tissue of the thorax, and the movement of the sacrum into the pelvic girdle (Duday and Guillon 2006: 130-131, 142). The sediment has not immediately entered the original volume of the corpse. At a later time, sediment eventually surrounds the bones fixing them in their new displaced positions (Duday 2006: 41). In addition to gravity, the presence of other taphonomic agents may cause further displacement of skeletal elements before this final fixing by sediment takes place, e.g. animal burrows or fluctuating water levels. Progressive in-filling occurs when the decomposing soft tissue is replaced rapidly by sediment. This can create what Duday (2006: 41) terms an ‘hourglass effect’, as fine-grained sediments quickly move downwards under gravity and fill the spaces made available by gradual decomposition. Evidence for progressive in-filling comes from limited disarticulation of joints, especially those considered labile, and the maintenance of skeletal elements in unstable positions, particularly the anatomical position of the hyoid bone (Roksandic 2002: 106). Understanding the timing of in-filling of sediment is essential to reconstructing the burial environment. By identifying the extent of skeletal displacement, it can be demonstrated whether a corpse decomposed in an original void or in a filled space, thus providing information about the original burial environment.

2.3.3.4 Decomposition in an empty space

The presence of an original external void creates the greatest potential for movement of skeletal elements during decomposition as it provides the opportunity for bones to displace outside the initial volume of the corpse (Bocquentin *et al*. 2013: 186). The original external void in an inhumation burial is usually a combination of empty space superior, inferior, lateral to and above the corpse, with the size of the void dependent on the structure creating it (Figure 2.1). Under gravity alone only bones in unstable positions would displace into an external void, as they have both the space to move into and the capacity to move (Duday 2006: 40). In a supine burial, in approximate anatomical position, this would be evidenced by a lateral fall of the *ossa coxae*, whereby the ilia lie on their lateral surface and the pubic symphysis opens, a fall of the mandible into the thoracic cavity, a possible rotation of the cranium (right, left, posterior, anterior or a combination) and the fall of the bones of the feet posteriorly towards the base (Duday *et al*. 1990: 35) (Figure 2.2). Castex and Blaizot (2017: 282) describe the resulting displacement as a reduction in the volume of the corpse so the skeletal elements “present a thin, flat layer”. Arrangement of the corpse at burial is significant, as it may place a differing combination of skeletal elements into unstable positions, and therefore impact which bones move in which directions (Duday and Guillon 2006: 130).

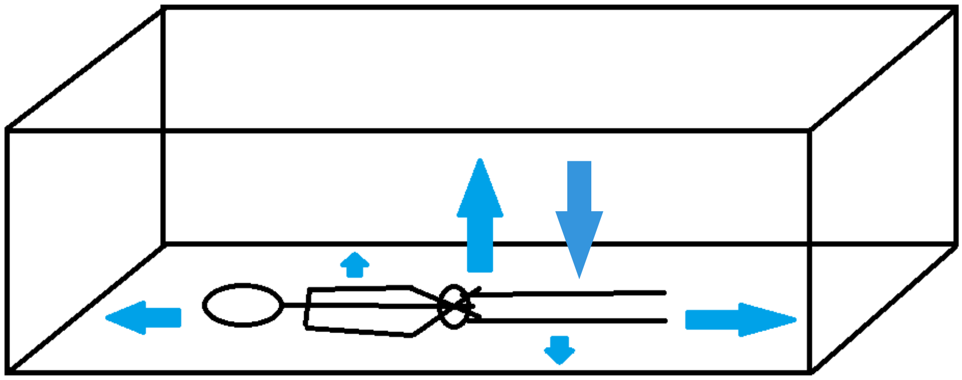

Figure 2.1: *Illustration of the direction of possible movements for skeletal elements in an original empty space*

The displacement of the *ossa coxae* is considered to be a strong indicator for decomposition in a void, as their anatomical position becomes unstable once the supporting soft tissue decomposes (Duday and Guillon 2006: 138). Linked to this lateral fall of the *ossa coxae*, and therefore taken to confirm the presence of an external void, is a lateral rotation of the femora and displacement of the patellae (Duday 2009: 35). Williams (2015: 87-88), however, discusses some limitations of relying on the external displacement of specific skeletal elements, for example, expressing concern that frequently the patellae are displaced during the excavation process or conversely, when displacement has occurred through the process of decomposition, they are often replaced onto the knee joint in order to take a photograph.

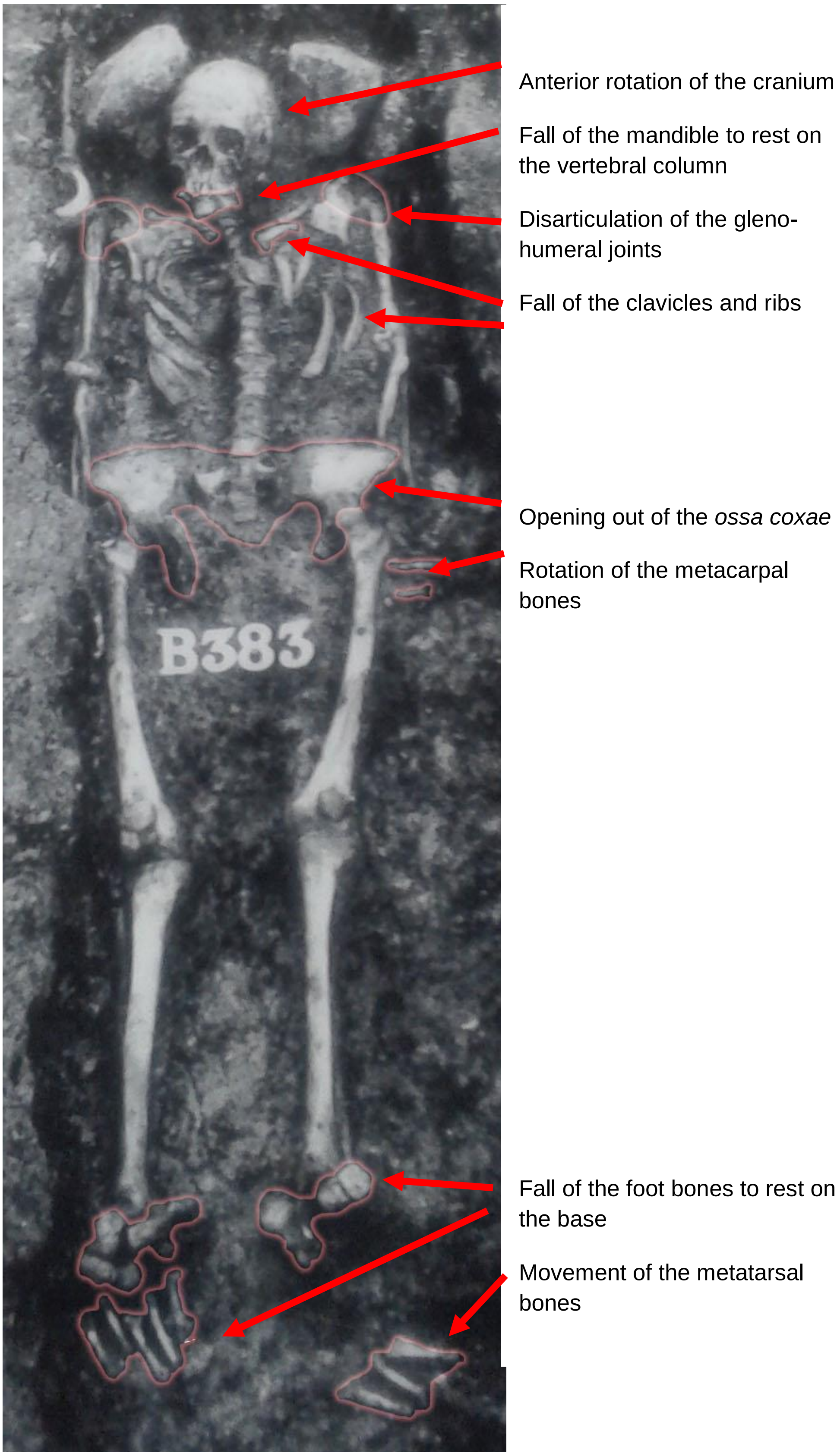

Figure 2.2: *An example of decomposition in an original external void – empty space. Displaying an anterior rotation of the cranium, a fall into the thoracic void of the mandible, a lateral fall opening out the ossa coxae, fall of the metatarsals to the coffin base. Produces the effect of flattening out the corpse. Other skeletal indicators of decomposition in a void – disarticulation of the gleno-humeral joint, and movement of the metacarpal and metatarsal bones (Copyright Gloucester City Museums)*

The extent of the skeletal displacement provides not only information about the longevity of an external void, but in some situations, it can define the shape and size of the original void. Blaizot (2014: 264-266) used the linear alignment of skeletal elements to establish the outline of decomposed wooden coffins, providing examples of both rectangular and trapezoidal shape containers. Furthermore, Duday (2009:50-52), Blaizot (2014:268-272) and Castex and Blaizot (2017: 281-284) discuss examples of the differences in skeletal displacement observed between, rectangular coffins, those with V-shapes and hollowed-out tree-trunk coffins, which had a rounded gutter-like base. A corpse decomposing in a coffin with a V-shaped cross section, for example, would displace towards the medial line of the corpse as they move down the slope of the coffin sides under gravity, giving a uniquely narrow, compressed effect to the skeletal arrangement (Duday 2009: 51).

Where skeletal elements are extensively displaced, and bones not originally in unstable positions have moved external to the corpse outline, this is evidence for additional taphonomic processes acting upon the decomposing corpse, and the resulting skeletal remains (Bocquentin *et al.* 2013: 187). Although it is important to attempt to identify the cause of this exogenous displacement, its presence alone is a strong indicator for decomposition in a void (Duday 2009: 38). Fluctuations in the water table can account for wide-spread skeletal displacement. This is seen in the multi-period Christian cemetery of St Peter's Barton-upon-Humber (Li), where skeletal elements were found floating in water-filled wooden coffins during excavation (Rodwell 2007: 22). Duday (2009: 36-37) presents a number of examples where the collapse of coffin boards at the ends or sides of containers resulted in displacement of skeletal elements beyond what was expected under gravity alone. Moreover, the activity of grave robbing, as discussed by Aspock (2011: 302), would create extensive disturbance in a void, due to the rearrangement of the decomposing/decomposed corpse. The intentional repositioning of skeletal elements in a grave to make way for a new burial or as part of an extended funerary ritual has also been evidenced, for example in a Mesolithic burial at Skateholm I Sweden, where the left radius, ulna, *os coxae* and femur, but not the bones of the hand which were left undisturbed, had been deliberately removed (Nilsson Stutz 2008: 24). These examples serve to illustrate both natural and anthropogenic sources of extensive disturbance in a void and highlight why understanding all processes that can affect a burial is an important step in interpreting its taphonomic history.

2.3.3.5 Decomposition in a filled space

A corpse interred directly surrounded by sediment, a plain-earth burial, or one in which sediment has enveloped the corpse quickly, will decompose in a filled space (Duday 1990: 194). The identification of a corpse that has decomposed in a filled space is based on the inverse reasoning of that used to identify decomposition in a void (Duday 2006: 41), thus, a lack of, or limited, external displacement of bones outside of the initial volume once occupied by the soft tissue of the body is expected, as no space exists for the bones to move into (Bocquentin *et al.* 2013: 186-187; Roksandic 2002: 106) (Figure 2.3). The most limited degree of skeletal displacement is seen in cases of progressive in-filling of sediment, whereby soil gradually replaces the decomposing soft tissue. This will only occur when decomposition takes place in a filled space in which a fine-grained sediment is in immediate proximity to the corpse. When progressive in-filling occurs, the sediment fixes the skeletal elements in their approximate original positions, including those in potential instability (Roksandic 2002: 106). In most cases, where sediments are not conducive to rapidly replacing the decomposing soft tissue, delayed in-filling will occur instead, so some natural skeletal displacement is expected (posterior fall of the clavicles, sternum and posterior/inferior fall of the ribs), even when burial takes place in a filled space (Duday 2009: 54). Furthermore, as body mass varies so to can the relative displacement of the skeletal elements and as a result the exact amount of displacement will vary but will always remain in close proximity to the initial volume (Roksandic 2002: 106). The presence of clothing or a shroud can also act as a barrier to the surrounding soil when a corpse is interred directly in the earth without a rigid container. The other observation indicative of decomposition in a filled space is the maintenance of skeletal elements in potentially unstable positions (Nilsson 1998: 11) (see 2.3.4). The source of this support is provided by the surrounding sediment, due to its immediate proximity to the corpse (Duday 2009: 40). Identification of decomposition in a filled space requires both the maintenance of skeletal elements in approximate original positions and little to no external displacement of bones outside the volume originally occupied by the soft tissue of the corpse. In these respects, skeletal positioning differs substantially from that seen in decomposition in a void, enabling differentiation between the two types of burial environment.

Evidence for delayed in-filling of the decomposing soft tissue of the thorax – left ribs and scapula have fallen into the thoracic region

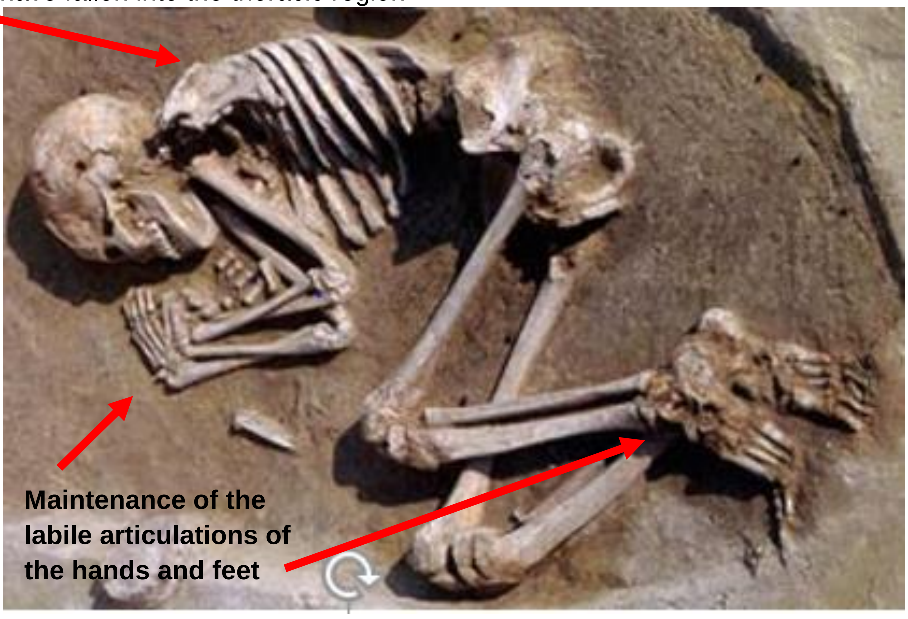

Figure 2.3: *An example of decomposition in a filled space. Note the lack of skeletal elements displacing outside the original volume of the corpse, maintenance of labile articulations and support for skeletal elements in potentially unstable positions. There is evidence for delayed in-filling, the natural fall of the left ribs into the area originally containing the soft tissue of the thorax. (Photo credited to Neugebauer/BDA taken from The Guardian online. Accessed 25/09/2014)*

2.3.4 Support

If a bone freed by the decomposition of soft tissue has remained in a potentially unstable position, it has not fallen to a position of stability under gravity, then something must have prevented its displacement (Duday 2009: 38-40). The effect produced by this supporting object has been referred to as a wall effect, in reference to the fact that the skeletal elements appear as if they are resting against a wall (Nilsson Stutz 2006: 220). The close proximity of sediment can provide such support, as would be evidenced in a plain-earth burial, where the grave was immediately back-filled with soil around the corpse. The shape of the grave cut and the position of the corpse in relation to it can have a significant influence on the overall position of the corpse and in turn skeletal positioning. If a grave cut is adjacent to any part/s of the corpse it can provide support for those skeletal elements as decomposition occurs and influence the spatial arrangement of the bones (Duday 2009: 40). Castex and Blaizot (2017: 278-281) present examples of variation in the cross section of grave cut shape including those with a gutter (narrowed base) and trough (rounded). They describe how the presence of a raised portion of the base of the grave beneath the head of the corpse will support the skull and cervical vertebrae, or alternatively, if the difference in levels is abrupt it could result in the displacement of the skull and cervical vertebrae into the thoracic region (Castex and Blaizot 2017: 278).

A burial container, while providing a barrier that will produce a void and tend to occasion skeletal displacement, can also be a source of support for certain bones, usually those from the appendicular skeleton. This was seen at Staple Garden's Winchester (Ha) where the *ossa coxae* and medially rotated left humerus have been supported by the sides of a lead coffin (Figure 2.4).

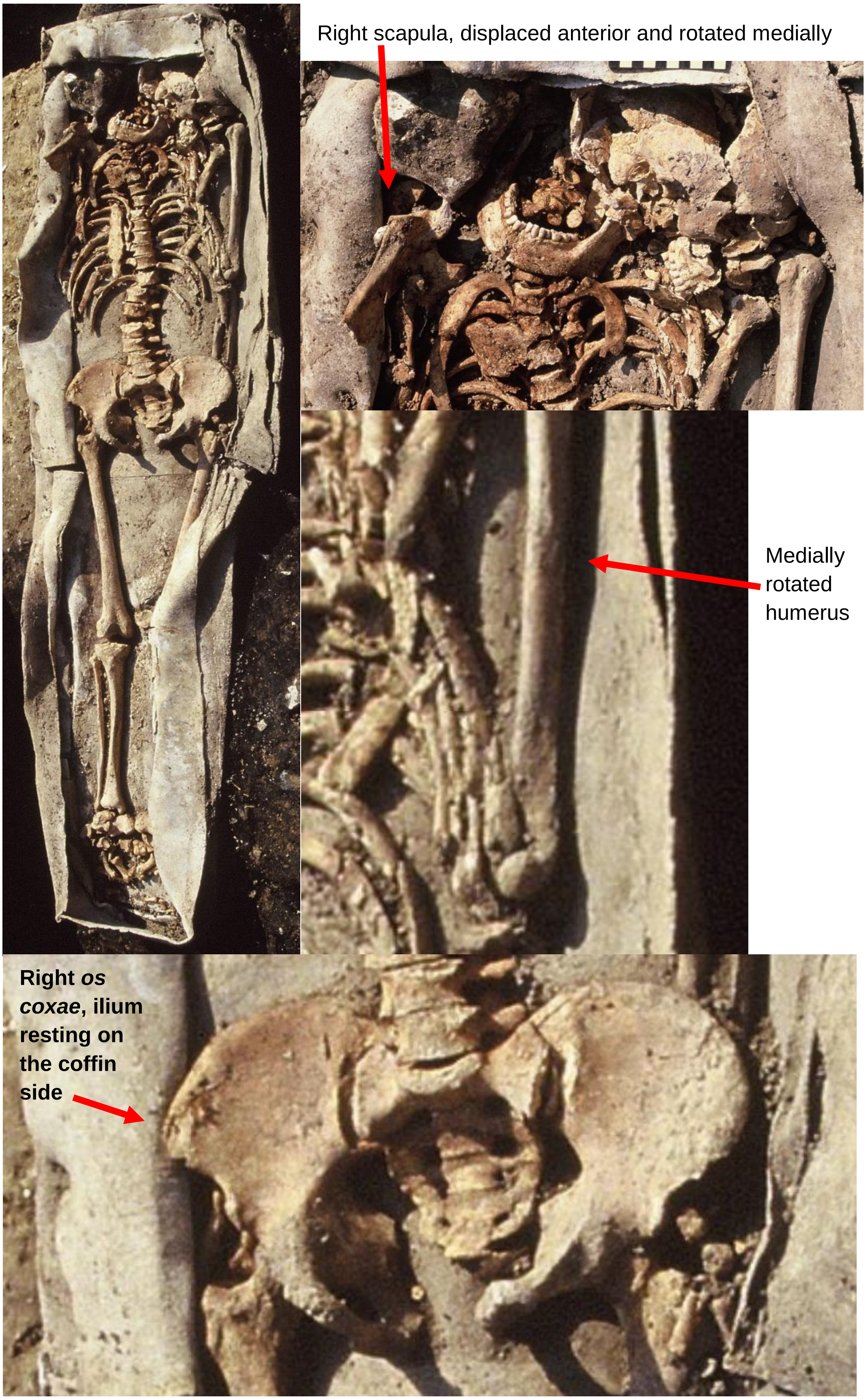

Figure 2.4: *Support of appendicular skeletal elements by coffin sides. The sides of a lead coffin supporting certain appendicular skeletal elements in potentially unstable positions. The right scapula, right os coxae and left humerus are supported in displaced positions (Copyright permission granted by Hampshire Cultural Trust)*

Tight clothing or shrouds may also provide support for skeletal elements. Textiles are rarely found preserved in archaeological contexts, therefore shrouds and clothing are normally identified by the presence of metal items such as pins and other fastenings (Hadley 2001: 93). These metal objects may themselves preserve part of the textile within corrosion products (Janaway 1987). Archaeological research has identified patterning present in positioning of skeletal elements that is likely the result of burial in a tight shroud. This includes bi-lateral constriction of the upper body, the verticalisation of the clavicles, the anterior and superior rotation of the scapulae and humeri and a reduction of the thoracic volume, as evidence by a narrowing of the ribs cage (Nilsson Stutz 2006: 219-221) (Figure 2.5). This is usually combined with a wall effect which extends along the body and includes, the maintenance of an anteriorly and superiorly rotated scapulae, the anteriorly and medially rotated humeri, the *ossa coxae* and limited displacement of the patellae (Nilsson Stutz 2006: 219-221). The lower limbs would be expected to be in adduction. Any wall effect may conform to the shape of the corpse, as the shroud, a malleable textile, can mould to the contours of the body producing a body-shaped outline (Harris and Tayles 2012: 232-233). But, evidence for bi-lateral constriction of the upper body alone is not always conclusive evidence for a shrouded burial; a narrow grave cut or container can produce similar skeletal positioning (Duday 2009: 45). Only by identifying and excluding other archaeological features can the use of a shroud be more confidently asserted. The presence of clothing may offer more limited support for skeletal elements freed by decomposition into potentially unstable positions, relating to its type and location (Langlois and Gallien 2009), and thus cannot be characterised simply. In the presence of a void, once the textile has decayed, there would be no further support for the skeletal elements and it would be free to displace to a position of stability.

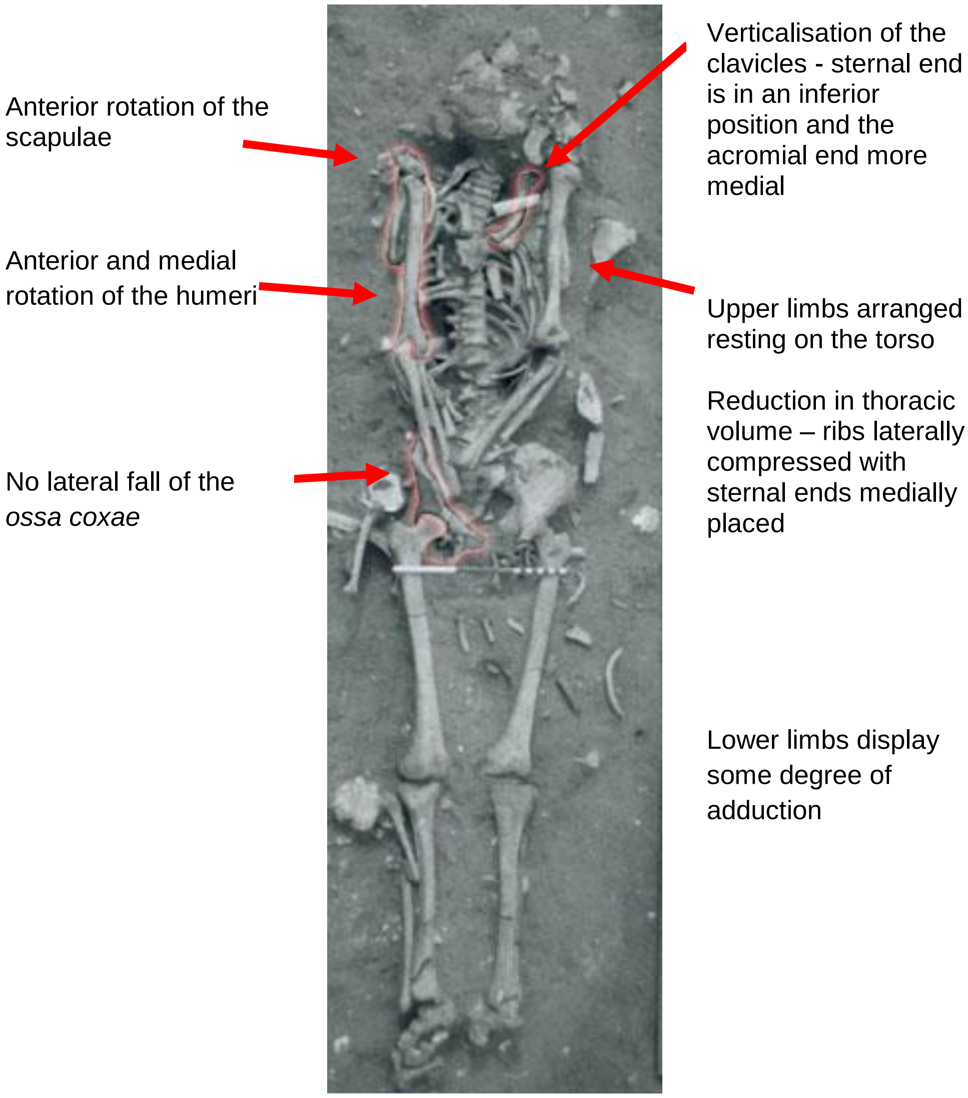

Figure 2.5: *The effects on skeletal positioning of a tight shroud (Image courtesy of Sedgeford Historical and Archaeological Research Project Post excavation digital archive)*

2.3.5 Skeletal Analysis and Interpretations

The key to interpreting the spatial arrangement of skeletal elements is the identification of patterns, both in their positioning and the extent of any displacement. Although, as this section has illustrated, the process can be far from straight forward. The natural processes of decomposition and disarticulation are subject to variability brought about by both environmental and anthropogenic taphonomic processes, of which only some will be related to funerary treatment. These taphonomic agents do not work in isolation and it is possible that more than one set of taphonomic processes could lead to the spatial distribution of skeletal elements revealed at excavation. For example, a delay in burial with the corpse being transported in a wooden coffin could present similar features to a body buried under a durable cover in a dug out earthen grave which has been significantly disturbed by the action of earthworms, as both would display evidence for decomposition in a void with exogenous displacement (Nawrocki 1995: 51). The flowchart used by Harris and Tayles (2012: 232) illustrates the complex nature of interpreting skeletal positioning. Here the pathways of the flow chart lead to outcomes for burial context for interments at Ban Non Wat, Thailand. These outcomes are rarely specific to just one pathway, highlighting that there are numerous possibilities in skeletal positioning, various forms of burial they could represent, and differing ways in which the skeletal evidence can be interpreted.

2.4 Summary

The principles underpinning an archaeothanatological approach are borrowed from the fields of biology, osteology, taphonomy and, more recently, forensic science. This amalgamation has furthered the multidisciplinary nature of archaeothanatology, building on its French roots, to create a truly holistic approach. By focusing analysis on the corpse, a taphonomy-based approach appears able to extrapolate, through the identification of the spatial distribution of skeletal elements, the original environment a corpse decomposed in, and interpret from that the potential funerary treatments applied to it. The archaeothanatological approach is not free from problems, however additional research has the potential to reveal means of overcoming these barriers and achieving wider acceptance for archaeothanatology as an essential approach in funerary archaeology.

This chapter has explored the methodological context for the thesis through an introduction of archaeothanatology. In the next chapter the material under study will be introduced through a review of late Anglo-Saxon funerary practices.

Chapter 3 – Late Anglo-Saxon Funerary Variation

This chapter provides a context for the objective of exploring the use of wooden coffins, explaining why this is important for the study of late Anglo-Saxon funerary practices. The chapter begins by looking at the influence the earlier Anglo-Saxon burial record (450-850) has had on research into the late Anglo-Saxon period (850-1100). The intention of this first section is to demonstrate the vital contribution analysis of the funerary record has made to studies of Anglo-Saxon culture and society. However, it also highlights a long-term bias in favour of studies of the grave goods which characterise early Anglo-Saxon rites, but are largely absent from later burials, and reveals that there is a comparative absence of similar examinations of burial containers and elaborations, which are more plentiful during the late Anglo-Saxon period. Next, variation in funerary practices from the late Anglo-Saxon period is reviewed in detail. The purpose of this section is to reveal the wealth of variation in the late Anglo-Saxon burial record, and to establish that recent research has successfully utilised this diversity in practice to begin to explore social, economic, political and cultural systems. The chapter ends by reviewing the use of containers in the late Anglo-Saxon funerary record, with an in-depth assessment of the current evidence for wooden coffin provision. This last section demonstrates the inherent limitations to previous studies of wooden containers imposed by differential preservation and therefore emphasises the necessity for new means of identification and quantification of wooden coffins.

3.1 The Funerary Practices 450-850 A.D. and the Impact of their Study on Late Anglo-Saxon Funerary Archaeology

The most commonly identified funerary practice throughout the early Anglo-Saxon period was the use of grave goods. Whether cremation or inhumation burial, items were often deliberately placed in a grave. These included items of clothing and dress accessories, such as brooches, buckles and other items of jewellery, including necklaces and pendants (Meaney 1964). Weaponry, in the form of spears, shields, swords and seaxes, has been frequently identified (Härke 1990). Other items found in graves included pots, amulets, toilet sets and food offerings (Lucy 1998). The provision of grave goods has been examined extensively to infer aspects of social identity relating to migration and ethnicity, age and gender, and wealth and status. Studies of migration at the beginning of the 20th century focussed on comparisons of typologies of grave goods between Britain and the continent as a means of identifying the great Anglo-Saxon migrations documented by, amongst others, Bede (HE i, 15). Other, more recent studies concentrated on exploring the relationships between the provision of material objects and facets of identity and social organisation, as the inclusion of grave goods has been regarded as a prominent form of social display (Hadley 2001: 93; Crawford 2004: 87, 89). Another common approach in studies of early Anglo-Saxon funerary practice is to compare grave good provision with aspects of individual identity drawn from analysis of skeletal remains such as age at death and sex (Härke 1990; Lucy 1998; Stoodley 2000).

Grave goods were not the only form of funerary variation identified in early Anglo-Saxon burials. Elaborations existed in grave structure, including earthen mounds over burials, ditches surrounding them and sockets, ledges and postholes indicating the presence of decomposed wooden structures (Down and Welch 1990; Hogarth 1973; Tyler and Major 2005). Cemetery location, layout, grave alignment and body position have also been studied (Williams 1997; Lucy 1998; Sofield 2015). For example, the location of a cemetery within the landscape has been associated with early Anglo-Saxon group identity and memory, as well as territory and resource claims, such as the reuse of prominent landscape features such as barrows (Semple 2008; Williams 2011: 255).

However, as grave goods provided funerary scholars with a highly visible, easily identifiable resource, and despite the wealth of evidence for other types of variation in early Anglo-Saxon funerary practice, studies of grave goods have dominated research agendas for many years. An over-reliance on grave goods in the funerary studies of early medieval identities has also influenced research into funerary practices of the middle Anglo-Saxon period (650-850), with the focus principally being on the changes observed in grave good provision at this time. This period saw an overall decrease in number and variety of grave goods in burials and a change in the items selected for deposition. More frequently graves contained a more uniform, set of items limited to dress accessories and Anglo-Saxon coins, with weapon burials all but disappearing (Geake 2002: 145-148; Welch 2011: 277-279). The dominant hypothesis forwarded to explain the reduction in grave goods during the 7th century was the introduction of Christianity to the pagan Germanic settlers (Meaney and Hawkes 1970: 53). Therefore, this period was seen as witnessing a transition between the old pagan traditions, and the use of grave goods, and Christianity, which was assumed to not allow grave goods (Geake 1997: 1). Due to this, the middle Anglo-Saxon phase became first known as the “final phase” and then by some archaeologists as the “conversion period” (Welch 2011: 267).

Nevertheless, Boddington (1990), Wilson (1992), Hadley (2002: 209), Cherryson (2005: 12-19), Astill (2009), Craig (2010) and Stoodley (2010), have challenged this narrow view of the funerary practices of the middle Anglo-Saxon period; arguing that it fails to consider the wide range of funerary practices adopted, but also continuing, in the period, including coffins, chests, cists, shrouds and clothed burials. These researchers have demonstrated that burial in this period presents, to use Stoodley's (2010: 46) words, "a dynamic and multifaceted" picture. There is also no explicit evidence to suggest that the Church outlawed the use of grave goods, in fact, burials of churchmen and women continued to contain items interred with the corpse, including those with an association with the new religion such as patens, chalices and wooden rods (Hadley 2001: 93). Moreover, cemeteries did not all become associated with churches until at least the 10th century.

A widespread misconception promoted by grave good-focused studies was that Christianity resulted in a homogenous funerary rite and, therefore, that late Anglo-Saxon burials could not be interrogated for evidence of social and cultural identities. Indeed, a substantial body of research has focussed on when and why this change in provision of grave goods occurred, rather than looking at the evolution of funerary practices into the late Anglo-Saxon period (Lucy and Reynolds 2002: 3). This focus on objects in graves has exerted a considerable influence on research not only of burial practices of the early Anglo-Saxon period, but that of the middle and late Anglo-Saxon periods. The absence of grave goods from the majority of burials dating from the mid-7thcentury has even led some to question the potential for applying detailed studies into funerary practises and identity to these later interments. Indeed, Halsall (1995: 70) explains that attempting to undertake social analysis without grave goods is "less easy" although he does concede that, "though they [studies into social analysis] require subtlety and good-quality data, possibilities do exist".

The assumption that late Anglo-Saxon cemeteries provide limited opportunities for study of social and cultural processes has been challenged, with Hadley (2000: 199) emphasizing that social display did not end with the gradual diminishing of grave good provision but was rather reinvented through the use of a range of new forms of burial elaboration such as above ground grave markers, containers, structural features of the grave and placement of the grave in relation to its distance from the alter. The problem for archaeologists, however, is that these new forms of funerary practice tend to incorporate more organic materials and are, therefore, more difficult to identify in the archaeological record compared to the grave goods of the early Anglo-Saxon period (Hadley 2001: 93). The following section reviews the latest evidence for variation in the burial record of the late Anglo-Saxon period, with the aim of demonstrating the wealth of burial forms adopted and introducing coffin provision as an important funerary practice in this period.

3.2 Variation in the Late Anglo-Saxon Funerary Record (950-1100 A.D.)

By the 9th century in England disposal of the dead by cremation had all but disappeared (Hadley 2001:11), and the predominant fate of the corpse was inhumation. Yet, it appears that this form of interment was far from a simple affair. Over the past decade and a half, studies including those of Hadley (2001), Thompson (2002), Buckberry (2004), Blair (2005), Cherryson (2005), and Reynolds (2009), have illuminated the plethora of archaeological information relating to variation in burial practices in the late Anglo-Saxon period. This included variation evident at different scales: at a community level, such as the position of a cemetery in the landscape; but also, those observed between individual graves through elaboration of the grave itself or use of containers for the body. Some forms of variation are rarely observed prior to the late Anglo-Saxon period, such as charcoal burials, while others, such as burial within a container, appear to increase in frequency throughout the early and middle Anglo-Saxon period. Other practices continued, albeit in some instances in an altered form, from the preceding centuries including the sporadic use of grave goods.

3.2.1 Location

The evidence for variation in the geographical and spatial location of late Anglo-Saxon cemeteries has been drawn together most notably by Hadley (2000; 2001), Lucy and Reynolds (2002), Blair (2005), Reynolds (2009), Buckberry (2010), Cherryson (2010) and Sayer (2013). This work has played an important role in challenging the notion that burial from the 8th century onwards took place chiefly in a churchyard.

Despite not becoming exclusive for several centuries, burial in churchyards does appear to commence in the late-7th or early-8th centuries. Initially, interment near a church was associated with minsters serving the lay population's pastoral needs, and monasteries, and appears to have been reserved for members of religious orders and the nobility (Hadley 2001: 18). Local parish churches acquired burial rights and became the predominant burial sites for the laity by at least the 10th century (Daniel and Thompson 1999: 33). Churchyard life-spans varied, with radiocarbon dating evidence from human remains showing that they came in and out of use throughout the late Anglo-Saxon period (Hadley 2001: 28). For example, burials at Christ Church, Oxford (Ox) span the period from the 7th to the 11th centuries (Boyle 2001), interments at St Peter's and St Patrick's church, Heysham (La) took place only between the 10th to 11th centuries (Potter and Andrews, 1994: 50) and the cemetery associated with St Peter's Church, Barton upon Humber (Li) was established in the 10th century and continued as an active place of burial until the 19th century (Waldron 2007: 15).

Burial sites with no association with a church continued to co-exist alongside churchyards, sometimes in close geographical proximity. In common with churchyards, these burial grounds are found across England and varied in their dates of commencement and longevity. Riccall Landing (NY) provided a long-term burial location, with interments dating from the 7th to 12th centuries, whereas School Street, Ipswich (Sf), dating to the 10th to 11th centuries was a much shorter-lived cemetery (Buckberry 2004; Mays 1989). Cemeteries without an associated church have been found located in settlements or connected to earlier features, such as Roman Forts and Neolithic barrows (Sayer 2013: 135). The reuse of earlier sites and landscape features was not restricted to cemeteries without associated churches; churchyards could also be located on an area formally occupied by an earlier site, or overlaying previous burials. The precinct of Southwell minster (Nt) lies within a large Roman villa complex (Savage and Sleap 2012: 3-4). There is an obvious caveat to any attempt to categorise late Anglo-Saxon cemeteries by the presence or absence of a church. The absence of evidence for a structure does not necessarily mean that it did not originally exist, only that we can find no trace of it (Hadley 2001: 31). Partial excavation of cemeteries, such as at Addingham (NY), means that it is not known whether churches existed beyond the excavated areas. Furthermore, churches may not have been located adjacent to their burial grounds. Blair (2005: 467), for example, refers to a cemetery at Chimneys (Ox), which belonged to Bampton Minster, situated three miles away.

The arrangement of late Anglo-Saxon graves in cemeteries presents another area of diversity. Although graves were, in general, roughly orientated west-east, and frequently conformed to orderly rows running on an approximate north-south orientation, excavations have revealed that variation was present (Cherryson 2005: 71-73). As at Winwick (Ch), where the burials are arranged around a barrow, the variation in grave orientation and layout has been interpreted as a response to a physical feature (Freke and Thacker 1987: 32). Normative burial practice involved individual interments. Multiple interments, where two or more individuals have been placed into the grave contemporaneously or where a grave has been reopened and a new individual/s added (Stoodley 2002: 106), although in a minority, are in evidence (Cramp 2006: 260; Waldron 2007: 20; Mahoney Swales 2012: 45). Density of burial varies in some cemeteries, suggesting a preference for some locations over others. At North Elmham (Nf), the graves clustered in the area closest to the cathedral, with evidence for frequent intercutting, whereas burials towards the periphery of the cemetery were more spread out and intercut rarely (Wade-Martins 1980: 187-88). Hadley (2001: 107-08), highlights the fact that disturbance of burials due to intercutting was a common occurrence adjacent to churches. This practice has been interpreted as evidence of a preference for burial *ad sanctos* – close to the holy focus of the site and relics of saints that would have been housed within the church (Foxhall Forbes 2013: 266-267). In contrast, a lack of intercutting and disturbance at some cemeteries has been attributed to the use of grave markers. For example, well-ordered rows of graves with no intercutting was interpreted as evidence of marked graves at the cemetery to the south of Bath Abbey (So), however, the only direct evidence provided was small fragment of stone thought to be from a grave marker (Bell 1993: 15). The presence of post-holes and rectangular slots associated with individual graves has also been used to infer the use of wooden grave markers (Gilmour and Stocker 1986; Rodwell 2007: 20; Craig 2010: 133).

3.2.2 Grave Types

Burial variation in the late Anglo-Saxon period also takes place at the level of the individual grave. This variation relates to features pertaining to the physical structure of the grave, the use of linings and containers, known as grave type

(Buckberry 2004: 171; Cherryson 2005: 91), as well as elaborations[4] such as stones and grave goods. The shape of late Anglo-Saxon graves appears to be, in general, rectangular, with parallel sides. Exceptions do occur, for example one infant grave was found to be nearly circular at Raunds Furnells (Nh) (Boddington 1996: 31). Whereas, at St John at the Castle Gate, Norwich (Nf) graves were described by Shepherd-Popescu (2009: 123) as "often elongated ovals in plan" and "body shaped". Despite considering expected variation in the size of a grave relative to the individual, related to age, stature and body mass, the size of grave cuts has been found to vary considerably. Excavators at Addingham (WY) commented on the narrowness of the many of the grave cuts, stating that this meant the corpses had been interred on their sides rather than supine (Adams 1996: 165). At Cemetery Three, Farmer's Avenue Norwich (Nf), Shepherd-Popescu (2009: 96) refers to a number of exceptional grave cuts which appeared to be much larger than the average grave size of 2m in length and 0.75m width. Another structural feature found in late Anglo-Saxon graves are head-niches, where the grave cut includes a shaped area at the head end of the grave. Examples include, one grave from period four at Trowbridge (Wi) (Graham and Davies 1993: 41), two graves of adults and one of a non-adult at Barton Bendish (Nf) (Rogerson *et al.* 1987: 43) and two graves of adults from St John at the Castle Gate, Norwich (Nf) (Shepherd-Popescu 2009: 123). Also, at St John's were four graves with what was described as a shelf (raised up area) for the head, while another grave had a shelf for the feet (Shepherd-Popescu 2009: 123).

Lined graves were in use throughout the whole of the late Anglo-Saxon period (Table 3.1). Graves were lined with an assortment of materials, including stone, tile, plaster, mortar, charcoal and wood. Most frequently encountered in

[4] These forms of inclusions have been termed differently by other researchers, Buckberry (2004) and Mahoney Swales (2012) refer to these as grave variations, whilst Cherryson (2005) and Craig (2010) use the term elaborations.

excavations are stone linings. Variety exists in the specific construction of stone linings; in the extent to which they line the grave's sides or base and whether a lid is present. In her research into burial practices in Wessex, Cherryson (2005: 92) created categories to define the arrangement of stone linings in graves. The first of these is where there are a few stones placed around the sides of the grave, of which Cherryson cites Barnstaple Castle as an example (Cherryson 2005: 93). Partial linings are where part of the grave is lined with stone, while complete lining is where all four sides are lined, both in evidence at Wells Cathedral (So) (Rodwell 2001: 109). Where a grave is completely lined with stone in a box-like formation, these are usually referred to as cists (Buckberry 2004: 86; Craig 2010: 134). These categories are equally applicable to graves outside of Wessex. Examples include, partial stone lined graves at Bowl Hole Bamburgh (Nb) (Groves 2010: 119-120) and complete stone linings at Mitre Street London (GL) (Youngs *et al.* 1987: 174). The form of stone can also vary and includes rubble, uncut stones in an assortment of sizes and shapes and rectangular cut slabs. These forms might co-exist at one site, as they do at Black Gate, Newcastle (TW) (Nolan 2010: 205) (Figure 3.1). There are examples of graves where the stones were held together with mortar, as has been identified at St Nicholas Shambles (GL) and at Black Gate (White 1988: 18; Mahoney Swales 2012: 28).

Figure 3.1: *Two examples of variation in the construction of stone cists at Black Gate cemetery, Newcastle. Left – SK509 cist constructed from worked stone blocks. Right – SK523 cist constructed using unworked stone and boulders. (Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In contrast to stone, other forms of grave linings have been identified less frequently (Table 3.1). Charcoal-lined burials emerge around the beginning of the 10th century and generally consist of a layer of charcoal covering the base of the grave, stratigraphically beneath the skeletal remains. This layer can differ in thickness. Holloway (2010: 84) reported in his research into the practice of charcoal burial in England, that graves in Oxford were found with only a layer measuring 5 to 8cm, whilst at York Minster (NY) charcoal layers could be up to 15cm in depth. There are rare examples where charcoal has been identified lining the sides of the grave or stratigraphically above the skeletal remains such as at Old Minster

Table 3.1: *Examples of cemeteries containing lined graves dated to the late Anglo-Saxon period (* the dates given are not always the full period the cemetery is dated to, rather it represents the period of late Anglo-Saxon burials*)

Site	Date (AD)*	Stone	Chalk	Charcoal	Tile	Wood	Other	Reference
Bath Abbey (So)	8^{th}-9^{th}			X				Bell 1993
Black Gate Newcastle (TW)	7^{th}-12^{th}	X						Nolan 2010
Burgh Castle (No)	8^{th}-10^{th}				X			Johnson 1983
Castle Green Hereford (He)	8^{th}-12^{th}	X		X				Shoesmith 1980
Christchurch Cathedral Churchyard Oxford, (Ox)	7^{th}-11^{th}	X						Boyle 2001
Exeter Cathedral (Dev)	7^{th}-12^{th}	X		X				Allan *et al.* 1984
Fillingham (Li)	7^{th}-12^{th}	X						Buckberry and Hadley 2001
Great Ryburgh (No)	7^{th}-9^{th}					X		BBC 2016
Mitre Street/Leadenhall St London (GL)	Late Saxon	X						Youngs *et al.* 1987
New Minster Winchester (Ha)	10^{th}-12^{th}			X				Kjølbye-Biddle 1992
Newark Castle (Nt)	Late Saxon	X						Samuels 1998
North-east Bailey, Norwich Castle (No)	11^{th}		X		X	X		Ayers 1985
Old Minster Winchester (Ha)	7^{th}-11^{th}			X			Sand	Kjølbye-Biddle 1992
Redcastle Thetford (No)	11^{th}		X					Knocker 1967
Rivenhall (Es)	7^{th}-11^{th}				X			Rodwell and Rodwell 1985
Romsey Abbey	8^{th}-11^{th}			X				Scott 1996
Staple Gardens Winchester (Ha)	9^{th}-11^{th}			X				Hampshire Cultural Trust Archives
St Andrew's Fishergate York (NY)	10^{th}-12^{th}						Lime	Stroud and Kemp 1993
St Martin's Wallingford (Ox)	10^{th}-11^{th}	X		X			Briar/ twigs	Soden 2010
St Nicholas Shambles London (GL)	11^{th}-12^{th}						Chalk/ mortar	White 1988
St Oswald's Gloucester (Gl)	10^{th}-12^{th}	X		X				Webber 1999
St Peter's Barton upon Humber (Li)	9^{th}-12^{th}	X		X		X		Rodwell 2007
Trowbridge (Wi)	10^{th}-12^{th}	X						Graham and Davies 1993
Wells Cathedral (So)	7^{th}-11^{th}						Plaster	Rodwell 2001
York Minster York (NY)	9^{th}-11^{th}	X		X	X		Mortar	Phillips and Heywood 1995

Winchester (Ha) (Biddle 1969: 321) and York Minster (Phillips and Heywood 1995: 87). Holloway (2010: 85-87) has found that there is little evidence of the use of charcoal burial in the north-west, East Anglia or the south-east of England, while the south and south-west regions provide the most frequent number of charcoal burials. The use of tiles, sand and mortar to line the base of the grave have been recorded, whereas plaster could be painted directly onto the walls of the grave, as seen at Wells Cathedral (So) (Rodwell 2001: 65).

There are a small number of sites at which organic preservation and/or indirect evidence has allowed the determination of plank-lined graves. Six plank lined graves were excavated in 2016 at Great Ryburgh (Nf) where the timber planks have been exceptionally well-preserved in the waterlogged sediment (BBC 2016). Two other sites in Norfolk have also revealed plank-lined graves. At Farmer’s Avenue cemetery, the identification of planks lining three graves was based upon the excavation of slots in the base of the grave containing wood stains (Shepherd-Popescu 2009: 96). Whereas the evidence used to determine linings at the north-east bailey of Norwich Castle (Nf), consisted of soil stains around the sides of the cut, which in one grave (118) rested upon indented ledges in the grave (Ayers 1985: 56).

There are examples of both wooden and stone grave covers dating to the late Anglo-Saxon period. These could be used alone or in conjunction with linings, so forming a container-like object. Stone cists at St Martin’s, Wallingford (Ox), for example, were capped with stone covers (Soden 2010: 17). Preserved wooden covers were recovered from five graves at Swinegate, York (NY). None of these graves appeared to be in lined. Boddington (1996: 38-43) suggests that the inclusion of slabs in graves Raunds Furnells (Nh) may have served to support wooden covers as there is no evidence for cap-stones.

In general, only a small percentage of graves in a cemetery have evidence for a lining, for example from period 4 at Trowbridge (Wi) only 3 out of 162 graves were lined with stone (Graham and Davies 1993). In contrast at Fillingham (Li), all of the 13 graves excavated were stone lined (Buckberry and Hadley 2001). Differences not only exist in the proportion of lined graves between cemeteries but in the materials used. Craig (2010: 135) suggests a possible geographical/regional impact due to influences in burial practices from other areas. For example, she discusses the potential link between stone cist burials of south-eastern Scotland and the high proportion of stone lined graves at sites in northern counties, such as Bowl Hole Bamburgh (Nb) and Black Gate Newcastle (TW) (Craig 2010: 134-135). Resource availability may also have been a deciding factor; in areas with little woodland utilising a limited resource such as wood to line a grave may not have made economic sense. Furthermore, it is probable that the various forms of grave linings performed different functions in the burial ritual. Some of these linings formed a solid barrier between the earth and the corpse (stone, wood and tile), whereas others, for example charcoal or sand, would not have done so. It must be considered then that some linings may have had a practical function, which was a requirement for the grave structure as opposed to having some significant symbolic meaning. For solid linings, such as stone and wood, a practical explanation could include shoring and stabilising the grave cut, helping with safe and efficient construction of the grave (S Prior 2017 pers. comm). Alternatively, as suggested by Hadley and Buckberry (2005: 135), elaborations may have been a display of wealth and prosperity. Stone cists, for example, may have been an attempt to recreate a high-status burial within a sarcophagus.

The difference between a container for the body and a grave lining is that the construction of a container would take place outside of the grave, comprising two sides, two ends, a base and a lid making it portable: whereas linings are erected *in* *situ* within the grave and may not represent a complete enclosure of the corpse. Containers for the body made of stone, wood, and rarely lead, were in use throughout the late Anglo-Saxon period and cemeteries are found with single container types, while others feature multiple forms (Table 3.2). Stone coffins, as opposed to stone cists, are recovered infrequently and usually in high-status cemeteries, for example, six at the Old Minster, Winchester (Ha) and one at York Minster (NY) (Biddle 1969: 321; Phillips and Heywood 1995: 90). Still, six stone sarcophagi were found at Raunds Furnells (Nh), not considered to be a high-status cemetery (Boddington 1996: 43, 65-66). Here excavators determined the stone coffins were reused, with the previous individual removed and reinterred in the earth before the placing of another corpse into the sarcophagus (Boddington 1996; 27). The only examples of lead coffins from the late Anglo-Saxon period were reported from Staple Gardens, Winchester (Ha), where a single intact lead coffin was excavated, a single lead coffin from Romsey Abbey, however the late Anglo-Saxon date is tentative, and an unconfirmed find from an excavation in 1928 at Kilham (EY) (Winchester Cultural Trust Archives; Scott 1996: 23-24; Buckberry 2004: 180, 430). The rarity of stone and lead coffins may be a result of the expense incurred, in time and money, in their construction. A cheaper and quicker alternative would have been the construction of a wooden container.

Evidence for wooden containers is more common than stone or lead, even though buried wood, as an organic material, survives less frequently in the majority of environments (see 3.4 below). This evidence leads to the conjecture that wood was more commonly utilised for burial containers throughout the late Anglo-Saxon period than either stone or lead. Coffins are the most frequent form of wooden container found; other forms include chests and boats, although the latter may not enclose the body and as such may act more like a bier (discussed below). The best evidence for late Anglo-Saxon wooden coffins comes from St Peter's Barton-upon-

Humber (Li) and Swinegate York (NY) where exceptional preservation of organic material allowed the recovery of intact fully-preserved coffins (Figure 3.2). More often, however, partial wooden coffins are identified by preservation of small amounts of wood, the presence of soil stains created by decomposition of wood, or corroded metalwork associated with coffin construction. At Staunch Meadows, Brandon (Sf), for example, excavators identified soil stains in 34 graves that they inferred represented the remains of wooden coffins (Anderson 2014: 192, 215). A metal hasp, two straps and a metal hasp and nail were also found across four graves (Anderson 2014: 192, 215). Metal brackets were found in 12 graves at St Oswald's Gloucester (Gl) indicating the presence of a coffin (Webber 1999: 207-215). While for further burials at St Oswald's, as well as in graves at Burrow Hill, Butley (Su), Castle Green Hereford (He) and Porchester Castle (Ha), for example, excavators determined the use of wooden coffins from the presence of nails in the grave (Webber 1999: 207; Fenwick 1984: 37; Shoesmith 1980: 11-38; Cunliffe 1976: 60). Discussion of wooden coffins is resumed below (section 3.4).

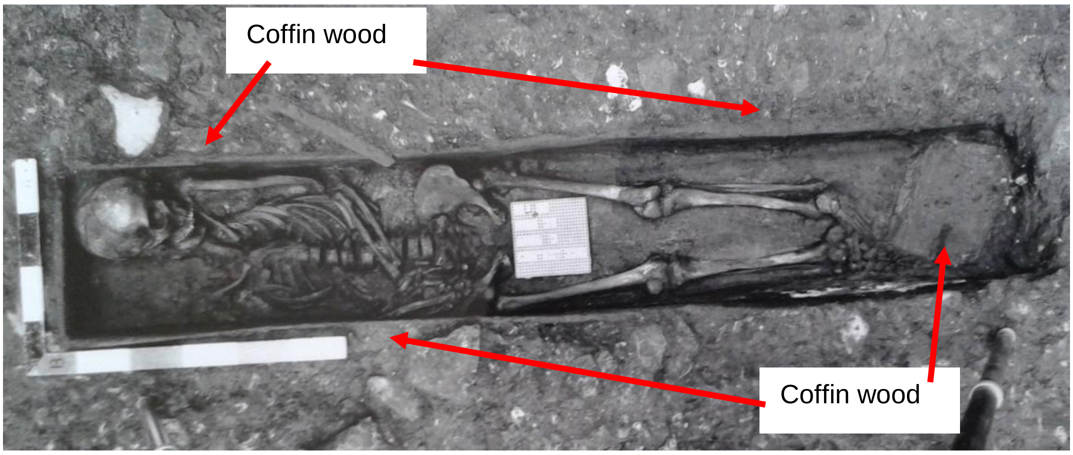

Figure 3.2: *Exceptional organic preservation of a wooden coffin from Swinegate, York (NY). The coffin wood can be clearly seen upright on three sides with the foot end board having fallen into the coffin to lie on the base. (Image used with permission from York Archaeological Trust)*

Table 3.2: *Examples of cemeteries containing lined graves dated to the late Anglo-Saxon period*

Site	Date (AD)*	Stone	Lead	Wooden	Reference
Barnstaple Castle (Dev)	Late Saxon			X	Miles 1986
Bath Abbey (So)	8th-9th			X	Bell 1993
Bishopsmill School Norton (CD)	7-10th			X	Johnson 2005
Black Gate (TW)	7th-12th			X	Nolan 2010
Burrow Hill (Sf)	Mid-Late			X	Fenwick 1984
Castle Green Hereford (He)	8th-12th			X	Shoesmith 1980
Cherry Hinton (Ca)	9th-12th			X	McDonald and Doel 2000
Cathedral Close Exeter (Dev)	7-11th			X	Allan *et al.* 1984
Farmers Avenue Norwich Castle (No)	9th-11th			X	Shepherd Popescu 2009
Gamlingay (Ca)	Late Saxon			X	McDonald and Trevarthan 1998
Kilham, Middle Street (EY)	Late Saxon		X		Buckberry 2004
Mitre Street/Leadenhall St London (GL)	Late Saxon			X	Youngs *et al.* 1987
Old Minster, Winchester (Ha)	7th-11th	X		X	Biddle 1969
Porchester Castle (Ha)	11th			X	Cunliffe 1976
Raunds Furnells (Nh)	10th-12th	X			Boddington 1996
Romsey Abbey (Ha)	8th-11th		X		Scott 1996
Staple Gardens Winchester (Ha)	9th-11th		X	X	Hampshire Cultural Trust Archive
Staunch Meadow Brandon (Su)	8th-12th			X	Anderson 2014
St Bertelins (St)	9th-10th			X	Carver 2010
St John at the Castle Gate Norwich (No)	10th-11th			X	Shepherd Popescu 2009
St Oswald's Gloucester (Gl)	10th-12th			X	Heighway and Bryant 1999
St Peter's Barton-upon-Humber (Li)	10th-12th			X	Rodwell 2007
Swinegate York (NY)	9th-11th			X	Pearson 1989
Tavistock Abbey (Dev)	10th	X			HER ref MDV3920
Thwing (EY)	7-10th			X	Watson 1993
Wells Cathedral (So)	7th-11th	X		X	Rodwell 2001
Worcester Cathedral (Wo)	7th-12th			X	Guy 2010
York Minster (NY)	9th-11th	X		X	Phillips and Heywood 1995

Chapter 3

Thompson (2002: 232-238) combines documentary and archaeological evidence to advocate that the movement in the late Anglo-Saxon period towards controlling and containing the body in the grave was a response to ideas introduced by the continental Christian movement, related to the need to protect the body, whether physically or symbolically, from decay. While not a written edict from the Church, there was a common belief that the body would rise again and as such needed to be preserved (Davies 1999: 8). There was also reference to bodily perfection/purity, that by remaining whole and un-decayed the buried individual was a person of virtue, as decay was linked to sin (Daniel and Thompson 1999: 78-79; Thompson 2002: 234). The recording by Ælfric of the miraculous preservation of Æthelthryth of Ely was given as such as example of purity, but also of perfection ready for resurrection (LS i, XX, 111). The use of coffins can perhaps be inferred from the line in *Vercelli Homily IX (VH IX, 101-2),* "the fourth likeness of hell is called burial, for the roof of the house is bowed down over his breast" (Translation taken from Thompson 2004: 52). This sounds like a coffin lid bowing under an over-burden of sediment onto the corpse below. The importance of coffin provision is suggested by a passage in the *Napier Homily XLIII* which refers to an act of mercy when the corpse of a pauper is provided with a cyst (Napier 1967 cited in Thompson 2004: 105). Although Thompson (2004: 105) notes this provision of a coffin may not be for burial, merely for transportation, as the description could be interpreted to mean either. Foxhall Forbes (2013: 271-272) discusses the need for interment in a peaceful resting place, using references made in consecration rites and funerary liturgies. This concept could be expanded to incorporate the need to enclose the corpse, to offer a specific quiet resting place excluded from those around them.

Aside from links to religious beliefs allied to the concealment and protection of the corpse, the design of some coffins suggests they were meant to be viewed, and thus played a role in social display (Butler 1980: 386; Buckberry 2004: 291).

The oval coffin at Wareham, and an oval lid from Dover (Ke) provide examples of unusually shaped containers (Butler 1980: 386). While at St Oswald's Gloucester and Old Minster Winchester, the addition of what appeared to be ornamental metal coffin fittings give the impression of purposeful elaboration (Webber 1999: 210-211; Kjølbye-Biddle 1992: 231). Furthermore, there are practical reasons for the employment of coffins, for use in the transportation and storage of corpses. Containers would be used for transporting the corpse to the grave, especially if an individual lived at some distance from the cemetery, or for storing a corpse if burial could not immediately take place, such as in winter when the ground was frozen. Although, as raised by Gilchrist and Sloane (2005: 111) when discussing the use of burial containers in monastic cemeteries in the 12th to 16th centuries, not all coffins may have been placed into the grave, some were reused by the community for the subsequent transportation of corpses. Traces of organic matter, soil stains and impressions stratigraphically beneath skeletal remains in graves, have been interpreted as evidence for biers. The main purpose of a bier would have been to transport the corpse into the grave. The differentiation between wooden coffins and biers relies on the location of wood remains – biers do not have sides. A single grave from Caister-on-Sea (No) and one from York Minster also provided evidence suggestive of the reuse of boat timbers as biers (Darling and Gurney 1993: *xvii*; Phillips and Heywood 1995: 86-87).

As seen in the provision of grave linings, wooden containers appear not to have been afforded to everyone in a cemetery and their prevalence rate varies between cemeteries. Of the 105 graves excavated at North Walk, Barnstable Castle (Dev), 49 (46.7%) were considered by the excavators to have originally contained wooden coffins (Miles 1986: 62-63; Cherryson 2005: 120). Whereas at York Minster, only 11 burials (9.6%) were thought by the excavators to have been in wooden coffins, with a further five (4.4%) interpreted as within wooden chests

(Kjølbye-Biddle 1995: 489-515; Phillips and Heywood1995: 82-88). While it would not be expected that everyone would have originally been buried in a wooden coffin, whether this variation in proportion is a consequence of their function, or a result of an under-representation due to differential preservation, is discussed below in section 3.4.

Despite all of the evidence for variation in grave type discussed above, so-called plain-earth burials are considered to comprise the majority of interments in late Anglo-Saxon cemeteries. These are graves cut into the earth into which the corpse is directly deposited without any form of container or grave lining (Buckberry 2004: 172; Craig 2010: 132). The absence of variation and apparent uniformity in this particular rite has still been interpreted as evidence of intentional burial rites, albeit a decision to not provide an embellished grave. However, the identification of plain-earth burials as the predominant mode of burial in the late Anglo-Saxon period is highly problematic and may be erroneous. In most situations, the identification of a plain-earth burial is based solely on the lack of direct archaeological evidence for any form of structural feature or container in the grave. Even so, these graves may not represent a true picture of the original burial practices, due to the variation in archaeological visibility of organic materials (Reynolds 2009: 35). Even though several studies do acknowledge the limitations of direct archaeological evidence for grave types, most continue as if plain-earth graves are just that, a valid representation of original burial practice; the possibility of elaborations or containers formed of organic materials that have long decayed is rarely mooted. Thus, it has been concluded that the principal burial type for the late Anglo-Saxon period would appear to be plain earth (Buckberry 2004: 22; Cherryson 2005: 91). This issue of archaeological visibility and its impact of funerary studies is central to the work undertaken in this thesis, and as such, this point will be returned to in subsequent sections and chapters.

3.2.3 Grave Elaborations and Preparation of the Corpse

Although deposition of grave goods diminished throughout the Anglo-Saxon period (Hadley and Buckberry 2005: 138), the inclusion of different items in the grave appears to increase. Stones have been found in graves placed adjacent to the left and right of the cranium (commonly referred to as ear-muffs), stratigraphically beneath the cranium or superior to it (known as pillow stones) or as head cists or boxes (in which stones are places surrounding the cranium on three sides) (Table 3.3 and Figure 3.3). Stones can also be positioned around the feet or directly on top of the skeleton. At Raunds Furnells excavators interpreted the placement of stones over the facial region of the corpse as a deliberate act, potentially to protect this area (Boddington 1996: 38). This was also the interpretation for the head cists at Black Gate (Mahoney Swales 2012: 33). In other cases, stones may provide support to the corpse, retaining it in an arranged position (Craig 2010: 135). Stones placed around the head could also have been part of an object such as a pillow, that we can no longer fully recognise due to decomposition of the organic components. As was seen in a coffin at St Peter's Barton-upon-Humber, where organic matter, in the form of a grass stuffed pillow was supported by two stones (ear-muffs) (Rodwell 2007: 27). This example serves as a reminder that differential preservation has the potential to mask the true extent of inclusions in a grave, especially those composed of organic materials.

Table 3.3: *Examples of stone arrangements in graves dated to the late Anglo-Saxon period (* the dates given are not always the full period the cemetery is dated to, rather it represents the period of late Anglo-Saxon burials)*

Site	Date (AD)*	Pillow	Ear muffs	Head cist	Foot	Other	Reference
Barnstaple Castle (Dev)	Late Saxon		X		X	2 burials where stone between the knees	Miles 1986
Bath Abbey (So)	8th-9th	X	X				Bell 1993
Black Gate (TW)	7th-12th	X	X	X			Nolan 2010
Caister on Sea (No)	8th-11th		X			Packing stones head and foot	Darling and Gurney 1993
Castle Green Hereford (He)	9th-12th	X	X				Shoesmith 1980
Cherry Hinton (Ca)	9th-12th	X					McDonald and Doel 2000
Christchurch Cathedral (Ox)	7th-11th		X				Boyle 2001
Fillingham (Li)	7th-11th		X				Buckberry and Hadley 2001
Haverhill (Su)	11th-12th	X					Murray 2005
Jarrow and Wearmouth (TW)	7th-11th	X	X				Cramp 2005
Kellington (NY)	10th-11th	X	X			White quartz	Mytum 1993
North-east bailey of Norwich castle (Nf)	11th	X	X				Ayers 1985
Priory Road Dunstable (Be)	Late/Norman		X				Warren 1993
Raunds (Nh)	10th-12th	X	X			10 placed over the facial region	Boddington 1996
Rothley Grange Charnwood (Le)	7th-10th	X				1 placed in mouth	Upson-Smith 2011
Staple Gardens Winchester (Ha)	9th-11th	X	X				Hampshire Cultural Trust Archives
St John at the Castle Gate Norwich (No)	10th-11th		X				Shepherd Popescu 2009
St Martin's Wallingford (Ox)	10-11th		X			1 over thoracic region	Soden 2010
St Martin's Wharram Percy (NY)	10-11th	X					Bell and Beresford 1987
St Nicholas Shambles London (GL)	11-12th	X					White 1988
St Oswald's Gloucester (Gl)	10th-12th	X	X		X		Heighway and Bryant 1999
St Peter's Barton-upon-Humber (Li)	10th-12th	X	X				Rodwell 2007
Trowbridge (Wi)	10th-12th	X					Graham and Davies 1993
Waltham Abbey (Es)	7th-11th	X					Huggins 1988
Worcester Cathedral (Wo)	7th-12th		X		X		Guy 2010

Figure 3.3: *Examples of stones arranged around the head of the corpse. Left – Black Gate Newcastle (TW), right – Worcester Cathedral (Wo). (Copyright Newcastle City Archaeological Unit, Newcastle City Council; Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The arrangement of the corpse in the grave displays variation. The majority of individuals in the late Anglo-Saxon period were buried in a supine position with their lower limbs extended. To put this into context, Cherryson (2005: 56-67) found that, in a data set of 1345 inhumations from Wessex, 95.1% were supine, and of those 74% had both legs in an extended position. For upper limb positioning, forearms could be extended, or the elbow flexed, and the forearm anterior to the chest pelvis or upper thigh. There are examples of cemeteries containing individuals buried resting on their sides (right and left), flexed and prone. At Templecombe (So) two out of 11 individuals (18%), who were buried 4m to the west of the main group of graves, were buried in a flexed position (Newman 1992: 64).

Most practices involved in preparing the corpse for burial will not be visible in the funerary record, as they leave no direct archaeological evidence. Documentary sources however, can supply further information. Thompson (2004: 1-112) provides a synthesis around the main documentary sources concerning the pre-burial treatment of a corpse. The Laud Miscellaneous 482 describes the sick being provided with linen gloves and socks, which, if the person happens to die before eight days have passed they are to be buried in, while another instruction includes the direction, that if the mouth, which should be closed, will not remain so a band should be tied around the jaw (Thompson 2004: 78-79, 82).[5] Texts, such as the A.D. 970s *Regularis Concordia*, refer to the washing/cleaning of the body and the removal of the deceased clothing, replaced either by clean clothes or by a burial shroud (Symons 1953: 65 RC XII 66). Audrey Meaney (2005: 235) has suggested that the reference in the *Life of St Guthlac* to uncorrupted corpses, which were of individuals considered for sainthood, may indicate the practice of embalming. These writings mostly pertain to religious and high-ranking individuals and may represent an ideal rather than a reality for the general population (Thompson 2004: 3, 62). Still, there is evidence for the continuation in the practice of clothed burial from the early Anglo-Saxon period into the late Anglo-Saxon period, in the form of items of adornment found in some graves of the latter period, such as dress fasteners and buckles (Cherryson 2005: 112, 118). Furthermore, a small number of graves have produced rare finds of organic threads believed to originate from burial clothes. A single grave at Torksey (Li), two graves from York Minster, four graves from Old Minster Winchester and a single grave from the New Minster at Winchester have contained gold threads upon the skeletal remains (Holst 2005: 20; Buckberry 2004: 215; Biddle 1969: 322).

The direct archaeological evidence for the use of shrouds in the late Anglo-Saxon period remains elusive and identification instead rests on a limited number of shroud pins recovered from graves, such as found at Wearmouth (TW) (Cramp 2005: 85). Green staining on the surface of skeletal elements has been interpreted as resulting from the oxidation of copper in shroud pins. At St Andrew's Fishergate

[5] Laud Miscellaneous 482 dates to the mid-eleventh-century and is a liturgical, confessional and penitential anthology (Thompson 2004: 57)

York (NY), green stains were reported on the bones of two late Anglo-Saxon skeletons (Buckberry 2004: 172). As illustrated the example from the *Regularis Concordia* described above, there is also documentary evidence for the use of shrouds in the late Anglo-Saxon period. Though, it is clear from the homilist of *Vercelli IX* that shrouds could be sewn into place and therefore would only consist of textile (VH IX supp I 433-4 lines 339-42 translated in Thompson 2004: 108). Other evidence interpreted as indicating the presence of a shroud includes fragments of preserved textiles. A fragment of fabric adhering to the cranium of a burial at St Nicholas Shambles has been interpreted as belonging to a shroud (White 1988: 18). As was the fabric impression in the mortared base of a cist grave at Black Gate cemetery (Nolan 2010: 280). Textile fragments, identified as wool, were recovered from eight graves at Worcester Cathedral (Guy 2010: 78). However, it is difficult to determine from the archaeological evidence whether these are examples of shrouded or clothed burials. As discussed in Chapter 2, the overall arrangement of the skeletal remains is frequently utilised to infer the presence of a shroud due to this paucity of direct archaeological evidence.

3.3 Researching Late Anglo-Saxon Funerary Variation

In the archaeological record of the late Anglo-Saxon period there is no evidence for the universal adoption of any one heterogeneous form of funerary practice. Indeed, the variation discussed above is found in different proportions in different cemeteries, with no obvious overall pattern. Diversity in practice means that not everyone was buried in the same way. Individuals or communities made choices about how to deal with the dead, whether to single them out in either positive or negative ways (Graham 2015: 4), an assertion that many studies have adopted to use funerary evidence to examine society in late Anglo-Saxon England, including its social, economic and political structure and its changing belief systems.

Links between burial variation and social status have been highlighted, both within and between late Anglo-Saxon cemeteries. Craig and Buckberry (2010) investigated the correlation between biological evidence for status and burial practices at Raunds Furnells. Using the presence of skeletal stress markers – conditions which modify bone such as cribra orbitalia and linear enamel hypoplasia – they classified individuals as being of low status where they showed evidence of skeletal stress (Craig and Buckberry 2010: 134-5). They compared these biological markers of status to funerary practices and found that burials in the south-east corner of the cemetery rarely contained coffined burials and housed skeletons for whom indicators of biological stress were more frequent and severe. In contrast, burials in a region directly south of the church contained more wooden coffins and all of the stone coffins, in addition to skeletons which appeared to have few stress markers, suggesting that they were of higher social status, and potentially exposed to fewer stressful episodes during life (Craig and Buckberry 2010: 138). Cherryson (2005: 169) has suggested that once burial in a churchyard was no longer the sole domain of the elite, social displays had to be made in other ways, including burial close to the church itself and a range of grave elaborations. This appears to be borne out by the evidence at Raunds. Differences exist between cemeteries in the frequency and types of grave variation, with some arguably higher-status cemeteries containing a greater number of variations than others and lower-status cemeteries having higher proportions of plain-earth graves (Buckberry 2004; Cherryson 2005; Hadley and Buckberry 2005: 138). The status of a cemetery has been linked, in part, to the status of the associated church, whether a minster, abbey, or local parish church (Buckberry 2010: 11). There is also evidence to suggest that some churches even had multiple burial grounds, and variation in elaboration between these sites may indicate they were to serve different social groups within society (Hadley 2000: 209; 2002: 214). Status of a cemetery may not have rested solely on its associated church. Stocker (2000) identifies a difference between urban and rural cemeteries in Lincolnshire and Yorkshire, based on the use of stone grave markers. Cemeteries with a greater display of stone grave markers appeared in urban areas, which Stocker (2000: 207) linked to centres of trade and commerce that brought an influx of migrants enhancing social competitiveness. This distinction between urban and rural burial practices was not, however, borne out in research by Buckberry (2004: 316) when she compared overall grave variation in Lincolnshire and Yorkshire.

Another key research theme for those interpreting variations in late Anglo-Saxon funerary rites has been the impact of Christianity. Christian documentary sources dating to this period are devoid of any specific instruction regarding the form a burial should take (Morris 1983: 50; Thompson 2004: 36). Indeed, the early Christian Church in England appeared unconcerned with the finer details of funerary practices (Wilson 1992: 67-8; Thompson 2002: 229; Hadley and Buckberry 2005: 123, 136-7). It is not even clear who held the responsibility for conducting funerals and managing burial grounds (Geake 2003: 259). The strongest evidence for an absence of guidance from the Church has been inferred from the archaeological record and the evident lack of homogeneity in burial practice across the late Anglo-Saxon period (Cherryson and Buckberry 2010: *ix*; Sayer 2013: 134). Paxton (1990: 1) commented that, until the 12th century, Christian life [and death] was more varied than uniform. Variation in practice, the amount of and frequency of different expressions in burials, and the lack of uniform distribution geographically and chronologically, led Hadley (2000: 200), Hadley and Buckberry (2005: 121) and Thompson (2004: 33) to suggest that local customs and ideas influenced burial practices far more than any overarching directives from the Church did in the late

Anglo-Saxon period. Indeed, as noted above, not everyone was buried in a churchyard for several centuries after the emergence of churches, and furthermore, grave variation is evident at both churchyard and non-churchyard cemeteries. While it appears that the Church did not set a proscribed form for Christian burial during the late Anglo-Saxon period, there is evidence to suggest that Christian ideas, in a more general sense, began to permeate decisions made regarding burial rites. As introduced above, the increase in the provision of containers for the body may reflect Christian thinking.

The identification of burial variations and the extent of their provision has provided vital for the studies of late Anglo-Saxon period. Several key social and cultural transitions have been illuminated by funerary studies, emphasising the value of archaeological data from the burial record for our understanding of the period as a whole. Nevertheless, whether it acknowledges it or not, research is limited by the visibility of the archaeological evidence (Reynolds 2009: 35). This presents a general problem for the interpretation of diversity in the burial record and a particularly acute issue for studies of the late Anglo-Saxon funerary practices surveyed here, many of which were composed of organic materials. Numerous studies of the late Anglo-Saxon period (such as those discussed above) utilise a biocultural approach. This combines grave variation, either in location, type or elaboration, with biological information obtained from the osteological analysis of human skeletal remains, including age, biological sex, pathologies and isotopic signatures, to make inferences about aspects of societal structure, beliefs and attitudes towards death. However, if the actual frequency of a variation in burial practice cannot be determined with any precision, how can its use be accurately explored, and the true meaning of its deployment understood? To facilitate an understanding of the scope and significance of the issue facing researchers of the late Anglo-Saxon period, the next section examines the effects of differential preservation on burial practices involving wooden containers and the ways in which this introduces bias into funerary studies, justifying the need for improved identification of burial practices.

3.4 Without a Trace – Identification of Late Anglo-Saxon Wooden Coffins

Archaeological evidence for late Anglo-Saxon wooden coffins rarely survives in the form of a complete container. While examples of intact wooden coffins do exist, more frequent is the recovery of partial evidence, in the form of incomplete preserved wooden fragments, soil stains, voids or impressions created by the decomposing coffin wood, and corroded metal coffin fittings and nails (Table 3.4). The range of archaeological evidence for wooden coffins is the result of differential preservation, the interaction between the composite materials of the coffin and the prevailing burial environment. In order to interrogate the survival of wooden coffins in the archaeological record and to appreciate why evidence for their use is problematic, it is essential to understand the form of late Anglo-Saxon wooden coffins, as well as examining the effects of varying environmental conditions on their preservation.

Most of the information concerning assembly methods of late Anglo-Saxon wooden coffins has been obtained from the small number of cemeteries with excellent preservation of wood and/or metalwork. These sites have revealed that wooden coffin construction was diverse, varying within, as well as between, cemeteries. The evidence from preserved coffin wood, soil stains, and *in-situ* brackets and nails has shown that in general, wooden coffins appear rectangular, with parallel sides. Although, such cemeteries as Barnstaple Castle, St Oswald's and St Peter's also contain coffins that taper slightly towards the foot end (Miles 1984: 63; Webber 1999: 216; Rodwell 2007: 22) (Figure 3.4). Furthermore, the size of the coffin differs in relation to the size of the interred corpse. At Worcester Cathedral excavators noted that the coffins did not appear overly large or small for their occupants, especially those containing non-adults, concluding the coffins were built specifically for each person. In contrast, at Swinegate, some coffins had voids either above the skull or below the feet. These may be accounted for if the coffin had not been specifically constructed for the individual, i.e. was too long, or alternatively it could be evidence for the position of an organic item which has since decomposed (J McComish Pers. Comm. 2015).

Figure 3.4: *Comparison between a rectangular coffin and one with a slightly tapered shape from St Peter's Barton-upon-Humber. Left - SP2322 in a rectangular coffin, sides and ends are parallel. Right - SP1863 in a coffin that tapers towards the foot end. (Copyright Photographs courtesy of Warwick Rodwell)*

Where the species of wood used to construct coffins has been identified, this is most commonly oak, as seen at St Oswald's, St Peter's and Swinegate (Webber 1999: 218; Rodwell 2007: 23; Bagwell and Tyers 2001: 1). However, a child's coffin from St Peter's was made of pine and a single plank from a coffin at Swinegate was found to be Scot's pine (Rodwell 2007: 23; York Archaeological Trust Archive). Analysis of late Anglo-Saxon charcoal burials has also identified that the wood was predominantly oak (Holloway 2010: 84). Kjølbye-Biddle (1992: 229) linked the use of oak in charcoal burials to its symbolising strength of faith and virtue and it being a potential source of wood for the Cross, on which Christ was crucified. This belief may also relate to its use in coffin construction. Though, the use of oak may also have been a practical one, owing to its wide availability as a native species (Murphy 2001: 20).

At St Peter's and Swinegate, coffins were made from six planks (one each for the ends, sides, base and lid) (Rodwell 2007: 22; York Archaeological Trust Archive). Yet, variations existed, for example at Swinegate three coffins had bases and lids made from two planks and in another coffin a base was formed using three planks (York Archaeological Trust Archive). At Thwing (EY), fragments of wood adhering to metal fittings provided measurements of between 20 and 30mm for board width (Watson 1993: 1). Watson (1993: 1) notes, however, that the width of the boards is uniform in the construction of each container, the difference in thickness is between individual containers (this term container has been used, as some of these coffins have now been determined to be chests, see discussion below). This also appeared to be the case at Swinegate where evidence from preserved coffin boards and soil stains provided plank thickness ranging from 10mm to 30mm (York Archaeological Trust Archive). One exception was a coffin in which the board on the northern side was thicker than the rest of the boards, at 45mm. This was interpreted by excavators to be a reused board due to the presence of one nail which was not attributable to the construction of the coffin (York Archaeological Trust Archive). This interpretation of reused boards was also made at other cemeteries. For example, at Caister-on-Sea (No) excavators interpreted the presence of clench-bolts[6] and hazel plugs in 13 graves as reused boat timbers for coffin lids and in one case a bier (Darling and Gurney 1993: *xvii*). A number of cemeteries produced evidence for the charring of the coffin boards prior to deposition (no evidence was found for a fire in the grave), including three from Staple Gardens and eight from Wells Cathedral (Hampshire Cultural Trust Archive; Rodwell 2001: 69). At St Peter's, the intact coffins did not show any evidence for the practice of charring boards, although, in graves with soil stains there was evidence for at least four coffins with charred planks (Rodwell 2007: 23; Waldron 2007: 133-171). The charring of coffin boards forms a carbonized outer layer to the wood, prolonging the life of the container, and it is for this reason archaeologists believe it was practiced (Rodwell 2012: 317).

The main difference exposed in the construction of wooden coffins has been the method by which the planks were joined together. Iron fittings, in the form of brackets, and/or iron nails have been recovered from a number of cemeteries, for example Castle Green Hereford, Exeter Cathedral Cemetery II (Dev), Staunch Meadows, Brandon (Su), and Old Minster, Winchester (Shoesmith 1980: 10-38; Allan *et al*. 1984: 389; Anderson 2014: 192, 216; Biddle 1969: 322; Table 3.4). When found *in situ*, this metalwork can provide information on coffin construction and shape. In general, the right-angled brackets found at St Oswald's were positioned along the sides of the coffin to attach the sides to the base and/or the lid (Webber 1999: 211; Figure 3.5). The surviving evidence appears to indicate that the brackets alone could not have held the coffins together, appearing to be too few in

[6] Clench-bolts differ from nails. Metal plates, roves have a central hole into which a nail passes, the end of the nail is then hammered down or clenched over (Ottaway 1992:615-616). If the nail is *in situ*, it will display a square or diamond shaped head (Zori 2007:36).

numbers or their position would be inadequate to securely hold the coffins together, for example, grave 241 (Webber 1999: 211). Excavators concluded that in addition to the brackets the coffins must have been pegged or jointed (Webber 1999: 211). For this reason, and the elaboration in design of the brackets, two forms of bracket, one with a single head and one bifurcated were present, excavators, determined the meta work was for display purposes (Webber 1999: 211). This conclusion was also drawn at Castle Green, Hereford, where fragments of metal strapping were recovered from three graves. Shoesmith (1980: 37-38) describes two widths of strapping and two different ends present. Due to this decorative feature and that the nails used to attach the straps were of a smaller length than others recovered from graves with solely nails, Shoesmith (1980: 38) determined the straps were an embellishment, not functional.

The number and location of nails in a grave, and whether they were found in a disturbed context or *in situ*, varies more than any other type of direct evidence for wooden coffins. At Castle Green Hereford, in addition to the evidence described above for metal straps, 12 out of 60 graves (20%) dated between the 9th and 12th centuries, produced evidence for nails (Shoesmith 1980: 33, 48). The number of nails found in graves ranged between 2-27, with nails presenting as complete examples through to broken head or shaft pieces (Table 3.5). In some graves, such as 80 and 83, the nails appeared to be *in situ* and marked out the shape of a rectangular coffin (Shoesmith 1980: 24, 28). Yet, in other graves, e.g. 66 and 84 the position of the nails was less informative, being badly preserved so their direction could not be ascertained or else disturbed (Shoesmith 1980: 33). This variation was also seen at Barnstable Castle, where a combination of preserved wood, soil stains and nails identified coffins. In grave 77, eight *in situ* nails were recovered along a black outline of decayed wood, whereas in grave 47, 10 nails were found but these were loose in the grave fill (Miles 1986: 63). In most graves at Barnstable Castle, the excavators determined that not enough nails were present to securely hold the boards together, mirroring the conclusions drawn at St Oswald's in regard to metal brackets. As there was no evidence for the use of any other metal fittings in the graves at Barnstable Castle, the excavators inferred the use of wooden pegs/dowels (Miles 1986: 63).

The use of wooden components in coffin construction has been substantiated by evidence from well-preserved coffins at St Peter's and Swinegate. At both sites, the majority of coffins were made entirely from wooden components, with no metal fittings or nails; instead, wooden pegs and dowels were inserted into drilled holes (Rodwell 2007: 22; York Archaeological Trust). One coffin at Swinegate used only a single nail in its construction to repair a split in the lid (York Archaeological Trust Archive). Confirmation that coffins could be built entirely from wood was an important discovery; it is now known that even one nail in a grave could indicate the burial was originally coffined. However, there appears to be no consensus on how much direct archaeological evidence is required to infer the presence of a wooden coffin, leaving excavators free to make interpretations at will. The implications of this inconsistency are pursued further in Chapter 4.

Table 3.4: *Numbers of nails found in graves at Castle Green, Hereford (He) (Taken from Shoesmith 1980: 33)*

Burial	Complete Nail	Nail Fragment
12	-	5
46	6	13
60	2	6
63	3	18
66	7	8
74	3	5
80	1	26
81	-	9
82	4	19
83	5	19
84	-	2
87	-	8

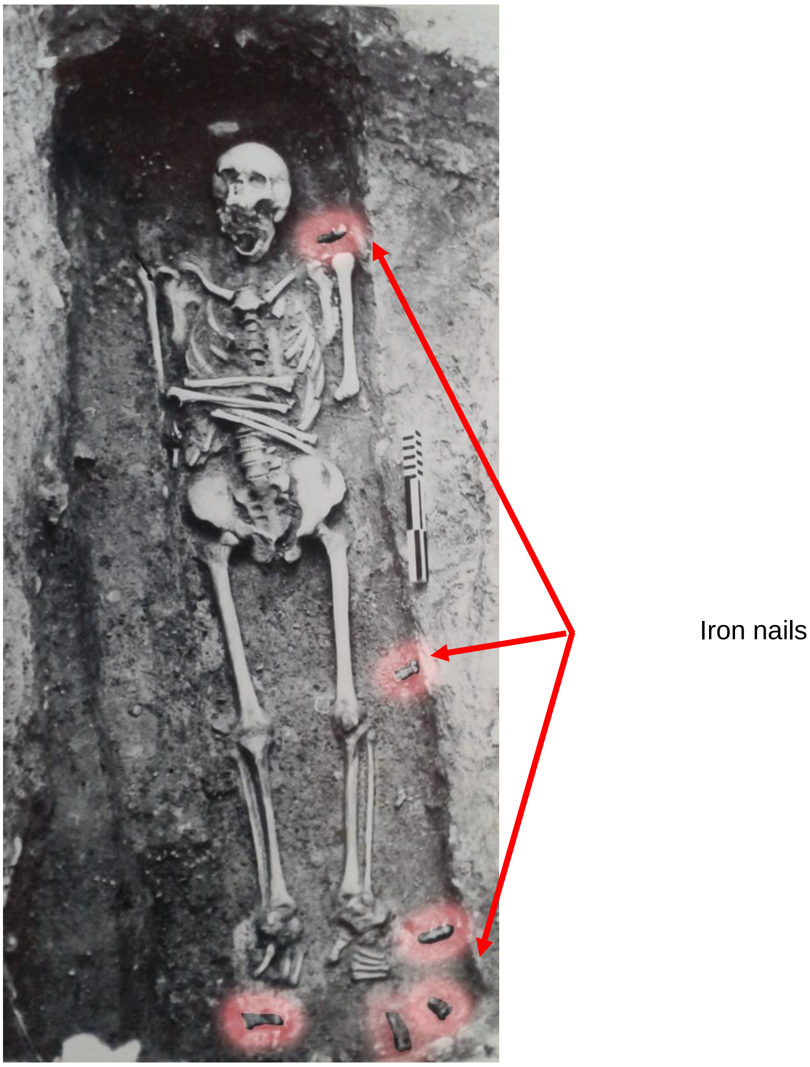

Figure 3.5: *SO175 illustrating approximately in-situ iron nails providing the outline of a wooden coffin (Copyright Gloucester City Museums)*

In concurrent use, additional variations in the form of wooden containers have been encountered. Single examples of hollowed-out tree-trunk coffins have been recovered at St Bertelin's (St), St Peter's and Swinegate, whereas an exceptional 81 examples were recovered from Great Ryburgh (Carver 2010; Rodwell 2007: 23; York Archaeological Trust Archive; BBC 2016). Until the excavations at Great Ryburgh, tree-trunk coffins were exceptions rather than the main form of coffin in any cemetery. The large number at Great Ryburgh may indicate that tree-trunk coffins were employed more frequently than previously understood and implicate poor preservation in their absence elsewhere. Wooden chests, identified by Craig (2012), were found in use at 19 sites across the north of England and southern Scotland, with most dating to the 7th to 9th centuries. A further four cemeteries with wooden chests used as burial containers have been identified, two from central England and two from southern England which appear to date slightly later, to the 10th to 12th centuries. Chests are re-used domestic items rather than constructed for the purpose of burial. Identification of a chest, as opposed to a coffin, is based on the presence of a hinged lid and in some cases evidence for a lock as these items would be superfluous in the construction of a coffin (Craig 2010: 3). This has led to the possible re-interpretation of a number of coffins based on the presence of redundant metal fittings. For example, Watson (1993) provides a detailed description of the construction methods of what she refers to as coffins from Thwing (NY). However, 15 of these have been later categorised by Craig (2010: 363) as chests. Craig (2010: 366-367) goes on to note, that often in archaeological literature no clear distinction is made between coffins and chests. It is possible chests may have been used at Burrow Hill cemetery, Butley (Su), as Fenwick (1984: 37) reported finding hinges in conjunction with evidence for wooden containers in the form of soil stains and rows of iron nails (Fenwick 1984: 37). Rodwell (2007: 22) reported that at St Peter’s a number of graves contained what he described as “hybrids” between a coffin, a bed and a bier, constructed using solid wooden sides with a woven wattle base. Bed burials reported from a number of middle Anglo-Saxon cemeteries include Edix Hill (Ca), Shrubland Hall Quarry, Coddenham (Su) and Street House, Loftus (NY) (Malim and Hines 1998: 261; Penn 2011: 41; Simmons 2011). Although, these earlier examples all include a significant amount of metalwork in their construction, something not identified in conjunction with these hybrids at St Peter’s.

The main cause of variability in the archaeological visibility of wooden containers is differential preservation. Wooden coffins are almost entirely composed of wood, with in some cases, metal fittings and nails making up smaller component part. The decomposition of wood is a natural process, primarily the result of microbial action (Blanchette *et al.* 1991: 4-5). Fungi and bacteria breakdown the carbohydrates and lignin components of wood, with the rate of the decomposition governed by moisture levels, oxygen levels, humidity and temperature of the burial environment (Blanchette *et al.* 1991: 4; Blanchette 2000: 192, 194). In temperate climates, where wood is in direct contact with soil, as would be the situation in the burial environment, decomposition is mainly fungal (Bjordal *et al.* 1999: 63). Wood therefore only survives in environments that restrict the normal functioning of these microbes (Blanchette *et al.* 1991: 4). Waterlogged soils at Swinegate and St Peter's inhibited the action of fungi, due to excessive moisture content creating an anaerobic environment, leading to organic preservation of coffin structures. At North Walk, Barnstable Castle cemetery, the publication described preservation of wooden coffins due to impregnation of re-deposited iron salts, introduced into the soil when the bailey bank of the castle was constructed (Miles 1984:62-63). The iron replaces minerals within the wood preserving its structure and inhibiting microbial attack (Murphy 2001: 5). This can also occur for smaller fragments of wood when in contact with metal, where the corrosion products either replace or coat the wood, preserving it (Keepax 1975). As was the case at Thwing and St Oswald's, where small pieces of coffin wood survived in association with metal brackets (Watson 1993; Webber 1999: 208). Certain species of wood are naturally more resistant to decay. Species such as oak contain higher levels of tannins that form polyphenolics, which can reduce the rate of decomposition (Murphy 2001: 5). Blanchette (2000: 194) reports that the prevention of wood decay is best achieved through a reduction of moisture levels. This may explain the survival of partial wooden coffins beneath the chapter house at Worcester Cathedral, as soil conditions were reported by the excavators as dry (Worcester Cathedral Archives). Charring the coffin can prolong its preservation. The main constituent of charcoal is carbon, a biological inert element (Murphy 2001: 5). The physical pressure exerted by the surrounding sediment will contribute to mechanical damage of wooden planks. As seen at St Peter's and Staple Gardens, this can lead to distortion and collapse of the coffin, especially the lid, which falls into the coffin (English Heritage Archive; Hampshire Cultural Trust Archive). This damage may then increase the rate of decay by directly exposing the internal surfaces of the planks to the burial environment.

In contrast, the survival of iron fittings and/or nails used in the construction of wooden coffins is influenced by the degree of oxidation of the metal (Kibblewhite *et al.* 2015: 251). Iron corrodes relatively easily in the presence of water and in aerobic conditions (oxygen in the air), found in most burial environments, with an increase in the rate of reaction in soils with high levels of chloride salts and/or acidity (Kibblewhite *et al.* 2015: 251). Conditions conducive to preservation are dry or anaerobic environments, such as permanently waterlogged soils, and those in which corrosion products form protective films, phosphates ($FePO_4$), in situations where the iron is associated with bone (Kibblewhite *et al.* 2015: 251) (Table 3.4).

As seen at St Peter's, environmental soil conditions can vary across a cemetery. Intact preserved wooden coffins were recovered from areas in the east of the site with high soil water content, whereas in the drier areas of the cemetery to the west, no evidence for coffins was found (Rodwell 2007: 23). The absence of organic remains might be expected as conditions were not conducive to microbe inhibition. This lack of evidence for wooden coffins in these areas cannot be taken to mean coffined burials did not occur, just that no evidence of them survived. Furthermore, environmental conditions can differ vertically as well as horizontally. At Gamlingay (Ca) stratigraphically lower burials were found to contain evidence for coffins (McDonald and Trevarthan 1998). Although, whether this was due to differences in soil conditions representing a preferential survival of coffins at this level or a change in burial practices over time is unclear. This complicates any analysis of chronological and spatial variation in grave type. Variations in coffin construction in a cemetery may also affect archaeological visibility. If organic preservation were poor, coffins construction entirely of wood would have decomposed completely, as opposed to any constructed using metalwork, which may have an increased chance of survival. Therefore, in most graves direct archaeological evidence for wooden coffins is likely to be at best inconclusive and most often absent all together. This may account for cemeteries that have no direct archaeological evidence for wooden coffins, such as the cemetery at the north-east bailey of Norwich Castle, Norwich (No) and the cemetery found when excavations took place on the north side of Sun Street, Waltham Abbey (Es) (Ayers 1985; Huggins 1988).

This absence of wood and/or metalwork has led some excavators to make determinations about the presence of coffins from indirect archaeological evidence. The presence of wooden coffins has been inferred from the re-arrangement of disarticulated bone forming a rectangular outline, packing materials forming an outline, grave size/shape, and empty graves. At Raunds Furnells two coffined burials were identified by the rectangular outline of the fill in the grave (Boddington 1996: 42). In another grave, the presence of a coffin was inferred from the repacking of disarticulated skeletal material, which again, formed a rectangular outline (Boddington 1996: 42-43). This was also the case in one grave at Wells Cathedral, whereas excavators concluded that in other graves displaying a rectilinear cut and appearing large in comparison to the interred individual probably contained wooden coffins (Rodwell 2001: 69, 82). Empty graves at St Peter’s were determined to have originally contained coffins due to the complete exhumation of all skeletal material. The excavators inferred this total removal of all bone meant corpses had been within coffins and therefore all skeletal elements had been contained (Rodwell 2007: 29). But, this interpretation did not consider the use of other forms of container or shrouds. Furthermore, as raised in Chapter 2, a small number of reports have used skeletal positioning to infer the presence of coffins such as Parkhouse *et al.* (1996), and Holmes and Chapman (2008).

Buckberry (2004: 172) raised the issue of wooden coffin visibility in her research on mid to late Anglo-Saxon cemeteries in Yorkshire and Lincolnshire, as did Cherryson (2005: 20) in her research into burial practices in Wessex between the 7th and 11th centuries. Both acknowledge that frequently graves are determined to be plain-earth burials due to the absence of direct archaeological evidence indicating to the contrary, with Cherryson (2005: 20) in particular noting that there may also be an over-emphasis placed upon the significance of some types of grave type and elaboration as a consequence of their preferential preservation. Nonetheless, these studies both continue to contrast plain-earth graves against burials in which there is evidence for the provision of other forms of grave types in order to make inferences about the relationship between funerary display and socio-cultural aspects of identity in the mid to late Anglo-Saxon period. For example, Cherryson (2005: 155) found differences existed in the array and frequency of funerary practices between the cemetery sites in the study sample. Those believed to be of a higher societal status, such as those associated with Minsters, contained a greater range in the types of grave elaboration present. However, these findings are probably biased. If features, such as all cases of burial in wooden container, are not evident, the full extent of funerary display at a cemetery may not be archaeologically visible. In her biocultural research at Black Gate cemetery, Newcastle Mahoney Swales (2012: 33) separates graves types into plain and elaborate based on an investment of labour and resources. She combines wooden coffins and plain-earth burials in one category “plain”, explaining that due to the poor archaeological visibility of wooden coffins, the lack of wood in a grave cannot be used to infer the absence of a coffin and therefore in most cases plain-earth burials and wooden coffins are archaeologically indistinguishable. Yet, the following sentence goes on to state that an oak coffin would be a substantial investment, thus indicating that wooden coffins may actually have warranted a separate category, having been provided to individuals in different circumstances to plain-earth burial.

The suggestion by researchers including Buckberry (2004), Cherryson (2005), Craig (2010), Hadley (2010) and Mahoney Swales (2012) that cemeteries can be divided into status types, or graves analysed based on the surviving residues in the grave alone are questionable at best, and probably flawed. Moreover, the base line for comparisons of variation in most studies is the perceived predominant grave type, plain earth, but, if this was not the foremost form in use in the late Anglo-Saxon period, then the results of these studies are essentially distorted. Yet, these, and other researchers understandably based their interpretations on what they perceived as the available archaeological evidence. They probably did not have any other choice, unless they used archaeothanatology to support the direct archaeological evidence.

Table 3.5: *Evidence used by excavators to infer late Anglo-Saxon wooden coffins. (Evidence presented here has not been corroborated by the author)*

Site	Date (AD)	Wood Preservation	Soil stains	Wood impressions	Metal Fittings	Nails	Packing/Void	Grave cut	Reference
Barnstaple Castle (Dev)	Late Saxon	X	X			X			Miles 1986
Bath Abbey (So)	8^{th}-9^{th}				X	X			Bell 1993
Black Gate (TW)	7^{th}-12^{th}	X	X						Nolan 2010
Burgh Castle (Nf)	8^{th}-10^{th}				X				Johnson 1983
Burrow Hill (Sf)	Mid-Late	?			X	X			Fenwick 1984
Caister on Sea (Nf)	8^{th}-11^{th}		?		X	X			Darling and Gurney 1993
Castle Green Hereford (He)	9^{th}-12^{th}				X	X			Shoesmith 1980
Cherry Hinton (Ca)	9^{th}-12^{th}				X	X			McDonald and Doel 2000
Cathedral Close Exeter (Dev)	7-11^{th}				X	X			Allan *et al.* 1984
Elstow Abbey	8^{th}-12^{th}		X						Baker 1969
Farmers Avenue Norwich Castle (No)	9^{th}-10^{th}		X						Shepherd Popescu 2009
Gamlingay (Ca)	6^{th}-10^{th}								McDonald and Trevarthan 1998
Jarrow and Monkwearmouth (TW)	7^{th} -11^{th}		X		X	X			Cramp 2005
Mitre Street/Leadenhall St London (GL)	Late Saxon	X							Youngs *et al.* 1987
New Minster, Winchester (Ha)	10^{th}-12^{th}				X	X			Kjølbye-Biddle 1992
Old Minster, Winchester (Ha)	7^{th}-11^{th}				X	X			Biddle 1969, Kjølbye-Biddle 1992
Porchester Castle (Ha)	11^{th}					X			Cunliffe 1976
Spofforth (NY)	8^{th}-12^{th}				X	X			NAA 2002
Staple Gardens Winchester (Ha)	9^{th}-11^{th}	X	X			X			Hampshire Cultural Trust Archive
Staunch Meadow Brandon (Sf)	8^{th}-12^{th}		X		X	X			Anderson 2014
St John at the Castle Gate Norwich (No)	10^{th}-11^{th}		X						Shepherd Popescu 2009
St Oswald's Gloucester (Gl)	10^{th}-12^{th}				X	X			Heighway and Bryant 1999
St Peter's Barton-upon-Humber (Li)	10^{th}-12^{th}	X	X			X	X	X	Rodwell 2007
Swinegate York (NY)	9^{th}-11^{th}	X	X						Pearson
Thwing (EY)	7-10^{th}				X	X			Watson 1993
Wells Cathedral (So)	7^{th}-11^{th}		X			X	X	X	Rodwell 2001
Worcester Cathedral (Wo)	7^{th}-12^{th}	X	X	X		X	X		Guy 2010
York Minster (NY)	9^{th}-11^{th}				X	X			Phillips and Heywood 1995

3.5 Summary

Coffins are an important part of funerary variation in the late Anglo-Saxon period. Evidence for coffin use during this period increases from that seen in previous centuries, potentially indicating their greater significance in burial rites. The provision of coffins has been examined by previous researchers in relation to identity and conclusions drawn about its association with status, gender, age and health status. Yet, past studies have failed to appreciate the differential preservation of wooden coffins and may be incorrectly identifying and interpreting plain-earth graves as a result. There is clearly a need to facilitate a more comprehensive understanding of wooden coffin provision in order to increase accuracy in the analysis and interpretation of their use in late Anglo-Saxon period.

An archaeothanatological approach holds great potential to provide additional information needed to explore wooden coffin provision. The next two chapters begin the process of undertaking an archaeothanatological analysis of burials from the late Anglo-Saxon period with this objective. Chapter 4 provides information on a sample of late Anglo-Saxon coffined burials in which containers were preserved and have been investigated to assess the impact on skeletal positioning of decomposition within a wooden coffin. Chapter 5 presents the findings from this analysis and how these have been used to develop an archaeothanatological method to identify wooden coffins.

Chapter 4 - Confirmed Wooden Coffins

The preceding chapter reviewed the evidence for variation in burial practices of the late Anglo-Saxon period. Here it was demonstrated that the interment of the body in a wooden coffin is part of a suite of funerary elaborations which become more common during this period, but that differential preservation has the potential to mask key features of wooden coffin provision and therefore create barriers to exploring funerary variation. The purpose of this chapter is to describe the identification and analysis of a sample of late Anglo-Saxon burials for which the presence of wooden coffins could be confirmed and therefore from which the effects of coffin burial upon the disposition of skeletal elements in the grave can be evaluated. The importance of analysing the skeletal positioning from burials in which the presence of a wooden coffin had been confirmed for the development of an archaeothanatological method for differentiating between coffined and uncoffined burials is discussed in Section 4.1. Section 4.2 establishes the set of criteria used to confirm the presence of a wooden coffin for the purposes of defining the sample of known coffined burials and why this was deemed necessary. The research method for the selection criteria and the background for each of the five sites are given in sections, 4.3 and 4.4 respectively.

4.1 The Importance of Analysing Confirmed Coffined Burials

The examination of graves where the original burial form can be confirmed provides an opportunity to explore and characterise the impact of a particular funerary treatment on the interred corpse and the resulting skeletal positioning found upon excavation. Duday (2009: 154) notes that:

> We must be able to take advantage of all opportunities where it is possible to observe anomalies and particularities in the arrangement of bones and to know precisely the conditions and characteristics of the original funerary deposit, either by oral tradition or written texts or through direct observable evidence.

In addition to the reasons established in Chapter 3 for the importance of identifying wooden coffin provision in the late Anglo-Saxon period, the rationale for this study's focus on wooden coffins was, in part, a practical one; there are a number of examples of excavated burials in preserved wooden coffins dating from the late Anglo-Saxon period available for study. These known coffin burials, henceforth in this study referred to as "confirmed coffin burials", provide an essential stage of development and testing of an archaeothanatological method – they reveal what to expect from the skeletal disposition of individuals who were definitely buried within this form of container.

By analysing confirmed coffin burials, the impact of interment in a wooden coffin upon the processes of decomposition and disarticulation can be directly assessed. The relationship between the structure of the coffin and the skeletal elements and what effects, if any, these have had directly and indirectly upon the decomposing corpse can be explored. For example, the coffin dimensions may have directly interacted with the corpse supporting skeletal elements in their original positions. Understanding construction methods may assist in understanding how the relative integrity of the coffin affects skeletal positioning, for example, how the warping or collapse of the planks comprising the base, lid, sides and ends of the coffin impact on the voids surrounding the corpse. By appreciating what effects can be attributed to decomposition in a wooden coffin, those relating to other funerary practices may possibly be eliminated. The aim of this part of the analysis is to identify repetition in the skeletal observations to discern whether there are key positions or patterns of elements which could be attributed to decomposition in a wooden coffin as opposed to other forms of burial practice or taphonomic processes. Repetition in skeletal observations has been identified by Duday (2009: 19-20) as essential to developing an understanding of ritual practice in archaeological contexts.

The opportunity to analyse definitive plain-earth burials from the late Anglo-Saxon period as comparators is problematic. There are few situations where plain-earth burials can be confirmed purely from direct archaeological evidence, although possible exceptions could include interment in which the grave cut has been identified as exceptionally narrow (Rodwell 1989:166). Even so, to use burials here that have been determined to be "plain earth" based only on the lack of direct evidence for the presence of a wooden coffin would create a circular argument – there can be no independent evidence for the absence of burial containers. As the consensus has been to label a burial as plain earth unless it can be proved otherwise, it is appropriate to focus on providing a means to identify from those "plain-earth burials" any that were in fact coffined, through the identification of skeletal positions relating to decomposition in a coffin.

This analysis of burials of known form is important not only for understanding the relationship between the corpse and the burial form, but because it provides the opportunity for the evaluation of the principles underpinning archaeothanatology, to ensure they are valid in this context. As considered in Chapter 2, there are several issues in archaeothanatology surrounding a lack of archaeological case studies and experimentation and the understandable dependence on data produced by forensic experiments. There is a tendency to accept archaeothanatological principles unquestioningly. The validation of the approach in France has not been mirrored by testing in English-language publications. Employing an approach in this thesis that analyses the skeletal positioning from confirmed coffin burials and compares this to the corpus of archaeothanatological information pertinent to this burial form allows the evaluation of the effectiveness and utility of current information. This approach also aims to explore commonly held views on what is generally expected in a coffined burial and challenge if these are in fact correct. The examination of such graves is therefore a vital step towards developing and applying a method which can then be applied to burials where there is no direct evidence for a wooden coffin and have previously been determined to be plain earth by default. This method aims to provide a framework into which, not only the results of the analysis of the known coffined burials, but the information obtained from previously-published studies can be incorporated, to present a standardised approach for investigating burials.

Although it would have been possible to examine a greater number of confirmed coffin burials from the later medieval and post-medieval period in this study, the justification for limiting the analysis to wooden coffins from the late Anglo-Saxon period was to ensure comparison of like with like; to capture the most representative coffin features and nuances in burial form relating specifically to the late Anglo-Saxon period. In doing so, it was hoped to reduce the possible variables which could be introduced by assessing coffined burials from other periods, such as differences in size, shape and composition, to aid in the recognition of skeletal positions that could be attributed to burial in a late Anglo-Saxon wooden coffin, specifically. Difference in construction material, such as stone and lead, could introduce variables related to coffin integrity. For example, stone will, unless disturbed, retain its relative shape and position around a corpse due to being a less flexible material and not subject to warping, distortion and decomposition in the same way as wood. Moreover, the analysis of coffined burials from more recent historical periods, such as the Victorian and Edwardian periods, and from forensic experimentation, will not allow for the effects over longer more archaeologically-appropriate timescales on the coffined burial to be evaluated.

There are other forms of funerary practice used during the late Anglo-Saxon period which could have been included in an archaeothanatological study of this kind, however, the availability of confirmed examples was prohibitively limited for some of the more archaeologically elusive burial forms, in particular shrouds and dug out earthen graves with a durable cover. The paucity of preserved shrouds/winding sheets, combined with limited positive evidence for their use provided by shroud pins, afforded no opportunity to apply an archaeothanatological approach to assess the state of skeletal remains in confirmed contemporary shrouded burials. The evidence for dug out earthen graves including a durable cover (discussed in Chapter 3) is limited to either a few examples of structural features cut into graves, such as ledges, or the occasional examples of preserved wooden covers. This paucity in comparable skeletal positioning evidence from graves in which covers or shrouds could be obtained would result in a reduced amount of data pertaining to these burial forms; this then would be of limited value in formulating a methodology, an objective in this study.

To competently explore decomposition and skeletal positioning in a container, it must be confirmed that the burial was indeed originally within a wooden coffin. Rare burials in which all or part of the coffin itself survives present the only opportunity to positively identify wooden coffins in late Anglo-Saxon cemeteries, and the chance to assess how archaeothanatological principles might be used to identify coffined burials. A corpus of burials was therefore required which provided strong, direct evidence for the presence of a confirmed wooden coffin in the grave. The identification and selection of this body of evidence is discussed in the following section.

4.2 What Constitutes Evidence of a Confirmed Wooden Coffin?

To study the effects of a wooden coffin on skeletal positioning of the interred individual, the presence of a coffin first had to be confirmed. Ideally, the identification of a coffined burial would be based on the direct survival of remains of the complete coffin structure; however, as discussed above, wood preservation is generally poor in the prevailing soil conditions across England. Chapter 3 established that there is variability in the amount of evidence required for a burial to be classified by the excavators as coffined. This has led to inconsistency in the reporting of coffined burials and in some cases, the evidence underpinning decisions is highly questionable. For example, at George Street, Aylesbury (Bu) (Allen and Dalwood 1983: 6) the size and shape of the grave cut alone was used to determine the presence of coffins. Here it was assumed that graves with large square cuts would have originally contained coffins. The converse argument, that graves with cuts that appear in close proximity to the skeleton, with uneven sides and rounded ends, are unlikely to have contained a coffin, is perhaps more logical, but far from infallible (Rodwell and Rodwell 1986: 101). Where excavators have used wood fragments and soil stains as evidence for the remains of wooden containers, there is particular potential for confusion between coffins, biers placed beneath the body, covers placed over the body and grave linings that do not have associated lids or bases (Rodwell 2012: 317). The only clear distinction at present between these different funerary structures in English-language reports can be made by their complete survival or perhaps by the presence of coffin fittings or *in-situ* nails, but even then, the use of reclaimed timber with superfluous nails needs to be considered.

As such, the presence or absence of wooden coffins as reported in excavation records was deemed unreliable, and therefore had to be validated by the author to ensure accuracy and consistency. This was essential to exclude, as far as possible, the likelihood that the skeletal positions observed were the result of forms of funerary treatment other than coffins. For this validation, only certain criteria, presented in Table 4.1, were regarded as providing strong-enough evidence for a confirmed coffin burial. The presence of preserved wood, the staining of the soil from decomposed wood or impressions left by wood directly underneath or above the skeleton without similar evidence from the sides of the burial was not considered sufficient to identify a coffin. This was to prevent confusion of enclosed coffins with biers placed beneath the body or planks covering the body. Similarly, evidence of wood from the sides of the grave alone could indicate a lined grave as opposed to a fully enclosed coffin and so was discounted. The issue of distinguishing between a wooden coffin and a fully wood lined grave may only be possible in certain circumstances, construction methods such as the presence of metal work indicating a portable container, or the presence of wood/stain at a distance from the cut itself. If the dimensions of the grave are larger than the preserved wood within it the wood would not be in direct contact with the sides of the grave, it would not be lining the grave and would most likely indicate a coffin (Figure 4.1). This was also applicable for graves in which voids left by decomposed wood that has not been in-filled by the surrounding sediment indicated the sides and/or ends of a coffin. Figure 4.2 shows where the excavators of a grave at Worcester Cathedral have indicated a void, determined to be the result of decomposed wood, with evidence of backfill between the void and the grave cut. Rodwell (2012: 317) discusses the frequent absence of evidence for coffin lids, explaining that wooden lids are damaged and collapse into the coffin due to the weight of the over-lying soil. It was determined that, for the purposes of this study, the absence of evidence indicating the presence of a lid would not preclude a burial from the sample, based the likelihood it could be difficult to identify in the grave due to its relative fragility.

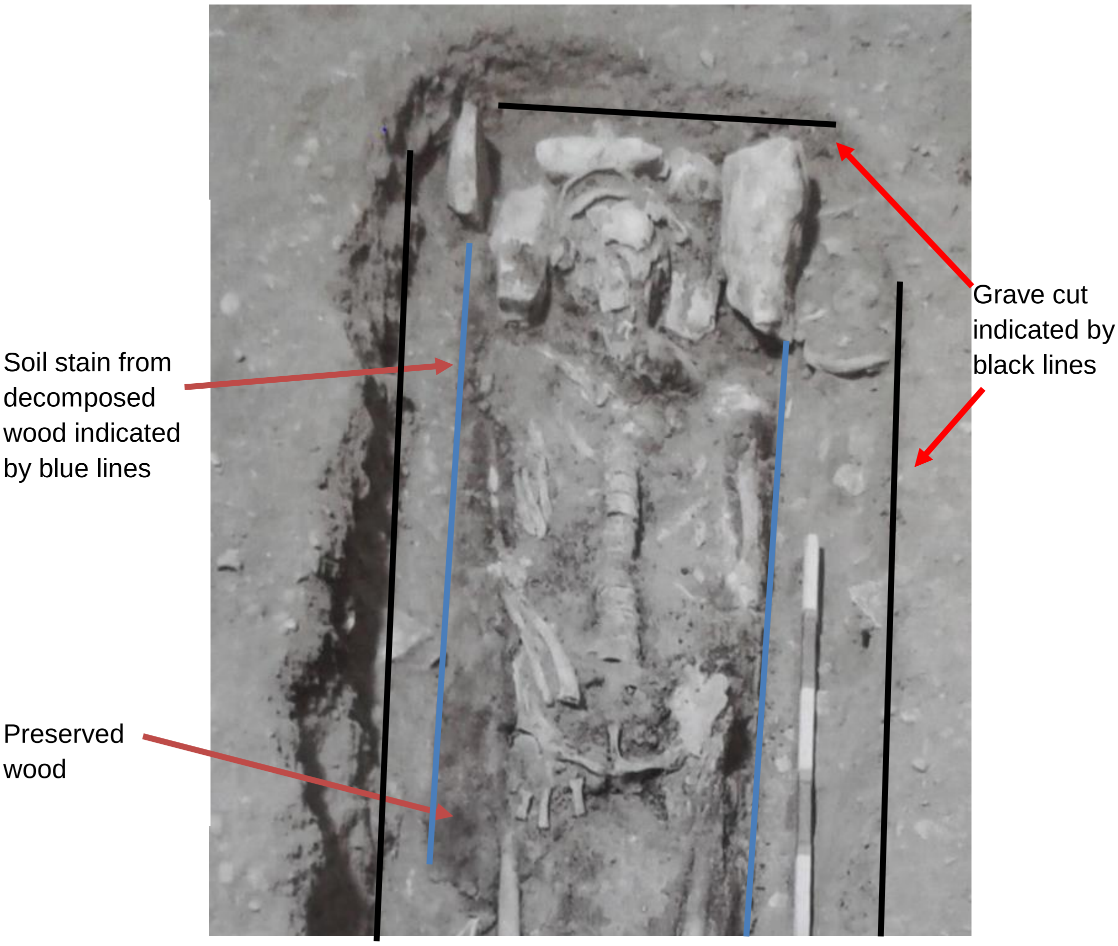

Figure 4.1: *Burial from Worcester Cathedral showing fragments of preserved wood and wood stains on the base of the grave at a distance from the grave cut (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

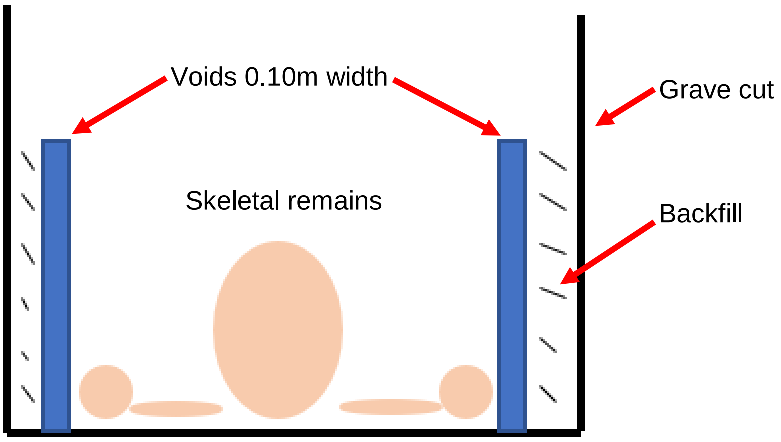

Figure 4.2*: Diagram illustrating a void formed by decomposed coffin wood identified by excavators at Worcester Cathedral (Based on a drawing from excavation context sheets from skeleton 1167 held in the archive at Worcester Cathedral)*

Table 4.1: *Criteria for determining a confirmed wooden coffin*

Evidence type	**Justification for coffin determination**
Preservation of wood representing a base and/or a lid and one or more sides	The presence of sides indicates the burial was not on a bier or provided with only a cover
Stains and/or voids in the grave fill from decomposed wood representing a base and/or lid and one or more sides	Staining identified as the remains of wood and voids left by decomposed wood that has not been in filled by the surrounding sediment is considered to be adequate evidence that a wooden structure once existed. The evidence for sides indicates the burial was not on a bier or with only a cover
Preservation of stain of base and/or lid or sides with a minimum of two *in situ* nails or fittings positioned to indicate the sides/lid of the coffin	Combined evidence of staining and nails/fittings indicates that an enclosed structure once existed
Nails/fittings *in situ* position representing the outline of the coffin	The nails/fittings should be positioned identifying the outline of the coffin.

In addition to the remains of wood, the presence of iron nails and fittings has, in certain specific circumstances, been included as evidence of a coffin. In some cases, iron nails are encountered in suitable positions and locations in the grave surrounding the body, with their heads furthest from the skeletal remains and the points towards the skeleton. This was considered to provide suitable evidence for the presence of a coffin rather than a wood-lined grave. Nails positioned this way would indicate that sides had been nailed to a base/lid forming a container rather than merely positioned inside the grave against the sides. In the situation where iron nails/fittings are the only evidence of a container these had to be of significant number and positioned forming the distinct outline of a coffin (Figure 4.3). Rodwell (2012: 317) suggests that 12 nails are required to construct a coffin, where nails are the only fixings used, but a grave containing only a few nails could not be discounted as a potential coffined burial. As discussed in Chapter 3, evidence from preserved intact coffins has shown construction methods utilising wooden pegs with a small number of nails used to secure a lid or defective joint (Rodwell 2012: 317). No minimum number of nails has been set for the purposes of this study; rather it is the combination of the number and positioning of the nails that is the important determining criteria. A problem that arose during the assessment of whether a burial contained a coffin concerned the detail with which the positioning of wood remains, soil stains and nails were reported in archaeological literature. Plans, images and context sheets did not always accurately record the position of evidence and in such cases these burials could not be used for the analysis.

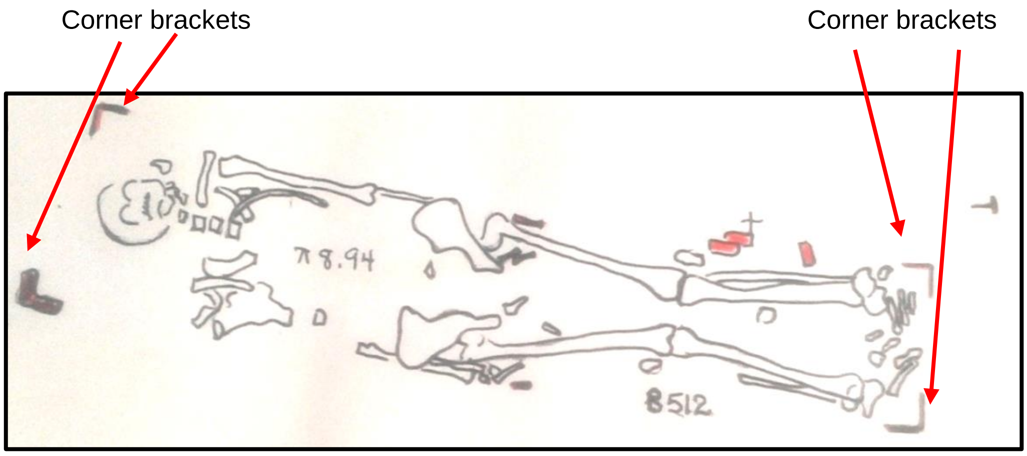

Figure 4.3: *Plan of Burial 512 showing the position of the metal coffin brackets (Taken from the St Oswald's archive at the Gloucester City Museum. Copyright Gloucester City Museums)*

4.3 Site Selection

There were a number of considerations for selecting cemetery sites with sufficient and suitable data for this part of the research. An initial site survey was undertaken to identify cemeteries containing burials dated to the late Anglo-Saxon period that reported clear and plentiful evidence for wooden coffins. This was to ensure that at least some would fulfil the rigorous criteria for a confirmed wooden coffin set by the present study. Table B1.[7] Secure dating of the burials, although helpful, was not a strict requirement. Sites that continued in use after the 11th century and contained phases that potentially included early 12th-century burials were not excluded as all dating methods have a potential margin of error associated with them and there is no evidence to suggest coffin form or construction changed dramatically at the Conquest. The potential overlap into the 12th century was therefore not deemed to affect the results of the study negatively. Information on the dating of burials has been taken from publications for each site, with dates variously obtained via radiocarbon dating, stratigraphic relationships or datable artefacts found in association with the burials. Sites were then selected from this datable corpus of cemeteries for inclusion in this study based on a further range of criteria.

For a cemetery to be considered in this part of the study excavations must have identified human skeletal material, which was in a sufficient state of preservation to allow for the position of the skeletal elements to be observed and recorded by the excavators. As with wood preservation, skeletal preservation is related to the burial environment, but factors intrinsic to the bone, such as its size and proportion of compact and cancellous bone, affect skeletal survival (Willey *et al.* 1997). Intra-site variability in preservation necessitated the evaluation of preservation state at the level of individual burials for an effective decision to be made regarding inclusion in this study. High-levels of post-depositional disturbance of inhumations also rendered graves unsuitable for analysis. Plough damage, truncation by other features such as later graves or building foundations and secondary burial practices can obliterate the original grave and cause disruption to

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[7] Tables located in the Appendices are labelled with a prefix which denotes the relevant appendix they are located in.

the skeletal remains. Dependent on the severity of the disturbance, this activity can mask skeletal positioning related to the original form of the burial. An example of extensive disturbance across a site can be observed at Burrow Hill, Butley (Sf), a cemetery consisting of in excess of 200 inhumations. The site is described by the excavators as “a chaotic jumble of human bone”, with the cause of this disturbance attributed to intensive reuse for burials and rodent activity (Fenwick 1984: 37).

Two other fundamental points needed addressing, firstly, confirmation of the intentionality of the burial (Duday *et al.* 1990: 30; Leclerc 1990: 15). This is easily proven, as all individuals are found deliberately interred in coffins, and therefore are not the result of any non-human processes. Secondly, that these are primary burials must also be verified. A primary burial is one in which the decomposition of the corpse has predominantly occurred in the grave where the remains are found. (Duday 2006: 33). A secondary burial is one where there is a planned manipulation/movement of bones from the location in which primary burial and decomposition occurred to other location/s over an indefinite period of time (Duday 2009: 89; Knüsel 2014: 47-50). Again, for coffined burials this is shown by the presence of the skeletal elements such as hand and foot bones, cervical vertebrae and the relationship between the scapula and the clavicles and ribs (Duday 2006: 33). As discussed in section 2.4, primary burials are easily identified where the labile joints of the hands, feet and cervical vertebrae are maintained in anatomical connection. However, within a coffin environment the presence of voids increases the potential for skeletal elements to become displaced and labile joints to become disconnected. Duday (2009: 28) emphasises that the absence of anatomical connections of labile joints does not preclude the burial from being a primary inhumation. Rather, for the determination of a secondary burial, evidence must exclude other taphonomic changes that could have altered a primary burial.

Cemeteries were also selected based on sample size. Burial grounds containing large numbers of inhumations enables the meaningful analysis of data obtained from excavations of burials and allows for significant associations to be drawn between observed features (Cramp 1983: 270). Demography of the buried population was another important consideration. As discussed in Chapter 2, studies of skeletal positioning have not been routinely applied to non-adults within English-language literature and, in consequence, it is not clear whether extant methods developed on and utilised for adults will be accurate when applied to immature skeletons. Indeed, this issue is noted by Cambra (2016) when studying the burials of four new-borns. Cambra (2016: 67) comments how the disarticulation and displacement of the numerous epiphyses in non-adults complicates interpretations. However, the decision to limit what evidence constituted a confirmed coffined burial (Table 4.1) resulted in not only a reduction in the potential sites available for detailed analysis, but in the number of burials at a site that were suitable for consideration. It was not considered appropriate to alter the method by which presence of a coffin was defined, as, although this would increase the sample size, it would do so by including a range of burials characterised by ambiguous evidence which may, in fact, have been biers or covered interments rather than coffins.

Images are essential for the type of analysis being undertaken. As such, sites which were excavated by antiquarians prior to the standardisation of basic archaeological recording and without images of burials could not be considered. Archives containing only drawings of burials were not considered for analysis, as they were deemed insufficiently accurate based on comparisons made by the author at other sites between drawings and photographs. For sites possessing images, these needed to show both the positioning of the individual skeletal elements and any associated items in the grave clearly for each burial. Photographs taken from directly above the skeletal remains were ideal, as this reduced potential distortion of the position of the skeletal remains and other objects in the grave which could be introduced in images taken at an oblique angle. Consideration was also given to the medium on which the image was contained. In the application of archaeothanatological principles to burials at a mid-to-late Anglo-Saxon cemetery at Sedgeford (Nf) both black and white and colour images of burials were analysed. There appeared to be no discernible difference between the accuracy of assessment of skeletal positioning using two forms of image (Green 2013). For expediency, digital images were preferred over photographic film as these could be accessed off site and allowed for the image to be enlarged to assist in analysis. An archive was required to contain excavation documentation which provided contextual information in support of the photographic images. This included but was not limited to; context sheets, burial records, site plans and finds records supplying data on the burial environment, stratigraphic matrix, location of finds not identifiable on the image and skeletal records.

Some cemeteries had to be omitted from inclusion in this study even when they were determined to fulfil all the above criteria. This was the result of difficulties encountered with access to the data. Securing access to the archives and permission to use images was not always possible. This limitation may have led to potentially valuable data not being included in the study, most notably the mid to late Anglo-Saxon cemetery at Great Ryburgh. This site was excavated by Museum of London Archaeology between January and June 2016. However, the extraordinary recovery of 81 hollowed-out log coffins and six wood-lined graves was only announced in November 2016 (BBC 2016). Due to the number of stakeholders and recent nature of the discovery, permission to use the site for this project could not be arranged within a suitable timescale.

Application of the selection process outlined above significantly reduced the number of potential cemeteries available for analysis. Nevertheless, adherence to these requirements resulted in a substantial yet manageable corpus of sites characterised by their suitability for archaeothanatological analysis.

4.4 Site Introductions

Five sites were selected for detailed analysis of the skeletal positions of confirmed coffin burials: St Oswald's, Gloucester (Gl); St Peter's, Barton-upon-Humber (Li); Staple Gardens, Winchester (Ha); Swinegate, York (NY) and Worcester Cathedral, Worcester (Wo) (Figure 4.4 and Table 4.3). Across all sites a total data set of 78 burials suitable for analysis was produced. The sites are introduced in the following section, highlighting the archaeological background to each, the available evidence for coffined burial and the number of burials selected for analysis. The data for each grave in all five case-study sites is provided in a database (Tables B2-B6).

Figure 4.4: *Map showing the locations of the five case-study cemeteries which contain burials with direct archaeological evidence for wooden coffins (Created using GeoBatch Map Data © 2017 GeoBasisDE/BKG©2009 Google, Inst. Geogr Nacional)*

Table 4.2: *An overview of the excavations of the five case-study cemeteries*

Site	Excavation	Publication	Date of burials	Total number burials	Number of coffined burials (Based on Table 4.1 criteria)
St Oswald's Gloucester (Gl)	1967 Maynard 1975-6, 1977-8 and 1983 Heighway	Heighway and Bryant (1999)	Phases A–F1 10th to 12th century	160	16
St Peter's Barton-upon-Humber (Li)	1979-1984 Rodwell and Rodwell	Waldron (2007) Rodwell and Atkins (2011)	Phase E 10th to 12th century	453	8
Staple Gardens Winchester (Ha)	1984/5 and 1989 Kipling and Scobie	Youngs, Clarke and Barry (1986) Gaimster, Margeson and Hurley (1990) Not fully published to date Data held by Hampshire Cultural Trust	9th to 10th century	285	5
Swinegate York (NY)	1989 and 1990 York Archaeological Trust	Pearson (1989) and (1990) Not fully published to date Data held at York Archaeological Trust	9th to 12thcentury	100	24
Worcester Cathedral Worcester (Wo)	2003 Guy	Guy (2010) Not fully published to date Data held at Worcester Cathedral	7th to 12th century	181	25

4.4.1 St Oswald's Gloucester

The ruins of St Oswald's Priory are located in the city of Gloucester. Rescue excavations took place in 1967 directed by Maynard, 1975-6, 1977-8 and in 1983 directed by Heighway. These revealed the previously undiscovered late 9th/early10th-century church and an extensive cemetery spanning the Roman period to the 1800s. The site has been fully published by Heighway and Bryant (1999). Unless otherwise stated the following information has been taken from the main publication by Heighway and Bryant and the supplementary excavation archive held by Gloucester City Museums.

The first Minster in Gloucester, dedicated to St Peter, was founded in the 7th century (Finberg 1972: 153-166). A second Minster, then referred to as the new Minster as it was also dedicated to St Peter, was commissioned by Æthelflæd, daughter of King Alfred, and her husband Æthelred (Winterbottom 2007 WMGPA 293). The exact date of the foundation of the new minster is unknown. It has been inferred from documentary sources such as William of Malmesbury's account, to be around the end of the 9th century before or about the time of King Alfred's death in A.D. 900 (Hare 1999: 34; Garmonsway 1972: 85 ASC (E)899) but before the reported theft and translation of the relics of St Oswald, a Northumbrian King and martyr from the 7th century, there in 909 (Garmonsway 1972: 94 ASC (A)C909; Winterbottom 2007 WMGPA 155.3). The 9th century foundation was re-dedicated to St Oswald, perhaps inspired by the translated relics of this saint (Hare 1999: 35). Enlargements to the building appear to have taken place throughout the 10th and 11th centuries (Heighway and Hare 1999: 22-24). Further additions were made after the Minster became a priory for Augustinian canons around 1152/3 (SOD ii 328 cited in Page 1907: 84-87). By 1537 the priory had been dissolved, although parts of the building continued to serve as a church until the 17th century (Heighway and Hare 1999: 22-24).

Burial took place at the site from the 10th to the 19th centuries, with more than 600 burials forming a series of intercutting stratigraphic phases of use. The phases of burial assessed in this study (designated A to F1) were dated to the late Anglo-Saxon/ Anglo-Norman periods, c. 900 to 1120 A.D, by a combination of radiocarbon dating (Table 4.3), stratigraphic phasing and relationships to the early 10th-century church.

Table 4.3: *Results from the radiocarbon dating of skeletal elements from St Oswald's (Heighway and Bryant 1999: 201) ([1]The calibrated dates provided were calculated to confidence interval of 95% Sigma-2)*

Skeleton	Calibrated Radiocarbon Dates[1] (A.D.)
SO464	680-990
SO507	790-1150
SO518	780-1030

Phases A to F1 contained 160 burials which covered an area to the north-west, north-east and south of the church. A high level of use was indicated by the seven distinct phases of burial, though the intensity of burial activity varied between the northern area which saw the most activity and the south, where only three phases of burials were encountered. Grave alignment, although generally orientated west to east, had a tendency towards a slight north-east south-west deviation. There is a loose conformity to north to south rows of up to only four graves, although burials appear in clusters around the church. Most graves contained one supine individual, although one grave may have been a double burial of an adult and infant. Evidence was found for a variety of grave elaborations, present singularly or in combination, including metal fittings and nails from wooden coffins (Table 4.4).

Table 4.4: *Grave elaborations identified in Phase A–F1 burials at St Oswald's (information extracted from the excavation archive held by Gloucester City museums and Heighway and Bryant 1999)*

Grave elaborations	Frequency
Coffins with brackets	12
Coffins with nails	15
Possible nailed coffins	9
Coffin un-nailed	1
Stone cyst	2
Charcoal	29
Stones around head or feet (From the excavation documentation the position of the stones was not always clear)	73

Wooden Coffins

The excavators identified wooden coffins at St Oswald's on the basis of the remains of iron angle brackets or iron nails in the graves. In the 12 graves with iron brackets the level of metal work preservation varied but was sufficient enough to allow two styles to be identified, one with a single headpiece and one with a bifurcated head. Parallel lines of iron nails were found in 15 graves and used to infer the location of coffin sides. In most cases these nails survived only as lumps of corrosion products. Nevertheless, excavators found it was possible to identify *in-situ* nails, positioned with their points towards the skeletal remains as would be expected in a coffin. Another nine graves were found to contain iron nails in sufficient numbers for the excavators to consider these possibly represented the remains of wooden coffins. Nails and bracket fragments were recovered from the grave fill in a further 30 graves, these were not found *in situ* and were recorded in low numbers of 1-2 per grave. Excavators deemed this insufficient evidence from which to confirm burial in a coffin. One burial was determined to have been made within a coffin due to the position of the skeletal elements, rather than from direct archaeological evidence.

This was described as presenting the parallel sided effect as demonstrated in Boddington's (1987) work at Raunds.

The relative positioning of iron brackets and nails suggests that the coffins at St Oswald's were approximately rectangular. However, the location of the nails in one grave was thought to indicate the coffin may have been slightly tapered towards the foot end. Surviving wood traces adhering to nails were able to indicate the thickness of the planks used in the construction of the coffins. In most cases this was between 15-25mm, although a few indicated plank thicknesses of 35mm. The only example of a potentially charred coffin was found in grave 383.

Of the 37 graves the excavators determined contained coffins, 34 were burials of adults (Table B7). When the selection criteria outlined in section 4.2 were applied to these inhumations, 13 were identified as containing confirmed wooden coffins and therefore suitable for skeletal positioning analysis. For example, individual 399 as shown in Figure 4.5. In response to the small proportion of burials that fulfilled the criteria of this study, an additional three burials were included from phases F2-G (SO028, SO109 and SO175). These also fulfilled all selection criteria and appeared to represent coffins which were comparable to those in phases A-F1. While phases F2-G are dated 1120-1230, the excavators acknowledge that there is a possibility that they contain some late Anglo-Saxon burials. This has given a total of 16 burials from St Oswald's suitable for skeletal positioning analysis (Table 4.5 and Table B8).

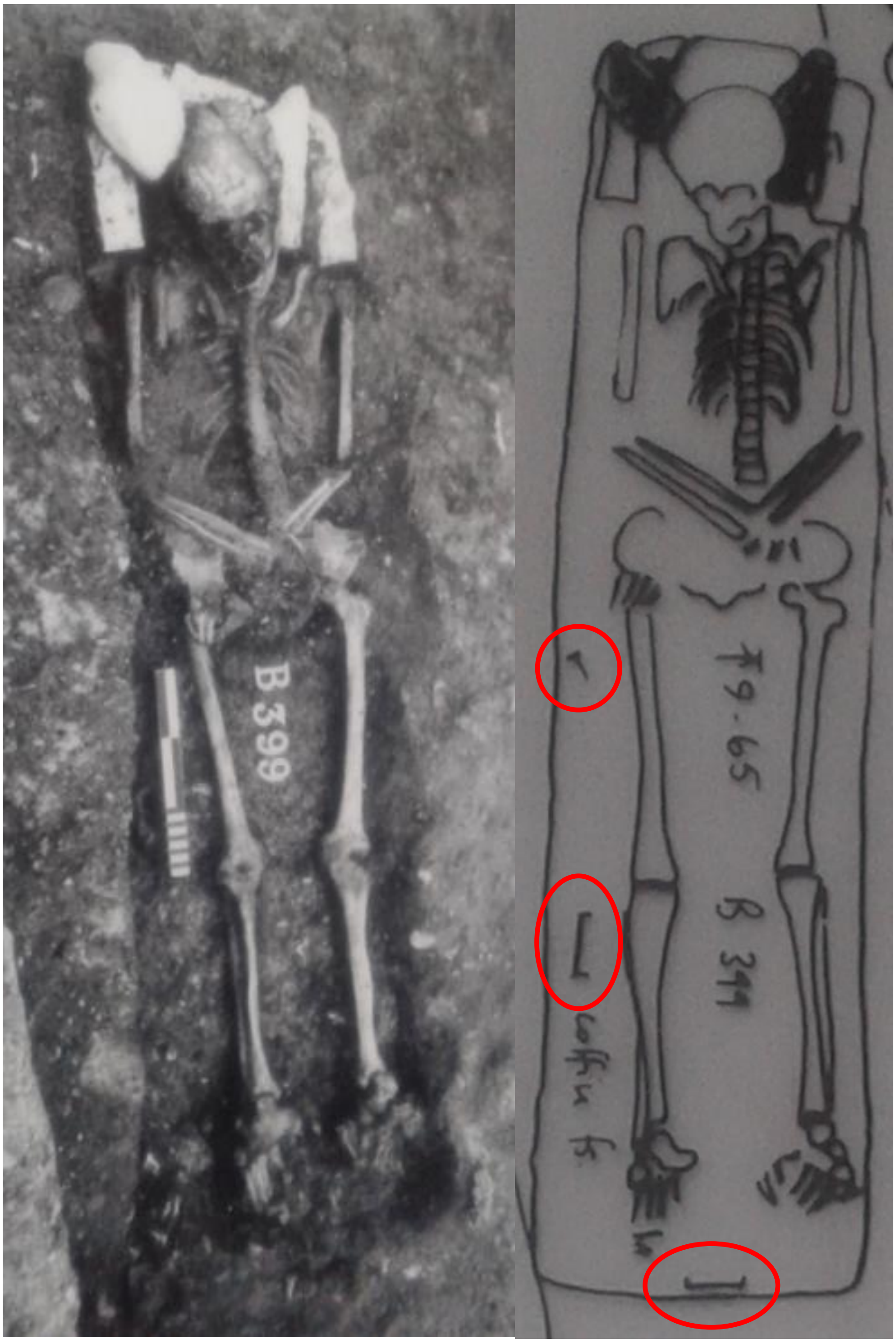


Figure 4.5: *Individual 399 with evidence in the grave of two in-situ coffin brackets and a nail, whose locations are indicated by the red circles on the diagram (Copyright Gloucester City Museums)*

Table 4.5: *Details of the direct archaeological evidence used to confirm the presence of wooden coffins in the 16 burials from St Oswald's suitable for skeletal positioning analysis (evidence obtained from the excavation archive held by Gloucester City museums)*

Individual	Coffin evidence
SO028	5 planned *in situ* nails
SO050	4 nails in total, only 2 on plan, both *in situ*
SO109	2 planned *in situ* nails with repetition of position with other burials
SO175	22 nails some planned and evidence of decomposed wood fragments/staining not planned
SO238	4 coffin brackets in total, 3 *in situ*. 3 nails in total, 1 *in situ*. 13 fragments possibly nails and brackets, 9 *in situ*
SO241	8 coffin brackets in total, 7 *in situ*
SO242	4 nails *in situ*
SO301	9 nails in total, 7 *in situ*
SO383	4 nails in total, 2 *in situ*
SO399	2 *in situ* coffin brackets 1 nail not *in situ*
SO405	6 *in situ* coffin brackets
SO412	3 *in situ* nails 1 possible *in situ* coffin bracket
SO511	3 nails *in situ*
SO512	9 *in situ* coffin brackets
SO515	3 coffin brackets in total, 2 *in situ* 5 nails in total, 2 *in situ*
SO524	18 nails in total, 2 *in situ*
Total: 16	

4.4.2 St Peter's Barton-upon-Humber

St Peter's church, Barton-upon-Humber (Li) lies on the southern river terrace of the Humber estuary. The church went out of use in the early 1970s. As part of a plan to repair and conserve the church, an archaeological research programme directed by Rodwell and Rodwell was undertaken between 1978 and 1984. The excavations uncovered 2750 inhumation burials and almost three tonnes of disarticulated human bone from areas both beneath and surrounding the current church (Rodwell 2007: *xi*). Unless stated otherwise, the following information has been taken from the main site publications by Rodwell and Atkins (2011) and Waldron (2007), with contributions by Rodwell (2007: 15-32) and from the excavation archive held by Historic England.

The excavations revealed that a three-celled church, dated by its architectural design to the late-10th to early-11th century, had been constructed over an already established cemetery. Excavations, however, did not find any archaeological evidence for a prior church associated with these earlier burials. Sub-circular earthworks located to the east of St Peter's, and sporadic finds of material culture dating to the middle Anglo-Saxon period provide evidence for Barton-upon-Humber as an established settlement of this period (Bryant 1994: 73-74), and the entries relating to Barton-upon-Humber in *Domesday* confirm it was a town in 1066. The Domesday entry for 1086 refers to the presence of a church listed under the property of Gilbert de Gant (Smith 1870: 120), with Rodwell (2007: 7) inferring from this that it was not a monastic site. The original three-celled church went through a number of phases of enlargement from the mid-11th century, when the chancel was demolished and a new church built which incorporated the original baptistery and tower to its west through to the final addition of an organ chamber in 1897-1898. Burial in the cemetery surrounding the church continued until approximately the 1840/50s.

Burial density varied across the cemetery, with intense use focusing on the south west corner of the church and the north appearing relatively less intensively utilised for burials. The high-level of intercutting in these areas made it difficult to identify individual grave cuts, and the creation of an overall stratigraphic matrix by the excavators impossible. Nevertheless, the burials were placed into five broad chronological phases (A-E), dating from 950 to 1855. The stratigraphic dating of phase E (c. 950-1150) was supported by dendrochronological dating of coffin wood samples and radiocarbon dating of skeletal material (Tables 4.6 and 4.7). Phase E burials were included in the present analysis.

Table 4.6: *Results from the dendrochronological dating of preserved wood from coffins at St Peter's (Rodwell 2011:197-218)*

Skeleton number	Context number	Dendrochronological date (Tree ring dating)
776	1753	After 1094
1053	1790	Winter 1131/32
1174	3508	?1099
1784	3868	Spring 1134
1819	3869	Winter 1130/31
1751	3908	1103-39
1863	3968	?1079
1867	3980	After 1092
1907	5031	After 1126
1925	5044	Winter 1088/89
1926	5045	Reused timber 1071-81
2322	5328	Winter 1134/35
2470	5357	Spring 1134

Table 4.7: *Results from the radiocarbon dating of skeletal elements from St Peters (Rodwell 2011) ([1]The calibrated dates provided were calculated to confidence interval of 95% Sigma-2)*

Skeleton number	Calibrated Radiocarbon Dates[1] (A.D.)
30	1025-1165
537	985-1020
592	985-1035
1323	995-1040
1910	990-1025
1911	1020-1065
2545	985-1020

Burials assigned to Phase E totalled 453. The graves were mostly aligned west to east with heads placed at the west and, while north-south graves rows can be seen, most burials appear more randomly positioned. The burials were generally single interments in a supine position. Exceptions include a grave which contained three individuals inside a large pit grave and one which contained an adult female and an infant inside a coffin. Excavators identified that three interments were also made within the chancel of the church in the late Anglo-Saxon period. A variety of grave elaborations were identified, all of which appeared to be in use contemporaneously and could appear both singly and in multiples in individual graves (Table 4.8). For example, grave 4101 presented the use of a single type of elaboration: two stones were placed under the body, whereas grave 1689, had evidence for a coffin and stones placed either side of the skull (so-called ear muffs). Excavators identified 26 burials in which they inferred alluvial clay had been added into the coffins encapsulating the corpse. The surrounding sediment did not contain this type of alluvial clay, and as such it was interpreted as the deliberate filling of the grave/coffin with liquid clay. This exact use of clay has not reported elsewhere, although Boddington (1996: 40-41) found two graves lined with clay and 17 graves containing clay he determined had been deliberately added at Raunds. While at Castle Green Hereford (He) Shoesmith (1980: 45) reported a grave containing clay packing around the head, and Hall and Whyman (1996: 83) comment on a grave from Ailcy Hill, Ripon (NY) with a possible clay-lined base.

Table 4.8: *Grave elaborations identified in Phase E burials at St Peter's (taken from the excavation archive held by English Heritage and Waldron 2007)*

Grave elaborations	**Frequency**
Wooden coffins (value includes possible wooden coffins)	255
Clay burial – liquid clay poured around the body	26
Wooden board covering the body	1
Wooden boards lining grave	2
Charcoal layer above the body	1
Stone ear muffs (placed on either side of the head)	29
Pillow stone (placed underneath the head)	10
Stones around skeleton (7)	1
Stones beneath skeleton (2)	1
Wooden sticks or wands	8
Grass pillow	1
Pot	10
Flint	1

Wooden Coffins

Evidence for burials in coffins at St Peter's was primarily provided by the excellent preservation of 13 complete or partial oak coffins, for example individual 1053, Figure 4.6. This resulted from anaerobic waterlogged conditions in the eastern areas of the cemetery. The amount of preserved wood varied from complete intact coffins comprising a base, a lid and all four sides to small sections of wood interpreted as representing parts of the coffin. The coffins were mostly rectangular in shape with parallel sides, although a small number tapered slightly towards the foot end. As might be expected, the western area of the cemetery, where soil conditions were drier and organic preservation poorer, resulted in fewer coffined burials being recorded. Although, in the area in between the waterlogged east and the drier west, the damp conditions preserved soil stains – in the form of thin grey streaks – were taken by excavators to represent the outline of coffins. A number of these outlines contained flecks of charcoal indicating the possible charring of the boards prior to deposition although, notably, charred boards were not reported in graves containing better-preserved wood. Construction methods of the preserved wooden coffins showed that wooden dowels were employed instead of iron nails in many cases. However, graves were also found that contained metal work, iron nails, clench nails and roves; evidence that differing methods were employed in constructing coffins. In a number of graves, the presence of a coffin was determined by the excavators via a layer of alluvial clay, appearing to delimitate the edges of a container which had decomposed. A further 16 of the 29 graves sealed beneath the 10th-century church were thought to have once contained coffined burials. These large graves had been exhumed in antiquity, to allow for the construction of the tower and western annex of the late Saxon church, and no human bone remained. The excavators hypothesised that coffined burials would both require a large grave cut and facilitate the complete removal of the original interment, and thus the size of the graves, combined with the successful exhumations, lead them to infer the presence of coffins.

Figure 4.6: *Individual 1053 in a preserved wood coffin (Photograph courtesy of Warwick Rodwell).*

Of the burials determined by the excavators to be coffined/possible coffined, 213 were identified as adult (Table B9). Although the delimitation of the clay encapsulating the bodies appeared to provide strong evidence for coffins, these burials were excluded from the current analysis. The reason for this decision lies in the different burial conditions created by the addition of the clay to the coffin, which could have the effect of altering the resulting skeletal positioning. Moreover, in some graves the cut could not be distinguished, which meant that the filling of the grave rather than a coffin with clay could not be ruled out. Of the burials from St Peter's phase E, seven fulfilled the criteria for confirmed coffined burials. This number was much lower than expected. The main problem lay with a lack of photographs. In a large number of cases the wooden coffin had been photographed but the skeletal remains had already been removed. An additional burial from a potentially later phase (D/E) has also been included in this analysis (SP1869). Burials allocated as D/E by the excavators could not be placed with confidence into either phase E or phase D (c. 1150-1300), and the coffin fulfilled all selection criteria, and appeared to be comparable to those in phase E. This provides a total of eight confirmed coffin burials from St Peter's (Table 4.9 and Table B10).

Table 4.9: *Details of the direct archaeological evidence used to confirm the presence of wooden coffins in the eight burials from St Peter's suitable for skeletal positioning analysis (evidence obtained from the archives held by English Heritage)*

Individual	Coffin evidence
SP776	Intact coffin – sides, ends and base present
SP1053	Intact coffin – sides, ends, bases and lid present
SP1174	Intact coffin – sides, ends and base present
SP1784	Intact coffin – sides, ends and base present
SP1819	Intact coffin – sides, ends and base present
SP1863	Intact coffin – sides, ends and base present
SP1869	Partly preserved wooden coffin – sides, ends, base and lid remains 2/3 of length
SP2322	Intact coffin – sides, ends and base present
Total: 8	

4.4.3 Staple Gardens Winchester

In 1984/5 rescue excavations directed by Kipling on a site in the north-western quarter of the city of Winchester known to contain Iron Age and Roman deposits unexpectedly revealed 78 inhumations sealed by a late Anglo-Saxon street (Youngs *et al.* 1986:149). Further excavations carried out in 1989, directed by Scobie, revealed further inhumation burials, bringing the total to 285 (Gaimster et al. 1990: 188-189). The information below was taken from the Staple Gardens archives held by the Hampshire Cultural Trust unless otherwise stated, as the site has not been fully published.

The occupation of Winchester from the Iron Age to present has been well established through both documentary and archaeological evidence (see Ottaway 2017 for an up to date synopsis). Kjølbye-Biddle (1992) produced a summary of evidence for burial practices in Winchester from the Iron Age through to the later medieval period where she notes that Staple Gardens appears to be the only cemetery within the urban limits of Winchester other than those associated with Minsters (Old, New and Nunnaminster); even though there are churches which date to the late Anglo-Saxon period, these do not appear to have been granted burial rites at this time (Kjølbye-Biddle 1992: 224). No evidence was found during excavations for a church at the site.

The site at Staple Gardens had been intensively used for burial and intercutting of graves occurred early in the cemetery's use. The overlaying of burials and associated slumping of newer graves into older hindered the identification of individual grave cuts and complicated the process of associating finds to a specific grave, which had implications for identifying coffined burials based on iron nails. Where grave cuts were discernible, they were mostly rectangular with steep sides. In addition to disturbance attributed to other later inhumations, the burials in some areas had also been disturbed by later features. The cemetery was stratigraphically dated by the position of burials in the levels above Roman occupation phases and sealed beneath a 10th century metalled surface. A limited radiocarbon dating programme provided only two dates, AD810-970 and 960-1040 (cal 2 sigma) (Bayliss 2001), but supported the stratigraphic dating.

The majority of burials were orientated west to east with heads placed at the western end of the grave. Most interments were supine with legs extended; nevertheless, two non-adults were buried in what was described as a “crouched” position and a further child in a “foetal” position. The intensive use of the site and the subsequent disturbance of some interments led, initially, to some burials being interpreted as multiple. With the exception of grave G1147, a triple burial in a single grave cut, post-excavation analysis determined all other burials to be of single individuals, however, how this determination was reached is not clear. Excavators recovered evidence for the concurrent use of a number of grave elaborations across the site (Table 4.10). As seen at St Peter’s, above, the different features could appear in isolation or in combination. Grave G0274 presented evidence in the form of nails for a coffin and grave goods: a coin, a glass fragment and pot. Staple Gardens also contains a rare late Anglo-Saxon example of a lead coffin.

Table 4.10: *Grave elaborations identified in burials at Staple Gardens (obtained from the archive held by Hampshire Cultural Trust)*

Grave elaborations	Frequency
Coffin – wood	37
Possible coffins from nails	18
Coffin - lead	1
Pillow stones/ear muffs	11
Charcoal	7
Grave marker	2
Coins	14
Pot	26
Copper object	12
Iron object	14
Bone object	4
Glass fragments	12
Lead object	2
Shale bracelet	1
Iron nails not associated with a coffin	19

Wooden Coffins

Of the 285 inhumations, excavators considered 54 were originally contained within wooden coffins. The presence of coffins was most frequently determined (in 32 burials) from varying amounts of soil staining from the decayed wood in the grave. In three of these graves the presence of charcoal was taken to infer that the coffin wood had been charred prior to deposition. Soil stains were most common beneath the skeletal remains and in the form of a rectangular or slightly tapered outline. They measured between 2 and 5mm in thickness. Lids were identified by the presence of soil stains in five graves and excavators were able to ascertain, as in grave G225, these had collapsed along the mid-line of the coffin. In one grave (G542) excavators inferred the presence of a coffin from a wooden imprint in a deposit of charcoal beneath the skeletal remains, the inference being that in this burial the charcoal must have been used to line the grave *before* the coffin was placed on top. Excavators also determined wooden coffins from the presence of nails in graves. In seven graves *in-situ* iron nails were found in combination with a soil stain underneath the body, but a further 20 graves contained iron nails with no evidence for soil stains. Unfortunately, the number and position of the nails was not always recorded in the documentation. The potential for residual nails in graves from earlier occupation or transference from adjacent burials is high due to the amount of disturbance recorded across the site. This means that the identification of coffins based on nails alone at Staple Gardens was deemed insecure.

Of the 54 burials the excavators had determined to be contained in coffins, 43 were established to be adults (Table B11). When the selection criteria outlined in section 4.1 were applied to these burials, only five were identified as confirmed wooden coffin burials suitable for skeletal positioning analysis (Table 4.11 and Table B12). An example of individual 1126 is presented in Figure 4.7.

Figure 4.7: *Grave of individual 1126 with evidence for charcoal/wood stains in patches on the base and vertically on the left side of the lower limbs (Copyright Hampshire Cultural Trust)*

Table 4.11: *Details of the direct archaeological evidence used to confirm the presence of wooden coffins in the five burials from Staple Garden's suitable for skeletal positioning analysis (evidenced obtained from the archive held by Hampshire Cultural Trust)*

Individual	Coffin evidence
SG856	Soil stain representing the base and parts of the sides up to a height of 0.24m
SG1056	Soil stains representing the lid, base and sides 1 nail present within grave fill
SG1126	Thin vertical band of charcoal along the side of the legs Charcoal representing the base of a coffin 2 nails present within grave fill
SG1255	Soil stains representing the base and collapsed sides and lid
SG3037	Soil stains representing the base and sides
Total: 5	

4.4.4 Swinegate York

Redevelopment of an area on Swinegate and Back Swinegate, York (NY) exposed evidence for Roman and medieval activity and resulted in an archaeological excavation between 1989 and 1990. Unless otherwise stated the information contained below relating to Swinegate burials was taken from the York Archaeological Trust excavation archive in the absence of a full site publication. Osteological analysis was undertaken by Buckberry for her doctoral thesis (Buckberry 2004).

The Swinegate site sits amid plentiful evidence for Roman activity: roads, a fortress and a bath house (McComish 2015: 3). Anglo-Saxon activity in this area is, however, more obscure. Although there is a vast amount of information about York throughout this period, there is little documentary evidence pertaining to this particular cemetery. Excavators made a link between the burials and the now lost church of St Benet's (Pearson 1989: 7). Although no physical evidence for the church was revealed by the excavations, the increase in burial density towards the corner of Swinegate and Back Swinegate was taken as evidence for the location of St Benet's beyond the boundary of the excavations (Pearson 1990: 7). The foundation date for St Benet's church is unknown, but its dedication to the Northumbrian Saint Benedict Biscop suggests a pre-Conquest origin (Dean 2012: 108-109). The parish later merged with St Sampson's, and by approximately 1300 the church of St Benet's had been demolished (Dean 2012: 150).

Out of the 15 trenches excavated, eight revealed a total of 100 inhumations. Large amounts of disarticulated human skeletal material, excavated from grave fills and from a charnel pit, was also found across the site. All but three inhumations were dated to the 9th to 11th centuries on the basis of dendrochronological dating of preserved coffin wood and in conjunction with stratigraphic evidence from the burials in trenches 3, 5, 7, 8, 11 and 15, sealed by a metalled surface dated to the 12th-century (Pearson 1989: 7) (Table 4.12). Those stratigraphically above the metalled surface have therefore been excluded from the analysis undertaken in this thesis.

The density and layout of burials appeared to vary across the cemetery. To the north of the site, trench three contained burials which appeared organised into rows, while trench 14 and 15 to the south-west on Back Swinegate saw a higher density of less orderly burials. The graves were roughly orientated west/north west to east/ south east, aligned with the underlying Roman structures, and standard burial form was a single individual placed supine in the grave with their head to the west (Pearson 1989:7). Grave cuts were generally hard to identify, but when discernible tended to be rectangular in shape with steep vertical sides. An exception was the grave cut for skeleton 11006 which was shallower with rounded south/south-west end. Evidence for grave elaboration was limited (Table 4.13), yet variation existed in the form of these elaborations. One individual had been buried in a coffin made from a hollowed-out tree trunk, while one plank grave covering for a child had been carved with what appeared to be a noughts-and-crosses game. Only one individual had been found buried with any items: an iron belt buckle, iron knife and a stone hone (Rogers 2015).

Table 4.12: *Results from the dendrochronological dating of preserved wood from coffins at Swinegate (Bagwell and Tyers 2001)*

Skeleton number	Coffin/lid Number	Tree ring sequence range (AD)	*Date Interpretation (AD)
3379	3406/3344	790-882	After 892
3489	3476	772-838 834-903	After 848 After 913
3505	3502/3509	828-923 793-915 767-892	After 933 After 925 After 902
3511	3414/3434	831-956	After 966
5032	5031/5033	749-921 761-912	After 931 After 922
14044	14045/14046	804-914 807-985 765-986	After 924 After 995 After 996
15015	15006	841-929	After 939

** The interpreted dates are calculated to take into account the date of felling based upon sapwood and bark. If no sapwood or bark is present the date can only be represented as being after a possible felling date.*

Table 4.13: *Grave elaboration identified in burials at Swinegate (taken from the excavation archive held by York Archaeological Trust and Rogers 2015)*

Grave elaborations	Frequency
Coffin – rectangular	42
Coffin – hollowed-out tree trunk	1
Iron knife	1
Plank covers	8
Pillow stones	1
Stone hone	1

Wooden Coffins

Preserved wood and soil stains indicated coffins in 43 of the burials at Swinegate, and wooden planks which could relate to covers or coffin lids were found in a further six graves, and one grave contained only a plank beneath the skeletal remains. Preservation of the coffin varied from three examples of complete, intact coffins with lids, to graves with a mixture of preserved wood and soil stains, to coffins which were represented by soil stains only. Figure 4.8 shows an example of a coffin with partially preserved wood base, left side and foot end board. The Swinegate coffins have been comprehensively discussed in the preceding chapter (Chapter 3) so only a summary is given here. Where the level of preservation was sufficient to allow the construction method of the coffin to be observed, in all but one case, in which iron nails were used, the planks had been joined together using wooden pegs. All the coffins, with the exception of the coffin made by hollowing out a tree trunk, were determined to be rectangular with parallel sides.

Of the 43 burials that had been designated as coffined by the excavators, 34 contained adult skeletal remains (Table B13). When the selection criteria outlined in section 4.2 were applied to these burials, 24 burials were determined as suitable for skeletal positioning analysis (Table 4.14 and Table B14).

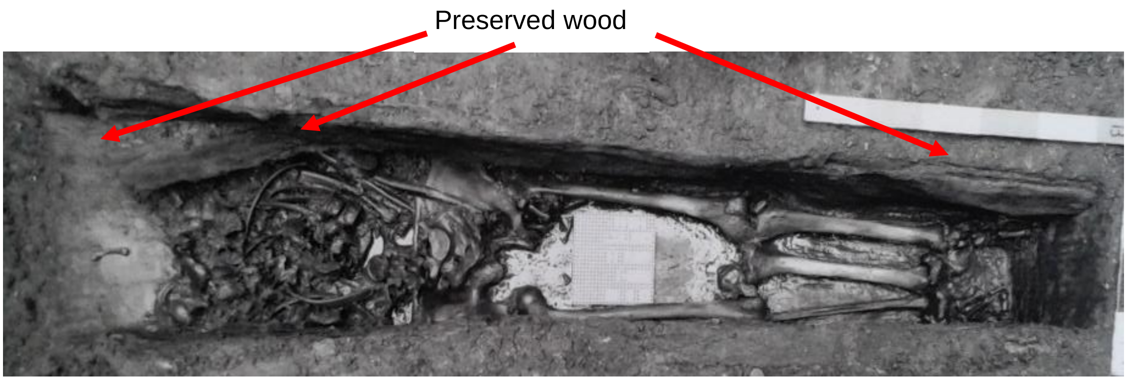


Figure 4.8: *Individual 14044 in a partially preserved wooden coffin, displaying a base board, left side board and foot end board (Used with permission from York Archaeological Trust)*

Table 4.14: *Details of the direct archaeological evidence used to confirm the presence of wooden coffins in the 24 burials from Swinegate suitable for skeletal positioning analysis (evidence obtained from excavation archive held by York Archaeological Trust)*

Individual	Coffin evidence
SY3331	Lid represented by soil stain of fine brown powder Preserved wood of sides to a height of 0.03m Preserved wood of base
SY3379	Preserved wood of base, sides and lid present
SY3381	Preserved wood of base, sides, ends and lid present
SY3426	Preserved wood of base, sides, ends and lid present
SY3428	Preserved wood of base, sides, one end and lid present
SY3441	Preserved wood and soil stains representing the base and sides Soil stain with fragments of wood representing the lid
SY3450	Badly decayed wood and soil stains representing the base, sides and ends Lid represented by fragment of preserved wood lying on the skeleton
SY3455	Preserved wood of base, sides and head end present Soil stain representing lid
SY3456	Preserved wood and soil stains representing the base, sides and one end Preserved wood of lid present
SY3481	Preserved wood of base and one end present Fragments of preserved wood representing one side present Preserved wood of lid present
SY3505	Preserved wood of base and sides present Decayed wood of lid present
SY3511	Preserved wood of base, sides and ends present Decayed wood of lid present
SY5005	Decayed wood of base, sides and ends present
SY5017	Preserved wood of base, ends and lid present
SY5032	Decayed wood of base, sides, ends and lid present
SY7061	Decayed and damaged wood representing base and a side
SY8006	Badly decayed wood and soil stains representing the base, sides and lid
SY8010	Badly decayed wood present for base and sides
SY11006	Preserved wood of base, sides and one end
SY11016	Decayed wood with inclusions of preserved wood of base, side and one end Preserved wood of lid present
SY14030	Decayed wood of base and sides present Combination of decayed wood and soil stain representing lid
SY14044	Preserved wood of bases, sides and ends present Decayed wood of lid present

Individual	Coffin evidence
SY15013	Preserved wood of base, side and one end
SY15015	Preserved wood of base, sides and one end
Total: 24	

4.4.5 Worcester Cathedral, Worcester

The replacement of the floor in the Norman Chapter House at Worcester Cathedral revealed a cemetery just below the Victorian joists. The excavations took place in 2003, directed by Guy. Unless otherwise stated the information contained below was taken from the main publication by Guy (2010) and from the excavation archive held at Worcester Cathedral. Only a preliminary osteological analysis of the skeletal material was carried out by Buckberry in 2006.

The cathedral in Worcester was founded in 680 by Bishop Bosel (Fryde *et al*. 1996: 223). In the late 10th century, the church was given to the Benedictine monks by Bishop Oswald, who constructed a new building (Winterbottom 2007 WMGPA iii, 115.8), however, nothing remains of these earlier buildings. A new cathedral was built and then enlarged over the next four centuries, including the addition of the Chapter House at the beginning of the 12th century (Heslop 2005). The burials encountered beneath the floor of the current church were dated by their association with the earlier church on the site and a *terminus ante quem* provided by the construction of the Chapter House above them (Guy 2010:73).

On commencement of the excavations the decision was made to excavate and lift only those interments that would have been disturbed by the building works. Thus, 181 burials were fully excavated and a further 109 burials exposed and recorded but left *in situ*. Graves conformed to a general west- east orientation, roughly arranged in north-south rows, and each contained one supine individual with heads to the west. The intensity of burial at the site suggests the cemetery was in use over a lengthy period of time and vertical intercutting produced a possible nine phases. Grave elaboration appeared to be limited to the use of wooden coffins and the placing of stones around the head (Table 4.15). However, the cemetery also produced evidence for textiles in nine graves which the excavators could not differentiate between clothing, pillows, shrouds or coffin linings.

Table 4.15: *Grave elaborations identified in burials at Worcester Cathedral (taken from the excavation archives held by Worcester Cathedral and Guy 2010)*

Grave elaborations	Frequency
Wooden coffin (including one with charred boards)	106*
Tree branch - unworked	1
Organic pillow	1
Textile	9
Lock and key	1
Stones around head	65*

**Total of fully and partially excavated burials*

Wooden Coffins

There were no examples of fully intact wooden coffins excavated at Worcester Cathedral. Instead, the excavators identified the presence of coffins from sections of preserved wood, soil stains, voids or impressions in the grave fill left by decomposed wood, and iron nails. Figure 4.9 shows evidence for preserved wood on the base and left side of individual WC092's. The survival of organic residues appears to be the consequence of the dry conditions of the surrounding environment, possibly resulting from the construction of the Chapter House above. Nevertheless, the amount of evidence was variable, with some graves featuring mere fragments of preserved wood, while others included a combination of evidence. Nails indicating coffins were located in 17 graves. These *in-situ* nails were determined to either fasten the sides of the coffin to the base or alternatively to fasten the lid down. A further 13 graves contained nails that were not *in situ* and as a result were not deemed conclusively to contain a coffin. Nonetheless, the presence of evidence for lids, bases and sides was recovered, inferring coffins rather than biers or boards covering the body were in use. Coffins were generally rectangular in shape, with a possible 12 displaying a slight tapering towards the foot end. The presence of voids in seven graves illustrated the thickness of the coffin boards, most frequently this was between 10 and 20mm, but a few examples measured up to 40mm. Only one grave produced evidence for possible charring of the coffin boards before deposition in the form of an ashy stain.

Excavators considered that the number of coffins may be under-represented due to the partial exposure of 109 graves. In these graves, where the human bone did not extend above the lowest level of construction for the new floor, the graves were only exposed to a point which allowed the recording of the skeletal material. As illustrated by the completely excavated graves, evidence for coffins may not include the lid or complete sides, thus the evidence for coffins may not have been reached before excavation ceased.

Due to the requirement for skeletal elements to be clearly photographed, only the 79 fully excavated burials that had been designated as being within a coffin by the excavators were suitable for analysis. Of those 79 burials, 55 contained adult skeletal remains (Table B15). Of these, 25 burials were identified as containing confirmed wooden coffins and suitable for skeletal positioning analysis (Table 4.16 and Table B16).

Figure 4.9: *Preserved wood found on the base and left side of individual WC092 (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Table 4.16: *Details of the direct archaeological evidence used to confirm the presence of wooden coffins in the 25 burials from Worcester Cathedral suitable for skeletal positioning analysis (evidence obtained from excavation archive held by Worcester Cathedral)*

Individual	Coffin evidence
WC092	Partial preservation of wood representing a rectangular container. Fragments of the base and sides present
WC093	Fragments of preserved wood from base and sides
WC103	Fragments of preserved wood from base and sides
WC193	Fragments of preserved wood of the base present Soil imprint from decomposed wood present along east side. Three *in situ* nails along north side.
WC194	Fragments of preserved wood of base and a side
WC253	Wood fragments in fill and a soil stain/impression of base and partial sides
WC262	Fragments of preserved wood combined with a powdery residue underneath and surrounding skeleton providing an outline of the base and sides Possible evidence for a lid from preserved wood fragments in fill
WC295	Preserved wood of the sides and base present The base was possibly lined with fabric
WC322	Preserved wood of the base and side present
WC324	An ashy soil stain in combination with fragments of preserved wood from the base and sides present
WC352	Fragments of preserved wood of sides present At the southern and western sides, it is clearly visible where the grave fill was packed around coffin 7 coffin nails in position to indicate a nailed down lid
WC396	Nails forming coffin outline: 4 along one side and 1 on the opposite side
WC507	Small fragments of preserved of wood within voids formed between the grave fill surrounding the skeleton and the fill within the cut Row of nails along northern side at the base and nails in 3 corners
WC532	Impression in the soil from the decomposed wood of the sides and base
WC545	Impression in the soil from the decomposed wood of the sides and base
WC674	Impression in the soil from the decomposed wood of the sides and base
WC693	Impression in the soil from the decomposed wood of the sides and base containing small fragments of preserved wood
WC697	Fragments of preserved wood of base, sides and lid 1 nail in situ
WC720	Impression in the soil from the decomposed wood of the sides and base

Individual	Coffin evidence
WC790	Fragments of preserved wood of east end, north side and south side Cut dimensions larger than wood, so not a grave lining
WC799	Fragments of preserved wood of base and a side with nails located for attaching the boards together
WC804	Preserved wood of the base and south side present
WC892	Combination of areas of preserved wood of the base and sides and where the wood has rotted a 10mm void is present indicating original position
WC930	Combination of areas of preserved wood of the base and sides and where the wood has rotted a 5mm void is present indicating original position
WC1167	Void left by decayed wood 10mm thick of sides. Evidence of fill between cut and void
Total: 25	

4.5 Summary

From the database of potential sites, five cemeteries containing burials dated to the late Anglo-Saxon period were considered to meet with the selection criteria of available photographs, adult burials, clear evidence for wooden coffins and acceptable levels of bone preservation. In total, 78 confirmed coffin burials were identified at these five sites. It is notable that there is variation within as well as between the sites in the range of evidence confirming the presence of a wooden coffin. Fully preserved intact containers were present at St Peter's and Swinegate, while at Worcester more fragmentary pieces of decayed wood were present in graves. At Staple Gardens, coffins were confirmed from soil stains, whereas at St Oswald's corroded metalwork represented only the remaining evidence of wooden coffins. Nevertheless, all burials which have been included in the 78 have been identified as being contained within wooden coffins as opposed to any other form of burial with a high degree of confidence. In the next chapter, these burials are the subject of a detailed analysis of their skeletal positioning to assess to what extent the presence of a coffin has impacted upon decomposition and disarticulation of the corpse.

Chapter 5 – Skeletal Positioning Analysis of Confirmed Coffin Burials

The identification of 78 confirmed coffined burials in the previous chapter provided the opportunity to explore and characterise directly the interaction between the decomposing corpse and the immediate burial environment created by a wooden coffin. The aim of this part of the project was to discern whether there are key patterns of skeletal positioning which can be attributed to decomposition in a wooden coffin, as opposed to other forms of burial practice or taphonomic processes. The potential effects of the wooden coffin on decomposition were considered and their manifestation in resulting skeletal positioning observed. The results of this analysis provided the basis for the development of a methodology to distinguish coffined and uncoffined burials which could then be applied to graves with no archaeologically-visible evidence for the coffin itself.

This chapter begins with the approach taken for the analysis of the confirmed coffined burials in Section 5.1. Section 5.2 presents the findings of this analysis. Initially, the findings from the confirmed coffined burials from all five sites were presented as one data set, in order to identify any similarities in skeletal positioning and identify possibly significant differences. In Section 5.3, the skeletal observations will be discussed with reference to interaction with the wooden coffin to explain their archaeothanatalogical significance. As part of this discussion, any variations in skeletal position that may be related to differences in environmental conditions between cemeteries or other taphonomic factors will be drawn out and explored. This will facilitate critical consideration of whether there are any skeletal indicators directly indicative of burial in a wooden coffin. Section 5.4 presents the archaeothanatological methodology that was created in response to the findings from the confirmed coffined burial analysis, and in section 5.5 the skeletal positioning criteria are assessed independently via other forms of contained burial. The selection criteria for the three cemeteries to which the method is applied in Chapter 6 are outlined in section 5.6.

5.1 Approach to the Skeletal Analysis of Confirmed Coffined Burials

Archaeothanatological interpretation of the 78 burials in confirmed wooden coffins required the examination of *in-situ* photographs of the skeletal elements in the grave, all the supporting excavation documentation and, where available, reference to osteological analysis of the remains. As discussed in Chapter 2, holistic approaches such as archaeothanatology necessitate the inclusion of data from all available sources to facilitate the reconstruction of the original burial and the interpretation of funerary practices. While photographs provide most of the information needed to assess skeletal positioning, excavation documentation and skeletal analysis data provide supporting information on aspects such as depth measurements, sediment type, the gradient of the grave floor and other features from the grave not visible in the image. In most cases, the excavation documentation included the only evidence pertaining to the coffin, as the direct archaeological evidence was not always apparent in the photograph.

Each burial was recorded using a systematic procedure. First, the information extracted from the excavation documentation was recorded, along with a detailed textual description of the position of each skeletal element. To facilitate the recording of this information a pro-forma database was created (Appendix C, Tab 1). The recording of data in this way ensured the approach to each burial was systematic and replicable, assisting comparisons between burials, sites and the published literature. To further standardise the approach, the positioning of the skeletal elements was recorded using a defined set of terms (see Appendix A). These terms are based upon the *Terminologia Anatomica*, the International Standard for Anatomical Terminology approved in 1998. This approach is supported by Sprague (2005), Duday (2009: 16), and Knüsel (2014), all of whom emphasize the need for clear unambiguous language for describing the burial tableau in archaeothanatological research and advocate the use of standard anatomical terminology as a means of achieving this. As well as providing a standard list of names for skeletal elements and regions, the *Terminologia Anatomica* provided a standardised way of referring to body position and movements. Standard anatomical position is used in this thesis as a reference point from which to describe displacement (Figure 5.1 and Appendix A). The position and location of each skeletal element in the grave was described with reference to any deviation or displacement from anatomical position and its relationship to other skeletal elements and coffin features, for example the coffin sides. Where right and left are used this refers to the skeleton's right and left, not the observers. Further vocabulary, not derived from the *Terminologia Anatomica,* was adapted from the previously published literature, rather than adding to extant terminological confusion highlighted by Knüsel (2014) by creating new and varied terms. This process of recording skeletal position resulted in a detailed description for each burial, recording the disposition of the bones with reference to each other and features in the wider grave using consistent, repeatable terminology. Following on from the descriptive documenting of the position of the skeletal elements, an interpretation was recorded in the database that considered the potential taphonomic factors that could result in the observed positioning. This included an assessment of how the presence of the coffin may have contributed to the skeletal positioning observed.

The following section presents the findings of the skeletal positioning analysis of the 78 confirmed coffin burials. Here, the data produced from the analysis of individual graves is interrogated and compared between burials across all sites. The results of the analysis are then reviewed with reference to information from published literature to examine how the results compare with previous research.

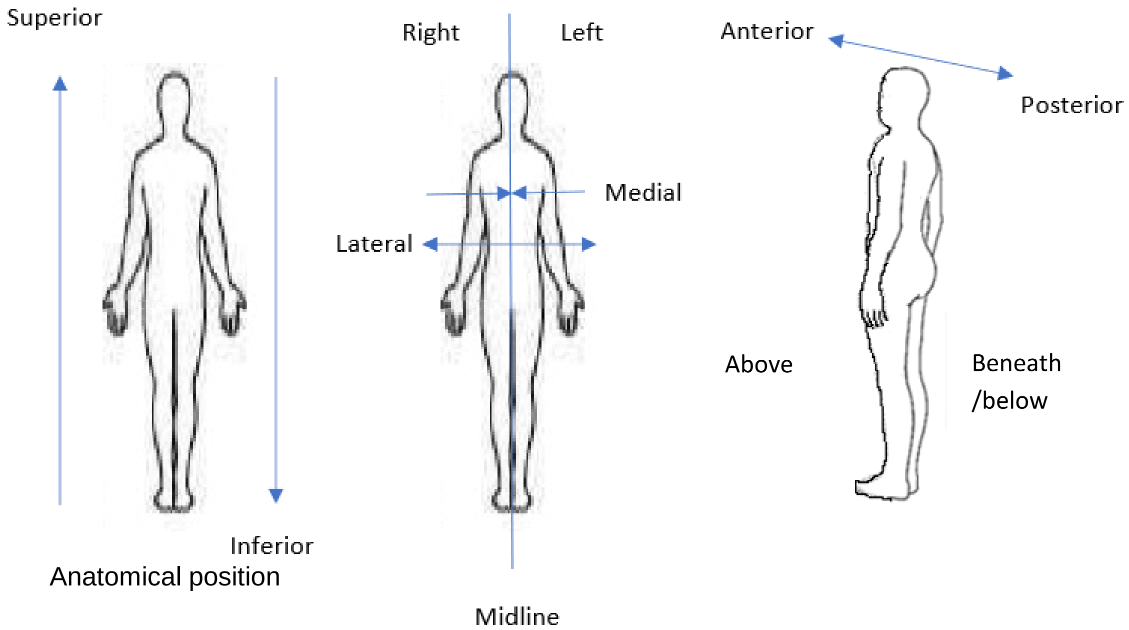


Figure 5.1: *Diagram illustrating the terms used to describe the direction of movement of skeletal elements in a grave*

5.2 Skeletal Observations

The dominant observation from across all burials is one of skeletal disarticulation and movement. All the analysed burials contained skeletal elements that had deviated from an anatomical position; although not all skeletal elements in a burial were affected. A considerable proportion of burials also displayed skeletal elements maintained in potentially unstable positions. Due to the variation in the level of skeletal preservation and completeness, as well as in image quality between burials, a comparison of the frequency of observations for different skeletal elements was difficult. Nevertheless, patterns emerged concerning certain bones and the way they were displaced or found to be in potentially unstable positions. Firstly, the original arrangement of the corpse at burial is discussed (5.2.1). Next, the type of displacement that has occurred will be examined, by presenting data on the skeletal elements involved, and the frequency and the extent of movement observed (5.2.2 to 5.2.4). Those skeletal elements found to be maintained in potentially unstable positions will then be presented (5.2.5).

5.2.1 The Original Arrangement of the Corpse

All individuals appeared to have been deposited into a coffin in a supine position. It was possible to use the predominant orientation of bones to ascertain that the corpse had been supine even in the burials exhibiting extensive skeletal displacement. Variation was, however, apparent in the exact arrangement of the upper and lower limbs. Of the 46 burials where the position of both upper limbs could be determined (46/78, 59%), arm position was determined to be approximately symmetrical in 26 burials (26/46, 58%), and asymmetrical in the other 20 burials (20/46, 44%). In 10 burials (10/78, 13%) the skeletal elements were visible for only one upper limb preventing assessment of symmetry (Table C2). The dominant upper limb arrangement was for the forearm to be flexed at the elbow and resting across the corpse (36/54, 67% right and 31/48, 65% left), most frequently this placed the hands over the pelvic area. In those burials in which the forearms were extended along the sides of the corpse (13/54, 24% right and 12/48, 25% left), there was apparent variation in rotation, with anatomical, neutral and pronation all recorded.[8] In the other five right and left upper limbs (5/54, 9% right and 5/48, 10% left) the limb appeared extended but adducted and anterior to the torso. A clear pattern emerged from the data relating to the overall compact nature of the upper limb positions; as even when the upper limb was extended this was in a position adjacent to the corpse or with a flexion of the wrist placing the hand in the fleshed corpse resting anterior to the thigh, as seen in the left upper limb in WC720. Abduction was only present in four cases (SO412, SO515, SY5017 and WC804) and even here the forearm was positioned over the corpse, indicating these may be individuals of larger body mass and thus the upper limb position is a consequence of body size rather than an exceptional ritual placement of the limb (Figure 5.2). Alternatively, the position could be the result of more extensive lateral movement into a larger external void.

[8] A neutral rotation of the forearm is position mid-way between anatomical position (supination) and pronation. The forearm would rest on its medial surface. The distal ulna would be posterior to the distal radius.

Flexed at elbow, resting on pelvis. Extended One flexed, one extended

Figure 5.2: *Example of the arrangement of the upper limbs. Left – WC804, in which the upper limbs are flexed at the elbow with the forearms resting over the pelvis, the right upper limbs displayed slightly abduction. Middle – WC697, in which both upper limbs are in an extended position. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral). Right – SO238, in which the upper right limb is flexed at the elbow and the forearm resting over the pelvis, while the left upper limb is in extension (Copyright Gloucester City Museums)*

For the lower limbs, not including the feet, which are discussed separately below, the placement ranged from extended through to adduction at the hip, with the medial epicondyles of the femora and the medial malleolus of the tibiae (knees and ankles) adjacent, or very close together. The only exception was skeleton SG1126 from Staple Gardens, whose tibiae were crossed distally right over left (the lower legs were crossed at the ankles) (Table C3). In almost all burials the lower limbs displayed symmetry in arrangement (56/58, 97%). In only SO383 and WC804 were the lower limbs not symmetrical, with one limb in an extended position and the other slightly adducted. The most frequently observed arrangement was one in which the limbs were adducted (22/58, 40%), with a further 19 displaying slight adduction (19/58, 33%) and 14 in an extended position (14/58, 24%). This supported the findings from the upper limbs for a tendency for a more compact arrangement of the corpse at burial (Figure 5.3).

Adducted Adducted and right crossed over left Extended

Figure 5.3: *Example of the arrangement of the lower limbs. Left – SY5032, in which the lower limbs are adducted. (Used with permission from York Archaeological Trust). Middle – SG1255, in which the right limb in crossed over the left at the ankle (Copyright Hampshire Cultural Trust. Right – SO175, in which the lower limbs are extended. (Copyright Gloucester City Museums).*

A discussion of the original position of the feet is more complex than the terminology applied to the rest of the lower limb can encompass, as there is the potential for more varied positions. The feet are unlikely to have been positioned with the plantar surface on the coffin base, as there is no corresponding evidence for flexion of the knee in any burials, as would be expected to occur on at least some occasions where the coffin was not quite long enough. Instead, the feet will have been positioned with the calcaneal tuberosity resting on the coffin base, in either an anatomical position or a variant thereof. Due to the extent of the external displacement present, the arrangement of the feet was difficult to ascertain, however, in 20 burials an approximate position of the feet could be inferred (20/46, 43%) (Table C4). In the majority of burials, the original arrangement of the feet appeared to be either in plantar flexion or a roughly anatomical position (8/19, 42% right and 7/17, 41% left), albeit with a subsequent posterior and inferior fall of skeletal elements, or a lateral rotation of the foot, again in plantar flexion (9/19, 47% right and 4/17, 24% left). In one right foot and four left, a medial/inferior fall was recorded, SO109, SY3331 and SY5032. It is unclear if this is related to differences in the original position of the feet or due to decompositional movement affecting the feet differently. In SO405 the right foot appeared to have fallen from a plantar flexed/anatomical position, although the left exhibited a lateral fall. In the final burial, SG1126 the right lower limb was resting anterior to the left. The left foot appeared to be resting on its lateral surface on the coffin base, while the right was plantar flexed and resting on the left foot. The space available inferior to the feet will affect whether the feet can fall in an inferior direction. If no space is available they could either, as in SY3456, fall to rest on the coffin end board or, if space is present, they could fall medially or laterally (Figure 5.4).

Figure 5.4: *Examples of the position of the feet. Left – SO109 the feet have fallen in an inferior/posterior direction towards the base, but with a slight medial rotation with the left foot possibly crossing anterior to the right (Copyright Gloucester City Museums). Right – SG3037, in which the feet have fallen in a more lateral direction resting on the coffin base. (Copyright Hampshire Cultural Trust).*

For the 49 burials (49/78, 62%) where both upper and lower limbs could be observed, there appeared to be no pattern in how the upper and lower limbs were arranged (Table C5). To illustrate this using the most frequently recorded upper limb position (flexed in 36 burials), corpses buried with their upper limbs flexed at the elbow and placed over the thorax or pelvis were almost equally as likely to have their lower limbs in an extended (11/36, 31%), slightly adducted (12/36, 33%) or adducted position (13/36, 36%). However, the combination of both upper and lower limbs in extended positions was not observed in any burial. Nor were any patterns found specific to each individual site in either the arrangement of the upper or lower limbs or in the combined overall position of the corpse.

A lateral compression or constriction of the upper body of the corpse at the level of the shoulders and thorax at burial was suggested in 33 burials (33/51, 65%) (Table C6). As identified in Chapter 2, skeletal indicators for lateral compression of the upper body are: verticalisation of the clavicles; medially rotated humeri resting on the medial surface; a superior and anterior rotation of the scapulae; and a narrowing of the thoracic cavity. For lateral compression to be recorded in the present study, at least two skeletal indicators had to be present. The decision to record compression in the absence of all the skeletal indicators being present was made first, in response to variation in the visibility of the skeletal elements in individual burials and second, as a consequence of the observed displacement of the humeri from medial rotation (Figure 5.5). In the 33 burials where the skeletal elements of both the right and left sides were visible the compression of the upper body was bilateral in all but five cases (28/33, 85%) (SO412, SY8006, WC194, WC693, and WC720), in which compression was only evident on the left side in three burials and the right side in two burials.

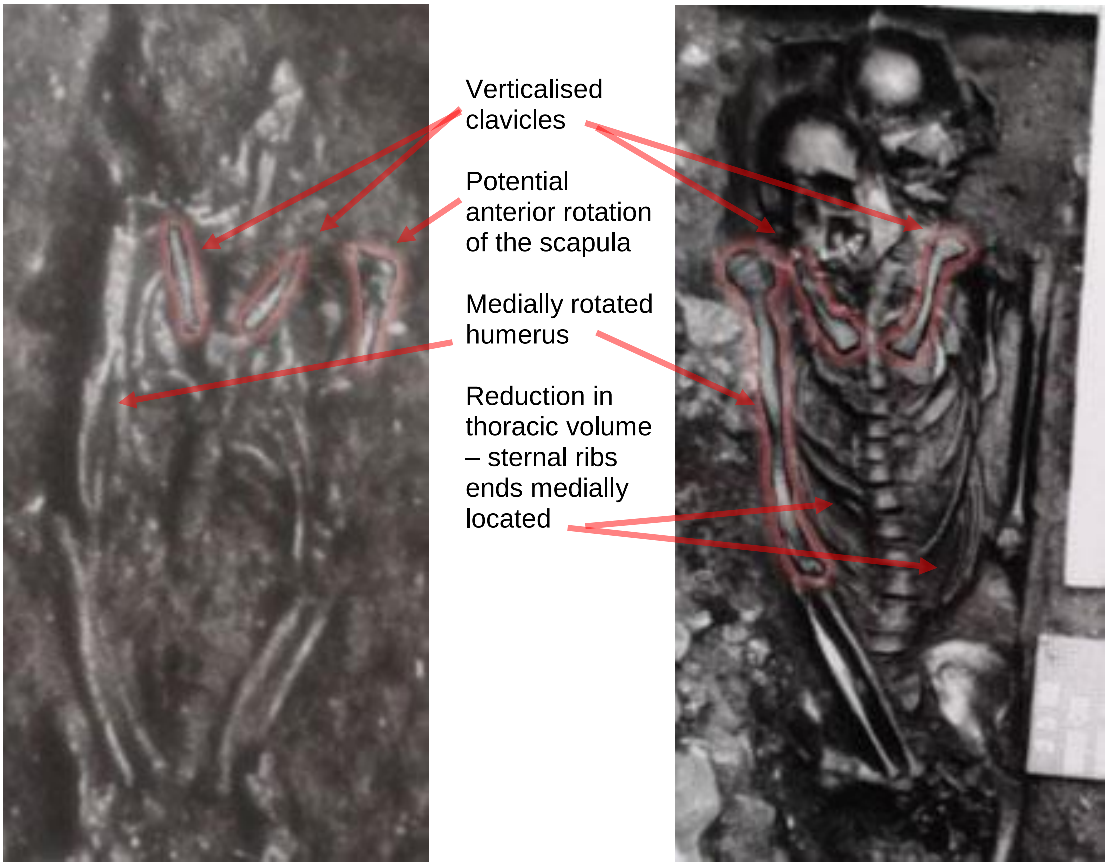


Figure 5.5: *Examples of skeletal evidence for bi-lateral compression of the corpse. Left – SO241, in which the clavicles are verticalised, the thoracic volume narrowed, and the right humerus medially rotated. It is also possible the left scapula is rotated anteriorly. (Copyright Gloucester City Museums). Right – SY7061, in which the clavicles are verticalised, the thoracic volume narrowed, and the right humerus is medially rotated. (Used with permission from York Archaeological Trust).*

5.2.2 External Skeletal Displacement

All confirmed coffined burials exhibited both external and internal displacement of skeletal elements (Table C7). The movement of skeletal elements outside of the original body volume was seen in all of the 78 burials (78/78, 100%).[9] A movement that included lateral and posterior displacement was most frequently observed, however, skeletal elements were also found to have moved in superior, inferior and/or anterior directions and could exhibit rotation in both a medial/lateral and/or an inferior/superior direction; examples include the left scapula in SO050 which had displaced in a superior and medial direction and WC396, Figure 5.6, in which the right femur had moved in an inferior, medial direction and rotated onto the anterior surface (Table C8). The type of skeletal elements found in an external void varied, as did the number of skeletal elements involved and the extent of the displacement. In the 78 burials the total number of skeletal elements displaying external displacement ranged from all visible elements, as in burial SP1053, to only a few bones, as seen in burial WC720 where only the mandible, first right rib and clavicles had moved externally. Nevertheless, certain skeletal elements were more repeatedly recorded as displacing into an original external void and displaying similar patterns of movement, and included: the cranium and mandible, the *ossa coxae*, the patellae and the bones of the feet. It is these that the following discussion will focus on. However, attention will be drawn to any unusual or noteworthy examples of other skeletal elements (Table 5.1. and Table C9).

[9] All percentage are given rounded up to the nearest whole number and are calculated based on the number of elements visible, a true prevalence rate.

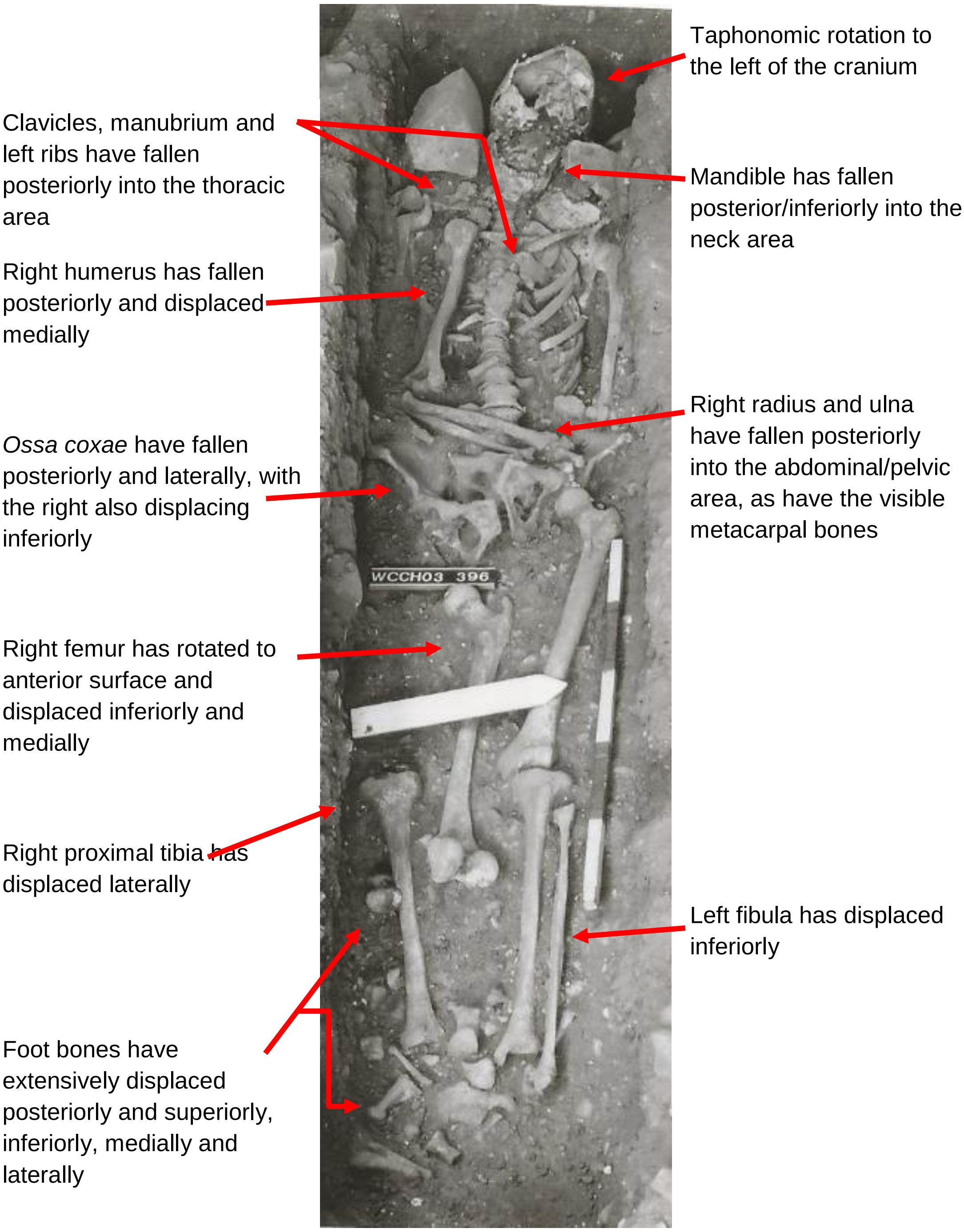


Figure 5.6: *WC396 showing a range of internal and external displacement of skeletal elements (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Table 5.1: *The frequency of skeletal elements exhibiting external displacement, by type of bone*

Skeletal element	Frequency	Skeletal element	Frequency
Cranium	43/58 (74%)	Right hand bones	5/41 (12%)
Mandible	53/54 (98%)	Left hand bones	14/45 (31%)
Vertebrae	8/61 (13%)	Right *os coxae*	42/53 (79%)
Right scapula	4/48 (8%)	Left *os coxae*	50/58 (86%)
Left scapula	4/45 (9%)	Sacrum	0 (0%)
Right clavicle	18/46 (39%)	Right femur	12/59 (20%)
Left clavicle	13/47 (28%)	Left femur	12/67 (18%)
Sternum (includes the manubrium and body)	2/41 (5%)	Right patella	14/31 (45%)
Ribs	7/65 (11%)	Left patella	15/33 (45%)
Right humerus	17/54 (31%)	Right tibia	17/61 (28%)
Left humerus	13/54 (24%)	Left tibia	13/64 (20%)
Right radius	2/56 (4%)	Right fibula	13/38 (34%)
Left radius	3/55 (5%)	Left fibula	16/42 (38%)
Right ulna	4/51 (8%)	Right foot bones	49/49 (100%)
Left ulna	1/54 (2%)	Left foot bones	53/53 (100%)

Cranium

The cranium was visible in 58 burials (58/78, 74%), although, in three burials due to damage it was not possible to assess for movement. In 43 burials (43/58, 74%) there was the potential for the cranium to have externally displaced from its original position (Table C10).[10] Unless damaged, the cranium displaced as a unit, as

[10] The tables embedded in this chapter show data pertaining to each specific element. However, due to the inter-related displacement of bones, full data by burial and skeletal element is contained in Appendix C.

expected, with cranial sutures maintaining articulation or fused together. Rotation of the cranium anterior, posterior, right or left after soft tissue decomposition, results from the unstable position created by the rounded morphology of the occipital bone where it commonly rests on the coffin base in a supine burial (Duday 2009: 17-18). This rotation would involve the frontal, facial and parietal bones moving through an external void. A combination of movements was recorded, including rotation in an anterior, posterior, right and left direction (Table 5.2 and Table C11). Of the 43 burials where the cranium had potentially displaced, rotation of the cranium to the right or left was observed in 29 cases (18/43, 42% right and 11/43, 25% left) (Figure 5.7). In only three of these 29 cases (3/29, 10%) (SO242, WC396 and WC545) could this rotation be confirmed as solely the result of taphonomic displacement, rather than due to the original position of the head at burial. In these three burials the rotation exhibited in the cranium was not replicated in the position of the mandible, with the inference that the rotation of the cranium had occurred after the disarticulation of the temporomandibular joint. In the remaining 26 burials (26/29, 90%) the mandible was aligned with the cranium or its position unclear. Identification of rotation of the cervical vertebrae to assist in distinguishing between taphonomic or intentional rotation of the crania was not possible in these 26 burials, as the position of the cervical vertebrae could not be ascertained. The rotation of the cranium in these 26 burials may have been the result of an intentional positioning to the right or left at burial, which was then further exaggerated by taphonomic movement, with the disarticulation of the cervical vertebrae that had, until decomposition, restricted the rotation to that possible in a fleshed corpse (Duday 2006: 35). However, as in the majority of burials this rotation was combined with other movement, this did not present a barrier to the identification of external space. The external displacement of the cranium in 18 burials (18/43, 43%) involved an extensive lateral and/or superior-lateral movement (Figure 5.8), and of these, four burials saw the displacement of the cranium completely away from anatomical location.

Table 5.2: *Frequency of variation in the external displacement of the cranium (* also includes rotation, right or left)*

Position	Frequency
Rotation - anterior	2 (5%)
Rotation - posterior	1 (2%)
Rotation - anterior and right	2 (5%)
Rotation - anterior and left	2 (5%)
Rotation - posterior and right	1 (2%)
Rotation right	5 (12%)
Rotation left	3 (7%)
Movement to the left *	2 (5%)
Movement in an inferior direction	1 (2%)
Combination of movement*	24 (56%)

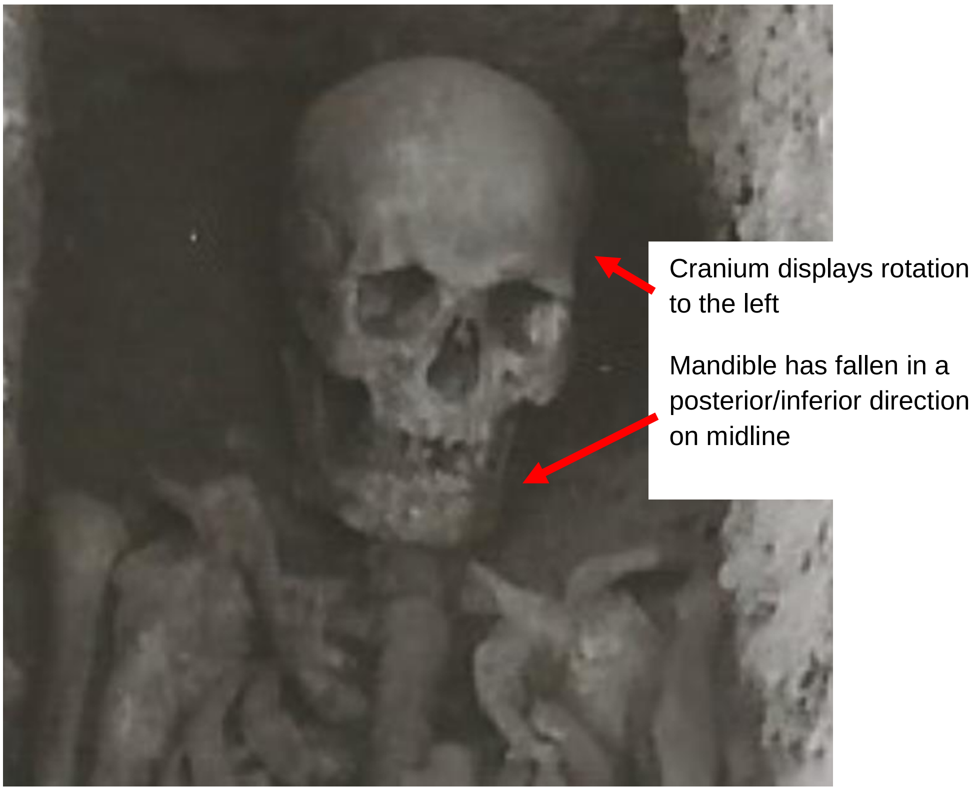


Figure 5.7: *Example of the external displacement of the cranium. WC545, displaying a rotation to the left of the cranium, while the mandible has fallen posteriorly to rest on the vertebral column. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

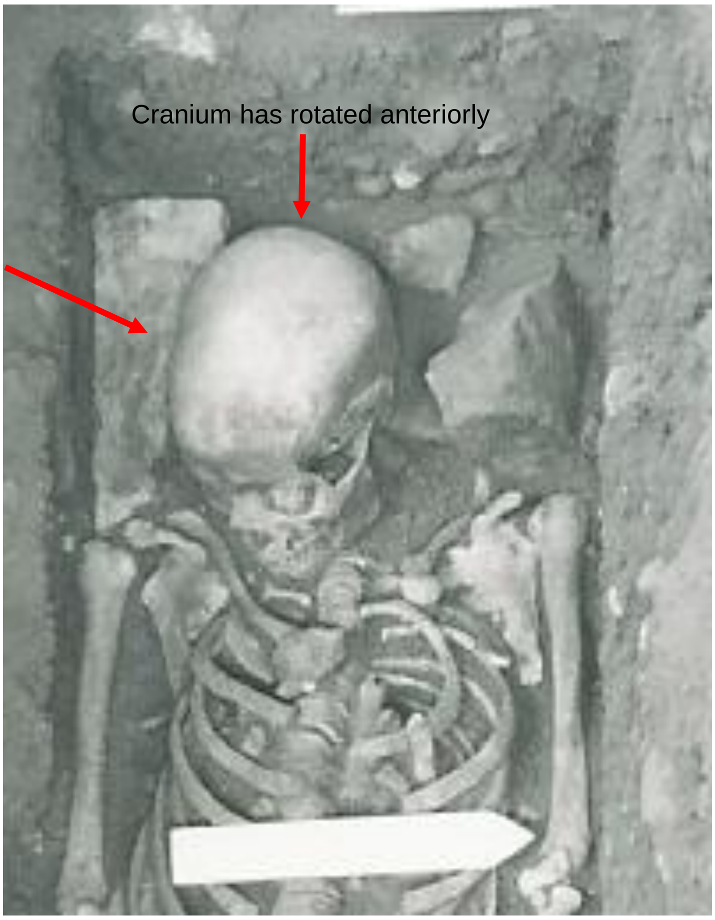


Figure 5.8: *Example of external displacement of the cranium. WC507 displaying an anterior rotation of the cranium, rotation to the right and a fall to the right to rest against a stone placed laterally (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Mandible

None of the 54 visible mandibles were located in anatomical position (54/78, 69%) (Table C12). Of these, 53 displayed a clear external displacement (53/54, 98%), with one burial (SY3455) in which it was less clear whether the mandible had moved in an internal or external void. The most frequent displacement of the mandible, as seen in burials SP1863, SY5005 and WC262, involved its fall in a posterior/inferior direction to rest on its inferior margin with the mental eminence in an inferior position to the ascending ramus (Figure 5.9 and Table C13). In 20 burials (20/54, 38%) this posterior/inferior movement appeared to be the only displacement observed (Table 5.3). This movement would have been both external and internal, unless the skull was rotated anteriorly allowing the chin to rest directly on the chest at burial, whereby the movement would only be internal. Due to movement of the cranium, this placement of the chin on the chest could not always be excluded, however, it would be an awkward position even for a corpse, and as such the decision was made to include all cases as evidence for external displacement. Where the mandible and cranium were still roughly aligned with each other, this gave the appearance of the mouth being wide open, as the anterior part of the mandible fell away from the cranium and/or the cranium fell in a posterior/superior direction. The mandible was also recorded rotated to either the right or left in 26 burials (16/54, 30% right and 10/54, 19% left). As discussed above in relation to the rotation to the right or left of the crania, whether this was an intentional placement of the head, or the result of a taphonomic displacement was not always clear. In nine burials (9/54, 17%) the mandible saw more extensive displacement, being moved from an anatomical location (Figure 5.9).

Table 5.3: *The frequency of variation in the external displacement of the mandible*

Position	**Frequency**
Posterior and inferior fall	20 (38%)
Posterior and inferior fall and rotation to the right	12 (22%)
Posterior and inferior fall and rotation to the left	4 (6%)
Rotation to the right	2 (4%)
Rotation to the left	2 (4%)
Displacement involving movement and rotation	13 (26%)

Figure 5.9: *Examples of external displacement of the mandible. Top – WC295, the mandible has fallen posteriorly and the chin inferior to anatomical position, resting on the vertebral column. Bottom – WC930, the mandible has rotated to the right and moved inferiorly away from the cranium, which has remained in approximate anatomical position, supported by stones. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

<u>Clavicles</u>

The clavicles were less frequently found displaying external displacement, but their review is still of benefit to the discussion of movement of elements outside the body volume, as rather than a lateral movement they display a superior one. External displacement of the clavicles was recorded for 18 right (18/46, 39%) and 13 left (13/47, 28%) across 22 burials (22/51, 43%) (Tables C14-C15). This involved movement in a superior-medial direction of either the whole clavicle or else the acromial end (Figure 5.10). In 12 burials (12/17, 71%), nine right and nine left clavicles exhibited evidence of verticalisation, alongside other skeletal indicators for compression of the upper body (Table C16). The acromial end had moved superiorly and anteriorly in response to the raising and anterior rotation of the shoulder. This in turn produced the effect of pushing the sternal end of the clavicle inferiorly. It appears that this natural position of the clavicle in situations where the shoulder is compressed appeared to result in an amplification of the clavicles position and movement upon decomposition into an external void. The acromial end released from the acute angle with the acromial process displaces in a medial and superior direction. This appears to represent a difference to the expected natural decompositional movement, a posterior fall, of the clavicle in a supine position with no compression of the shoulders. In the other five burials (5/17, 29%) in which there was skeletal evidence for upper body compression, the clavicles had not externally displaced. While in the remaining five burials (5/22, 21%) with clavicles exhibiting movement into an external void, there was no evidence of compression of the shoulders but the clavicles had still displaced superior/medially but this was a less extensive movement in the superior direction.

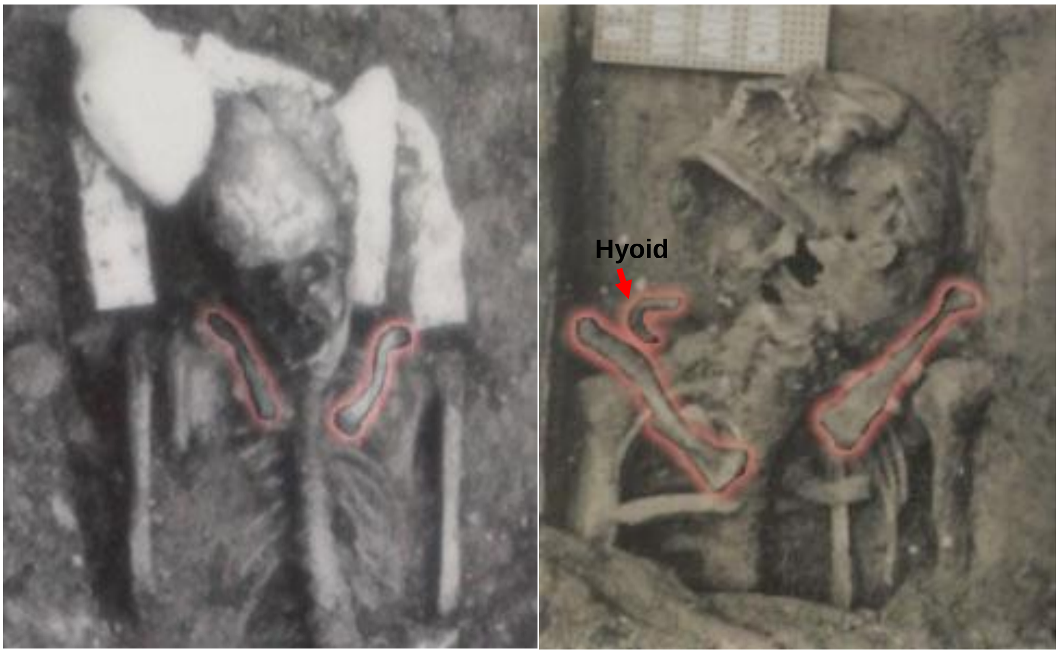


Figure 5.10: *Examples of external displacement of the clavicles. Left – SO399, left clavicle has rotated onto its inferior surface and the acromial (lateral) end has moved in a medial and slightly superior direction. (Copyright Gloucester City Museums). Right – SY3505, displays evidence for bilateral compression of the upper body. The left clavicle has moved in a superior and lateral direction. The hyoid bone has displaced laterally to the right. (Used with permission from York Archaeological Trust)*

<u>Ossa coxae</u>

External displacement was present in 42 right and 50 left *ossa coxae* (42/53, 79% right and 50/58, 86% left) (Tables C17 and C18). In the majority of cases the direction of movement involved a posterior/lateral fall or rotation, presenting as an opening or flattening out that moves the pubic bone and iliac spine into a lateral location, compared to anatomical position. In only six burials (4/53, 8% right and 2/58, 3% left) did the coxal bones display other variation in direction of movement. In SP1784, SP1869 and SY7061 the right *os coxae* had moved medially and in SY5017 the left *os coxae* had displaced in a medial direction. While in SP776 and SP1053 the coxal bones were extensively displaced, moving completely from anatomical location and orientation (Table C19). The degree of lateral rotation varied across the burials with some burials exhibiting less extensive displacement from anatomical position through to the *ossa coxae* having fallen almost flat with an opening-out of the pelvic girdle and each coxal bone resting with its lateral surface on the coffin base/underlying sediment (Figure 5.11 and Table 5.4). This variation appeared to relate to the proximity of the coffin sides. In those burials in which the *ossa coxae* had fallen flat, fully opening out, there was enough lateral space present between the corpse and the coffin sides. The coffin sides appeared in closer proximity to the corpse in the burials that exhibited less lateral displacement of the *ossa coxae*, where they displayed a partial wall effect (see 5.2.5 below). In the burials where both *ossa coxae* could be observed, external displacement was approximately symmetrical in 21 cases (21/43, 49%). In the other 22 burials (22/43, 51%) the position of the *ossa coxae* varied, but most frequently one coxal bone had completely fallen and the other was maintained in an approximate anatomical position, as seen in burials SO405 and WC693 (for discussion on supported bones, see below 5.2.5) (Figure 5.11). Again, this variation appeared to relate to the proximity, in these cases of one side of the corpse to the coffin side. In SP1784 and SP1869, the medial displacement of the right *os coxae* was considered to represent movement through an external void.

Table 5.4: *Frequency in variation of external displacement of the ossa coxae involving a lateral and posterior fall (* other bone may not have displayed external displacement or one not involving solely a lateral and posterior displacement)*

	Full lateral fall of coxal bone		**Partial lateral fall of coxal bone**	
	Right	Left	Right	Left
Symmetrical	11	11	10	10
Unsymmetrical*	6	5	7	10
Single *os coxae* visible	2	6	0	2

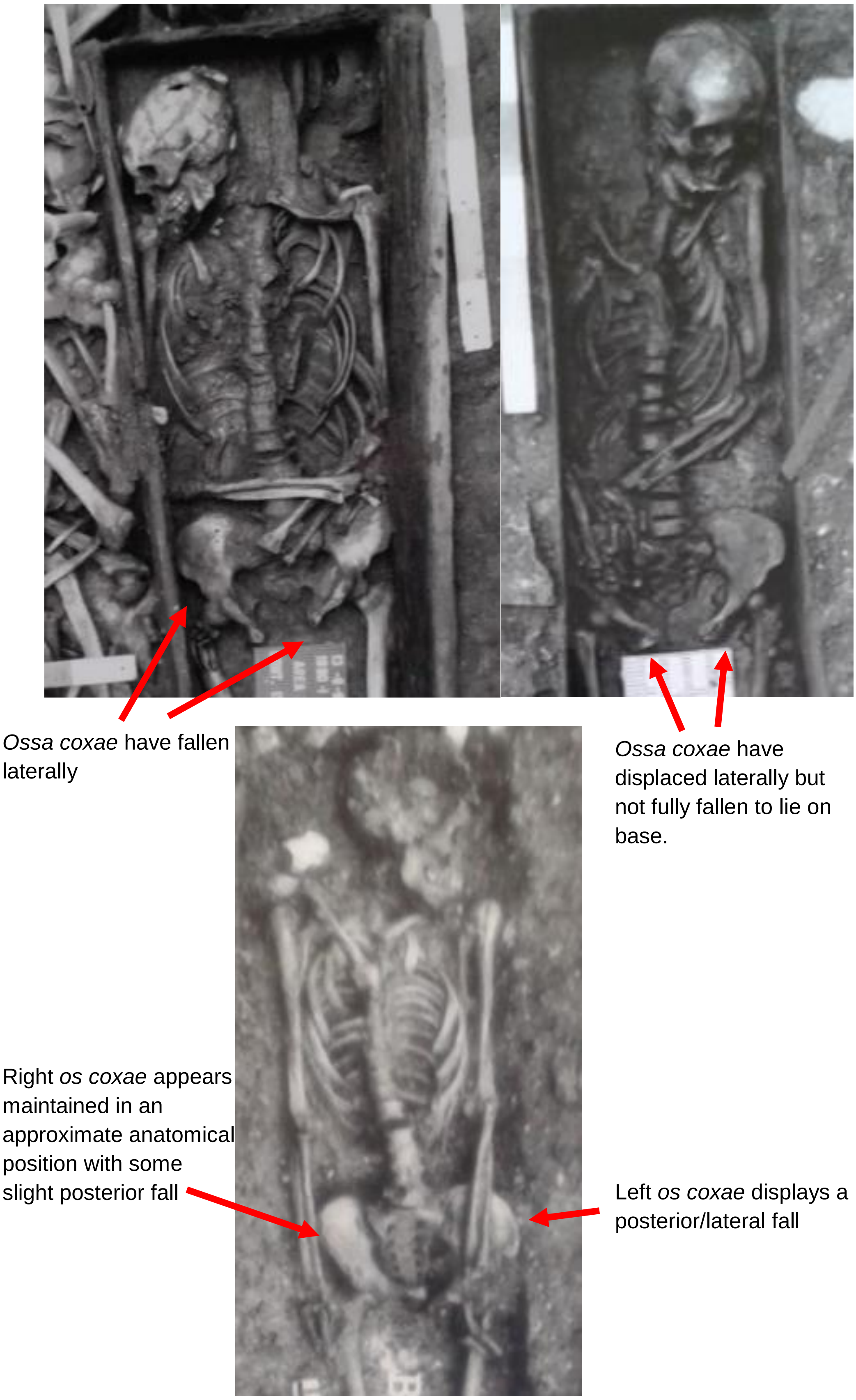


Figure 5.11: *Examples of the posterior/lateral fall of the ossa coxae. Top left – SY15015 displaying the symmetrical fall of the ossa coxae opened out to lie on the base. Top right – SY3381 displaying a lateral fall of the ossa coxae, however they have not fully opened out. (Used with permission from York Archaeological Trust) Bottom – SO405 displaying the unsymmetrical fall of the left os coxae. (Copyright Gloucester City Museums)*

Patella

The information that could be obtained regarding the displacement of the patellae was limited. Across the 78 burials the position of the right patella was only identified in 31 burials (31/78, 40%) and the left in 33 burials (33/78, 44%). Although, in almost half of the cases the patellae were externally displaced (14/31, 45% right and 15/33, 45% left) (Tables C20-C21). Displacement most often saw the patella having fallen posteriorly from the knee joint, either medially or, more frequently, laterally, to rest on the coffin base (Figure 5.12). Furthermore, displacement involved some movement in a superior or inferior direction, in addition to the lateral or medial posterior fall (Table 5.5, and Table C22).

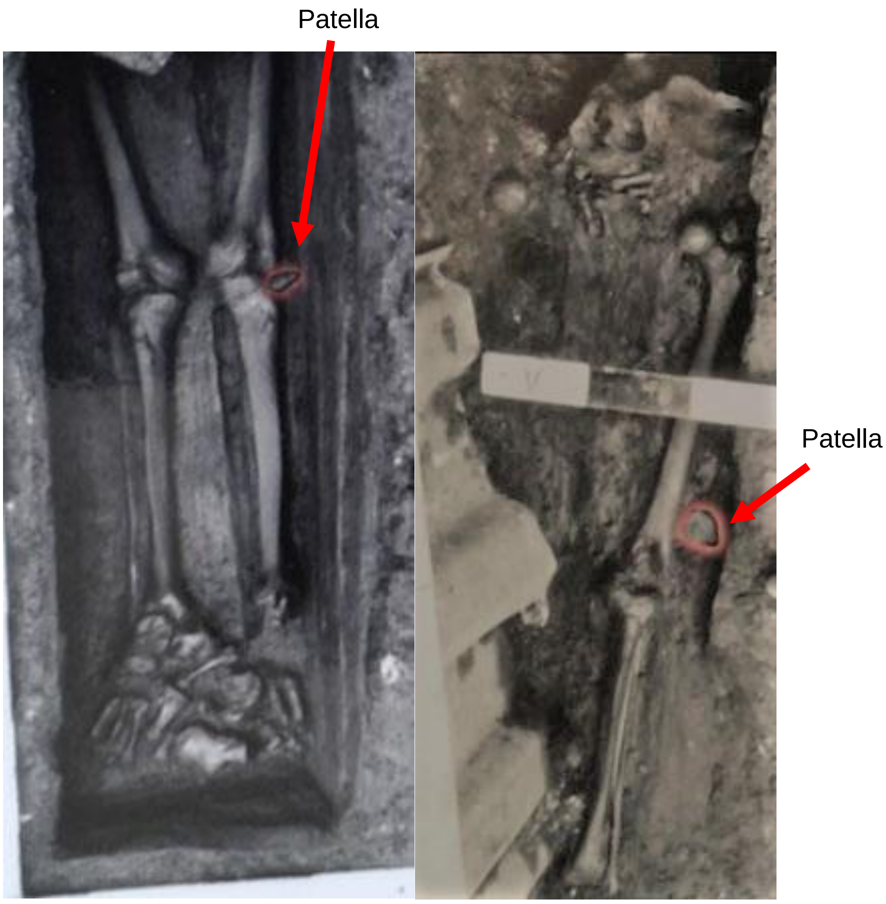


Figure 5.12: *Examples of patellae displaying external displacement. Left - SY3426, left patella has displaced laterally and posterior. Right – SY5005, with the left patella displaced in a posterior, left and superior direction and now resting on its anterior surface (Used with permission from York Archaeological Trust).*

Table 5.5: *Frequency of variation in the direction of the external displacement of the patella*

Direction of displacement	Frequency	Direction of displacement	Frequency
Posterior and lateral	7	Lateral	2
Posterior and medial	5	Lateral and superior	2
Posterior, lateral and superior	7	Lateral and inferior	2
Posterior and superior	2		
Posterior and inferior	2		

Ankle and foot bones

The disarticulation and external displacement of the skeletal elements of the ankles and feet was observed in all burials where their position could be observed, (49/49, 100% right and 53/53, 100% left) and was highly variable (Tables C23-C24). There were no cases in which the whole foot maintained full articulation, nor did the talus maintain anatomical connection with the tibia due to the posterior/inferior fall of the foot. Where approximate anatomical connections were preserved, these were generally between the metatarsal bones. Displacement was rarely symmetrical between the feet and the extent of the disarticulation and displacement observed varied, but in all cases involved the posterior/inferior fall of elements bringing the bones to rest on the coffin base. This posterior/inferior displacement was observed in a lateral direction (11/49, 22% right and 8/53, 15% left), a medial direction (2/49, 4% right and 6/53, 11% left) or towards the foot end of the coffin (10/49, 20% right and 7/53, 13% left), with the skeletal elements not displacing far from the original volume of the foot (Figure 5.13). Extensive displacement of the foot bones was recorded in more than half of burials (26/49, 53% right and 32/53, 60% left) and involved the bones from one or both feet, but often included both feet (23/49, 47%). The extensive bone displacement could be limited to a small space, roughly within the volume of the feet, as observed in SY3381. Conversely, in the most extreme cases of dispersal, the skeletal elements of the foot were displaced across a wide area of the coffin and found in positions lateral, medial, superior and inferior to their anatomical location, examples include WC103 and WC352 (Figure 5.13 and Table C25).

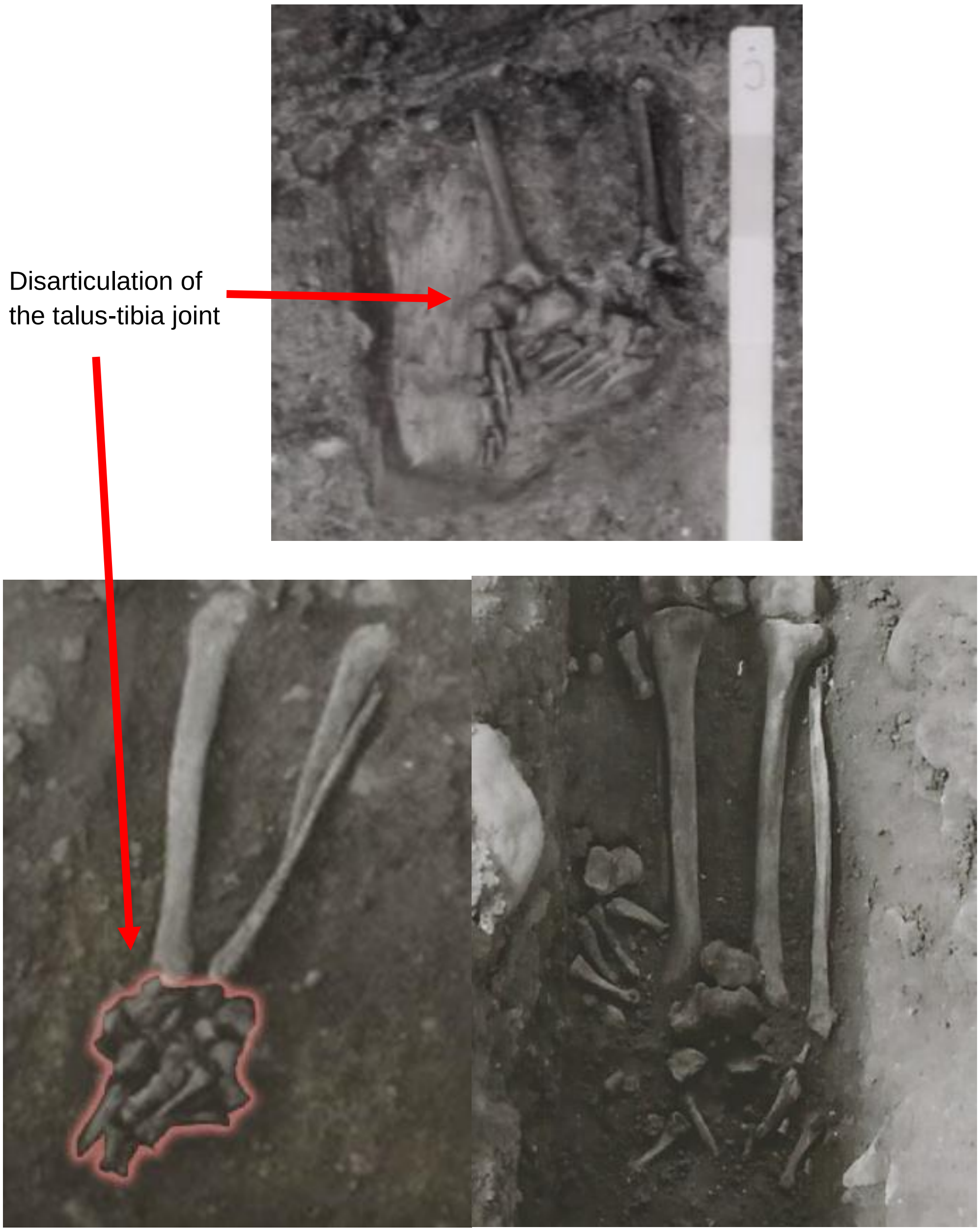


Figure 5.13: *Examples of the external displacement of the skeletal elements of the feet. Top – SY3331, right foot has fallen laterally with the metatarsals and phalanges also showing some inferior/posterior fall. The left foot has fallen medially with more posterior/inferior fall of the cuneiforms and metatarsal bones. (Used with permission from York Archaeological Trust) Bottom left – WC693 displaying a posterior/inferior fall of the bones of the feet. There is evidence for some more extensive displacement of the tarsal bones. Bottom right –WC352 extensive external displacement of the bones of the feet. The tarsal and metatarsal bones have displaced over a wide area of the coffin moving in superior, inferior, medial and lateral directions. This patterning could be the result of movement by retained decomposition fluids or the actions of a small mammal. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The extent and number of skeletal elements displaying external displacement has been shown to be wide ranging, with a predominance for elements such as the *ossa coxae*, humeri, fibulae to move in a lateral direction. However, in a number of burials the degree of displacement was notably more extensive, with skeletal elements displaced, rotated and spread out across the coffin (9/78, 12%) (Table 5.6 and Figure 5.14). In WC892 and SY14030, for example, all joints appeared disarticulated. Moreover, a number of the externally displaced skeletal elements had aligned along the sides of the coffin in all of the burials from St Peter's and Swinegate in Table 5.6. In six burials (6/78, 8%) a linear alignment of a more limited number of externally displaced skeletal elements was observed (WC092, WC103, WC352, WC396, WC697 and WC799) (Figure 5.15). This included the ankle and bones (5/5), the *os coxae* (5/5) the humerus (4/5) and tibia (2/4). Again, as seen in the burials with the extensive displacement of a wider range of skeletal elements these bones had aligned with the sides of the coffin.

Table 5.6: *15 burials from the confirmed coffins exhibiting extensive external displacement of skeletal elements*

Site	Individual
St Peter's	SP776
St Peter's	SP1053
St Peter's	SP1174
St Peter's	SP1784
St Peter's	SP2322
Swinegate	SY14030
Swinegate	SY14044
Swinegate	SY15013
Worcester Cathedral	WC092
Worcester Cathedral	WC103
Worcester Cathedral	WC352
Worcester Cathedral	WC396
Worcester Cathedral	WC697
Worcester Cathedral	WC799
Worcester Cathedral	WC892

Figure 5.14: *Example of extensive external skeletal displacement. SP1784. The cranium has moved superiorly and laterally to the left to occupy a position towards the upper left corner of the coffin, rotated to rest on the sphenoid/inferior aspect of the cranium and facing the left coffin side. Below the cranium are two rib shafts; these appear to have remained aligned together but are rotated bringing the posterior aspect of the shaft anterior and displaced superiorly. Two more rib shafts can be seen towards the right side of the coffin again rotated, but here bringing the sternal end inferior and almost parallel to anatomical, and displaced superiorly. A number of vertebral bodies are displaced across the thoracic region of the coffin; most of these are disarticulated single vertebrae. There are two vertebrae, possibly thoracic, which have remained aligned with each other but have moved to the right of the mid line. The right os coxae has displaced to the left and has rotated medially, the left is not visible. The head of the right femur appears to have remained in connection with the acetabulum of the right os coxae and as a result has moved to the left as well. The left femur has rotated to rest on the lateral/anterior surface with the proximal end further displaced to the left. Both tibiae are rotated; the right onto its lateral surface and the left onto the anterior surface, with both fibulae resting medial rather than lateral to the tibiae. What foot bones are visible appear to be displaced about the lower foot end of the coffin. However, the right patella has remained anterior to the patella surface of the femur, in almost anatomical position. (Photograph courtesy of Warwick Rodwell)*

Indicates a linear alignment

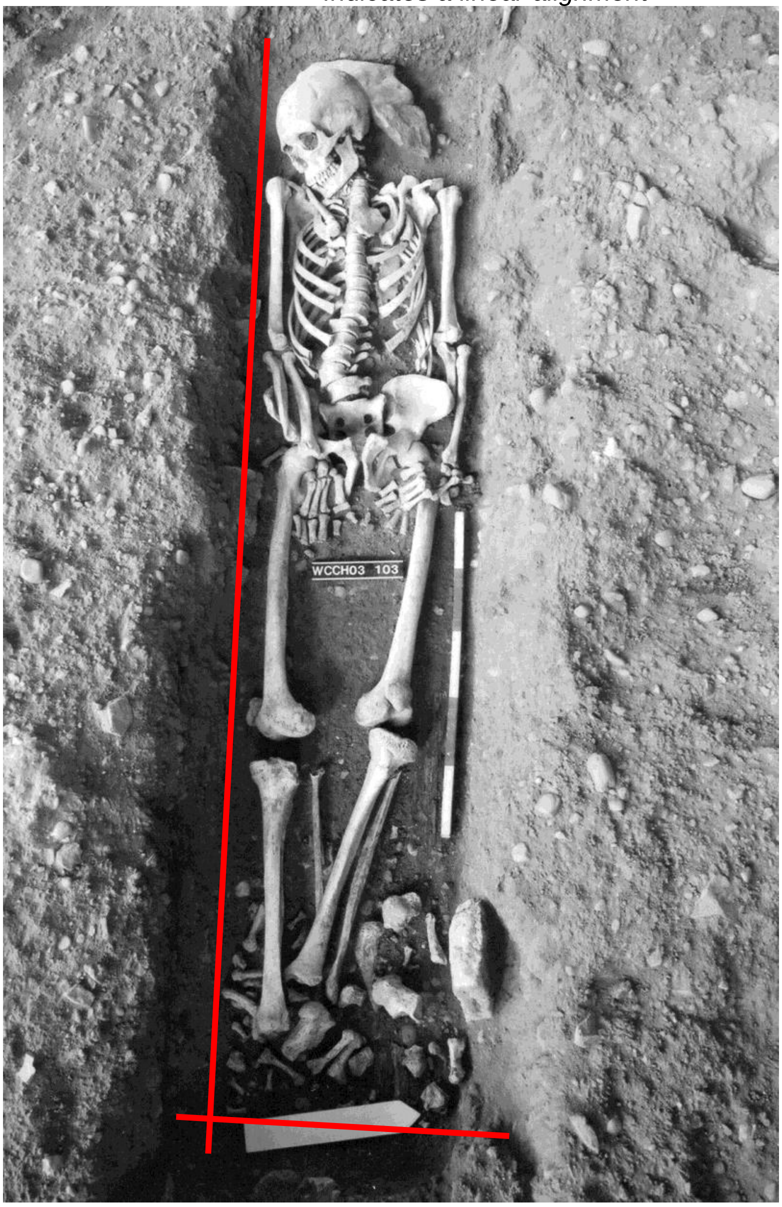


Figure 5.15: *Example of the linear alignment of externally displaced skeletal elements. WC103 displayed linear alignment of the external displaced bones of the feet to the right side of the coffin and along the foot end. To the right side, the externally displaced elements aligned with the upper limb and ossa coxae bones. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

5.2.3 Displacement into Secondary Voids

The image of SY3505 appears to show the cervical vertebral column (C3 and below) occupying a position anterior of anatomical. The cranium and mandible have fallen and rotated posteriorly to a lower stratigraphic level than the vertebral column. The first and second cervical vertebrae have also fallen posteriorly. This pattern of displacement would suggest a secondary void created by the decomposition of an organic pillow, originally placed beneath the head. In SY3455 the cranium, mandible fragments, the humeri and cervical vertebrae C1-4 look to be at a higher stratigraphic level than the rest of the vertebral column, the ribs and the manubrium. The cervical vertebrae display curvature and there is disjuncture between C4 and C5. It appears from the images that the coffin base has decayed resulting in a fall of the ribs and other elements to a lower stratigraphic level. The intensity of decomposition fluids beneath the large mass of the thorax, in comparison to the cranium, has decomposed the board beneath the thorax more rapidly and this has resulted in a variation in levels (Figure 5.16). A longitudinal collapse in the base board of the coffin appears to have caused a displacement of the lower limbs in SY3426. This has resulted in a lateral rotation of the lower limbs. Two other burials showed skeletal elements extending outside the confines of the coffin. In SO238, the left metacarpals appeared to be displaced laterally, outside the original limits of the coffin sides. Although, the action that resulted in their displacement could not be confidently attributed to a secondary void specifically resulting from the decay of the coffin. While in SO524, the broken mid-shaft fragment of the left radius appears displaced at excavation. It must be noted that these conclusions are limited by the lack of depth measurements for individual bones, meaning the vertical displacement of each skeletal element cannot be confirmed.

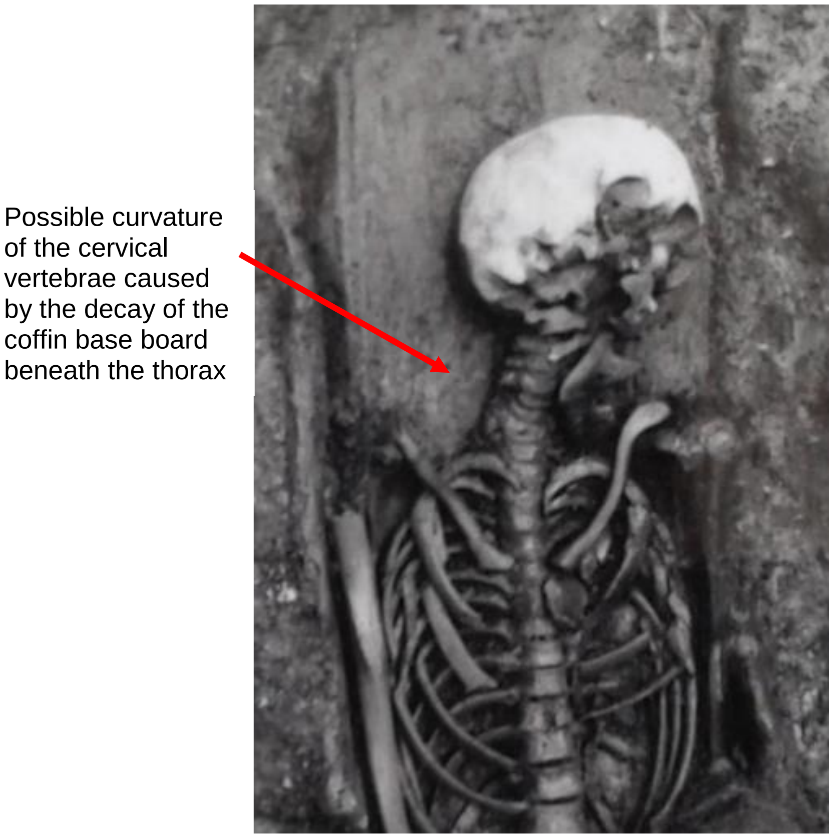


Figure 5.16: *Example of skeletal evidence consistent with displacement into an external secondary void. SY3455, displaying the cranium and fragment of the mandible at a higher stratigraphic level than the ribs and thoracic vertebrae. The cervical vertebrae display curvature. (Used with permission from York Archaeological Trust)*

5.2.4 Internal Displacement

All confirmed coffin burials displayed the internal displacement of skeletal elements. This is the expected natural displacement of bones that have become unstable due to decomposition into the areas formally containing soft tissue, internal secondary voids. The range of elements and the extent of movement differed from those displaying external displacement (Table C26). The predominant direction of movement was a posterior fall onto the coffin base, most frequently involving the vertebrae and sacrum, clavicles, ribs and sternum into the large voids created within the thoracic and pelvic regions. The internal displacement of the bones of the hands and forearms was also recorded in a number of burials, possibly inferring that part of the upper limb was positioned over the soft tissue of the chest, abdomen and pelvis at the time of burial (see 5.2.1). In the majority of burials, the type of skeletal elements that frequently displayed internal displacement did not often exhibit external displacement; in those which did, the bones most often found outside the original body volume were the cervical vertebrae, the clavicles and the bones of the hands (discussed above).

Vertebrae

The internal displacement only of the vertebrae was observed in all individuals where recordable (52/61, 85%), and involved both segmentation of the column and movement of individual vertebra (Tables C27-C28). Displacement separated the column into individual vertebra and/or segments containing from two to six vertebrae in anatomical connection. Movement took the form of displacement of vertebrae to the left or right of the mid line, rotation to the left, right, anterior, posterior or a combination of displacement and rotation, as seen in SO524, where the lower thoracic vertebrae were individually displaced to the right and left of the mid-line and rotated to rest on their superior/inferior surfaces. Displacement affected both individual vertebra and whole segments (Figure 5.17). The sacrum was frequently recorded as displacing internally (39/41, 95%) (Tables C29-C30). This was in an anterior direction within the pelvic region, but could exhibit rotation or movement to the right, left or in an inferior direction as seen in SO515 and WC396. In two burials (2/41, 5%) the sacrum appears to have maintained an approximate anatomical position. This observation may indicate that this expected anterior movement had not occurred, or else these observations may be due to limitations in image quality. Displacement resulted in the disarticulation of the 5th lumbar vertebra and the sacrum in 45% of the burials where the connection could be assessed (15/33), e.g. SY3511 and WC396 (Table C31).

Clavicles

A posterior fall was also evident in the internal displacement of the clavicles in all 51 burials where the clavicles were identifiable (51/78, 65%) (Tables C32-C33). The clavicles frequently displayed rotation, more commonly onto their inferior surface but also onto their superior surface. This would have occurred due to the instability of the clavicle in anatomical position when not maintained by soft tissue – the posterior surface is narrow and exhibits curvature that results in a reduction of the surface area which would be in contact with the coffin base (Figure 5.17). Displacement of the clavicle was usually accompanied by disarticulation, with only three (3/48, 6%) occurrences of an approximate anatomical connection between the acromion process of the scapula and clavicle being maintained, SO109, SO405 and SY3381.

Sternum

Internal displacement only was recorded in all but two of the 41 burials, for which the manubrium and/or *corpus sterni* (body) was visible (39/41, 95%), with the other two burials exhibiting external displacement of the sternum (Figure 5.17 and Tables C34-C35). In all 39 cases, the sternum had fallen posteriorly towards the base of the coffin, into the internal void created by the decomposition of the soft tissue beneath. There was some variation in direction of this movement within the thoracic area, with only a posterior fall seen in seven burials (7/39, 18%), for example SO241 and SY3381. Displacement to the right, as in WC262, or to the left, as in SY15015, of the vertebral column was observed most repeatedly (30/39, 77%). While in two burials the sternum remained on the midline but moved in an inferior direction. In five burials (5/39, 13%) the manubrium and body were seen to displace in different directions; for example, in SY3379 the manubrium displaced posteriorly, inferiorly and to the left, whereas the body remained in approximate anatomical position in front of the vertebral column having displaced posteriorly only. Displacement resulted in the disarticulation of the manubrium from the body in all 39 burials (100%), and from the clavicles in all but one burial, WC507 (38/39, 97%).

Ribs

In 58 burials (58/65, 89%) a solely internal displacement of the ribs was recorded (Table C36). This internal displacement was most frequently observed as loss of thoracic volume arising from the posterior/inferior fall of the sternal ends of the shaft, bringing these into an inferior position in relation to normal anatomical location, with the rib resting on the inferior edge of the shaft on either the coffin base or an inferior rib (Figure 5.17). The heads of the ribs in the majority of cases were unclear in the images, as a result of poor image quality, incomplete excavation and poor preservation. In those burials where the heads could be identified, they generally appeared rotated inferiorly, and in some case displaced laterally with no maintenance of anatomical connection with the vertebral column. Variation was apparent in how the individual ribs displaced and between the left and right side. The first and second rib tended to displace until resting flat on the coffin base/underlying sediment, whereas the lower ribs differed more widely in the extent of posterior/inferior fall. In some burials, such as WC092, there appeared that there was not a complete loss of thoracic volume, with the ribs not completely falling to rest on the base of the coffin. However, due to the angle of the image it was difficult to confirm this was not just an artefact in the photograph. (Support of bones in potentially unstable positions is discussed below.)

Forearm and hand bones

The bones of the forearms and/or hands from one of both limbs were found located within the internal areas of the thorax and pelvis in 44 burials (44/62, 71%), strongly suggesting the original arrangement of the upper limbs saw them resting on the corpse (Table C37). In all cases, the skeletal elements of the forearms and hands had been subject to a posterior fall, resting partially on the coffin base, and anterior to the vertebrae, *ossa coxae*, sacrum and/or femora (Figure 5.17). Disarticulation was observed in the majority of the burials between the bones of the forearm and carpal bones (38/45, 84% right and 40/43, 93% left). Of these 44 burials six burials (6/44, 14%) contained one limb where the internal displacement of the hand bones saw the posterior fall of the skeletal elements into the area originally containing the thigh muscles, inferring that the upper limb was flexed only at the wrist and the hand resting on the thigh. In three burials (3/62, 5%) both limbs appeared placed with the hands resting on the thighs at burial. Most frequently the joints were disarticulated and often extensively displaced (rotated and displaced *en mass*). The articulations within the hand are very labile, decomposing relatively quickly in comparison to others (Duday 1990: 195). These elements are then free to disarticulate and be displaced by the relatively large quantity of decomposition fluids created within the thoracic and pelvic regions. The skeletal elements of the hand were also frequently found in the region below the pelvis, between the femora, for example in SG1056. Although consistent with the description above, this pattern of displacement of the hand bones could potentially result from the presence of an external void between the thighs, especially where the lower limbs are in an extended position. In seven burials (7/62, 11%), such as SO515 and WC720, the hand bones displayed only a posterior fall, maintaining approximate articulation of the joints within the hand.

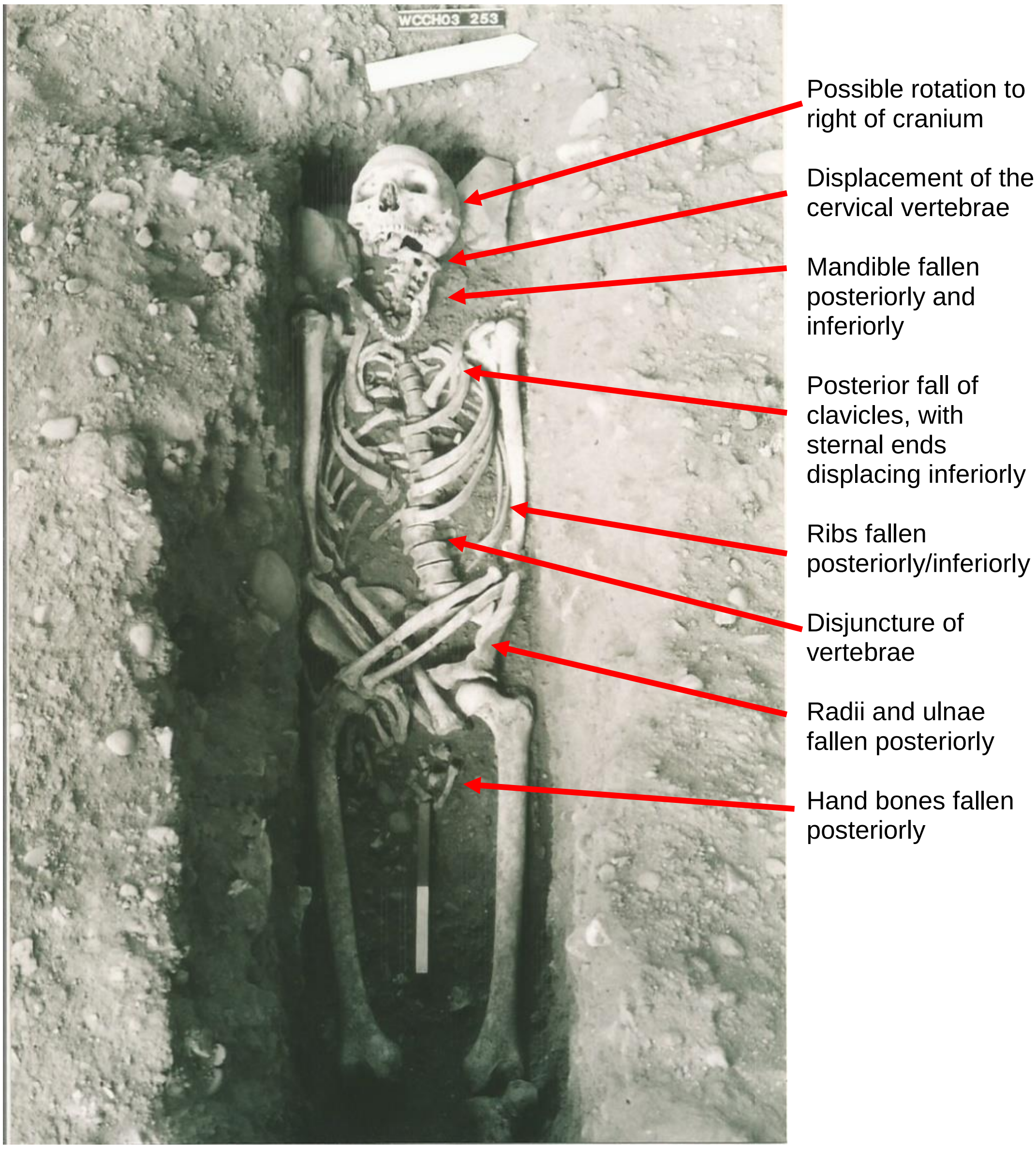


Figure 5.17: *An example of skeletal elements displaying internal displacement. The vertebral column disjuncture in skeleton 253 from Worcester Cathedral. The thoracic vertebrae that can be recorded have formed two segments; one consisting of T4-7 and one of T8-11, possibly including T12. There is further disjuncture between T12 and the first lumbar vertebrae. The lumbar vertebrae have also segmented, one containing L1-2 and the other L3-4, while L5 is potentially still in connection with the sacrum. Lateral movement, both to the right and left can clearly be seen and appears to account for the segmentation of thoracic and lumbar vertebrae. Rotation to the right was also observed in the segment containing the first two lumbar vertebrae. The first ribs on either side have fallen inferiorly and posteriorly to rest on their inferior surface in front of the lower rib shafts. The heads of both have fully disarticulated from the vertebral column resting anterior to the anterior surface of possible the first thoracic vertebra. The other ribs are displaced inferior/posterior but have not fully fallen to rest upon the coffin base/underlying sediment. There has been partial maintenance of thoracic volume. Only the corpus sterni is visible, falling posteriorly and to the right of mid line, resting within the right ribs. The clavicles display a posterior fall, evidenced by their resting anterior to the displaced ribs. Rotation is clearest in the right clavicle; here seen resting on the inferior surface. The forearm bones have fallen posteriorly into the abdominal region. The right and left radii and ulnae can be observed resting in direct contact with the underlying elements of the pelvis; and in this burial the left forearm is crossed over the right. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

In one burial (1/78, 2%), SO050, the ribs, clavicles and vertebrae exhibited a greater degree of internal displacement than others, surpassing expected natural movements within an internal secondary void and bordering on external displacement. This movement appeared to be contained to the area of the thorax and pelvic region. Rather than observing the displaced skeletal elements in a position maintaining their anatomical orientation, they were spread around the thoracic region and appear to have been extensively displaced relative to each other and their original anatomical position. The left radius and ulna also display unusually extreme displacement with the proximal ends moving in an inferior direction into the pelvic region (Figure 5.18).

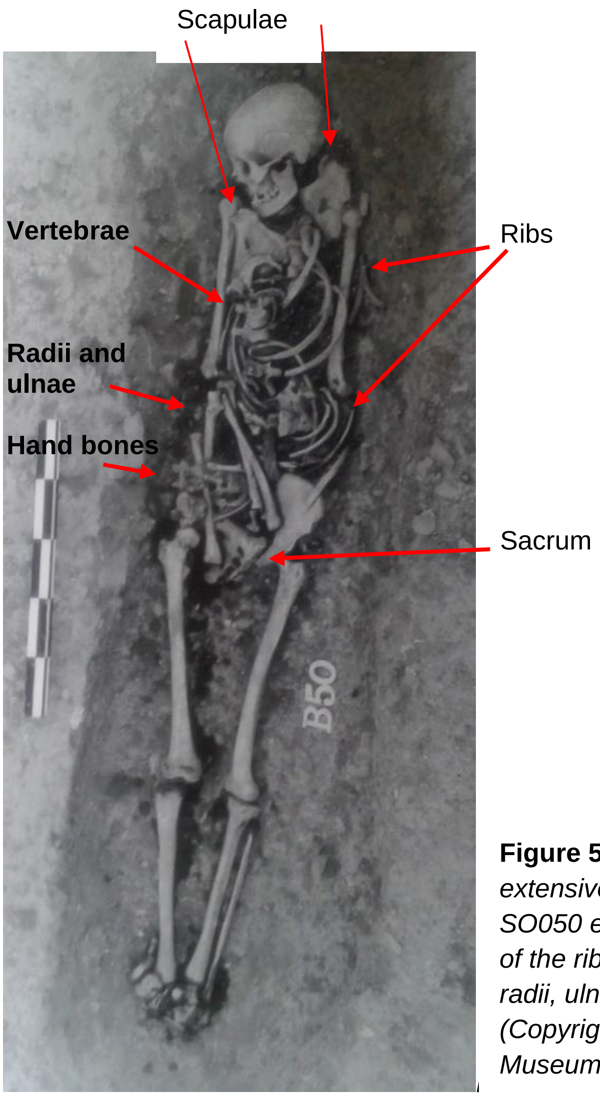


Figure 5.18: *Example of extensive internal displacement. SO050 extensive displacement of the ribs, scapulae, vertebrae, radii, ulnae and hand bones (Copyright Gloucester City Museums)*

5.2.5 Skeletal Elements Supported in Potentially Unstable Positions

Over three-quarters of burials exhibited one or more skeletal elements supported in a potentially unstable position (64/78, 82%). The number of elements involved varied, from a single bone, as seen in SP0776, to 12 as recorded in SO405[11] (Table C38). Observations which merit further investigation, due to their repetition and location, concern the scapulae, humeri and *ossa coxae*. While, less frequently recorded in potentially unstable positions, the patellae and the bones of the hands and feet still require comment (Table C39).

Scapula

The potentially unstable position maintained by 18 right scapulae (18/47, 38%) and 14 left scapulae (14/45, 31%) was an anterior rotation, bringing the coracoid process and glenoid fossa anterior of normal anatomical position. In all cases this appeared to be the approximate original position of the scapulae, allowing for slight internal displacement (Figures 5.19 and 5.20). Due to widespread displacement of the clavicles (see 5.2.1), connection between the rotated scapula and the clavicle was approximately maintained in only three burials (3/22, 14%). The glenoid fossa appeared to retain some connection with the head of the humerus in six right (6/20, 30%) and 11 left (11/16, 69%).

[11] These numbers count the bones of the ankle and foot, and hand as single entities.

Figure 5.19: *An example of support for the humerus and scapulae in potentially unstable positions. WC193, displaying scapulae maintained in anterior rotation and the right humerus is in an anterior and medially rotated position, retaining connection with the glenoid fossa of the scapula. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

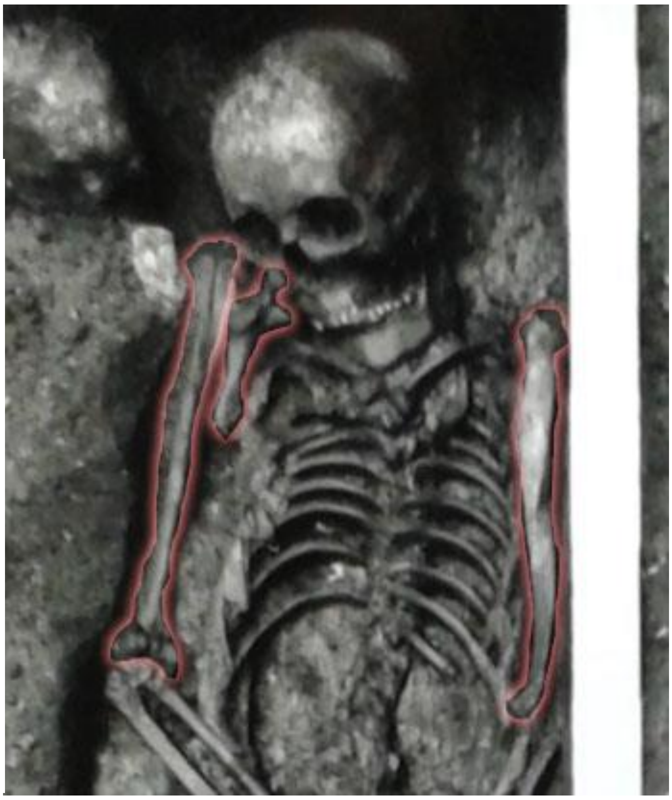


Figure 5.20: An e*xample of support for the humeri and right scapula in potentially unstable positions. SY5017, the right humerus has displaced in a superior, lateral and posterior direction away from the glenoid fossa of the scapula. The right humerus appears maintained in medial rotation, while the right scapula is supported in an anterior and superior rotation, possibly displaying some internal displacement in a medial direction. The left humerus is supported in medial and anterior rotation, although it is unclear if the head retains connection with the glenoid fossa. (Used with permission from York Archaeological Trust)*

Humerus

The support of a medially rotated humerus was recorded for 33 right humeri (33/51, 65%) and for 32 left (32/51, 65%) (Table C40). The degree of rotation observed varied. Most frequently, the humeri exhibited rotation onto the medial surface, although a small number, 8 right and 8 left (8/51, 16%), displayed evidence for only a slight medial rotation, whereby the lateral epicondyle did not fully move into an anterior position. In most cases, the humeri had been subjected to only slight internal displacement leaving the gleno-humeral joint in approximate connection (Figure 5.19). But, in eight right (8/27, 30%) and five left humeri (5/29, 17%) the bone had displaced into a position external to the original volume of the corpse, seeing a complete disarticulation of the gleno-humeral joint, yet it was still supported in a medial rotation (Figure 5.20). In only two burials (2/38, 5%), WC194 and WC532, the medially rotated humerus remained in approximate articulation with the radius, and in these cases the radius itself was also maintained in a potentially unstable position anterior to the ulna; in all other burials the radial head displaced posteriorly away from the capitulum. The olecranon/trochlear notch of the ulna was more frequently found to have maintained an approximate articulation with the olecranon fossa of the humerus. In those burials in which it had not, the ulna had displaced in an inferior direction, as seen in SY5017 where both ulnae had displaced inferiorly. In all but three cases (SY3381, SY3505 and SY11006) the coffin sides were clearly the source of the support for the humeri, as they were adjacent to the bones (40/43, 93%). There appeared a small void between the humerus and the coffin side in the other three burials (3/43, 7%). With no measurements available to corroborate this space, the introduction of a distortion in the image could not be excluded. In the case of SO524, a collapse of the coffin side could potentially explain the medial displacement of the right humerus and forearm bones. The coffin side would then have subsequently laterally supported them in an unstable position (Figure 5.21).

Figure 5.21: *Possible skeletal evidence for a collapse of the wooden coffin side in SO524. The right scapula, humerus, and forearm bones are supported in an unstable position. They display a curvature, with the distal end of the humerus and proximal end of the forearm displaced medially. (Copyright Gloucester City Museums).*

Os coxae

Of the 53 visible right *ossa coxae*, 30 (30/53, 57%) were determined to be supported in unstable positions as were 32 lefts (32/58, 55%) (Table C41). The lateral support of the *ossa coxae* saw ,17 right (17/30, 57%) and 22 left (22/32, 69%) *os coxae* supported in a clearly displaced position, appearing to have begun to open out laterally, only to have their displacement halted before they could fully fall to rest on the coffin base (Figure 5.22). In 13 right (13/30, 46%) and 10 left (10/32, 31%) the *ossa coxae* were maintained in an approximate anatomical position, with little or no lateral displacement present (Figure 5.22). As discussed above (5.2.1) the displacement of the *ossa coxae* was not always symmetrical. Of the 39 burials with supported *os coxae*, both *ossa coxae* were present in 23 burials (23/39, 59%). Symmetry was seen in 13 of the 23 cases (57%). The coffin sides were clearly responsible for supporting the *ossa coxae* in their current positions. The variation could be attributed to differences in the relative size of the coffins, with those coffins that were wider than their occupants allowing for more lateral displacement. Also, variation in body mass would see the potential for more movement in individuals with more soft tissue around their hips.

Figure 5.22: *Examples of ossa coxae supported in potentially unstable positions. Top – SY8006, displaying some lateral/posterior fall of the ossa coxae, but they are supported in an unstable position having not fully fallen to rest on the coffin base. (Used with permission from York Archaeological Trust). Bottom – WC720 where the right os coxae is supported in an approximate anatomical position and the left displays some lateral/posterior fall. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Patella

The patellae were found to be supported in potentially unstable positions in a small proportion of burials (12 burials, 5/31, 16% right and 9/31, 29% left) (Table C42). The posterior fall onto the knee joint (femur-tibia articulation) was not considered to represent a potentially unstable position for the patella, unless the lower limb bones displayed lateral or medial rotation. Nine patellae (9/14, 64%) appeared supported in potentially unstable positions on a rotated femur, for example the right patella in SO405. In the remaining burials, the patellae had fallen laterally, but were supported in unstable positions adjacent to the lateral femur, (SO050, SO241, WC253 and WC674) (Figure 5.23). In burials such as WC674 and SO241, the patella was supported by the adjacent coffin side. However, in others, such as SO050, the coffin side could not be the source of the support due to the position of the lower limbs placing them at a distance from the side of the coffin (Figure 5.23). The presence of durable textiles, such as shrouding or clothing could provide some additional support in these cases. As discussed in Chapter 2, there are potential problems regarding inferences made based on the position of the patella. In some burials the patellae are in unusual positions and/or those which may be unlikely to have occurred through decomposition. At St Oswald's, the patellae, in all of the burials in which they were visible, although displaying some displacement had remained resting on the femur/tibia. Williams (2015: 87) attributes this to human interference, the replacing of patellae for the purposes of the photograph or their becoming displaced during the excavation. If this is indeed the case, as has been witnessed at other sites (E Craig-Atkins 2017, pers. comm., 14 Nov) this will affect the inferences drawn from this data.

Figure 5.23: *Examples of patellae supported in potentially unstable positions. Left – SO050 the right patella has fallen laterally/posterior. Right – WC674, the right patella fallen medially/posterior to the base and moved in a superior direction, while the left patella has displaced laterally, but is being supported rather than falling to the base. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Bones of the hands and feet

In a small number of burials, the bones of the hands and feet were displaced, but supported in potentially unstable positions with the maintenance of articulations. Of the 39 right hands with elements visible that could be assessed for support (39/78, 50%) and the 40 left hands (40/78, 51%), four and five respectively appeared to be maintained in unstable positions (4/39, 10% right and 5/40, 13% left). In all nine cases, the hand bones displayed a posterior fall (Figure 5.24). In three burials (2/39, 5% right and 3/40, 8% left hands), approximate anatomical connections were maintained between most of the visible skeletal elements, even though they had internally displaced posteriorly and were found resting on the skeletal elements below (SY3428, WC103 and WC720). In the other four cases (2/38, 5% right and 2/40, 5% left), the metacarpals were displaced and found on the anterior surface of a femur in a potentially unstable position (SO242, SO405, SO515 and SY11016). These cases were drawn out for discussion due to the labile nature of the articulations between the bones of the hand. In these burials it might have been expected that the hands would have been found to display a greater degree of displacement than they have.

Figure 5.24: *Example of the support for bones of the hand. SY3428 left hand bones are supported between the left femoral shaft and the side of the coffin. Approximate relationships have been retained between three metacarpals and two proximal phalanges. (Used with permission from York Archaeological Trust)*

A posterior/inferior fall of skeletal elements was also seen in the feet, but again some articulations appeared to have been maintained and bones supported in unstable positions (4/49, 8% right and 3/53, 6% left) (Figure 5.25). In burials SG1126 (right), SO109 (both) and SY3428 (right) the disarticulation of the ankle joint (talus-tibia/fibula) has allowed the foot to drop posterior/inferiorly to rest on the coffin base but the other articulations have been maintained such that the other tarsal bones have retained their relative positions. In SO399 only the talus and calcaneus are visible, but although falling posterior/inferiorly, these tarsal bones have maintained an anatomical connection. This also appears to be the case in SO175, right foot. The heads of the left metatarsal bones in SY3456 have fallen to rest on the end board of the coffin, and although not completely clear in the photograph, it appears that the tarsal bones may have maintained an anatomical position.

Figure 5.25: *Example of support for the foot bones in potentially unstable positions. SY3456 the heads of three left metatarsal bones have fallen in an inferior/posterior direction and are being supported by the end of the coffin. (Used with permission from York Archaeological Trust)*

Of the 64 burials (64/78, 82%) exhibiting the support of unstable skeletal positioning, 37 showed evidence of linear delimitation, consistent with bones resting up against the sides of the coffin (37/64, 58%) (Table C43). Commonly, this consisted of the alignment of a medially rotated humerus and an anatomical or slightly displaced *os coxae*, with no other skeletal elements occupying a more lateral position. In most burials where left and right sides could be clearly observed (21/33, 64%), the delimitation was bilateral, for example in SO405 and SY8006 (Figure 5.26). In combination with the supported skeletal elements, as discussed above (5.2.1), linear demarcation was often enhanced by externally displaced bones aligning against the coffin sides and/or ends.

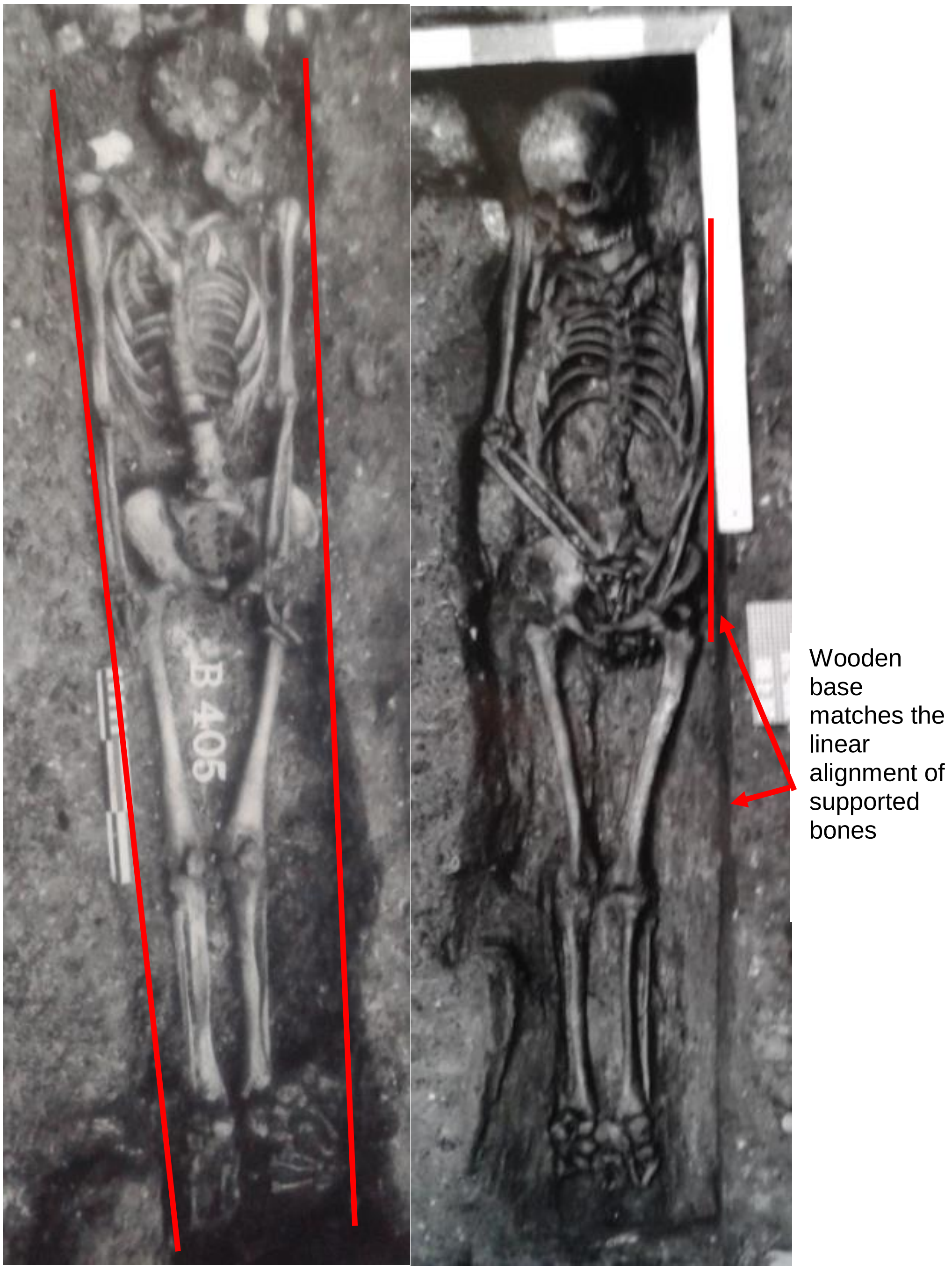


Figure 5.26: *Example of bi-lateral and unilateral linear support of potentially unstable skeletal elements Left – SO405 the humeri and ossa coxae are supported in potentially unstable positions with only small amounts of displacement present. The displacement of the left metatarsal bones also aligns laterally with the left humerus and coxal bone (Copyright Gloucester City Museums). Right – SY5017 the left humerus and coxal bone are supported in potentially unstable positions, whereas, the right coxal bone has fallen laterally and the upper limb is in an abducted position. (Used with permission from York Archaeological Trust)*

5.3 Interpretation of the Impact of a Wooden Coffin on Decomposition and Disarticulation of a Corpse

The detailed data collected has provided the evidence to assess whether burial in a wooden coffin resulted in a consistent pattern of skeletal disarticulation and movement during, and following, decomposition. Analysis of the data has shown that no single specific configuration of skeletal elements was observed across all coffined burials. Yet, a number of repeated patterns were identified consistently in the majority of burials (Table 5.7).

Table 5.7: *Key skeletal patterns identified across the 78 confirmed coffin burials*

	Pattern	**Skeletal evidence**
1	Original voids, external to the corpse, present at the start of decomposition of the body	The external displacement of skeletal elements
2	Internal secondary voids created by the decomposition of the soft tissue of the corpse	The internal displacement of skeletal elements
3	External secondary voids created external to the corpse during or sometime after decomposition of the body	Displacement of elements outside the delimitation imposed by the coffin structure
4	Source of lateral support	The support of appendicular skeletal elements in positions of potential instability
5	Source of barrier	Linear alignment of displaced skeletal elements
6	Use of shrouds or clothing	The support of skeletal elements in positions of potential instability that cannot relate to the sides of the coffin

Taking each of these features in turn, and considering potential relationships, their value for inferring coffined burial is considered below. This assessment resulted in a set of observations that were developed into a working methodology to re-evaluate the presence of coffins in burials that have been designated as “plain earth”, based on a lack of direct archaeological evidence to indicate otherwise.

5.3.1 Original voids

The decompositional environment within a coffin is one where there is a delimited amount of space around the corpse separating it from the surrounding sediment. Based on the evidence discussed in Chapters 3 and 4, late Anglo-Saxon wooden coffins are typically a solid rectangular container, which would not conform to the contours of the corpse. Skeletal evidence for decomposition in a wooden coffin should then relate to decomposition in an original void rather than in a filled space (see Chapter 2). The evidence for decomposition in an original void is convincing across all burials in the confirmed coffin data set, corroborating the findings of other studies. Indeed, there were no confirmed coffined burials in which all skeletal elements were maintained in anatomical connection, with no disarticulation and/or displacement present. In all 78 burials (100%) there was external displacement of skeletal elements outside the original volume of the corpse, indicative of the presence of an original external void. Skeletal elements left in unstable positions, once freed from articulation by decomposition, will be susceptible to displace under the force of gravity into these voids (Duday and Guillon 2006: 138). This was evidenced by the frequent external displacement of the *ossa coxae*, the mandible and cranium, and the bones of the feet, all of which would be in unstable positions in a supine corpse. Moreover, any disarticulated skeletal element has the potential to be displaced, by any number of additional taphonomic factors into any available voids (see below), a pattern evidenced here by widespread displacement of the bones of the feet, as discussed above.

In all burials, the external displacement of skeletal elements involved the movement of bones posteriorly, in a fall towards the base of the coffin, in a lateral and/or inferior direction which appeared to have resulted predominantly under the force of gravity. The analysis of the confirmed coffin burials has corroborated Blaizot's (2014) findings, that the direction and distance of external displacement has the potential to aid in the identification of the size and the shape of the container. Indeed, in most of the burials (74/78, 95%) the external displacement was clearly contained within the area provided by the coffin. There are four burials, all from St Oswald's, with skeletal elements that appeared displaced outside of the coffin volume (4/78, 5%). These would all appear to be the result of taphonomic disturbances to specific areas of the corpse. In SO050 two left ribs have moved laterally, possibly during excavation or alternatively could have been displaced by a small mammal. In SO238 and SO524, the right clavicle and distal left radius respectively have displaced laterally. In SO238 the area of the right shoulder is damaged and in SO524 the radius has broken and only the distal part has been displaced. While in SO028 the right humerus, radius and ulna have potentially been moved and replaced perhaps when disturbed by a subsequent burial. A number of burials contained displaced bones that were aligned directly against the coffin side. In others, the skeletal elements had displaced more randomly across the whole length and width of the coffin. In both cases, the position of the externally displaced bones presented linear alignments, indicating the position of the containers side/s. The intact coffins in the sample illustrated how the sides of the container can be affected by warping, clearly seen in the coffins at Swinegate and St Peter's, and as such any alignment of bones may not strictly appear to conform to a straight line (Figure 5.27). In the burials displaying widespread external displacement and linear alignment of skeletal elements, it is unlikely that decomposition under gravity alone would result in this level of external displacement. This significant level of disturbance to the bones must be evidence for other taphonomic agents acting on the skeletal remains in a void. It was clear from excavation documentation at both Swinegate and St Peter's that water was a key factor in bone displacement. At these two sites the wooden coffins had been preserved by waterlogged sediment and evidence for the high-water content in the environment is clear from the images, where water partially fills the coffins at the time of excavation. At both sites excavation records remark on the wet conditions within the coffins; with skeleton SP1053's cranium found floating inside the water filled coffin upon excavation. The presence of water suggests displacement of elements in a void by the rise and fall of water within the coffin. At Worcester Cathedral, where a number of coffins displayed a linear alignment of externally displaced skeletal elements, the environmental conditions were drier, and as such fluctuations of the water table were not believed to account for the skeletal displacement observed. An alternative explanation could arise from the robust construction of the coffins which allowed the retention of the decompositional fluids. This would be consistent with the extensive movement of the foot bones observed in four burials from Worcester Cathedral. Whatever its cause, the additional displacement resulting from an additional taphonomic agent generated strong evidence for decomposition in a void, by increasing the external displacement of bones.

Figure 5.27: *Examples of wooden coffin sides warped by sediment pressure. Left – SP1819 (Photograph courtesy of Warwick Rodwell) and right – SY3428 (Used with permission from York Archaeological Trust).*

No single suite of bone movements was deemed characteristic of burial in a wooden coffin, rather a combination of external and internal movement of a variety of different body parts was seen. The problems related to using specific skeletal elements to infer the presence of an external void was raised in Chapter 2. The results of the analysis of confirmed coffin burials appears to support this previous research cautioning against the over-reliance on certain skeletal criteria. Issues surrounding the cranium and mandible were identified. The fall of the mandible may indicate the presence of an external void if the original position of the head left space between the chin and the chest of the corpse. Although, identifying this proved problematic. In nine cases the cranium was found to display anterior rotation (9/58, 16%). It was not possible to confirm if this anterior rotation of the cranium was solely the result of taphonomic displacement, as the cervical vertebrae could not be seen. Therefore, a reliance on the fall of the mandible as proof of an external void without additional skeletal indicators would be flawed. The rotation to the right or left of the skull (cranium and mandible together) was also deemed to be an unreliable indicator for decomposition in a void, when taken alone. Confirmation of intentional rotation can be obtained from a corresponding rotation of the cervical vertebrae. In 12 burials (12/58, 21%) the cervical vertebrae allowed the identification of lateral rotation right/left to be confirmed as intentional positioning of the head at burial. Conversely, in 26 burials (26/58, 45%) an inability to record the position of the cervical vertebrae hampered identification of taphonomic lateral rotation of the cranium. This inability to determine exact skeletal placement emphasises why on-site analysis is important for an archaeothanatological approach and facilitates a more accurate interpretation. Duday (2009: 35-36) reported that the position of the mandible can be used for aiding in the interpretation of cranial rotation, but is problematic, as it relates to the varied timing of the disarticulation of the tempromandibular (TMJ) joint compared to that of the cervical vertebrae.[12] Of the 78 confirmed coffin burials the rotation of the cranium was identified as taphonomic by a misalignment of the displacement between the cranium and mandible in only three burials. Harris and Tayles (2012) include the position of the patella as one of their key skeletal criteria for identifying a wide coffin. However,

[12] Disarticulation of the TMJ can occur both before and after that of the cervical vertebrae. If the TMJ disarticulates first any subsequent rotation of the cranium would not involve the mandible and decompositional rotation could be inferred. If the cervical vertebrae disarticulate prior to the TMJ, any decompositional rotation of the cranium could potentially include movement of the mandible.

they did not appear to consider other burial forms that could produce an external void. In this study reliance on the patella for evidencing an external void would be limited by its occurrence in just over half of the burials (40/78, 51%, 31 right and 33 left). This coupled with uncertainty as to the validity of patellae position, introduced by discussion around the replacing of patellae for photographs, means caution must be used when interpreting patellae data.

The lateral fall of the *ossa coxae* is one of the skeletal indicators often used by researchers to infer decomposition in a void. Its position in a supine corpse is unstable once decomposition of the surrounding soft tissue occurs, and, if there is no other object to support it, the coxal bones will displace to obtain a stable position. Nevertheless, unlike some studies, such as Harris and Tayles (2012: 232) where the lateral fall of the *ossa coxae* alone was considered sufficient evidence from which to infer burial in a wide coffin, the decision was made to not rely solely on this one skeletal elements displacement. It was clear from the results of the analysis of the confirmed coffin burials that a complete lateral fall of the *ossa coxae* did not occur as frequently as may have been expected for decomposition in a void, due to the lateral proximity of the coffin sides. These were seen to either fully support the *ossa coxae*, maintaining them in approximate anatomical positions, but also allowing some lateral fall before the bone's movement was arrested by the coffin side. Furthermore, the presence of less rigid barriers, such as durable clothing and shrouds, in combination with a body cavity in the soil, could allow for this lateral displacement. This would be even more likely if an individual had a greater body mass, as the decomposing soft tissue would leave a relatively larger void, into which the *ossa coxae* could fall posteriorly and then open out.

Researchers have linked the lateral fall of the *ossa coxae* to the lateral rotation of the femur; as the acetabulum is displaced in a lateral-posterior direction this causes the lateral rotation of the femoral head as they are displaced in the acetabula, resulting in the lateral rotation of the whole femur (Duday 2006: 40). Out of the 78 burials the position of both the *ossa coxae* and femur together could be assessed in 38 right sides (38/78, 49%) and 46 left sides (46/78, 59%). Of these burials, a full lateral fall of the *ossa coxae* was associated with a laterally rotated femur in only 6 right (6/38, 16%) and 9 left (9/46, 20%) (Table C44). Lateral rotation of the femur was also seen, in burials in which the *ossa coxae* had not fully fallen laterally to rest on the base (5/38, 13% right and 8/46, 17% left), and also in a small number of burials in which the *ossa coxae* had maintained an approximate anatomical position (3/38, 8% right and 4/46, 9% left). An explanation for this could be, that the original arrangement of the lower limbs included lateral rotation, and this rotation was enhanced by decompositional movement, or alternatively, a post burial lateral fall of a foot might create lateral rotation of the lower limb. There were also burials in which the *ossa coxae* had fallen laterally but there was no corresponding rotation of the femur, such as seen in WC194, (full lateral fall of the *ossa coxae* 13/38, 34% right and 13/46, 28% left, partial fall of the *ossa coxae* 11/38, 29% right and 12/46, 26% left). Here, it appeared that the femur may have been laterally rotated but had subsequently moved back into anatomical position. This was inferred from the lateral rotation of the tibia and the lateral fall of the tarsal bones, which could not be accounted for easily by any other taphonomic agent and did not appear to relate to the original position of the lower limb as the metatarsals had fallen posteriorly and inferiorly (straight down). This disarticulation and subsequent re-articulation of joints has also been identified in forensic experimentation by Mickleburgh (2017), occurring over a period of a few days.

5.3.2 External secondary voids

A small number of burials displayed external displacement which could be attributed to the emergence of an external secondary void, rather than movement of a bone into a pre-existing void. While original voids and secondary voids are both external to the original body volume, they need to be distinguished as they have a different origin. Evidence for external secondary voids is relevant to the identification of a coffined burial when the void's origin can be related to decomposition of the wooden coffin, or by its presence provides evidence for the existence of the container. In a small number of the sample burials the evidence for an external secondary void was considered relevant, as bones appeared displaced outside the delimitation originally imposed by the coffin and their movement resulted from decay of the coffin itself. In SY3455 and SY3426 the skeletal elements appeared displaced by the decay/collapse of the base of the coffin beneath them.

5.3.3 Internal secondary voids

Internal displacement was observed in all burials. In these burials it was determined that this was the result of the wooden coffin acting as a solid barrier between the corpse and the soil and impeding the surrounding sediment from progressively in-filling the decomposing soft tissue. This, in turn, allowed for the creation of internal secondary voids which facilitated the movement of bones that had become naturally unstable during decomposition under gravity. It can be concluded that evidence for internal displacement is not as informative as the occurrence and extent of external displacement in determining the presence of a wooden coffin. This displacement into internal secondary voids was expected, as it has been identified as part of the natural movements that occur during decomposition of a corpse (see section 2.3). Although important in excluding burial in direct contact with fine grained sediment, internal displacement can occur in burials where the body is wrapped, clothed, covered, or buried in soil comprising predominantly coarser grained sediments. In these situations, internal secondary voids will still be created and the bones move before the sediment falls into these cavities. Moreover, the evidence for internal displacement from the 78 confirmed coffins has added little to that obtained from external displacement.

The reasons for the observed diversity in the amount of displacement, both in terms of the number of bones involved and the extent of movement, need addressing. This variation probably relates to differences in the durability and integrity of the wooden coffin, in addition to environmental factors, and the size of the coffin. Preserved wooden coffins which maintain integrity allow for the prolonged existence of voids within the coffin, as soil cannot enter the container. This increases the potential for bones to become displaced by taphonomic forces besides gravity. Yet, the movement of elements does not have to occur simply because the potential for movement exists. Indeed, the presence or absence of additional taphonomic factors potentially plays a significant role in determining how clearly an external void is demarcated. Conversely, if the integrity of the coffin is compromised early in the decomposition sequence, allowing sediment to enter while decomposition is still occurring, this will limit bone movement. Both internal and external voids will be in-filled and bones will be fixed in place. The type of sediment will have an impact on both the speed of in-filling and coffin integrity. Where the sediment is fine-grained, such as at Worcester Cathedral, this has the potential to infiltrate into the coffin through smaller fissures than would be accessible by courser soils, those with high clay content or those which are highly waterlogged. Nevertheless, sediments high in clay are susceptible to shrinking and expansion, and this will have a physical effect on the coffin integrity, as evidenced in a study by McGowan and Prangnell (2015). They reported that sediments with coarse grains, such as sand and gravels, by trapping air produced less pressure on the coffin than sediments made up of fine grains, which presented a solid mass above the coffin and resulted in lid collapse and warping/collapse of the sides (McGowan and

Prangnell 2015: 16). As discussed above, warping of the coffin sides was clear in a number of burials in the sample. McGowan and Prangnell (2015: 16-17) found that the collapse of the coffin lid and subsequent vertical soil pressure onto the bones, could result in considerable damage to the skeletal elements, but this was also dependent on sediment type and environmental conditions. They discuss examples of burials in which the bones were highly compressed and appeared like powdery silhouettes. This description is similar to what was found in three graves at Worcester Cathedral, in which the preservation of the bones was exceptionally poor compared to the other burials in the sample (WC324, WC799, and WC804). The size of the coffin in relation to its occupant affects skeletal displacement. If the coffin is large and there is more empty space, there is more potential for external displacement than there would be in a coffin in which the sides and ends are adjacent to the corpse. Indeed, these results do not show the complete flattening to a thin layer of skeletal elements described by Castex and Blaizot (2017: 282). Rather, these coffins are in general only wide enough to fit the corpse into, leaving little lateral empty space.

5.3.4 Skeletal elements supported in potentially unstable positions

In addition to providing space and forming a barrier between the corpse and the surrounding sediment, the wooden coffin interacted with the corpse in another way – providing support to certain appendicular skeletal elements. When a skeletal element maintains a position that, through the decomposition of the supporting soft tissue, is unstable, it affords evidence for an object sustaining it in that position. As discussed in Chapter 2, the potential sources of this support can include: the grave fill in direct contact with the corpse; a narrow or v-shaped grave cut; a perishable object such as a shroud; or a burial container. As the presence of a coffin has been securely established for all burials in the data set, it was clear where this support was provided by the coffin. All of the 64 burials displaying the maintenance of unstable skeletal positioning also exhibited evidence for decomposition in a void (64/78, 82%). The combination of displacement and support for skeletal elements in unstable positions is important in identifying burial in a wooden coffin, as it was clear that frequently bones were supported in only approximate original positions, with disarticulation, internal, and external displacement also present. The support of bones in unstable positions then can also provide evidence for the location of the coffin sides in conjunction with the evidence for funerary architecture and therefore provides strong evidence for the size of the container.

There were some paradoxical articulations present in the burials, mainly in the hands and feet. The situation in which these labile articulations exhibit connections when other more persistent joints, such as the sacroiliac, did not required explanation. Duday and Guillon (2006: 146) discuss an example of how skeletal analysis identified the maintenance of labile articulations, appearing to represent burial in a filled space, however, there was direct archaeological evidence for the presence of a wooden container. They suggested that this discord in evidence can be explained through the wooden container decaying in advance of the complete decomposition of the corpse within (Duday and Guillon 2006: 146). Yet, a reference in Chapter 3 may hold the answer – burial of the sick in linen gloves and socks. For the maintenance of labile articulation of the hand, a glove would keep the bones of the hands together allowing the posterior fall as a whole, rather than individual elements. For the feet, the differences in position and extent of displacement could also relate to the presence or absence of footwear or wrappings. If decomposition of the foot begins within a shoe, the void present in the coffin will act more akin to a secondary void, only accessible to the bones of the foot once the shoe has itself decomposed.

5.3.5 The original arrangement of the corpse

Other than burial in a supine position, there did not appear to be one predominant arrangement for the corpse related to interment in a wooden coffin. There was a general tendency for a compact arrangement of the limbs, with the forearms adjacent to or lying over the corpse and the lower limbs favouring some degree of adduction towards the mid-line. This arrangement of the upper limbs appears to relate to the dimensions of the coffin, and further corroborated by the evidence for bi-lateral compression of the upper body. Chapters 3 and 4 identified that wooden coffin construction in this period appeared to favour a narrow rectangular design, with those which tapered towards the foot end of the coffin also in use. The measurements from the coffins within this sample provided a mean coffin width of 0.40m and a modal value of 0.35m, the maximum was only 0.50m. If there is little to no available space for the upper limbs to be placed in an anatomical position, which would be the case in many of these narrow coffins, then they have to be placed resting over, or positioned tightly against, the body. A coffin would afford the lower limbs sufficient space to be in an extended position; unless the stature of the corpse exceeds the length of the coffin. This might present in the lower limbs being flexed to the left or right, however, there was no evidence of flexion at the hip or knee joints in any of the coffined burials. The data on coffin length showed that coffins were long enough to comfortably contain a supine individual. At Swinegate some coffins appeared overly long, leading excavators to infer the presence of a now decomposed object, or else that the coffin was not made-to-measure. The arrangement of the lower limbs would appear not to be constricted by the width of the coffin. Lower limb position therefore, could be purely practical, as lifting a corpse is easier if the limbs are closer together, or evidence for the presence of a shroud, or indeed intentional positioning relating to the appearance of the corpse.

It is clear within this data set that bilateral compression resulted from a lateral pressure introduced from the adjacent sides of the coffin, as evidenced by the location of the supported humeri to the coffin sides. This is an important observation, as evidence for bilateral compression of the upper body (verticalisation of the clavicles, anterior/superior rotation of the scapulae and narrowing of the ribs)[13] in combination with adducted lower limbs are key skeletal indicators used by excavators to infer shrouded burials in other studies of late Anglo-Saxon burials in the UK (for examples see Rogerson *et al*. 1987: 63; Nolan 2010: 204; Anderson 2014: 192). For three burials (3/78, 4%), SY3381, SY3505 and SY11006, the possibility of a shrouded corpse within a coffin could not be excluded as there appeared to be a space between the coffin side and the supported lateral skeletal elements. In two burials (2/78, 3%), SY5005 and SO383, bilateral compression was suggested by the narrowing of the thorax, though, the scapulae and humeri did not display an anterior and medial rotation accordingly. The evidence from the ribs showed that a bilateral pressure had been acting on them as these elements disarticulated. However, the inference that could be drawn from the lack of medial rotation in the humeri, combined in some cases with its lateral and/or superior displacement is that the source of the compression has decomposed allowing the humeri access to the void within the coffin, previously not available to it. This could present evidence for a shrouded corpse within a coffin. Alternatively, a narrowing of the thorax has been discussed by Williams (2015: 96) as potential evidence for burial in clothing.

In summary, evidence indicating the presence of decomposition in an external void is deemed fundamental to the determination of burial in a wooden coffin. Yet, rather than attempting the define decomposition in a void by means of

[13] In most publication the terms here are not used. Rather reference is made to a ‘tight compression of the body’ or ‘constricted position’.

the external displacement of any single type of skeletal element, it is the overall pattern of disarticulation and displacement that is significant, and this can involve any combination of bones. It is clear that extensive skeletal displacement does not have to occur, but where it does the additional disturbance produces more conclusive evidence for burial within a coffin by suggesting a durable solid void around the corpse throughout, and for a considerable time after, decomposition. Although, external displacement alone may not always provide enough evidence to distinguish a coffined burial from a covered burial. Analysis of the confirmed coffined burials has evidenced that bones which are commonly expected to display external displacement in a void do not always do so. Skeletal elements maintained in unstable positions are therefore not mutually exclusive to burial in a coffin and can actually provide conclusive evidence for the presence of a coffin in certain circumstances, as in the case of laterally-supported bones. However, to fully utilise this skeletal indicator, it has to be combined with evidence for external displacement and evidence pertaining to the source of the support. In these confirmed coffin burials this could be seen to be the side of the coffin. In burials where there is already limited evidence for the presence of a coffin this source of the support has to be interpreted via other means. Identification of a grave cut at a distance from the supported bones will exclude the possibility that support visible was provided by direct contact with the grave cut itself. This inclusion of information about the grave cut reinforces how important the interaction is between the skeletal elements, archaeological evidence and the environment, to understanding the skeletal positions revealed at excavation. In some cases, without additional evidence provided by archaeological features such as the grave cut and/or inconclusive direct archaeological evidence for a coffin, the presence of a wooden coffin may remain a possibility rather than a certainty.

5.4 The Archaeothanatological Method

This section outlines the development and application of an archaeothanatological method from the observations described above to be used for identifying wooden coffins from evidence of skeletal positioning at three late Anglo-Saxon sites.

Utilising *in-situ* skeletal positioning to identify burials which were originally within wooden coffins, in the absence of any direct evidence for the container itself, appears to be a process of elimination as much as it is about the identification of absolute features present. As section 5.3 above has demonstrated, there is strong evidence for a suite, rather than a specific set of completely replicated, skeletal indicators that appear to relate to burial and decomposition in a container. In light of this observation, it was decided to develop a method based on a flexible flowchart as opposed to a fixed set of criteria. Observations of the *in-situ* skeleton are made with reference to the statements in the flowchart, leading, by a process of elimination, to a conclusion about potential burial form. In their archaeothanatologically-based investigations of burials practices in prehistoric Thailand both Willis and Tayles (2009) and Harris and Tayles (2012) utilised flowcharts. Both papers emphasise how flowcharts are best utilised as a guide and not a strict formula which must be adhered to; an opinion that is assented to in this research. A degree of flexibility is a necessity when dealing with the potential myriad of taphonomic factors – natural, environmental and intrinsic to the corpse – which may produce differing effects in each individual burial; reproducing this infinite complexity within a rigid method is not practicable.

The creation of the flowchart involved selecting the most frequently observed skeletal characteristics deemed to reflect burial in a wooden coffin, obtained from the analysis of the confirmed coffined burials and supplemented by evidence from previous studies. The progression through the flowchart is not meant to necessarily represent a hierarchy, in which more important skeletal indicators take precedent over those below. Rather, from reviewing the observations made of the confirmed coffin burials, and those made in other studies, the starting point for the flowchart took into consideration the apparent strength of the skeletal indicator and the frequency of observations across the data set. As raised in the preceding section, it is only when skeletal indicators are combined that the identification of an original burial form can be securely inferred. Working through the flowchart thus allows for the amalgamation of the skeletal evidence in a structured way. In addition to skeletal observations the decision was made to include one archaeological feature into the pathways of the flowchart – grave cut location. The rationale for this was that in the confirmed coffin burials it was clear when the side of the coffin was the cause of the maintenance of unstable skeletal positions. Nevertheless, the application of this method to burials with no direct, or inconclusive, evidence for a coffin (wood, metal work, voids, stains), means the location of the grave cut becomes fundamental to discovering the source of the support of any skeletal elements maintained in potentially unstable positions (Figure 5.28 and Table 5.8).

In endeavouring to keep the flowchart succinct and user friendly, a decision was made to omit skeletal observations relating to internal secondary voids, bilateral compression, and the incorporation of inconclusive direct archaeological evidence. As was noted in section 5.3.3 above, the evidence for internal secondary voids failed to add any further significant information to that provided by external displacement of bones for the identification of coffined burials. Bilateral compression, although shown to result from pressure exerted from the coffin sides, was not thought to be a fundamental indicator of burial within a wooden coffin. Compression can also result from a narrow grave cut or a tight shroud. It was therefore deemed that this information was better used to refine potential burial forms once an initial analysis using the flowchart had been undertaken. This method is envisaged as primarily for use in situations where there is little to no direct evidence for burial form available from the grave context. It was therefore deemed that any evidence recovered could be used to refine the burial form obtained using the flowchart. For example, evidence of wood on the base of the grave could be determined to be evidence for a bier if the burial form is determined by the flowchart to be uncoffined due to a lack of external displacement indicating decomposition occurred in a filled space and not an original void. Whereas in the case of a burial with an outcome of ‘void – rigid container’ evidence for nails could be used to confirm this was a coffined burial as opposed to a wood-lined and covered grave.

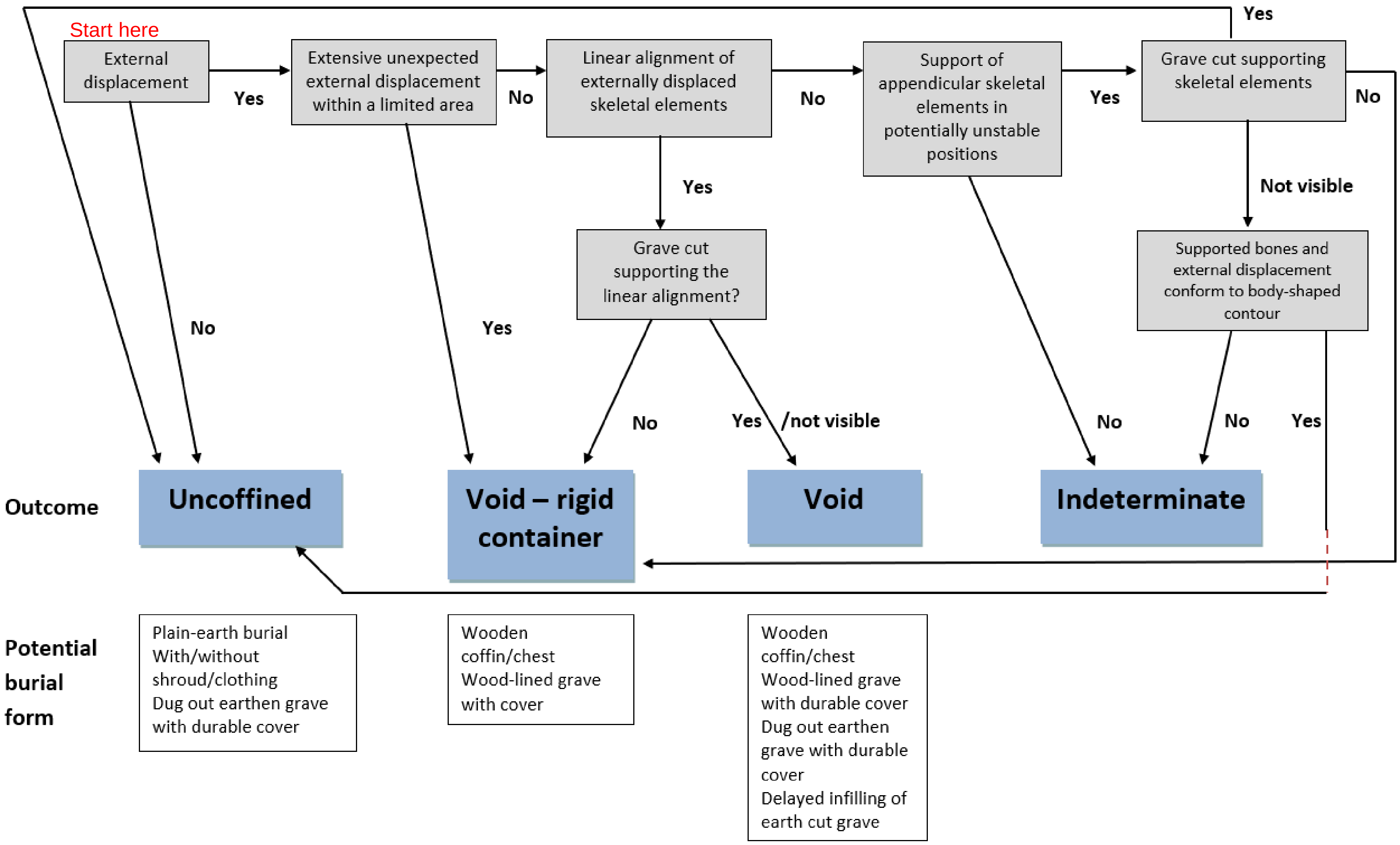


Figure 5.28: *Flowchart developed from the skeletal analysis of confirmed coffined burials for determining burial form in the absence of direct archaeological evidence for a burial container*

Table 5.8: *Explanation of the burial outcomes used in the Flowchart in Figure 5.28*

Void – rigid container	Wooden coffin/chest Wood-lined grave with cover	Skeletal evidence for decomposition in a long-lasting original void, formed by a rigid barrier. Archaeological evidence either excludes the grave cut as a source of this barrier and/or provides evidence for the presence of a wooden structure in the grave that is not representative of a cover only. Presence of extensive skeletal displacement in a limited area. Extent excludes a dug out earthen grave with a durable cover, as these in loose/sandy soil would not be expected to maintain void as long as container.
Void	Wooden coffin/chest Wood-lined grave with cover Dug out earthen grave with durable cover Delay in backfilling grave	Skeletal evidence for decomposition in an original void. Archaeological evidence cannot determine the source of the void/barrier as there is insufficient direct archaeological evidence (wood, metal work) and no grave cut has been identified. Alternatively, there is archaeological evidence indicating it cannot be a container – location of grave cut adjacent to skeletal elements.
Indeterminate	Wooden coffin/chest Wood-lined grave with cover Dug out earthen grave with durable cover Durable loose shroud Durable clothing Delay in backfilling grave	Skeletal evidence indicates delayed in-filling, but the source of the barrier cannot be identified. There is limited evidence for external displacement and that recorded could have occurred within the confines of a body cavity maintained in the sediment enhanced by clothing/loose shroud, therefore decomposition in a filled space cannot be confidently excluded. A lack of archaeological evidence for the presence of a wooden container or durable cover.
Uncoffined	Plain earth with/without clothing/shroud Dug out earthen grave with durable cover	Skeletal evidence for decomposition in a filled space – progressive or delayed in-filling present, limited amount of external displacement observed (that which could be accounted for by secondary voids or those possible within clothing/shroud) Archaeological evidence indicating it cannot be a container – location of grave cut adjacent to skeletal elements or overall position of corpse would exclude a typical late Anglo-Saxon wooden coffin.

The pathways of the flowchart terminate in boxes which provide a category of burial form. A burial within the void – rigid container category will display evidence for decomposition in an original void formed by a long-lasting rigid container. This evidence will either exclude the grave cut as the source of the barrier/support for bones or else confirm the presence of a wooden structure in the grave that cannot be solely a cover in an earthen grave. The term void – rigid container was chosen over coffin as distinguishing if this rigid container is a portable one, a coffin/chest, or is the result of a fully wood-lined grave can be problematic from skeletal positioning. Both coffins/chest and wood-lined graves will be formed from wood and present comparable original voids around the corpse. The only differences may come in the form of specific construction. A lined grave may not necessarily be lined on all six sides, i.e. it may not have a base board. The presence of metal work, nails and brackets, can identify a portable container. Alternatively, the location of the wood/stain/void may be found at a distance from the grave cut (discussed in section 4.2). Therefore, the presence of direct archaeological evidence may allow a distinction to be made between burials in this category. From now on in this study wooden container will be used to denote either a coffin/chest or fully wood-lined and covered grave, unless there is archaeological evidence (metal work, location of the grave cut in relation to the wood/linear or supported skeletal elements) to determine the exact form of wooden container present only then will the term coffin be used. In a number of burials in the confirmed coffin sample unexpected extensive skeletal displacement occurred within the wooden coffin. It was determined that in certain circumstances the classification of void – rigid container may be permissible from the extensive displacement of skeletal elements without supporting evidence from the location of the grave cut or direct archaeological evidence for the container itself. Due to the relative time a corpse takes to fully disarticulate extensive skeletal displacement would not be expected in graves cut into sediments that without some form of barrier would not maintain original voids around a corpse, for example dry soils with a high sand content. Therefore, in sediments such as these if extensive skeletal displacement is present it would indicate the use of some form of rigid container, not just a cover above the corpse holding back the surrounding soil.

For a void outcome, burials must have exhibited evidence for decomposition in an original void. However, not enough evidence exists to confidently determine if this void was created specifically by a rigid wooden container. Burials with a void outcome might be either of two plausible burial forms: a wooden container (coffin/chest or fully wood-lined and covered grave) or a dug out earthen grave with a durable cover. Other possibilities for an original void, such as a delay in back filling a grave so decomposition commences, need to be considered. Even though archaeological evidence for dug out earthen graves containing a durable cover in the late Anglo-Saxon period is not extensive the possibility that they may be present must be considered. There are, nevertheless, inherent problems in confidently distinguishing between a wooden container and an earthen grave furnished with only a durable cover in the absence of direct archaeological evidence (wood/metal work). Firstly, the original void present will be comparable to that found within a wooden container in shape and size, and as such the patterning of external displacement may be similar. Secondly, relating to the relative longevity of the void. Potentially, the void in a dug out earthen grave containing only a durable cover may not be as long-lasting compared to that in a wooden container, especially a coffin whose construction, using nails or wooden dowels would increase the robusticity, as there is no physical barrier between the soil and the skeletal elements to the sides/ends of the grave. This would allow ingress of sediment faster than a physical wooden barrier. As introduced above, sediment type is crucial in determining the longevity of a grave cut, and will vary between sites, and potentially between graves across a cemetery. For example, if the sediment at a site is fine-grained, grave cuts might not retain integrity long enough to allow a void to be maintained. Conversely, graves cut into sediments with a high clay content may be exposed to larger vertical pressures caused by the compact sediment, and this could cause the collapse of the grave sides. Water action is known to destabilise a wall of sediment (DeCamp 2007), this could suggest that the cut of a dug out earthen grave containing only a durable cover might become relatively unstable under in environmental conditions where water levels are high or fluctuate. If this was the case then the longevity of the void would be reduced compared to that inside a wooden container. Therefore, burials displaying extensive displacement in sediments with low clay and high sand components may be more indicative of contained burials than those within a dug out earthen grave containing only a durable cover, as the potential for movement would be decreased due to the reduction in the length of time the external void was present. However, due to a lack of confirmed covered late Anglo-Saxon graves an evaluation of skeletal positioning resulting from this form of burial is not available for comparison, hampering differentiation between them from skeletal positioning evidence. Therefore, in burials in the 'void' category there was insufficient archaeological evidence to allow a distinction between a container and an earthen grave with cover to be confidently made.

For the indeterminate burial outcome, neither the spatial arrangement of the skeletal elements nor any archaeological evidence, either direct or indirect, has been able to provide conclusive evidence for burial form. Burials within this category suffer from a lack of information to explain their form of burial. Although displaying internal and external displacement of skeletal elements, any external displacement will not be extensive, nor provide an outline suggestive of a rigid linear barrier or be solely attributable to the emergence of a secondary void. Thus, skeletal movement could have occurred within a cavity created by the initial volume of the corpse supplemented by clothing or shrouding. In the burials in which the grave cut has been identified, it has failed to prove any assistance in distinguishing between burial forms. For burials containing skeletal elements supported in potentially unstable positions the grave cut has not been identified, and as such cannot be excluded as a potential source of support. The original presence of a wooden container cannot be completely excluded, due to variable factors such as durability and integrity, and the potential complication of clothing or shrouds used in addition to a wooden container. Thus, there is still a possibility that burials with this outcome could have been provided with wooden containers. It is also possible that alternative funerary practices are being employed that, as yet, we are unable to identify.

The uncoffined burial outcome does not have to indicate a plain-earth burial, but rather signifies that no coffin/chest was present in the grave. Possible burial forms are likely to include either plain-earth burials in which the individual was interred with or without clothing, shrouding or other forms of bodily wrapping. Or alternatively, there is evidence for decomposition in a void, however, the use of a wooden coffin has been excluded due to the location of the grave cut or the overall position of the corpse at burial (corpse is arranged in such a way that they would not fit into a coffin).

5.5 Independent verification of skeletal observations

Excavations of two of the cemeteries included in this study identified burial containers other than wooden coffins. These were a lead coffin from Staple Gardens and stone cist burials from Black Gate[14] (Table C45). While the key to developing the method for identifying late Anglo-Saxon wooden coffins in the

[14] The background information pertaining to Staple Gardens is contained in Chapter 4 and for Black Gate cemetery in Chapter 7.

present study was to focus only on wooden coffins from this period, to ensure comparison of like with like, both lead coffins and stone cists should also result in an original external void around the cadaver. Therefore, an examination of skeletal positioning in these alternate funerary containers presents an opportunity to: first, corroborate the observations concerning the impact of decomposition in a void on skeletal position from the analysis of the confirmed wooden coffined burials; and, second, to provide additional verification for the newly developed method before its application to burials with a plain earth/undetermined burial form.

The construction of the lead coffin found at Staple Gardens consisted of lead sheets that had been joined using hammered strips rather than soldering the edges and there was no evidence found for the use of nails or any wooden components (Excavation archives held by Hampshire Cultural Trust). The lid had compressed down onto the individual, creating an imprint of the skeleton on the lid (Excavation archives held by Hampshire Cultural Trust). The shape of the coffin appeared originally to have been tapered, but due to soil compression the lead had buckled, and the sides were no longer linear. The construction and shape of the stone cists at Black Gate were varied (Table 5.9), although all were all constructed using sandstone. In seven burials they were made from roughly-hewn slabs, but in BG523 the cist was formed from sandstone rocks. BG375 had evidence of mortared joints and also a mortar coating on the inner surface of the slabs (Nolan 2010: 220). There was evidence for stone covers on four cists.

Table 5.9: *Construction details for the eight adult cist burials from Black Gate suitable for archaeothanatological analysis (Taken from the excavation documentation and Nolan 2010: 205, 215-221)*

Individual	Cist/coffin construction	Additional information	Archaeological evidence for a cover/lid	Shape of container
BG368	Rough-hewn sandstone slabs, covered with thin slabs	Ear muffs, head and foot stones	yes	Slightly tapered
BG375	Rough-hewn sandstone slabs with mortared joints and inner surface coated in mortar. Covered with capstone with mortared joints	Ear muffs	yes	Roughly rectangular/slightly tapered
BG377	Rough-hewn sandstone slabs with surface slabs	Head niche, head and foot stones	yes	Slightly tapered/ anthropomorphic
BG381	Rough-hewn sandstone slabs	Head niche	no	? Rectangular
BG415	Rough-hewn sandstone slabs		no	Unclear
BG482	Rough-hewn sandstone slabs	Ear muffs	no	Roughly rectangular
BG499	Rough-hewn sandstone slabs with surface slabs	Ear muffs	yes	Roughly rectangular, right wall curves outwards
BG523	Rough rubble sandstone rocks		no	Tapered/ anthropomorphic

All nine burials displayed evidence for the natural displacement under gravity of skeletal elements into the internal secondary voids created by soft tissue decomposition (Table 5.10). To varying degrees, eight of these burials displayed the displacement of skeletal elements through/into a void external to the original body volume (8/9, 89%) (Table 5.10). One of these (1/9, 11%), BG499, displayed extensive external and internal displacement of skeletal elements (Figure 5.29). The displaced right proximal radius and right ilium had aligned against the side of the cist. Of the visible bones, only the cranium and left femur appear to have remained in an approximate original position. In contrast, there was more limited external displacement in BG482. The mandible, left proximal humerus, right proximal radius and *ossa coxae* were the only skeletal elements to move externally to the original corpse volume (Figure 5.30). In BG415 no skeletal elements appeared to have displaced externally. The slabs, however appear to have been positioned directly adjacent to the bones, restricting their movement. Moreover, only the head and thoracic region has been exposed in the image, limiting the scope of any assessment (Figure 5.31).

Table 5.10: *The skeletal elements displaying displacement into internal secondary voids and external voids for each burial*

Individual	Internal displacement	External displacement
BG368	ribs, clavicles, vertebrae, radius	mandible, clavicles, *ossa coxae*, tarsals, metatarsals
BG375	ribs, clavicles, vertebrae, radius, ulna, hand bones	mandible, clavicles, *ossa coxae*
BG377	ribs, manubrium, vertebrae, radius, ulna	mandible, ulna, patella, tarsals, metatarsals
BG381	ribs, vertebrae	? humerus, *os coxae*, femur
BG415	ribs, clavicles	
BG482	ribs, clavicles, vertebrae	mandible, humerus, radius, *ossa coxae*
BG499	ribs, radius, ulna, femur	mandible, vertebrae, metacarpal, *ossa coxae*, patella
BG523	ribs, clavicles, radius	cranium, mandible, *os coxae*, radius, metatarsals
SG3115	ribs, sternum, vertebrae, metacarpals	cranium, scapula, humerus, *ossa coxae*, patella, tarsals, metatarsals

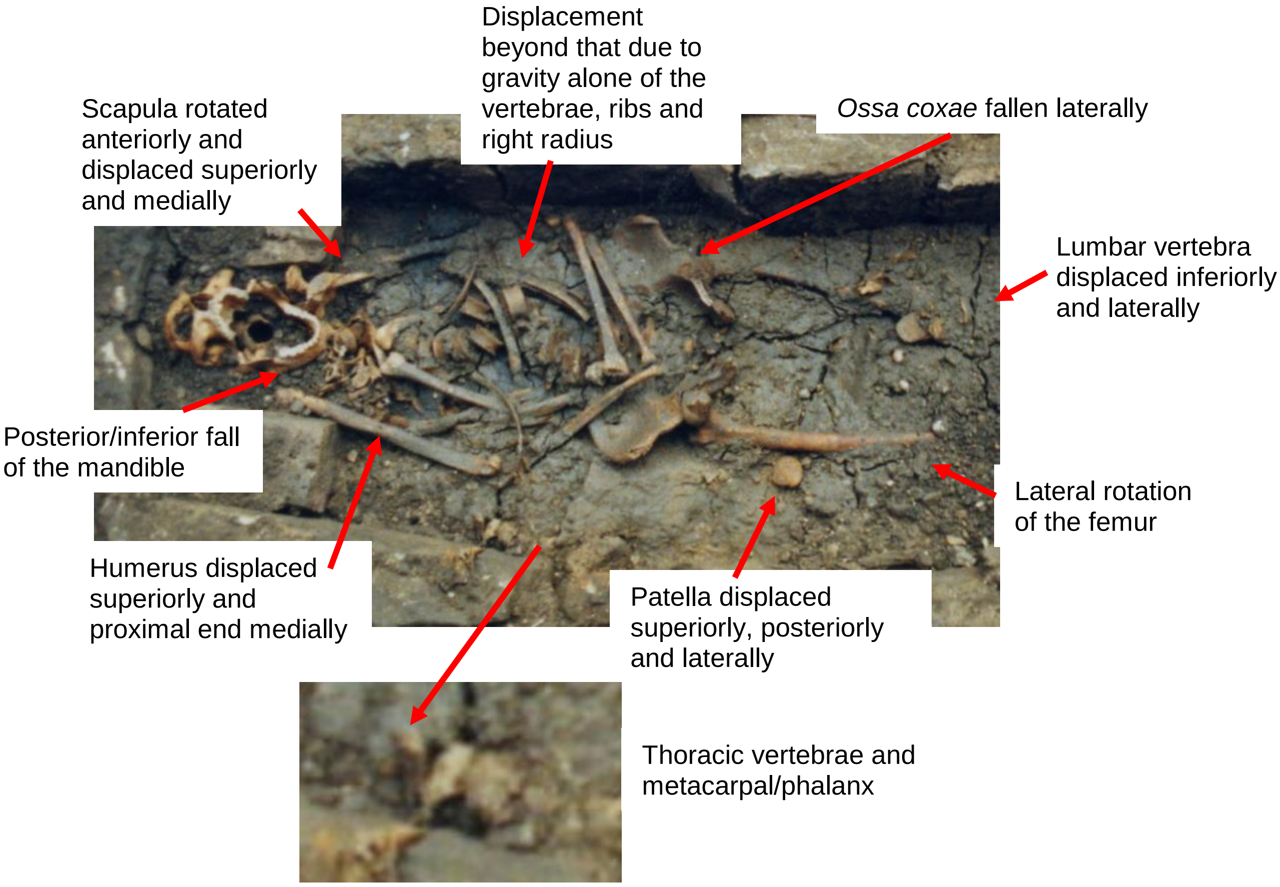


Figure 5.29: *BG499 displaying extensive skeletal displacement (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

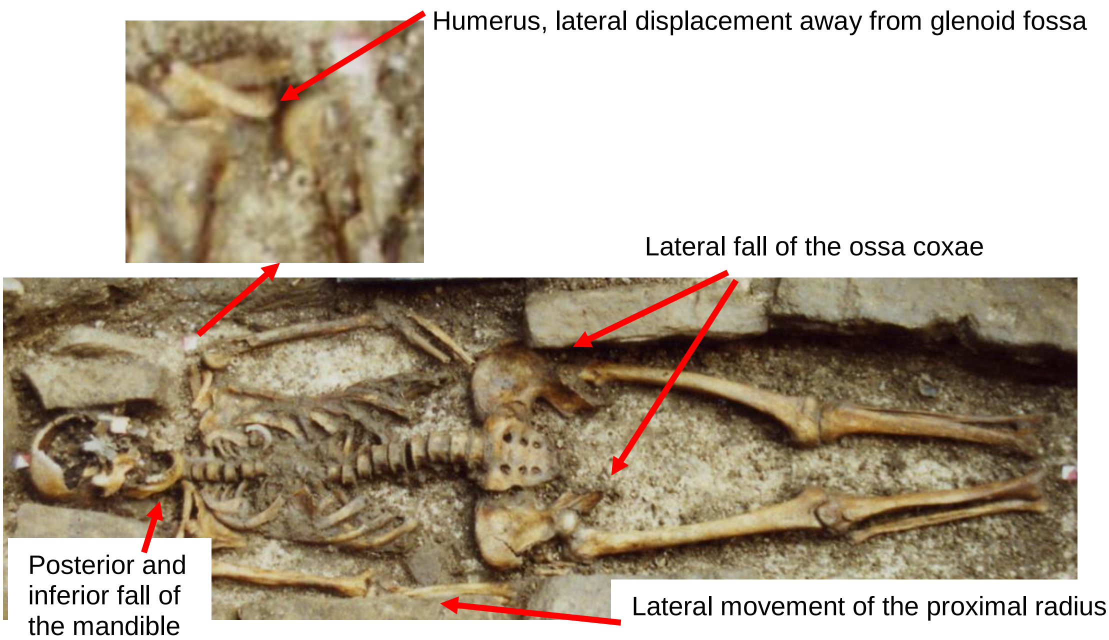
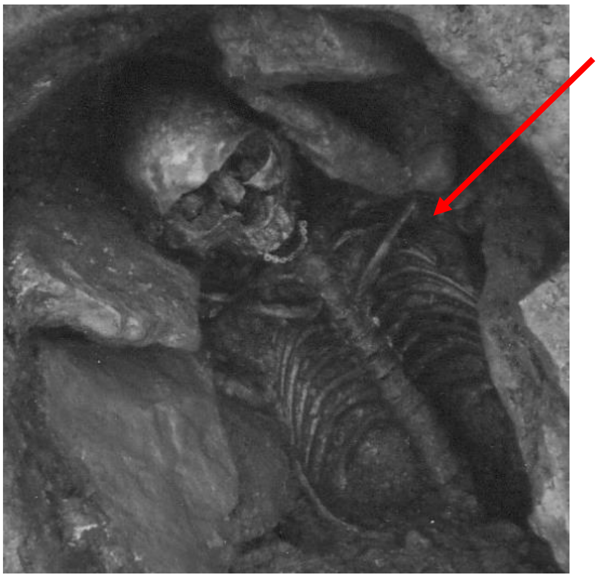


Figure 5.30: *BG482 displaying external displacement of the mandible, left humerus and ossa coxae (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*



Posterior fall of the mandible, clavicles and ribs

Figure 5.31: *BG415 displaying movement into internal secondary voids only. The head and thoracic region only has been exposed in the image, limiting the scope of any assessment (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

A linear alignment of displaced skeletal elements and/or those supported in potentially unstable positions was found in five burials (5/9, 56%) (Table 5.11). In SG3115 this involved the right scapula, ribs, *os coxae* and tarsal bones and on the left the humerus, *os coxae* and hand bones (see Figure 2.4). In BG381 the left humerus and *os coxae* align against the cist slabs (Figure 5.32).

Table 5.11: *Burials displaying a linear alignment of externally displaced and/or supported bones*

Individual	Linear alignment involving displaced bones	Support for appendicular skeletal elements
BG368	no	no
BG375	yes	yes
BG377	yes	unclear
BG381	yes	yes
BG415	no	no
BG482	no	no
BG499	yes	yes
BG523	no	no
SG3115	yes	yes

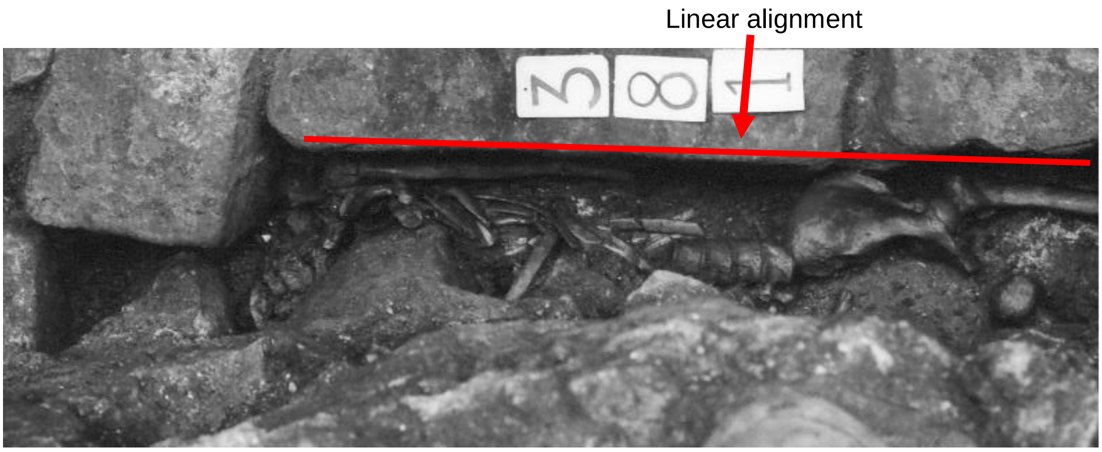


Figure 5.32: *BG381 displaying the linear alignment of the left humerus and os coxae, which is supported in a potentially unstable position against the cist slabs. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

The application of the method on these nine interments confirmed the presence of an original external void in eight burials through the combination of direct archaeological evidence and skeletal positioning (8/9, 89%) (Table 5.12). In three out of the four cases where there was no evidence for a cover found by the excavators, skeletal positioning suggests there was originally some form of cover protecting the grave from rapid infilling. The excavators did not find any direct evidence for the presence of a cover over/in BG415's grave. The skeletal evidence may then suggest it either did not have a cover or that it any cover was not constructed of a durable material. The suite of skeletal features identified in the wooden coffined burials in sections 5.2 and 5.3 above was repeated in the lead coffin and stone-lined graves. This alternative group of burials, therefore, provided independent evidence reinforcing the observations seen in the confirmed coffins. Thus, offering independent verification of the links between skeletal positioning and decomposition in an original void. The method however remains imperfect. In four cases (4/9, 44%) (BG368, BG375, BG482 and BG523) without the presence of the stones lining the grave burial form would have been ambiguous. Therefore, the findings reinforced the importance direct archaeological evidence has for assessing original burial form.

Table 5.12: *Skeletal factors leading to burial outcomes, by burial*

Individual	Outcome	Rationale
BG368	Void	External displacement Strong direct archaeological evidence for stone lining/cist
BG375	Void	External displacement Bone supported against slabs in a linear alignment involving displaced bone
BG377	Void	External displacement Linear alignment of displaced bones
BG381	Void	Extensive displacement within internal secondary void External displacement Bone supported against slabs in a linear alignment involving displaced bone
BG415	Indeterminate	No external displacement Strong direct archaeological evidence for stone lining/cist Limited skeletal elements visible
BG482	Void	External displacement Strong direct archaeological evidence for stone lining/cist
BG499	Void	Extensive external displacement of bones Linear alignment against slabs involving supported bones
BG523	Void	External displacement Strong direct archaeological evidence for stone lining/cist
SG3115	Void - rigid container	External displacement Linear alignment against lead coffin sides involving displaced bones and those supported in potentially unstable positions

5.6 Site Selection

The criteria for selecting cemeteries suitable for the application of the archaeothanatological methodology outlined in 5.4 was similar to that used in Chapter 4, Section 4.3. As the rationale behind these decisions was fully discussed above, only a summary is presented here. Sites were selected to include:

- Burials dated to the late Anglo-Saxon period
- Human skeletal material was sufficiently preserved
- Graves were intentional primary burials
- Limited post-depositional disturbance
- Substantial numbers of adult burials
- Suitable photographic archive
- Copyright and permissions

Unlike in Chapter 4, cemeteries selected at this stage of analysis had to contain significant numbers of graves that had been determined to be plain-earth burials based solely on a lack of direct archaeological evidence for any other form of burial.

The three cemeteries selected for analysis are Worcester Cathedral (Wo), Black Gate, Newcastle (TW) and Elstow Abbey (Be). Burials from Worcester Cathedral were also used in the development of the archaeothanatological method, however, a separate group of interments from this same site comprised adult burials for which there was inconclusive and/or no direct evidence for burial form and all of which had been photographed. At Black Gate cemetery there is direct evidence for a number of wooden containers, but the majority of graves have been labelled as plain-earth burials. Finally, the late Anglo-Saxon burials at Elstow Abbey have all, except three, been determined to be plain earth due to a lack of direct archaeological evidence to the contrary and as such would benefit from an archaeothanatological analysis.

The burials for each site were dealt with as separate data sets for the purposes of the initial analysis, due to the potential influence of site-specific environmental factors upon the grave and its contents. Each of the graves was subjected to the same analytical process with all data and observations recorded onto a database. It is important to clarify that any prior determination of burial form for each burial, other than any general comments applicable to the whole site, were not known prior to analysis in order that the observations were not biased. This allowed for a comparison to be made between the archaeothanatological determination for burial form and the excavator's interpretations. Only after the burial form for each grave had been determined for a whole site was information regarding prior categorization of individual interments added to the database.

To begin with, the photograph and excavation documentation were reviewed and details pertaining to any archaeological features recorded. This included but was not limited to: the dimensions and shape of the grave cut; sediment type and environmental conditions, to include evidence of animal burrows or plant roots; truncation and its cause; any inclusions and elaborations (grave goods, stones) and any direct archaeological evidence for a container or structure within the grave (preserved wood fragments, soil stains, nails and fittings, discrete areas of oxidised soil). Next, the skeletal positioning for each burial was assessed. As with the analysis of the confirmed coffin burials, standard terminology was used throughout (Appendix A). Observations regarding the articulation/disarticulation, displacement and location of the skeletal remains were made in conjunction with the flowchart, which acted as a guide to analysis. Any supplementary data – overall corpse arrangement/environmental conditions/inconclusive direct archaeological evidence – was utilised to reach a final determination of burial form. The outcome for original burial form resulting from the archaeothanatological methodology was then compared with the previously suggested form for the burial to assess concordance.

5.7 Summary

The analysis of 78 burials securely determined as interred in wooden coffins has identified a suite of skeletal characteristics that, in combination, appear to relate to decomposition of a corpse in a wooden container. A taphonomy-based method has been created from the data obtained from the analysis with the objective of identifying coffined burials from graves that have been previously determined to be plain earth based on a lack of evidence indicating to the contrary. The results of the application of this method to three cemeteries containing late Anglo-Saxon burials are presented, by site, over the next three chapters.

Chapter 6 – Analysis of Worcester Cathedral Burials

The next three chapters present the results of the application of the archaeothanatology-based method, developed in Chapter 5, on the burials from the three-selected late Anglo-Saxon cemetery sites of Worcester Cathedral, Black Gate and Elstow Abbey. Each cemetery is presented and discussed individually, allowing for the potential effects of any site-specific factors, such as sediment type, to be addressed. Chapter 7 and 8 begin with an introduction to the cemetery. As Worcester Cathedral was one of the five sites on which the method was developed, the introduction to the site is contained in Chapter 4 section 4.4.5 and does not need to be reproduced here. The taphonomic analysis has grouped the burials on the basis of the potential for the original presence of a wooden container; void – rigid container, void, indeterminate and uncoffined, presented and discussed separately. Each chapter concludes with a short discussion of how the results from the skeletal analysis have impacted understanding of funerary practices at the cemetery. An overall discussion regarding the effectiveness of the approach across all three sites is contained in Chapter 9.

6.1 Results

Of the 53 adult burials from Worcester where images were available and clearly showed skeletal material, results were obtained for 39 burials (39/53, 74%) (Table D1). Analysis of the remaining 14 burials was unable to generate reliable determinations for burial form due to the limited number and/or range of skeletal elements visible. Most frequently the skeletal elements visible were restricted to the tibia, fibula and foot bones. The skeletal analysis of the 39 individuals from Worcester has resulted in their division into groups based on the potential for the burial to have been within wooden containers (Table 6.1). It was deemed highly plausible that a total of 69% of the sampled burials were originally in voids provided by rigid wooden containers whereas only 10% provided convincing evidence for burial without a wooden container.

Table 6.1: *Results for the potential burial form for the 39 burials from Worcester Cathedral*

Void – rigid container		**Void**	**Indeterminate**	**Uncoffined burials**
26 (67%)		1 (3%)	8 (21%)	4 (10%)
WC090	WC917	WC941	WC104	WC157
WC234	WC935		WC158	WC272
WC335	WC938		WC363	WC818
WC343	WC944		WC400	WC1025
WC390	WC968		WC756	
WC521	WC993		WC856	
WC615	WC1016		WC950	
WC710	WC1021		WC1060	
WC723	WC1055			
WC762	WC1064			
WC784	WC1071			
WC903	WC1086			
WC910	WC1138			

6.1.1 Burials in a void – rigid container

The taphonomy-based method determined that 26 individuals were originally interred in wooden containers (26/39, 67%) (Table D2). There were several frequently observed characteristics. All 26 burials displayed external displacement of skeletal elements, most frequently involving the humeri (9/17, 53% right and 5/17, 29% left), the *ossa coxae* (7/15, 47% right and 10/18, 56% left), the patellae (12/14, 86% right and 7/14, 50% left) and the bones of the feet, tarsal bones (18/18, 100% right and 20/20, 100% left) and metatarsals/phalanges (17/17, 100% right and 17/17, 100% left) (Table D3). Most often the humeri and *ossa coxae* displaced in a lateral direction, while the bones of the feet frequently appeared extensively displaced across the base of the container in inferior and lateral directions. In 23 burials (23/26, 88%) skeletal elements were supported in potentially unstable positions. This most often involved one or both humeri (13/17, 76% right and 12/18, 67% left), and the *ossa coxae* (10/15, 67% right and 11/18, 61% left) (Tables D4-D5).

Key to identifying these 26 burials as within wooden containers was the relationship between the skeletal elements and the grave cut and/or the presence of preserved wood fragments, imprints or soil stains. In 19 burials (19/26, 73%) presence of a wooden coffin was identified by the position of the grave cut at a distance from one or more of: a combination of externally displaced skeletal elements which displayed a linear alignment, or appendicular elements supported in potentially unstable positions. The distance between the grave cut and the skeletal elements was evidence that a barrier, other than the grave cut itself, was responsible for the support and/or linear alignment of the bones. In six burials (6/26, 24%) the presence of preserved wood and soil stains in conjunction with evidence for a limited amount of external displacement was able to confirm the presence of a container, not specifically a wooden coffin. In the one remaining burial (1/26, 3%) the extent of the skeletal displacement alone led to determination of void – rigid container, as this involved extensive skeletal displacement into an external void - strong evidence for a long-lasting rigid container in the burial sediment at Worcester Cathedral (Table D6). Again, as with the previous six burials there was insufficient evidence to confirm this was a wooden coffin specifically.

The excavators had previously classified 11 of these 26 burials (42%) as undetermined, due to a lack of archaeological evidence indicating a form of burial other than interment directly into a grave cut. For the other 15 burials (15/26, 58%), excavators concluded they had contained wooden coffins based on the presence of preserved wood fragments, imprints in the soil from wooden boards, soil stains from now decomposed wood and differences in grave fill. These prior determinations had been based on direct evidence (wood fragments) but also indirect sources of archaeological evidence (e.g. sharp linear edges to grave fill contexts) (Table D7).

For 10 of the 11 burials the excavators had classified as undetermined/plain earth (10/11, 91%), the presence of a linear alignment of externally displaced skeletal elements at a distance from the grave cut clearly identified a portion of the coffin outline (Table D8). The type of bones displaying a linear alignment were similar across the burials and included the humeri, the *ossa coxae*, the fibulae and bones of the feet. In some cases, such as WC784, only displaced bones provided a linear alignment, in either stable or potentially unstable positions. Here the left humerus, *os coxae*, hand bones, fibula and tarsal bones had externally displaced and were aligned down the left side (Figure 6.1). Or, as was the case in WC993, the left fibula had displaced laterally and was now aligned with the left humerus and *os coxae*, which appear in approximately original positions. Whereas, on the right side, the right femur had displaced outside the area defined by the coffin, moved to a position superior and lateral to its original one. The excavators reported that the grave of WC993 had been truncated by a subsequent grave cut. This external secondary void created by the new grave cut could account for this movement of the femur. WC1064 also displayed a bone outside of the area of the coffin which could be attributed to truncation of the grave, in this case the left tibia. In WC1055, skeletal elements had been supported in potentially unstable positions in a box-shaped outline. Although there was quite extensive displacement of the foot bones these had moved in a superior and medial direction, so had not produced a linear coffin outline. However, the right humerus, *os coxae*, femur and fibula, and the left humerus, femur and fibula presented a rectangular outline, further supported by a displaced metatarsal bone to the east end of the grave (Figure 6.2).

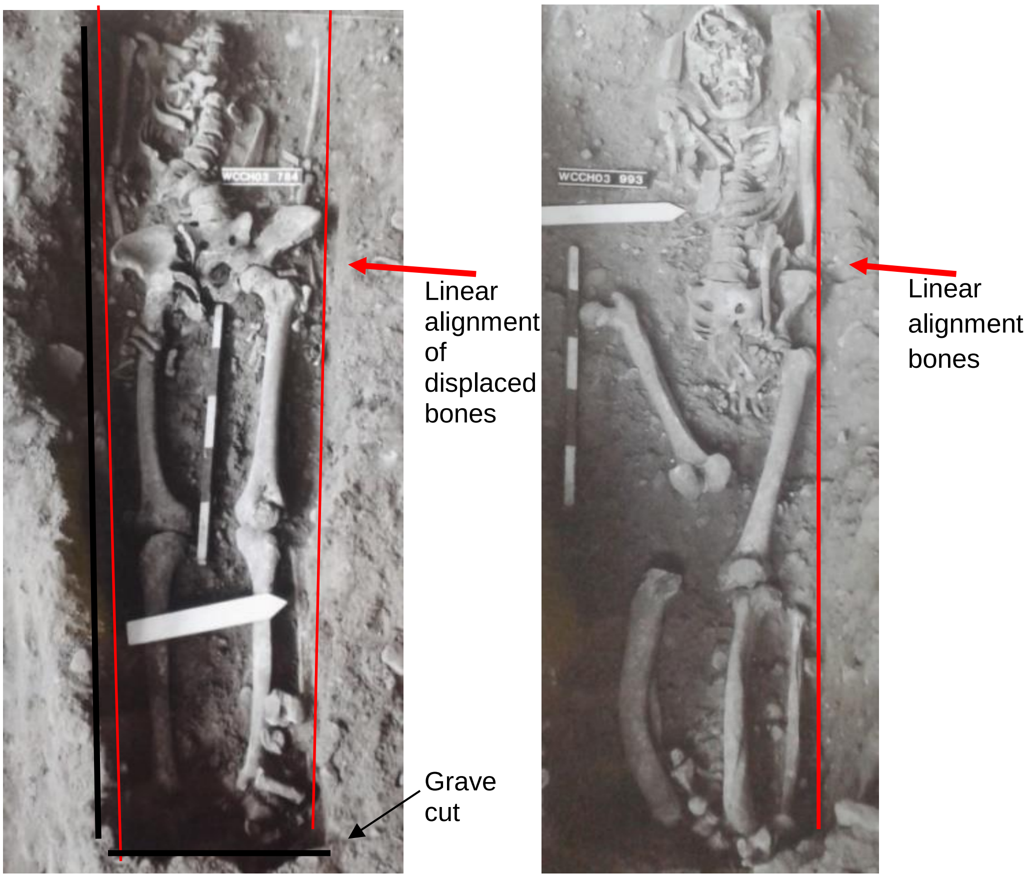


Figure 6.1: *Examples of burials from Worcester Cathedral displaying a linear alignment of externally displaced bones. Left – WC784 displaying a linear alignment of displaced bones to the left side including the os coxae, hand bones, fibula and tarsal bones and on the right of the radius, os coxae, and hand bones. Right – WC993, displaying the linear alignment of skeletal elements to the left, while on the right the right femur has displaced into a lateral/medial angle and superior position, with the proximal half extending to the far right. Grave cut not visible in photograph. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Figure 6.2: *Example of a burial with a void – rigid container outcome displaying skeletal elements supported at a distance from the grave cut. WC1055 displaying a box-shaped skeletal spatial distribution (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

For the other burial (1/11, 9%) considered previously by the excavators to have not been interred in a coffin, WC615, the presence of extensive skeletal displacement led to the void – rigid container outcome. The right humerus is the only bone in its potentially original position (Figure 6.3). They may also be a linear alignment on the right side, the humerus and the femur, if this represented a taper rather than rectangular barrier. Even though a width measurement is given in the excavation documentation (0.45m) its location is said to be tentative in relation to the skeletal elements. Nevertheless, the level of cohesion and the fine grain nature of the sediment at the site would mean that grave integrity would be short-lived; the sides would be expected to collapse filling the grave. Therefore, if this burial were not coffined it would have had to be shored, with the shores left in place, or lined with wood and covered, otherwise the void would not have lasted long enough to allow the external displacement of elements released from persistent articulations to occur. This led to the void – rigid container outcome for this burial.

Figure 6.3: *An example of extensive skeletal displacement from a burial with a void – rigid container outcome from Worcester Cathedral. WC615 displaying; internal movement of the scapulae, right clavicle, lower thoracic vertebrae, ribs, ulnae, radii and hand bones, lateral rotation of the right femur, medial movement of the tibiae and extensive displacement of the ankle and foot bones (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Of the 15 graves the excavators had previously classified as containing wooden coffins or structures, nine burials (9/15, 60%) were identified by this study as void – rigid container based on skeletal analysis alone, before the presence of direct archaeological evidence (wood/soil stains) was considered (Table D9). As with the ten burials described above, these burials contained a combination of externally displaced skeletal elements forming a linear alignment and/or skeletal elements supported in potentially unstable positions (Table D10). Similar bones were involved. For example, in WC910, the right humerus, *os coxae* and displaced patella form a linear alignment and, on the left, the humerus, ribs patella and tibia align, with extensively displaced foot bones aligning at the east end of the burial. In WC335, the displaced bones aligned with skeletal elements maintained in approximately original, potentially unstable, positions on the right side. The right humerus is maintained in an anterior position connected to the glenoid fossa and medially rotated, the right *os coxae* is maintained in an upright position and aligned with these are the displaced right patella and right tarsal, metatarsal and phalanges. The left ulna however, appears displaced outside the original area of the coffin. This could have resulted from movement at excavation, but due to how the excavators have dug round the bone, it may have displaced into an external secondary void created by the decomposing coffin side (Figure 6.4).

In the remaining six of the fifteen burials classified as coffined by the excavators (6/15, 40%), the skeletal evidence analysed in the present study was insufficient to determine presence of a wooden container in isolation (WC090, WC723, WC938, WC1021, WC1086 and WC1138). In these cases, there was limited evidence for external displacement and this did not produce a clear linear delimitation. For example, in WC1138 the only external displacement was the lateral/posterior fall of the right humerus from the glenoid fossa of the scapula (Figure 6.5). Furthermore, grave cuts had not been identified so could not be

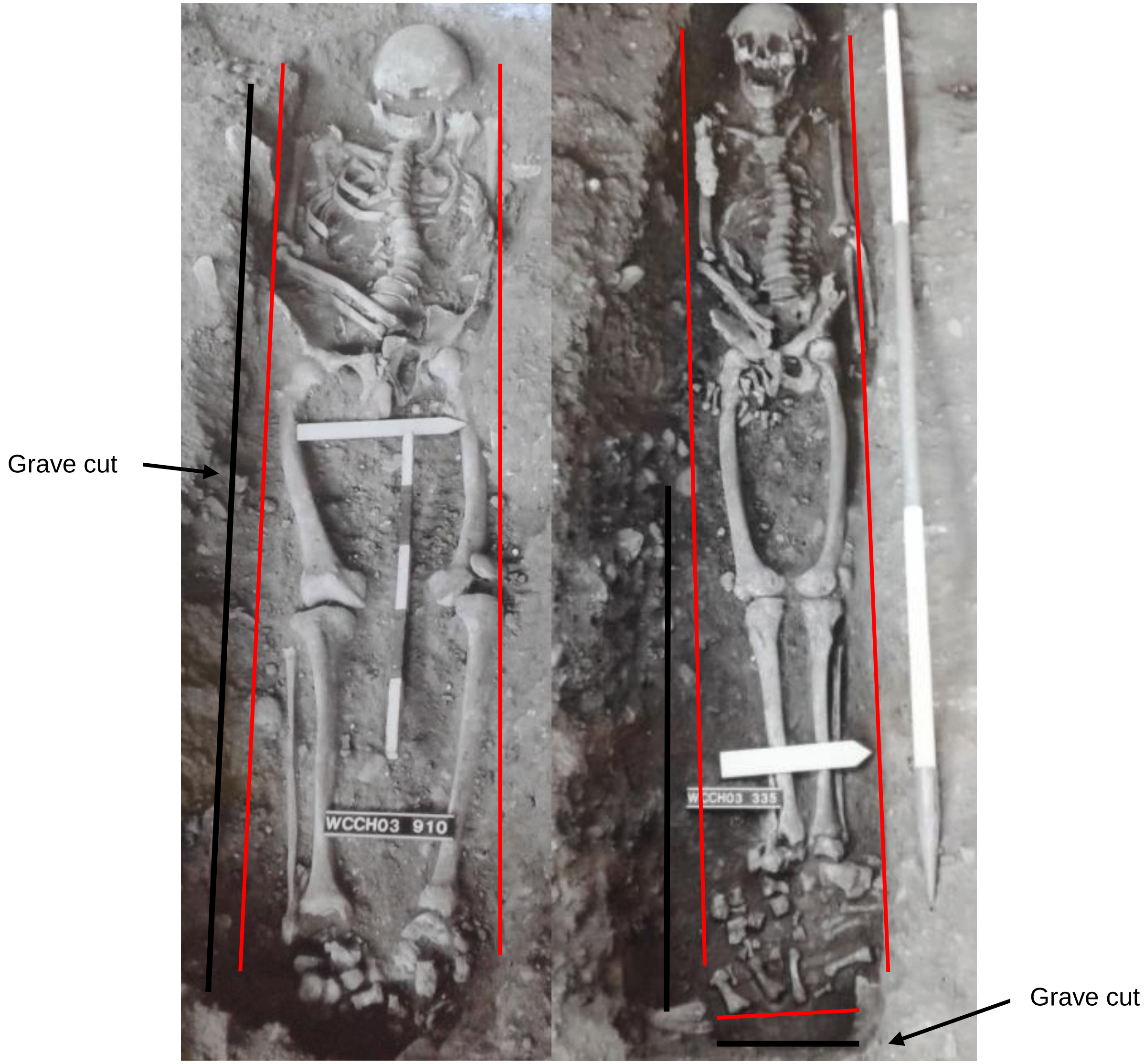


Figure 6.4: *Further examples of burials with a void – rigid container outcome displaying a linear alignment (red lines) of displaced bones and support for potentially unstable skeletal elements from Worcester Cathedral. Left – WC910, displaying linear alignment of the right humerus, os coxae and displaced patella and the left humerus, ribs patella and tibia. Right – WC335 displaying lateral support for the right medially rotated humerus and os coxae whilst the external displacement of the foot bones exhibits a linear alignment to the right and east end of the grave. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

excluded as a potential source of any laterally supported skeletal elements. However, these six graves contained direct archaeological evidence for the presence of a wooden object/structure in the grave (preserved wood or wood imprints beneath the skeletal remains in five burials and a vertical edge and nails in the one burial). When this archaeological evidence was combined with the evidence for, albeit, limited external displacement, it was deemed sufficient to confirm the presence of a wooden container for five burials and a wooden coffin in the sixth (Table D10).

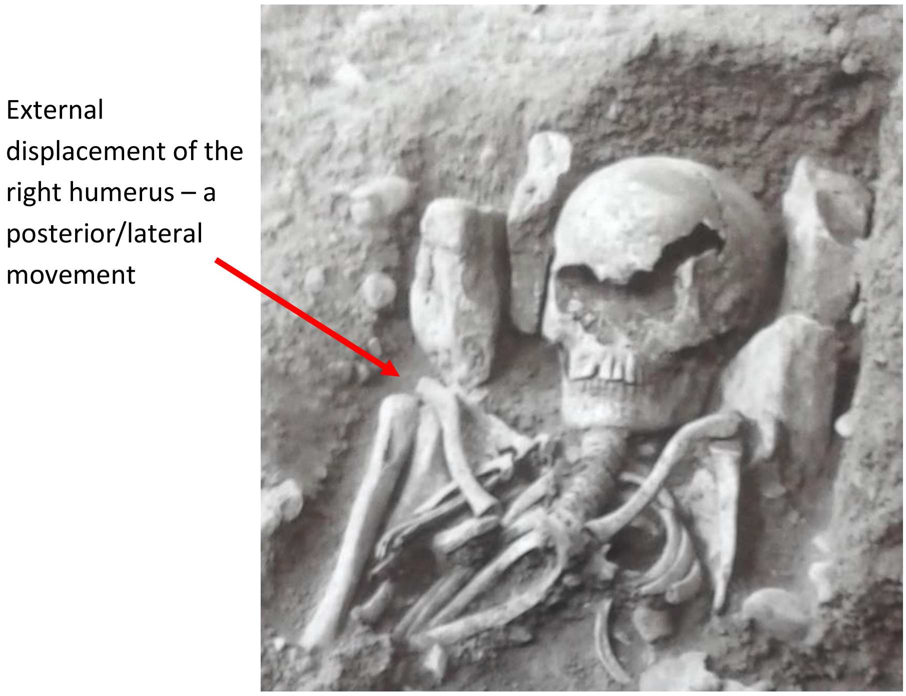


Figure 6.5: *Example of a burial with a void – rigid container outcome, WC1138, whose identification was supported by the presence of direct archaeological evidence in the form of a fragile and thin piece of wood measuring 0.33m in length (grave has been truncated) and 0.40m in width beneath the skeletal remains. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

While there are many similarities displayed by the burials with a void – rigid container outcome, there are also notable variations present. The presence of constriction of the upper body was observed in nine burials (9/17, 53%) (Table D11).

In WC1064 the scapulae are rotated in an anterior and superior direction, the humeri are rotated anteriorly and medially, the thoracic volume is reduced with the rib cage narrowed and the right clavicle appears verticalized (the left is displaced) (Figure 6.6). In the majority of these burials the compression could be directly related to the sides of the wooden coffin/container, in two cases the situation was not as clear. In WC1138 the evidence for compression, the anterior and superior rotation of the scapulae and the verticalisation of the clavicles is more likely the result of the shoulder region of the corpse resting on the lower edge of the stones placed laterally on either side of the cranium; forcing the shoulders anterior. In burial WC762 the left clavicle is possibly verticalised, both scapulae are rotated anteriorly and superiorly, the left more so and there is a reduction in thoracic volume with the sternal ends of the ribs anterior to the vertebral column. However, the humeri are not directly adjacent to the ribs and appear to have slightly fallen laterally, as have the *ossa coxae*. This evidence for voids lateral to the corpse infers that the compression must come from another source. This could be evidence for a shroud.

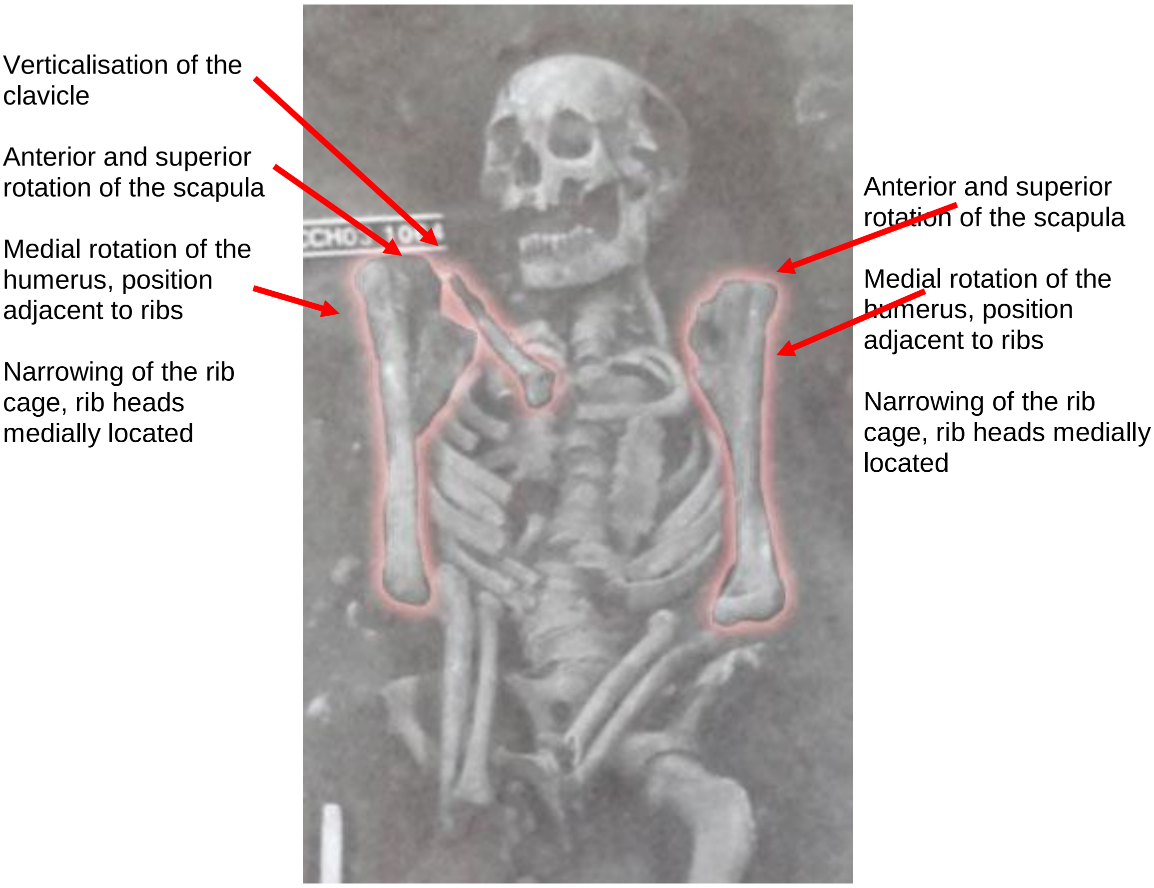


Figure 6.6: *Example of a burial with a void – rigid container outcome exhibiting the skeletal traits for compression of the upper body. WC1064 has anteriorly/superiorly rotated scapulae, medially rotated humeri and a narrowing of the rib cage. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Other variation noted in these 26 burials with a void – rigid container outcome includes, in WC935 and WC1021 there appears to have been a lateral displacement to the left of the torso of the corpse before decomposition had completely disarticulated all joints. In WC1021, the right scapula and clavicle, although displaced, have remained in an approximate original location in relationship to the cranium which appears to be on the midline of the body. The scapula's connection with the torso is relatively labile, and this suggests this had decomposed prior to the movement of the rest of the torso. The left scapula and humerus are also maintained in what appear to be an original location and position, with connection of the gleno-humeral joint. The vertebrae and ribs have displaced in an inferior and lateral left direction together, as has the mandible (Figure 6.7).

Possible explanations could include the collapse of a board beneath the corpse, or movement of the corpse when the grave was disturbed by another, as both graves have been truncated. In WC903 there appeared to be far less external displacement present. The bones of the hands and feet had noticeably retained connections (Figure 6.8). The right-hand elements had displaced posteriorly to rest adjacent and anterior to the proximal shaft of the right femur, while the elements of the right foot had fallen posteriorly to the base. The left hand and foot were less complete and as a result appeared more displaced. The left hand in WC993 appeared to have retained connections between elements displaying only limited posterior displacement. The carpal bones have maintained almost complete anatomical connection (Figure 6.9). Chapter 3 discussed the use of gloves and socks for the ill, and previous studies (see Chapter 2) have suggested the presence of foot wear may be responsible for maintaining connections within the feet. This could account for the skeletal patterning observed in these two burials.

In WC390 the pattern of the skeletal positioning suggests a curved rather than a linear alignment in addition to archaeological evidence indicative of a wooden container (wood fragments). This raises the question of whether the body was interred in both a shroud and a container (Figure 6.9). Clarification of this issue is complicated by the level of completeness of the burial – only the lower leg and foot bones were visible. Textile was found adhering to the bones of the feet and a shroud would account for the shape of the displaced foot bones more than the straight sides of a coffin could. An alternative explanation could be the shape of the container. Rather than being a rectangular coffin generic to this cemetery and the late Anglo-Saxon period, this individual could have been interred in a hollowed-out tree-trunk coffin. As demonstrated in Chapter 2, the curved interior of this type of coffin leads to a different spatial displacement of the skeletal elements.

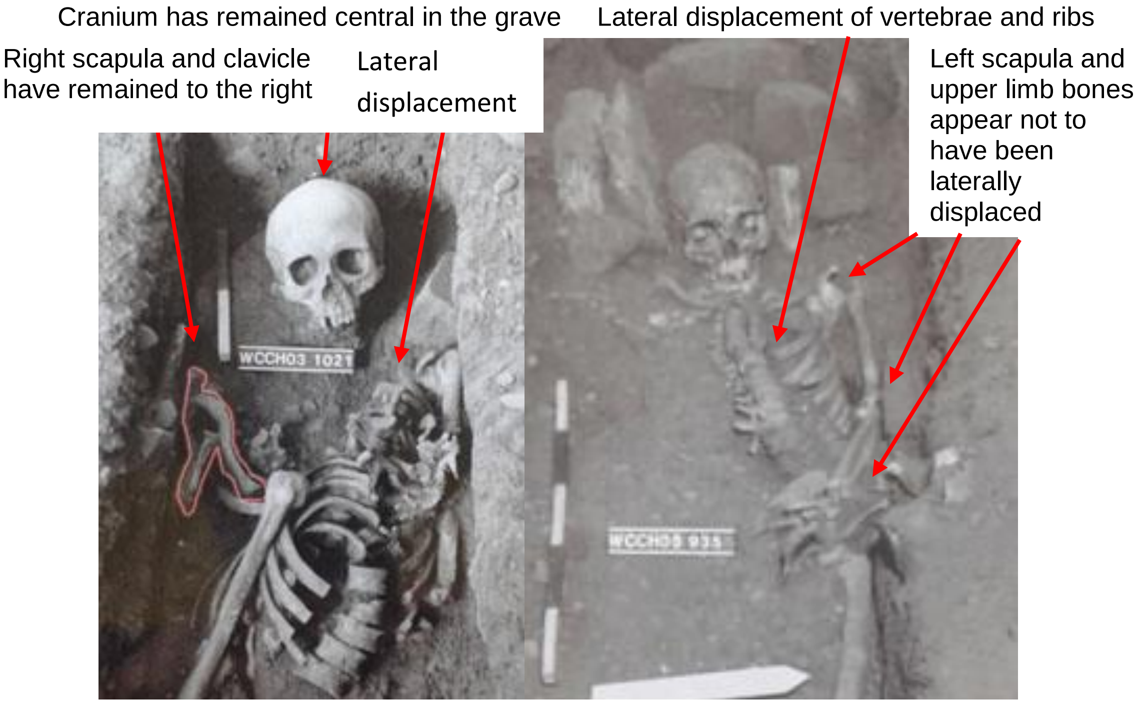


Figure 6.7: *WC1021 and WC935 displaying a displacement of the skeletal elements of the thorax in relation to other bones which appear in approximately original positions (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

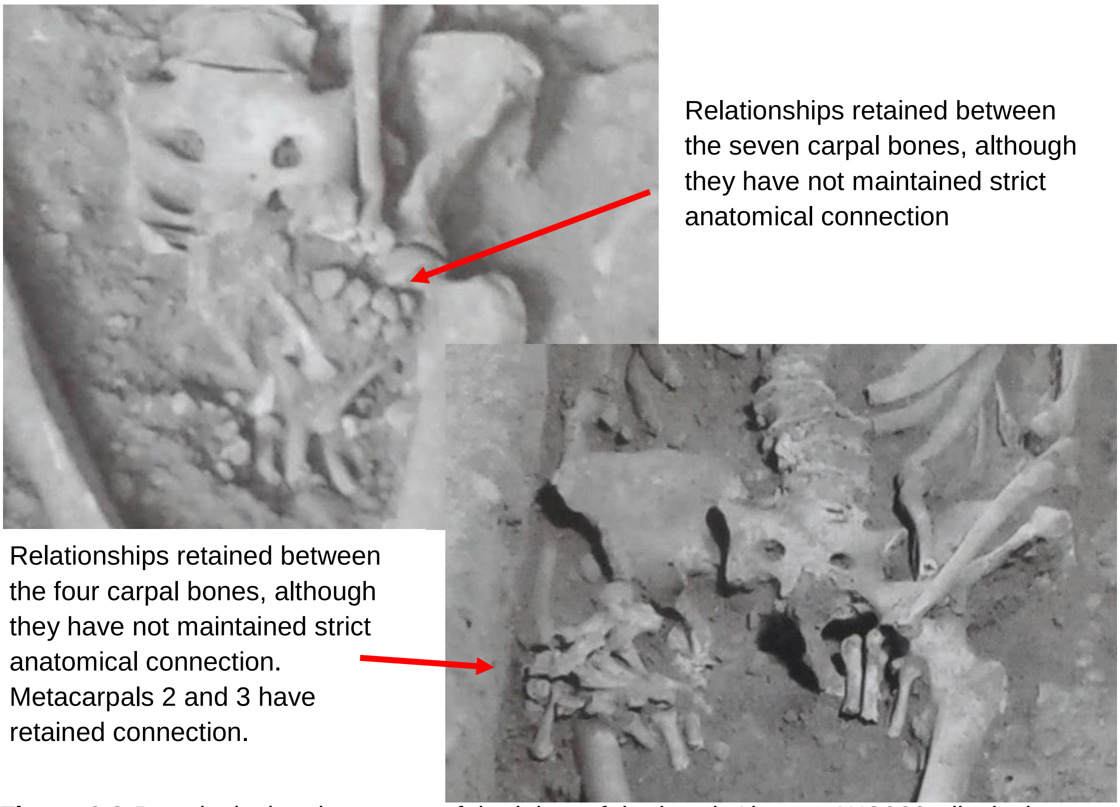


Figure 6.8 *Paradoxical maintenance of the joints of the hand. Above – WC903, displaying connections of the left-hand joints. Below – WC993 displaying connections of the right-hand joints. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

Figure 6.9: *WC390 presents a curved alignment of displaced tarsal and metatarsal bones which are supported in unstable positions (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The majority of the burials with a void – rigid container outcome appeared to have been interred in a supine position (23/26, 88%) (Table D12). WC343 and WC710 displayed a slight rotation of the corpse to the left, with the right side resting and supported against a barrier – the coffin side (Figure 6.10). This could have resulted from either movement within the wooden coffin during transport or lowering into the grave. There was only one other example of a burial displaying a slight rotation, WC104. This burial was categorised as indeterminate. None of the 78 confirmed coffin burials discussed in Chapter 5, displayed rotation to either the right or left. There were examples of unilateral support, suggesting the corpse was resting against only one side of the container. This positioning could also have resulted from movement during transportation of a coffin. There is insufficient evidence from this sample of burials from Worcester Cathedral to confirm that a rotation is definitively linked to burial within a coffin, as the same positioning could result from a less then careful depositing of a corpse into a dug out earthen grave that contains a durable cover only or a fully wood-lined grave.

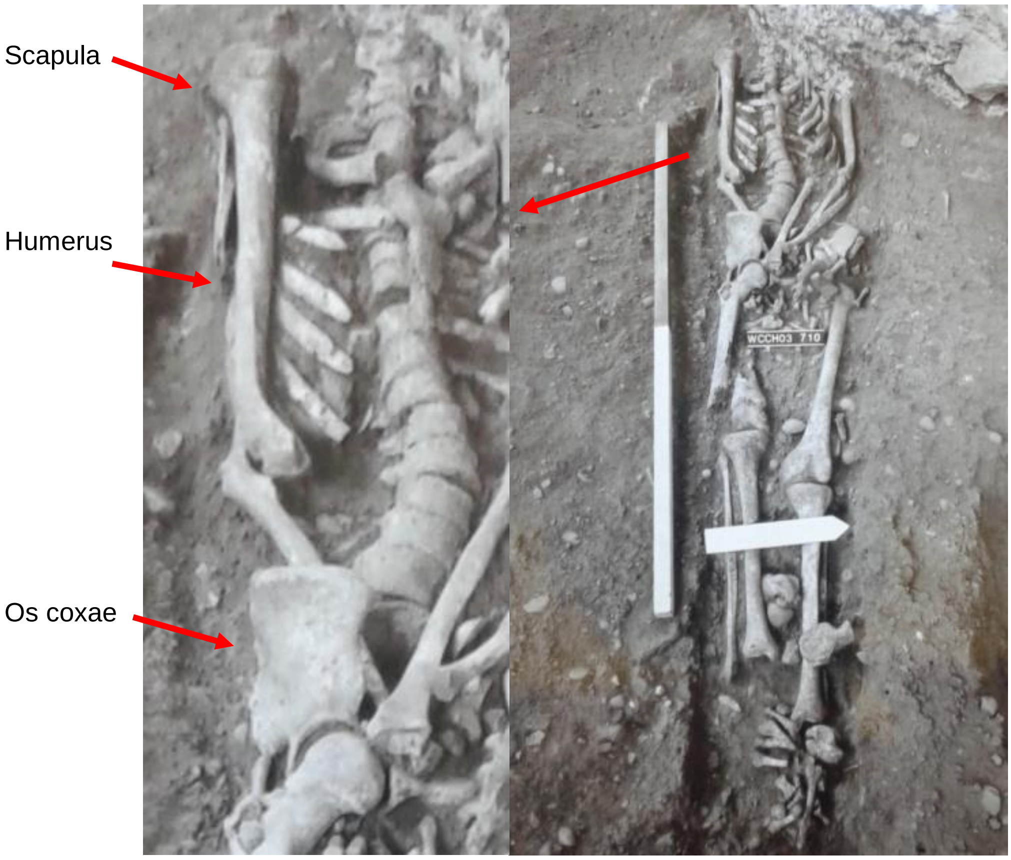


Figure 6.10: *WC710 displaying a slight rotation to the left, with the right scapula, humerus and os coxae supported in potentially unstable positions. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

There appeared to be no patterns in the arrangement of the upper and/or lower limbs among the burials with a void – rigid container outcome (Tables 6.2 and 6.3 and Tables D13-D14). The upper limb position was recordable in 20 burials, with both limbs visible in 14 of these. Upper limb position was varied, but mostly involved some flexure. Of the 21 burials where the lower limbs were visible, there did not appear to be one dominant arrangement, although there were more individuals with lower limbs displaying some degree of adduction (12/21, 57%).

There appeared no relationship between upper and lower limb positions in these burials with a void – rigid container outcome (Table D15). As examples, burial WC917 had lower limbs in an extended position and the upper limbs are flexed at the elbow with the forearms and hands placed anterior to the pelvic area. In burials WC335 and WC1071 the legs are adducted, with the knees and/or ankles adjacent. While the upper limbs in WC335 are unsymmetrical with the right being flexed at the elbow and the forearm and hand anterior to the pelvic area whereas the left is extended, in WC1071 both upper limbs appear from the position of the metacarpals to be symmetrically placed, flexed at the elbows and the forearms and hands anterior to the pelvic area. There also appeared to be no relationship between those burials which displayed upper body compression and lower limb position. In the nine burials where, lower position could be assessed, three were extended, three slight adducted and three fully adducted (Table D15).

Table 6.2: *Frequency of upper limb arrangements in the 20 burials with a void – rigid container outcome from Worcester Cathedral in which position could be assessed.*

Upper limb potential arrangement	Number of burials
Both in extension with flexed wrists hands on thighs	1
Both flexed at elbow, forearm on pelvis/upper thigh	8
One flexed at elbow, forearm on pelvis One in extension with flexed wrist	2
One flexed at elbow, forearm on pelvis One in extension	1
One flexed at elbow, forearm on pelvis/upper thigh One flexed at elbow, forearm on abdomen	2
One not recordable One in extension	1
One not recordable One flexed at elbow, forearm on pelvis	3
One not recordable One flexed at elbow, forearm on abdomen	2

Table 6.3: *Frequency of lower limb arrangements in the 20 burials with a void – rigid container outcome from Worcester Cathedral in which position could be assessed.*

Extended	Slight Adduction	Adduction
9 (45%)	5 (25%)	6 (30%)

Grave cut dimensions had been recorded for 20 burials (Table 6.4 and Table D16). The overall impression is for economical grave cuts not much larger than the coffins they contained. This was evidence for example in WC938 where the grave cut measured 0.37m in width and the coffin approximately 0.30m based on the imprint left in the grave by the base board/s. When comparing the grave cuts, in both size and shape to those recorded for the other burials in the sample, there appeared to be little difference, with most cuts measuring a width of between 0.34-0.50m.

Of the 26 burials determined to have been originally contained within a wooden container, the area around the cranium could be seen in 17 (17/26, 65%). Of these 17 burials, nine burials had stones placed around the cranium (9/17, 56%) (Table D17 and Figure 6.11). One burial, WC090, had a stone to the right of the right foot; although, it is unclear if this was a deliberate placement of the stone at this location. Only one coffined burial provided evidence for any other object within the grave, WC1064. A copper alloy object was found beneath the left side of the thorax; no information was put forward by the excavators as to what this item could have been.

Table 6.4: *Grave cut shape and dimensions of the burials with a void – rigid container outcome from Worcester Cathedral (Obtained from the excavation archive held at Worcester Cathedral)*

Skeleton	Description of shape	Dimensions (metres)*
WC234	Rectangular with rounded corners	0.75 x 0.42 x 0.20
WC343	Not given	1.15 x 0.55 x nr**
WC521	Rectangular	1.63 x 0.46 x 0.32
WC615	Sub-rectangular	Nr x 0.45 x nr
WC710	Rectangular	1.50 x 0.40 x 0.12
WC762	Rectangular	1.78 x 0.40 x nr
WC784	Rectangular with square corners	1.90 x 0.45 x 0.10
WC903	Roughly rectangular	2.00 x 0.60 x 0.28
WC910	Sub-rectangular	1.90 x 0.57 x 0.14
WC917	Rectangular	1.45 x 1.40 x nr
WC935	Not given	1.90 x 0.45 x nr
WC938	Not given	1.85 x 0.37 x nr
WC944	Rectangular with rounded corners	1.70 x 0.50 x 0.14
WC968	Sub-rectangular	2.00 x 0.50 x 0.34
WC993	Rectangular	1.55 x 0.58 x nr
WC1021	Rectangular	0.65 x 0.37 x nr
WC1055	Sub-rectangular	1.89 x 0.44 x 0.25
WC1064	Rectangular	1.67 x 0.46 x 0.16
WC1071	Rectangular	1.04 x 0.37 x nr
WC1138	Rectangular	Nr x 0.42 x nr

(due to truncation and unclear identification of ground level these may be minimums in length and depth measurements. ** indicates not recorded/identified)*

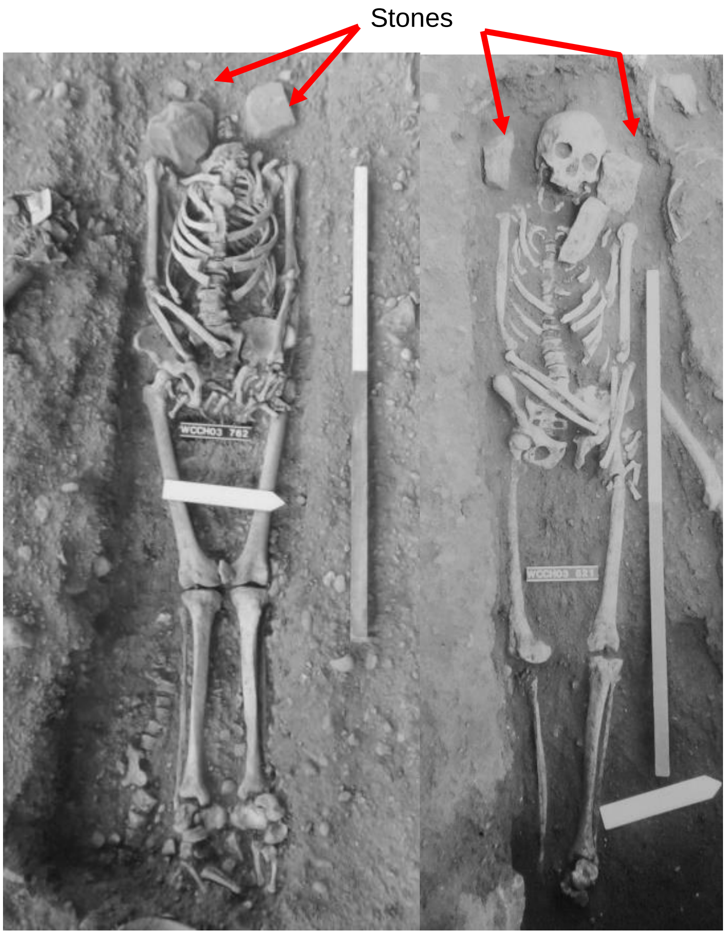


Figure 6.11: *Examples of burials with a void – rigid container outcome from Worcester Cathedral with stone arrangements. Left – WC762 with a single stone placed either side of the area in which the cranium should be. Right – WC521 with a single stone laterally right of the cranium, a stone laterally left of the cranium and another stone across the left clavicle. Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

6.1.2 Burials in a void

The analysis of skeletal positioning of a single individual, WC941, resulted in a burial in a void outcome. This burial displayed evidence for a void around the corpse, however it was not possible to determine whether a container or the grave cut had acted as this barrier (Figure 6.12). The skeleton presented some external displacement (although not what was considered to be extensive external skeletal displacement) in addition to the linear alignment of skeletal elements. Both suggest decomposition in a void with a solid, long-lasting barrier. The skeletal elements displaying external displacement were the cranium, right humerus, the *ossa coxae*, the left femur, the left fibula and the bones of the feet. While the range of both displaced elements and those involved in forming a linear outline was comparable to that seen in the burials with a void – rigid container outcome, the skeletal elements displayed what appeared to be a more intensive internal, rather than an external, extensive displacement. The level of displacement meant that assessing if any compression of the upper body was present was not possible, although the scapulae had moved medially and anteriorly, a displacement that might be easier if they were already anteriorly rotated.

The key differentiator that places WC941 in the burial in a void group as opposed to the void – rigid container category was that excavators were unable to determine the full dimensions of the grave cut. Therefore, it has not been possible to differentiate the source of the barrier between a wooden container side/end and the grave cut itself. As discussed with regards to WC615 above (6.1.1) the type of sediment is unlikely to afford stability to the grave cut and without a barrier soil will begin to cover the corpse. However, the level of displacement although extensive and above the natural movements expected during decomposition does seem to be restricted to the internal secondary voids rather than external areas. This more internal displacement may be evidence for a differential burial treatment to that performed upon the other burials and led to a void rather than a void – rigid container outcome for this burial.

The excavators classified WC941 as an undetermined/plain-earth burial based on the lack of direct archaeological evidence for a wooden coffin. Through the application of a skeletal positioning analysis, the balance of evidence is in favour of this being a contained burial. There is no positive evidence against the provision of a container, rather the issue revolves around the lack of evidence for the grave cut by which the presence of a coffin could be confirmed.

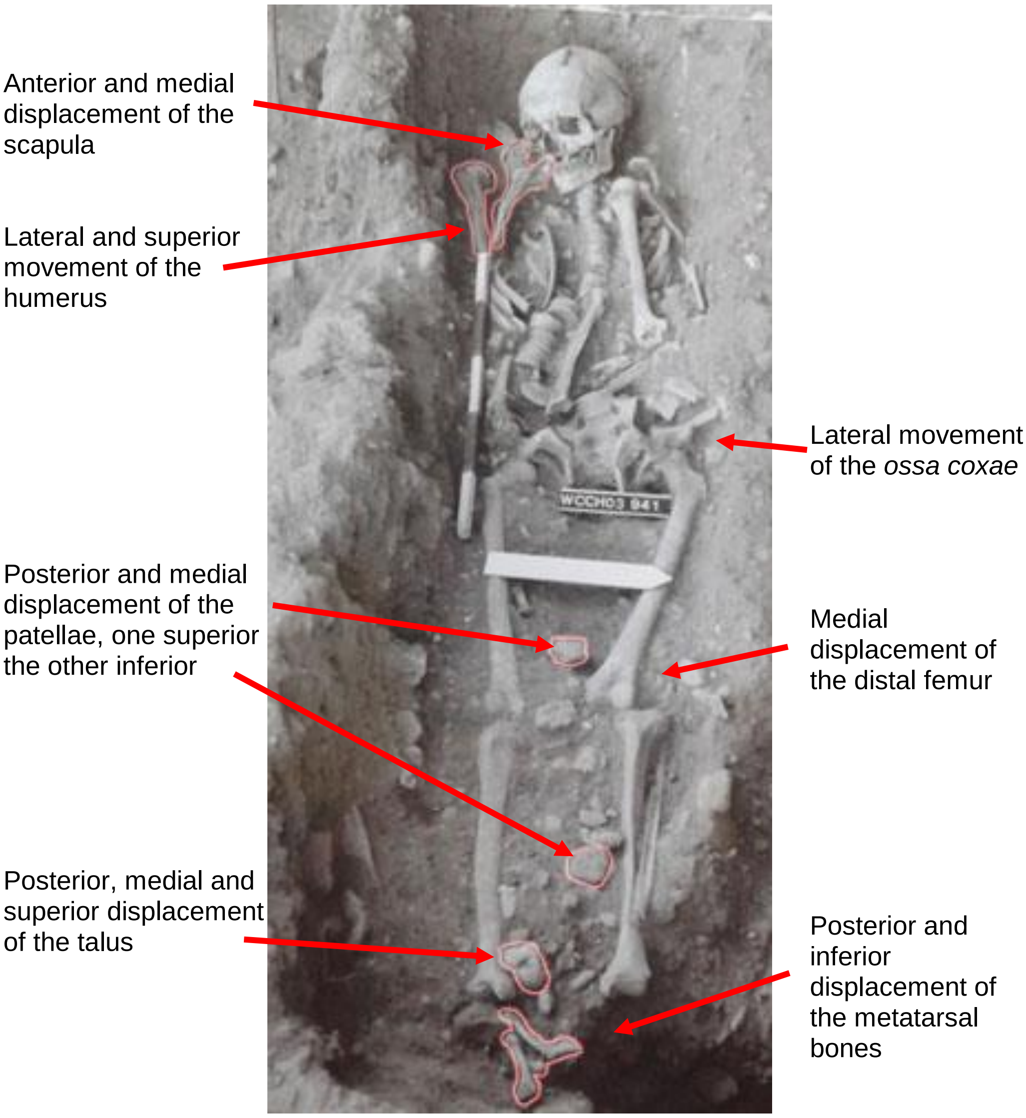


Figure 6.12: *WC941 a burial with a void outcome from Worcester Cathedral. External displacement of the right humerus, ossa coxae, patellae, left femur, tarsal and metatarsal bones of the feet. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

6.1.3 Indeterminate Burials

A group of eight burials were classified as indeterminate (8/39, 21%) (Table D18). These all display evidence for the internal and external displacement of skeletal elements; however, the external displacement did not involve that considered to be extensive skeletal displacement and there was no evidence for linear alignment. The skeletal elements frequently found displaying external displacement included the metatarsals and foot phalanges (6/6, 100%), the *ossa coxae* (5/7, 71%) and humerus (3/5, 60%) (Table D19). The displaced skeletal elements remained relatively close to the original body volume of the corpse. Of the eight burials, four displayed no evidence for any skeletal elements supported in potentially unstable positions (4/8, 50%), whereas, in the other four burials, elements were supported in approximately original and/or displaced positions (4/8, 50%), most frequently including the humeri and *ossa coxae* (Table D20). This support did not present a clear linear, or box-shaped, pattern but neither was it clearly maintaining a body-shaped contour, thus there was no evidence to distinguish between potential sources of the support of the elements. These burials did not provide enough information to allow a more definitive burial form to be allocated to them.

Although there is possible evidence for decomposition in a void in all of these burials, the pattern of external displacement was not sufficient to completely exclude decomposition in a filled space. Indeed, the skeletal evidence could not differentiate between a short-term void created by a soft material such as clothing or a durable loose shroud, and a more durable rigid structure. No direct archaeological evidence was found for the presence of clothing or shrouds/wrapping. Grave cuts, if recorded, were tentative, therefore could not be excluded, nor confirmed, as the source of any laterally supported skeletal elements. Nor, conversely, could their location be used to exclude the use of a wooden container. None of the eight graves contained any direct archaeological evidence for wooden structures, and, as such, the excavators had classified them as undetermined/plain earth. The inability to exclude the source of both the barrier and support, in conjunction with reduced evidence for decomposition in a void, were the key factors that distinguished these burials from the void – rigid container and burial in a void group.

In four out of the eight indeterminate burials (50%) there were no skeletal elements supported in potentially unstable positions (WC158, WC856, WC950 and WC1060). A lateral fall of the *ossa coxae* and external displacement of the bones of the feet were evidenced in all burials in which they were visible; however, there was also variation in the types of skeletal elements found displaying external displacement. The external displacement of the tibia and fibula was only recorded in WC856. In WC158 the mandible had moved through an external space, while in WC950 the mandible appeared to have displaced more internally, but the acromial end of the right clavicle appeared to have moved into an external void. While in WC1060 alongside the fall of the *ossa coxae* and foot bones, the patellae have fallen, the right laterally and posterior and the left medially (Figure 6.13). In comparison to the extensive displacement observed in the feet of the void – rigid container and void burial, the external displacement observed in these four burials appeared more limited. For example, in WC158 the right and left feet are distinct; the skeletal elements having not mixed together. The right foot appears more displaced than the left with the tarsal bones and metatarsals spread out on the base; whereas the left foot bones have only fallen to rest and have retained some connections/relationships. There is one metatarsal, probably from the left, foot which has completely displaced away from the rest of the left foot elements. This has displaced inferiorly and rotated at right angles to the foot (Figure 6.13). WC950 displayed possible evidence for lateral compression of the upper body. The right scapula appears anterior to anatomical and rotated superiorly and the right clavicle is also verticalised. However, the ribs do not show corresponding evidence for lateral compression, as there is potentially only a slight reduction in thoracic volume with a medial positioning of the sternal rib ends. This raising the shoulder could be the result of the stones placed to the right of the cranium, or alternatively could be evidence for a thick flexible wrapping around an individual with a large soft tissue mass.

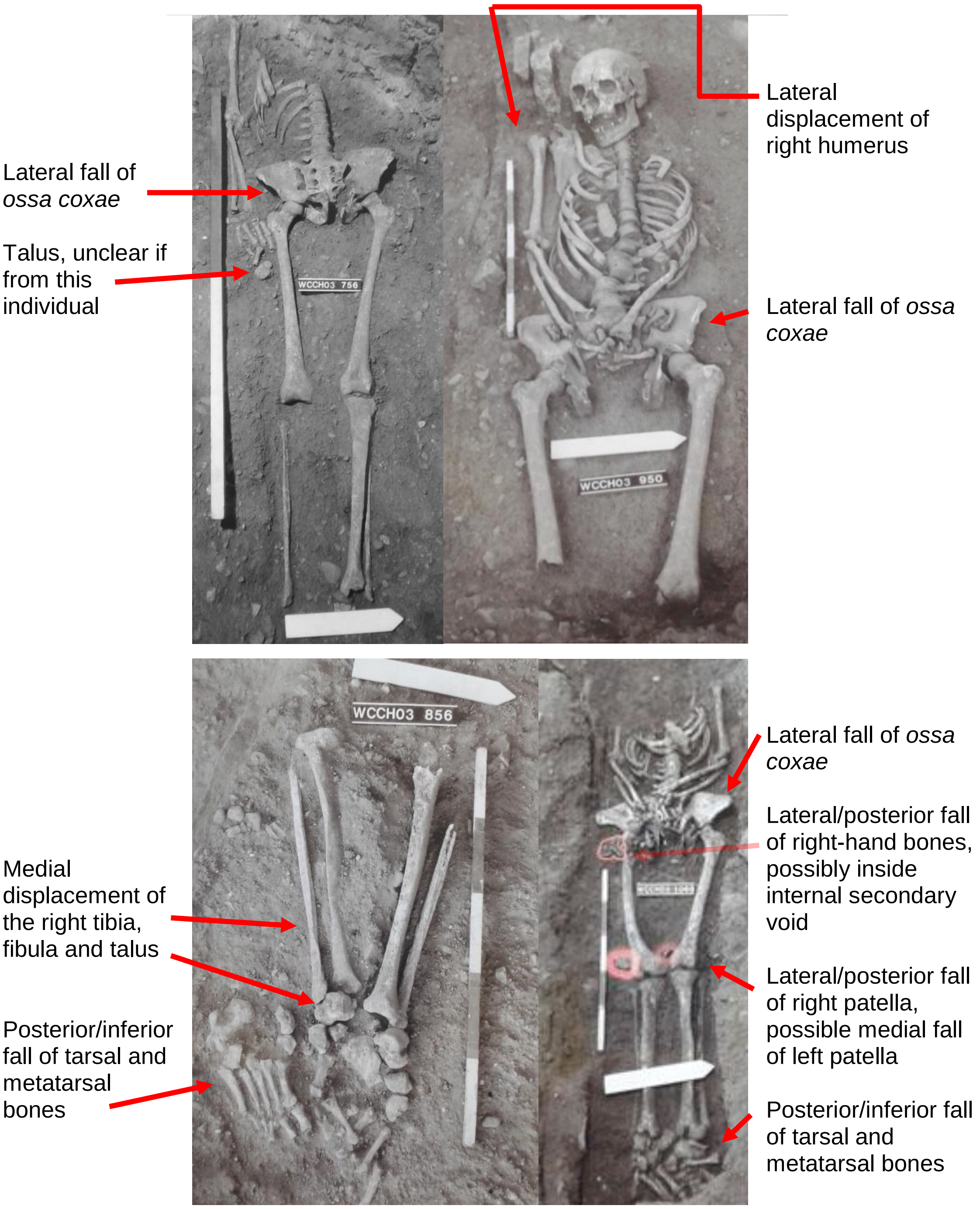


Figure 6.13: *Examples burials with an indeterminate burial outcome, displaying no support of skeletal elements from Worcester Cathedral. All four burials exhibit external displacement of bones. Top left – WC756, external displacement of the ossa coxae and possibly the talus. Top right - WC950, external displacement of the right humerus and clavicle, and the ossa coxae.* Bottom left – WC856, external displacement of the right tibia, fibula and talus, and left foot bones. Bottom right – WC1060, external displacement of the *ossa coxae*, right hand bones, right patella and the bones of both feet. *(Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The nature of the sediment at Worcester may indicate that all four of these burials decomposed inside a rigid void – coffin or covered and lined grave – rather than surrounded by a soft flexible barrier. With a fine-grained sediment, in-filling would be expected to be fairly rapid, as earth collapsed on the corpse, exerting pressure onto any flexible barrier and reducing internal voids rapidly.

The bones of the hands in WC158 have maintained approximate anatomical relationships for a pronated position at burial (Figure 6.14). A direct comparison can be made to the confirmed coffin burials WC103, 295, 507 and 720, and the void – rigid container burials WC903 and WC993, where the bones of the hands were also seen maintaining paradoxical relationships (see Chapter 5). As was suggested for these burials in Chapter 5 and above (6.1.1), this skeletal patterning could point to the presence of gloves as it is paradoxical to the breakdown of more persistent articulations.

Figure 6.14: *WC158 displaying a maintenance of connections between the metacarpal bones of the hands (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The remaining three indeterminate burials all display appendicular skeletal elements supported in unstable positions (WC104, WC363 and WC400) (Table D20). Variation was observed in type of bones involved, whether the support was unilateral or bi-lateral and whether the skeletal element was supported in an approximate original position or one in which the bone has displaced to a greater extent (Figure 6.15). For WC104, the support is unilateral. The right humerus and *os coxae* are supported in approximate original positions with the left *os coxae* falling laterally. On the left, a number of hand bones and the damaged fibula display external displacement, more than can be attributed to movement under gravity alone. Even so, this is not extensive enough to clearly indicate an external void. In WC400 the support is bi-lateral, with clear evidence for compression. The support would class as body contoured, except on the right there appears to be a number of displaced tarsal bones, with a talus to the far right. If these bones belong to this individual, they could suggest the presence of an external void. Although, this limited displacement could be the result of a secondary void opening up, for example an animal burrow. The *ossa coxae* in WC363 appeared to be supported in an approximately upright position, although some internal displacement had occurred. The source of this support is not clear. Support for the *ossa coxae* would come from the surrounding sediment if the grave cut or a container side could not be adjacent to the bones due to the arrangement of the corpse, as in this case. However, there are other skeletal elements, such as the left-hand bones, the patellae, and the right humerus, which have displaced outside the original body volume providing evidence for a potential external void. There is some semblance of a linear delimitation to the right, though the broken right humerus extends past this, but this could have resulted from the opening of a secondary void, and this still would not account for the supported ossa coxa. The right humerus, tibia and fibula and the left femur display damage, but there does not appear to be specific region of the skeleton affected.

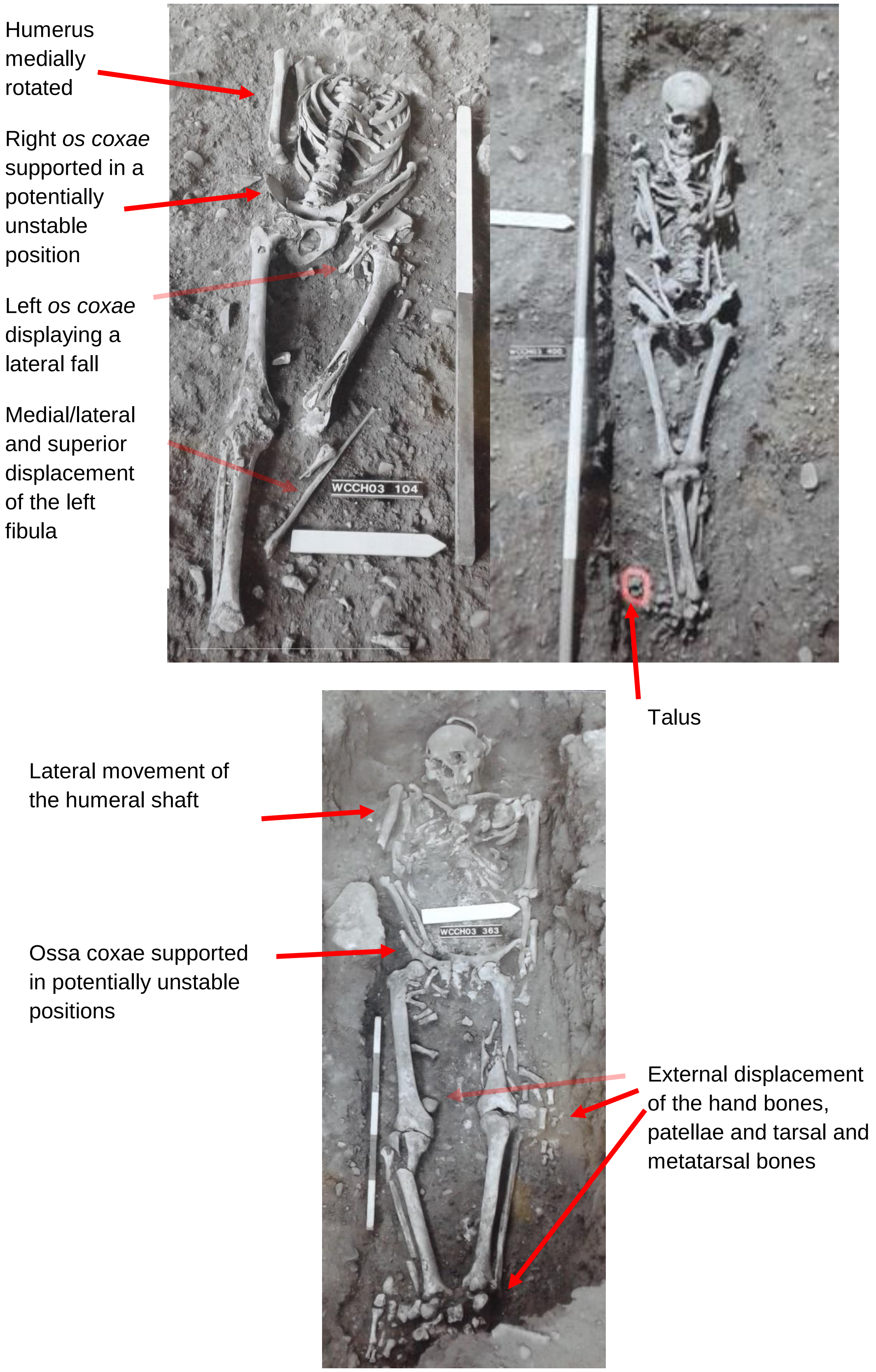


Figure 6.15: *Indeterminate burials displaying skeletal elements supported in potentially unstable positions. Top left – WC104, with a supported right medially rotated humerus and upright os coxae. Top right – WC400, with support for the scapulae, left humerus and ossa coxae. Bottom – WC363, with support for the ossa coxae. (Photograph by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

6.1.4 Uncoffined Burials

There were four burials that appeared to not have utilised a wooden coffin (4/39, 10%) (Table D21). These all displayed internal displacement of skeletal elements, though there was a difference in the amount of external displacement observed between the burials. Two burials displayed evidence for decomposition in a filled space (2/4, 50%), with displacement predominantly within what could be considered the original body volume and appendicular skeletal elements maintained in approximately original positions. While the other two burials (2/4, 50%) exhibited stronger evidence for decomposition in a void, but the location of the grave cut appeared to exclude the use of a wooden coffin.

All four burials had been previously determined by the excavators to be undetermined/plain earth, due to the lack of any direct archaeological evidence suggesting a wooden structure in the graves. The skeletal evidence in WC1025 and WC818 corroborated this prior determination (Figure 6.16). For WC1025, there appeared to be no external displacement. Natural movement expected during decomposition have been observed, with the slight fall of the *ossa coxae* considered to be accountable within the internal volume of the corpse. Furthermore, the hyoid bone appears to have been maintained in an approximate original position. For this to occur, sediment must have progressively in-filled the decomposing soft tissue, indicating this individual was interred directly into the earth. WC818 displayed natural expected movement of bones into internal secondary voids, internal displacement, and a limited amount of external displacement – only a fall of the bones of the feet in an inferior and medial direction. The skeletal elements supported in potentially unstable positions were the anterior/superior rotation of the scapulae, medial rotation of the humeri which had also maintained anatomical connection with the left scapula, the *ossa coxae*, and the patellae. This external displacement and support of bones is restricted to the area within what could be considered a body-shaped outline, respecting the natural contours of the corpse rather than a linear effect produced by the alignment against a rigid support. The pattern of the skeletal elements supported in unstable positions suggests a flexible support and/or direct contact with the grave fill, rather than alignment against the parallel, rigid sides of a coffin. The overall constricted appearance of the skeletal positioning of the corpse is highly suggestive of burial within a tight shroud. A burial that took place without any form of barrier might be expected to display evidence for the progressive in-filling of some of the more labile articulations in this fine sandy-silt sediment. However, this did not appear to have occurred, the inference then that this individual decomposed in a filled space surrounded by a soft less durable barrier.

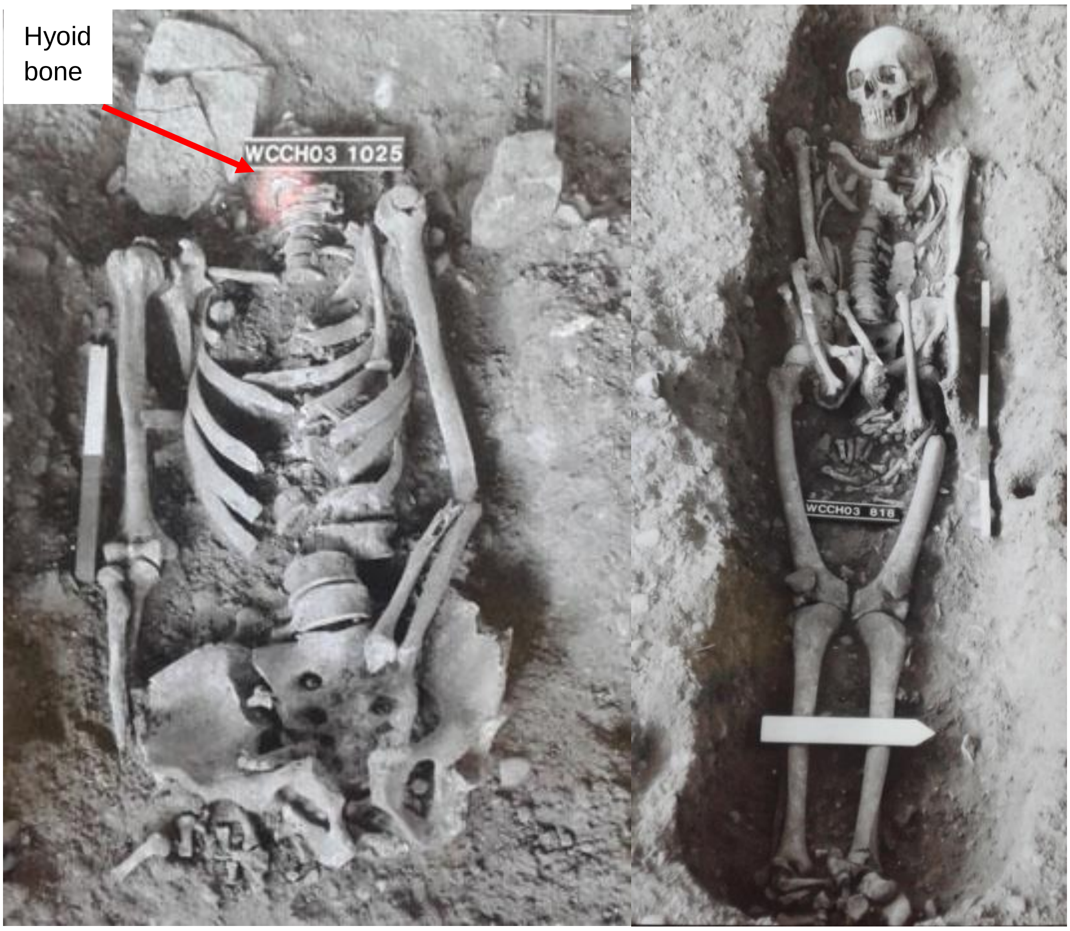


Figure 6.16: *Two uncoffined individuals determined to be plain-earth burials. Left – WC1025, no external displacement, internal displacement of the vertebrae, ossa coxae, clavicles, left radius and ulna. Ribs not fully fallen. Hyoid bone appears to have been maintained in an approximate original position. Right - WC818, external displacement limited to the foot bones, internal displacement ribs, clavicles, radii, ulnae and bones of the hands. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

The other two burials determined to be uncoffined (50%), did display some skeletal evidence for decomposition in a void as opposed to a filled space (Figure 6.17). The burials shared a number of similarities, displaying internal displacement, external displacement and a possible lateral support for medially rotated humeri. The appendicular bones, even when displaced, do not extend past the lateral edges of the stones placed to the right and left of the cranium. In WC157, the cranium, humeri, left clavicle, *ossa coxae* and left foot bones display external displacement (the right foot is not visible). In WC272 there is external displacement of the mandible, humeri and both feet (the *ossa coxae* are not visible). The source of the void in these two burials is unlikely to be provided by a wooden coffin. In WC157, the grave cut has been identified almost adjacent to the stones placed on either side of the cranium and in WC272 the grave cut appears adjacent to the left humerus and radius. For these two burials the evidence suggests they were interred under durable rigid covers within dug out earthen graves.

Figure 6.17: *Two uncoffined burials determined to be interred beneath covers in earth cut graves. Left – WC157. Right – WC272. (Photographs by Mr. Christopher Guy, Cathedral Archaeologist. By permission of the Chapter of Worcester Cathedral)*

6.2 Discussion

The taphonomy-based approach was able to identify 26 individuals at Worcester that had very likely been interred in wooden containers (void – rigid container) (26/39, 67%), with 19 considered to be wooden coffins. In one further burial the evidence for decomposition in a void established that, at the very least, it did not take place in direct contact with the surrounding earth, although the source of the void could not be confidently distinguished between a wooden container and a dug out earthen grave with a durable cover (1/39, 3%). In four burials (4/39, 10%) a more limited amount of external displacement combined with evidence for sediment type could be suggestive of burial in a wooden container (indeterminate burials). Furthermore, additional evidence has been presented to support the previous conclusion that four burials were unlikely to have been placed within wooden coffins and were plain-earth burials. Most probably two were plain-earth burials (2/39, 5%) and two interred in dug out grave with durable covers (2/39, 5%). The excavator's determinations in these four burials had been based on negative evidence, a lack of archaeological data suggesting any other burial forms. However, the analysis undertaken in the present study has offered the first positive evidence for plain-earth burials at this site. For the remaining four burials there was insufficient evidence to determine burial form (4/39, 10%).

The findings of this study have confirmed that wooden containers were a frequently-employed burial form at the late Anglo-Saxon cemetery at Worcester Cathedral. From the sample of 39 burials assessed here, the excavators had previously identified 15 individuals as being interred in wooden coffins (15/39, 38%). But through the application of this taphonomy-based methodology this has risen to 31 (31/39, 79%). Thus, the method applied in this study has identified a substantial additional number of wooden containers at Worcester Cathedral (16/39, 41%), 10 of these being identified as wooden coffins. Unfortunately, the surviving archaeological evidence has not been able to confidently distinguish between wooden linings and portable coffins in all cases. Nevertheless, these finding suggest that plain-earth burial was not the prevailing funerary rite at Worcester.

Some conclusions can also be drawn about the form of the containers. The suggestion that narrow wooden coffins were used at Worcester Cathedral, as discussed in Chapters 3-5, has been corroborated by the information obtained from the taphonomy-based method. This evidence includes the width of the grave cuts, evidence for bi-lateral compression of the upper body and the compact arrangement of the upper limbs. The position of the limbs did not appear to favour a specific arrangement, rather the general trend was for individuals to be buried in a more compact arrangement with both upper and lower limbs placed towards the midline of the corpse.

The excavators had also determined the use of shrouds in two burials (2/39, 5%), WC390 and WC1064, based on archaeological preservation of textile fragments. In both cases the spatial distribution of the skeletal material supported this conclusion. Yet, the archaeothanatological analysis has also identified a further two burials which were potentially wrapped in shrouds (2/39, 5%). The extensive internal displacement recorded in WC941 could have resulted from decomposition wrapped in a shroud that was subsequently either placed in a wooden container or into a dug out earthen grave containing only a durable cover. For WC950, the evidence for constriction, verticalized right clavicle and rotation in a superior direction of the right scapula, combined with a lateral displacement of the right humerus and no anterior rotation of the right scapula are perhaps evidence of a loose shroud wrapped around an individual with a large body mass. This combined evidence for shrouds gives a total of four possible shrouded individuals (4/39, 10%)

Chapter 7 – Analysis of the Burials from Black Gate Cemetery, Newcastle

7.1 Introduction to Black Gate Cemetery

The cemetery at Black Gate, Newcastle, provides evidence for a wide variety of funerary practices. The site has been the recipient of a recent in-depth study and is accompanied by a more comprehensive excavation archive that the sites discussed in the two previous chapters. Black Gate cemetery therefore provides a different set of archaeological circumstances from Worcester and Elstow in which to evaluate the archaeothanatological investigation of coffin provision.

The large inhumation cemetery is situated at the Black Gate in Newcastle city centre, close to the north bank of the River Tyne (Figure 7.1). The burial ground was located within the area once occupied by the 2nd-to 4th-century A.D. Roman fort, *Pons Aelius*. After the fort's abandonment in the 4th century little conclusive evidence exists for further activity at the site, until the commencement of burial, at the end of the 7th century (Nolan 2010: 156). What can be adduced from documentary sources and the archaeological record, was that in 1080 the "New Castle" was erected, which cut through, covered and enclosed parts of the cemetery within its ramparts (Nolan 2010: 157). The addition of a barbican in the 13th century adjacent to the burial ground, has given the cemetery its name, "The Black Gate". There is stratigraphic evidence for burials into the post-Norman period, albeit at much reduced rate, with most burials predating 1080. Radiocarbon dating from a sample of skeletons confirmed the inferences drawn from stratigraphic evidence, and along with the recovery of a few dateable finds (coins, pins, dressed stone), date the cemetery to the period from the 8th to the 12th century (Table 7.1). Due to the central location of the cemetery in the city of Newcastle, the site has continued to experience numerous episodes of use and redevelopment.

Excavation of the cemetery took place between 1977 and 1992 in response to the City of Newcastle wishing to repair and landscape the area to the north of the castle keep (Nolan 2010: 147). The presence of burials in this area was known prior to the 1977 excavations. Indeed, skeletal remains had previously been unearthed, and a significant area of the cemetery destroyed, in the construction of the railway viaduct in 1847. The areas available for excavation were determined by buildings, standing structures, such as fences as well as the railway piers, roads and car parks, thus dividing the site into nine areas and leaving the full extent of the cemetery undetermined (Nolan 2010: 150, 161). The excavation areas appear to have been named by their association with current structures, for example Railway Arch 25 and Compound (Figure 8.1). Nevertheless, over the 16-year excavation period, 660 inhumation burials were discovered, from which 679 individuals were identified in post-excavation osteological analysis (Table E1). Grave cuts proved elusive in most areas, nonetheless, as the majority of skeletal material was recovered from *in situ* contexts it could be discerned that all graves were roughly aligned west to east. The density of burials varied across the site, both within and between excavation zones. As might be expected, intercutting was more marked in the areas exhibiting more intensive burial and was probably the cause of a significant amount of disarticulation of earlier burials.[15] Activity at the site post-dating the cemetery will also have removed burials, affecting areas differentially. For example, excavation area, Railway Arch 25, was truncated by a 17th-century artillery bastion and a medieval ditch while Railway Arch 26 was in addition truncated by 20th century petrol tanks and large part disturbed in the late 12th century

[15] Nolan (2010: 248) reports that disarticulated skeletal material from the 1990 and 1992 excavations was collected but the MNI is not reported. The disarticulated material from earlier excavations was not collected and again no number for MNI can be found.

when the stone keep was constructed (Nolan 2010: 172-173). Due to this disturbance, the discrete areas available for excavation and the excavation's long duration the excavators determined that the creation of an overall sequence of phases for the whole cemetery would not be achievable (Nolan 2010: 149-150, 160).

Table 7.1: *Radiocarbon results for 10 sampled skeletons from the Black Gate cemetery. Providing confirmation of the date range for the cemetery's use obtained via artefact dating and stratigraphic relationships. ([1]The calibrated dates provided were calculated to confidence interval of 95% Sigma-2) (Nolan 2010: 282-283)*

Skeleton Number	Calibrated Radiocarbon Dates[1] (A.D.)	Sampling
BG660	667 - 780	2008 Oxford Radiocarbon Accelerator Unit
BG422	670 - 900	2003 Scottish Universities Environmental ReseArch Centre
BG477	799 - 883	2009 Arizona State University Radiocarbon laboratory
BG646	831 - 915	2009 Arizona State University Radiocarbon laboratory
BG575	832 - 916	2009 Arizona State University Radiocarbon laboratory
BG506	879 - 962	2009 Arizona State University Radiocarbon laboratory
BG022	880 - 1040	2003 Scottish Universities Environmental ReseArch Centre
BG040	880 - 1040	2003 Scottish Universities Environmental ReseArch Centre
BG375	960 - 1160	2003 Scottish Universities Environmental ReseArch Centre
BG175	1015 - 1155	2008 Oxford Radiocarbon Accelerator Unit

Figure 7.1: *Top – Geographical location of Newcastle (Created using Map Data ©2018. GeoBasisDE/BKG©2009 Google, Inst. Geogr Nacional). Below – Site of Black Gate cemetery excavations and trenches (Copyright John Nolan)*

Graves produced evidence for variations in funerary practice (Table 7.2). Evidence for variation in grave structure included: evidence for above-ground grave markers in the form of sockets and dressed stones; various forms of grave lining, including stone slabs or rubble grave linings; head boxes and ear muffs. Some burials revealed stains resulting from decomposed wood, although it is unclear for the majority of the burials whether this is evidence of a wooden lining or coffin. However, in one grave the combination of preserved wood and the presence of metalwork, in the form of a piece of a hinge strap, is suggestive of a chest burial. In graves without evidence for wood the presence of straps, locks and other metal work indicated that more than one burial probably included a chest (see discussions in Chapter 3). In some graves variations in elaboration were found in combination, for example, stone cist graves were found containing ear muffs, which were placed inside the cist, rather than being part of its construction. The excavations also revealed structural remains of a building or buildings predating the 1080 construction of the castle. This building appears contemporary with the early phases of the cemetery (Nolan 2010: 187). Excavators suggest these structural remains could indicate the presence of a church or chapel associated with the cemetery, due to their location and design (Nolan 2010: 187). This deduction is potentially supported by the density of burials in the area adjacent to the walls of the building – a phenomenon seen in other churchyard cemeteries such as Barton upon Humber (Rodwell 2007: 30-31).

Table 7.2*: Frequency of grave elaborations identified in burials at Black Gate cemetery (taken from excavation archive held by John Nolan and Nolan 2010)*

Grave elaboration	Frequency
Cist – Stone	15
Cist – rubble	4
Ear muffs	24
Head box	5
Cap stone	7
Above ground marker – Head/foot stone	12
Above ground marker – slab	10
Wooden coffin	82
Wooden chest	5

The cemetery excavations at Black Gate were published in *Archaeologia Aeliana* by Nolan (2010). This report and the archive held by Newcastle City Archaeological Unit provided the majority of the information relating to the excavation used in this study. Osteological analysis of the skeletal remains was undertaken dependent on the year of excavation by a variety of individuals: skeletons 1-18 were studied by Lake in 1977, although several of these individuals (1, 8, 14, 17 and 18) were re-analysed by Anderson in 1988, who also studied skeletons 19-148a. In the late 1980s and early 1990s, skeletons 150-430 were examined by Marlowe, and the final 229 individuals were examined by Boulter and Rega in 1993 (Nolan 2010: 149-150). The site has also featured in a number of Master's and doctoral research projects from the University of Sheffield, which largely focus on data obtained from osteological analysis of the skeletal remains. Most recently the doctoral research of Mahoney Swales (2012) analysed the osteological data in conjunction with the evidence for funerary practices with the aim of exploring variation in status, health and lifestyle of the population.

7.2 Results

Results were obtained for 232 adult burials (Table E2). Analysis of the 232 usable burials resulted in the prediction that 11% decomposed in a wooden container while a further 19% of burials decomposed in an unidentified original void (Table 7.3).

Table 7.3: *Results for the potential burial form for the 232 Black Gate burials*

Void - rigid container	Void		Indeterminate		Uncoffined burials		
26 (11%)	44 (19%)		67 (29%)		95 (41%)		
BG021	BG017	BG283	BG006	BG256	BG002	BG212	BG482
BG040	BG052	BG293	BG009	BG298	BG003	BG206	BG488
BG047	BG053	BG300	BG034	BG299	BG005	BG224	BG491
BG069	BG077	BG304	BG056	BG301	BG022	BG252	BG493
BG080	BG114	BG305	BG075	BG302	BG027	BG271	BG499
BG099	BG127	BG337	BG076	BG306	BG033	BG288	BG523
BG120	BG153	BG339	BG085	BG314	BG042	BG294	BG534
BG121	BG165	BG343	BG086	BG318	BG054	BG315	BG540
BG170	BG178	BG346	BG087	BG319	BG058	BG323	BG549
BG289	BG186	BG347	BG095	BG328	BG066	BG333	BG556
BG335	BG196	BG351	BG097	BG336	BG068	BG334	BG561
BG427	BG216	BG386	BG117	BG342	BG074	BG338	BG566
BG454	BG236	BG404	BG128	BG344	BG078	BG341	BG567
BG487	BG243	BG408	BG130	BG349	BG084	BG368	BG571
BG513	BG245	BG410	BG147	BG400	BG089	BG375	BG577
BG555	BG249	BG442	BG154	BG413	BG100	BG377	BG578
BG568	BG257	BG473	BG157	BG425	BG115	BG381	BG588
BG612	BG269	BG500	BG163	BG429	BG116	BG409	BG589
BG619	BG275	BG590	BG172	BG439	BG123	BG415	BG605
BG622	BG277	BG610	BG177	BG446	BG124	BG420	BG606
BG626	BG280	BG611	BG181	BG451	BG133	BG421	BG607
BG642	BG282	BG643	BG191	BG462	BG151	BG423	BG609
BG644			BG197	BG469	BG152	BG428	BG620
BG645			BG198	BG498	BG155	BG437	BG625
BG656			BG200	BG517	BG158	BG448	BG634
BG657			BG204	BG538	BG159	BG449	BG635
			BG211	BG550	BG160	BG456	BG637
			BG218	BG564	BG161	BG460	BG639
			BG223	BG572	BG167	BG464	BG641
			BG229	BG585	BG173	BG467	BG651
			BG230	BG616	BG176	BG468	BG660
			BG237	BG640	BG176a		
			BG242	BG650	BG205		
			BG246				

7.2.1 Burials in a void – rigid container

The taphonomy-based methodology determined that 26 graves originally contained burials in rigid containers with the highest degree of confidence (26/232, 11%) (Table E3). Of these eleven were determined to specifically be wooden coffins due to location of the grave cut at a distance from the linear and/or supported bones (11/26, 42%), two to be wooden chests via metal locks in the grave (2/26, 8%) and two to be either wooden coffins or chests due to corner brackets in situ in the grave (2/26, 8%) (Table E4). The main features uniting these 26 burials are divided between; those exhibiting either support for skeletal elements in potentially unstable position and/or displaying a linear alignment of skeletal elements at a distance from the grave cut (12/26, 46%), those where the external skeletal displacement appears more limited but whose graves contain varying amounts of direct archaeological evidence indicative of a wooden container (13/26, 50%) and a single burial in which the evidence for skeletal displacement into an external secondary void indicates a wooden container (1/26, 4%) (Table E4). External displacement was present in all 26 burials, although, the extent and number of bones exhibiting external displacement varied, but most often involved the bones of the ankles and feet (17/17, 100%), the lateral fall of the *ossa coxae* (22/23, 96%), and movement of the femora (17/21, 81%) (Table E5). In most of the external displacement, the movement appeared limited to that expected under gravity, however, there were skeletal elements exhibiting more extensive displacement, such as that observed in the bones of the ankles and feet. In 22 burials skeletal (22/26, 85%) elements were recorded as being supported in potentially unstable positions, including the *ossa coxae* (16/23, 70%), and the scapula (7/18, 39%) (Table E6). Of these 26 burials, the excavators had previously determined 12 to have been plain earth and 14 to have potentially contained wooden coffins/chests, an inference based on the presence of wood fragments or metal fittings and locks in the grave fill (Table E7).

In five of the 12 burials (5/12, 42%) previously established as plain earth (BG121, BG454, BG555, BG622 and BG642), the presence of a coffin in the present study was determined from the identification of the grave cut at a distance from the linear alignment of externally displaced skeletal elements. In BG642, this was seen as the displacement in an inferior direction of three right metacarpals which aligned with the distal end of the displaced left metatarsal bones on the left, and at the east end, the alignment of displaced right metatarsal bones and phalanges. There is also evidence on the right side of support for the displaced right *os coxae* and lateral compression of the ribs, at a distance from the grave cut (Figure 7.2).

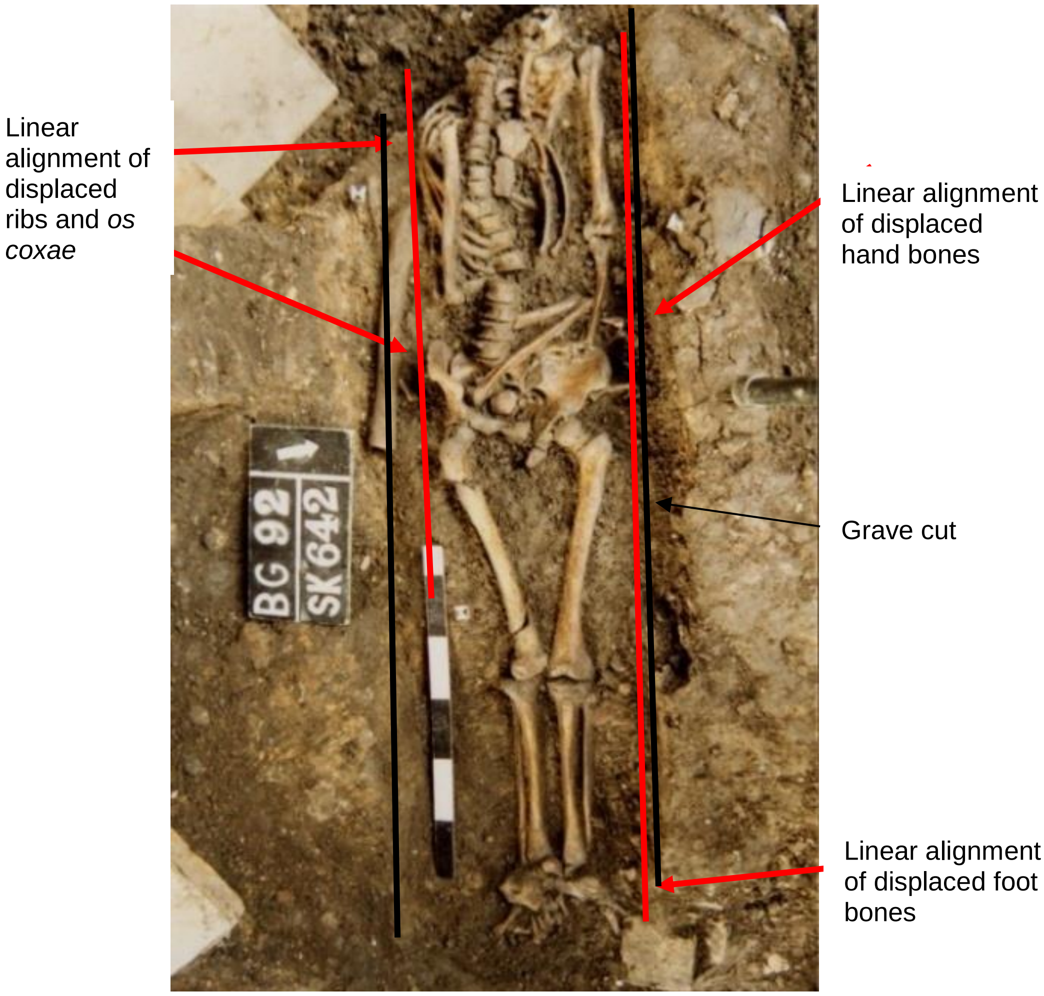


Figure 7.2: *Example of a burial with a void – rigid container outcome displaying a linear alignment of skeletal elements. BG642 presents an inferior displacement of three right metacarpals, align with the distal end of the displaced left metatarsal bones. Alignment at the east end of displaced right metatarsal bones and phalanges. Evidence on the right side of support for the displaced right os coxae and lateral compression of the ribs, at a distance from the grave cut. (Image* Copyright Newcastle City Archaeological Unit, Newcastle City Council)

In a further four of these 12 burials (4/12, 33%) previously thought to be plain earth, appendicular skeletal element/s were supported in unstable positions, at a distance from the grave cut leading to a coffin determination. In three (BG568, BG645 and BG656), this support was bi-lateral (Figure 7.3). However, in BG427 there was evidence for damage to the right humerus and ulna which could have resulted from the collapse of the right side of the coffin (Figure 7.3). In BG568 the maintenance in an unstable position of the right patella resting on the medial edge on the grave base adjacent to the laterally rotated right lower limb needed further interpretation, as it could not have been supported by the side of the coffin, given the pattern of displacement observed in the upper limb and the bones of the feet. An explanation consistent with decomposition within a void would be the presence of an item of clothing that could have provided some support for the patella as decomposition occurred.

Figure 7.3: *Examples of burials with a void – rigid container outcome from Black Gate displaying lateral support of elements in an approximately original position. Left – BG645, with bi-lateral support of a medially rotated humeri, in connection with the anteriorly rotated glenoid fossa of the scapulae. Right - BG427, with unilateral support, the left os coxae aligned with the potentially medially rotated humerus that has displaced posteriorly and laterally from the anteriorly rotated glenoid fossa. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

For the final three of the 12 (3/12, 25%), BG487, BG626 and BG657, a combination of evidence determined the presence of a rigid container. For BG487 this was: the posterior and lateral fall of the head of the right humerus, the fall of the left *os coxae*, and the extensive displacement of the foot bones; the maintenance of potentially unstable skeletal positions, right *os coxae* and the medial rotation of the humeri; and the collapse towards the skeleton of piled up disarticulated human bone. For BG626 it was: the fall in an inferior and posterior direction of the mandible; the posterior and superior fall of the acromial end of the left clavicle; the lateral fall of the *ossa coxae*; and the possible lateral displacement of the proximal end of the right ulna. Moreover, the image of the latter burial presented a clear rectilinear stain on the base of the grave beneath the skeletal remains. Although not noticed in the original report, this was considered to be the decomposed remains of wooden planks by the author and corroborated the skeletal evidence for the original presence of a coffin. Evidence of external displacement in BG657 closely resembled that described by Duday (2009: 36-37) as resulting from the collapse of a board beneath the skeleton: rotation of the cranium; disjuncture of the cervical vertebrae; lateral displacement of the left ribs; and displacement in an inferior direction of the tibiae and fibulae. This inference was further supported by the presence of stones beneath the skeleton on which the board could have rested (Figure 7.4).

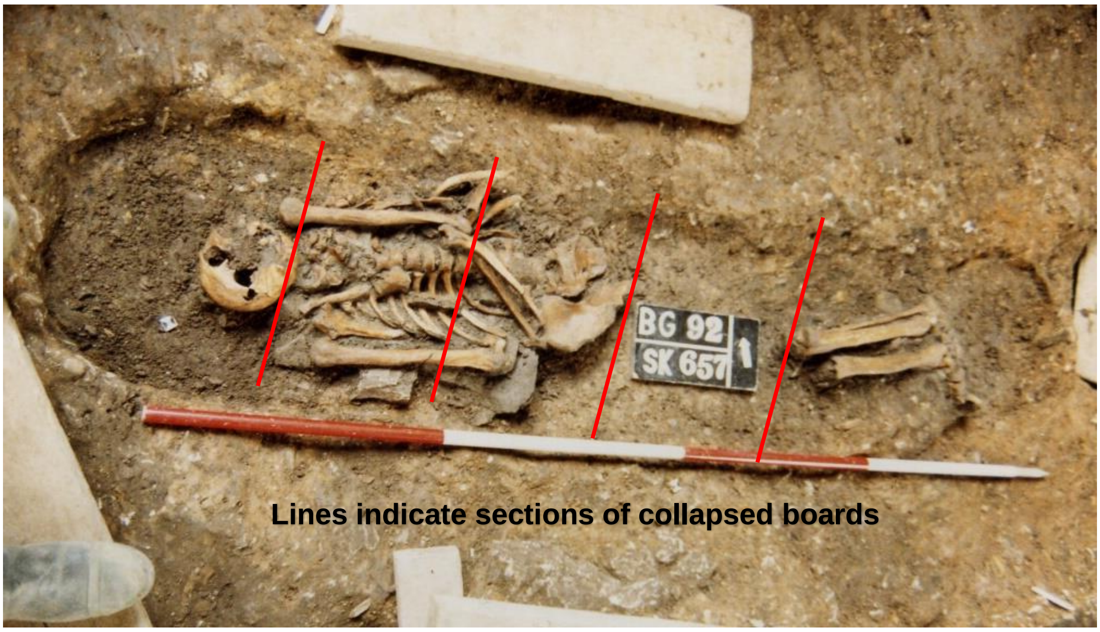


Figure 7.4: *Example of a burial with a void – rigid container outcome from Black Gate displaying possible indications for a collapsed coffin base board. BG657. (Image* Copyright Newcastle City Archaeological Unit, Newcastle City Council)

Of the 14 graves (14/26, 54%) the excavators had previously classified as containing wooden coffins or structures, two burials were categorised as being void – rigid container based on skeletal analysis, even before the presence of direct archaeological evidence for a wooden container was considered (2/14, 14%). BG612, the grave cut was identified at a distance from the potentially unstable medially rotated humeri, anterior rotation of the right scapula and upright left *os coxae* (Figure 7.5). Wood fragments were found to the south and west of the grave. In the case of BG619 the grave cut was identified at a distance from the potentially unstable left radius and left metacarpal bones and the internally displaced linear alignment of the left ribs. The excavators concluded this was a coffined or chest burial based on a line of charcoal and a metal chest lock, located in the grave fill.

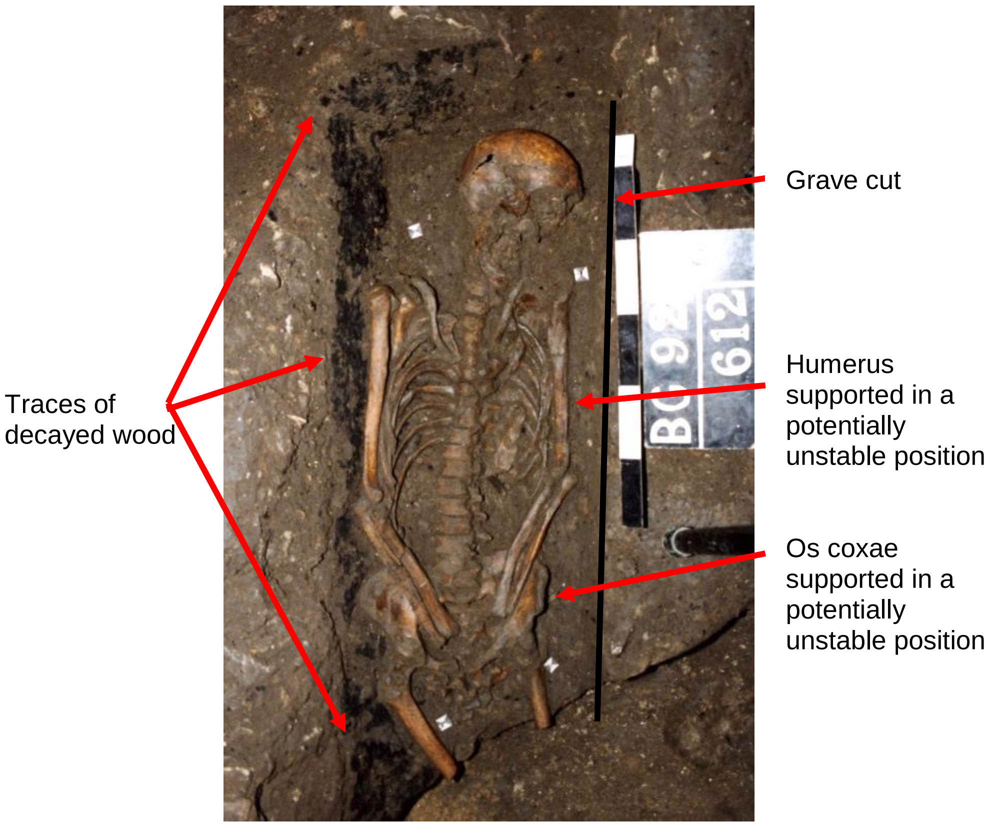


Figure 7.5: *BG612 exhibiting support for the potentially unstable medially rotated left humerus and upright left os coxae, at a distance from the grave cut. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

For the other 12 out of the 14 burials the excavators had previously designated as coffined (12/14, 86%), the presence of direct archaeological evidence for a wooden container supported evidence for decomposition in a void. The majority of these burials (11/12, 92%) clearly exhibited externally displaced skeletal elements and/or appendicular bones supported in potentially unstable positions, with a linear alignment. For example, in BG069, the fall of the left ribs has produced a linear alignment with the laterally displaced left *os coxae* bone, which align with the proximal femur and the calcaneal tuberosity of the left calcaneus (Figure 7.6). As the grave cut had not been defined in all these cases, it could not be excluded as a potential source of the lateral barrier, and therefore, without the support of direct archaeological evidence the presence of a wooden container would not have been confirmed. This linear alignment of supported skeletal elements was not always bi-lateral. Burials in which the body was placed on its side usually exhibited unilateral support of skeletal elements which has displaced from the upper-most side of the body, as it would be that these elements would be placed into unstable positions in respect to the bones on the opposite side which would be resting on the wooden base and more likely to be in stable positions, as seen in BG121 (Figure 7.6). In supine burials a unilateral wall effect could result from the corpse resting adjacent to only one side of the container, possibly as a result of the corpse shifting when being transported and deposited into the grave. The other burial (1/12, 8%), BG335, required further interpretation as it contained paradoxical maintenance of skeletal elements in potentially unstable positions. The bones of the hands, the feet, and the ribs, even though exhibiting a degree of internal displacement, had not fallen completely to rest on the container base but were maintained in approximate anatomical relationships. This internal displacement was expected, as there was clear evidence for external displacement of the *ossa coxae*. A plausible explanation for these paradoxical observations could be offered by the excavators recording that clay had been placed into the container, and above it, potentially limiting the space around the corpse and resulting in encapsulation of certain parts of the corpse, resembling some of the effects of a plain-earth burial. Alternatively, a coffin with a more rounded interior, such as a tree trunk coffin would support the ribs presenting less posterior fall, and Blaizot (2014: 268-273) discuss how the spatial distribution of the bones of the feet is affected by such a coffin. As considered in earlier chapters the presence of gloves and foot wear could also provide support, maintaining these more labile articulations of the hands and feet (Figure 7.7). Burial BG289 also exhibited evidence for decomposition in a void, including the external displacement of the right *os coxae* and humerus laterally to the right and the posterior and inferior movement of the metatarsals of the left foot, however, in contrast to the other 11 burials, no skeletal elements were maintained in potentially unstable positions or displayed a linear alignment.

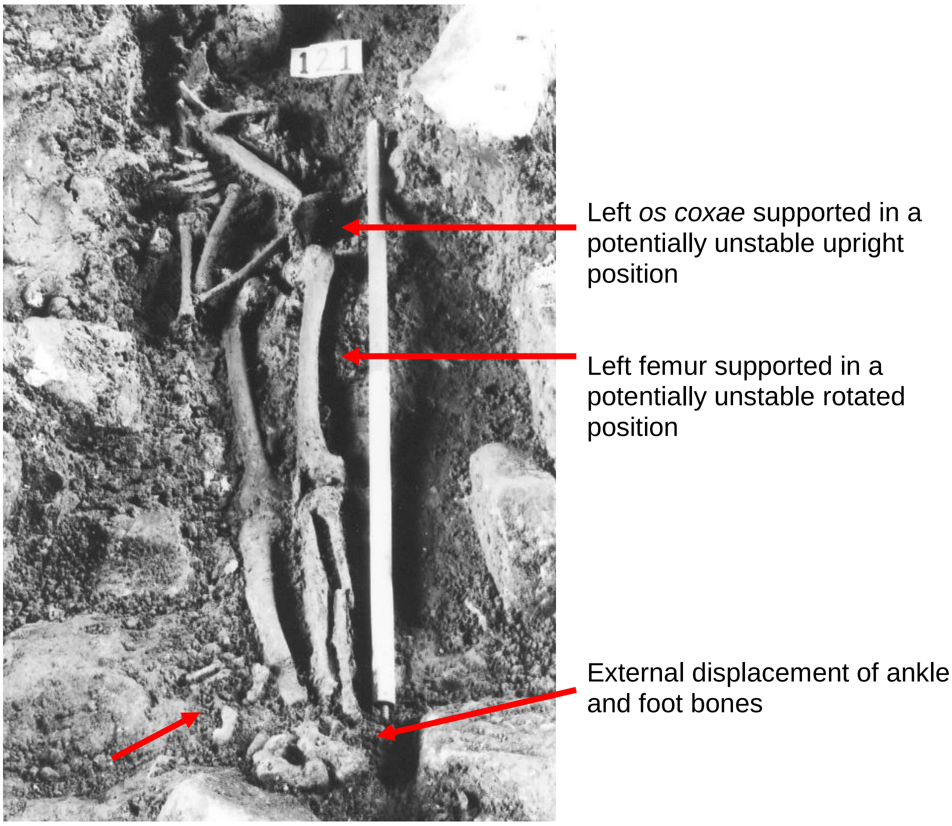


Figure 7.6: *Example of a burial with a void – rigid container outcome interred resting on its right side, with unilateral support for skeletal elements, BG121. The left os coxae and femur are maintained in potentially unstable positions. The upper left limb is displaced falling posteriorly in the void created by the decomposition of the thoracic region, distorting the original position of the limb. The lower left limb is positioned on the coffin base behind, to the left of the right lower limb. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

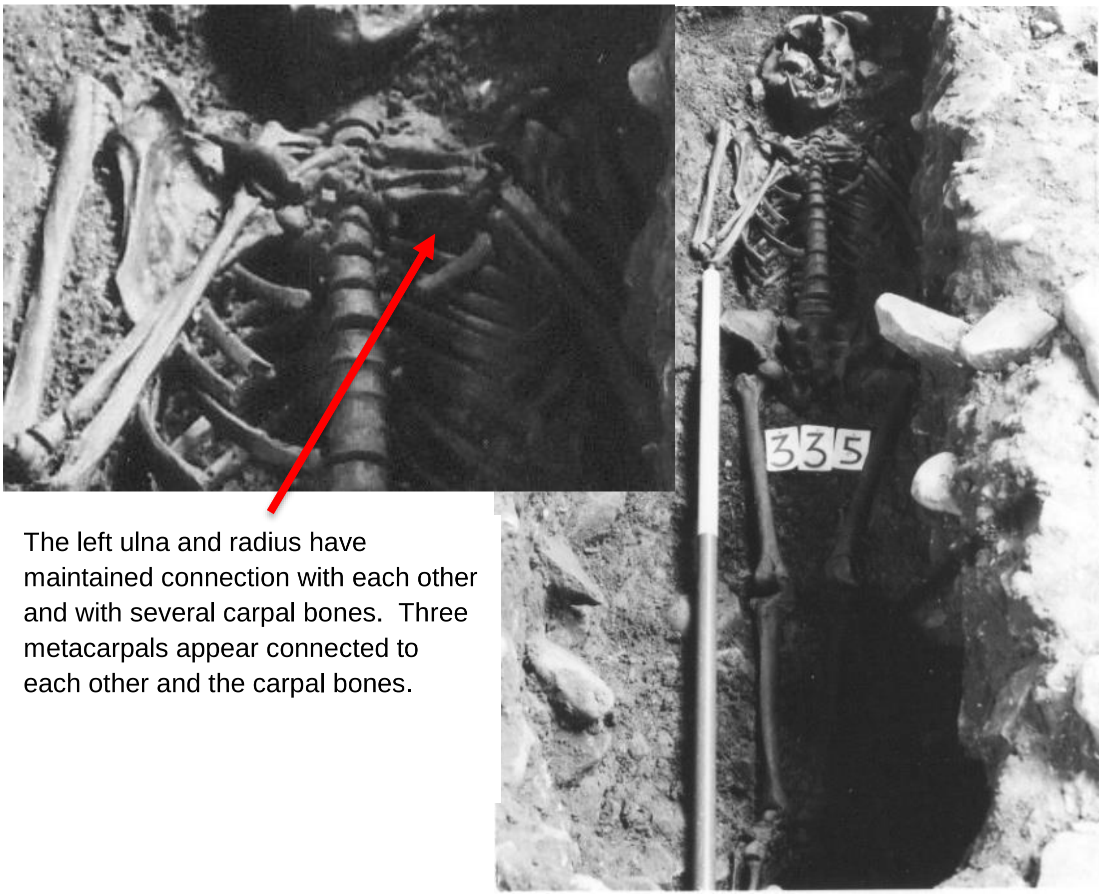


Figure 7.7: *An example of a burial with a void – rigid container outcome displaying paradoxical articulations of the joints of the hands. BG335. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

An assessment of compression of the upper body was only possible for eight burials with a void – rigid container outcome (8/26, 31%) (Table E8). These burials were either supine or presented a slight rotation of the corpse to either the right or left. Of these eight individuals, six displayed skeletal indications of compression of the upper body (6/8, 75%). For example, in BG645 and BG612 the clavicles are verticalized, the scapulae rotated anteriorly and superiorly and the humeri anteriorly and medially rotated (Figures 7.3 and 7.5). In the burials where the corpse was resting on either the right or left side, assessing for compression of the upper body relating to a shroud was not possible. This was due to the position of the corpse which compressed the side it was resting on and the skeletal elements upper most in the coffin had displaced under gravity to rest on the base.

Analysis of the 26 burials with a void – rigid container outcome has shown that nine individuals were buried resting on their right side (9/25, 36%), with four individuals on their left side (4/25, 16%), revealing that burial on the side (13/25, 52%) was more frequent than supine burial (8/25, 32%) in these contained burials (Figure 7.6, Table 7.4 and Table E9). This is a contrast to the burials in the confirmed coffin sample used for the refinement of the archaeothanatological method and presented in Chapter 5, in which all 78 burials were supine. There did not appear to be one predominant arrangement of limbs displayed in the 26 burials with a void – rigid container outcome (Tables 7.5, 7.6 and Tables E10-E11). This could be the result of displacement masking true limb position and introducing variation where it did not originally exist, as raised by Heighway (2007: 235). This appears to be the case for the corpses placed on their sides, where movement under gravity will have increased the likelihood of displacement, distorting the original position of the limbs of the upper-most side (Figure 7.6). In only nine burials where the individual was interred in a supine or slightly rotated position was the possible original arrangement of the upper limbs visible. The limited data appeared to suggest that the placing of the forearm and hands across the corpse was preferable to laying the arms in an extended position on the container base. In the 20 burials where the lower limbs were available for assessment, adduction was more common in the supine and slightly rotated burials, whereas in the burials in which the corpse was placed on its side, the lower limb on the base of the container tended to be extended while the upper-most lower limb was either slightly behind the other limb (adducted) or placed resting on the limb beneath (Figure 7.6). The overall arrangement of the limbs, in the supine burials and those displaying a slight rotation to either the left or right, appeared to be similar to those observed in the 78 burials from the confirmed coffin sample (see Chapter 5), with a compact arrangement of the limbs; with the upper limbs either resting on or adjacent to the torso of the corpse and the lower limbs showing evidence for extension and adduction.

Table 7.4: *Frequency of burial positions for the 26 burials with a void – rigid container outcome from Black Gate*

Supine	Body resting on the right side	Body resting on the left side	Slight Rotation right	Slight Rotation left	Unclear
8 (30%)	9 (35%)	4 (15%)	2 (8%)	2 (8%)	1 (4%)

Table 7.5: *Frequency of upper limb arrangements in the nine supine/slightly rotated burials with a void – rigid container outcome from Black Gate in which position could be assessed*

Extended	Extended/not recordable	Flexed elbow forearm to chest	Flexed elbow forearm to pelvis	Flexed elbow one forearm to pelvis the other to abdomen	Flexed elbow one forearm to abdomen the other to the shoulder
1 (11%)	3 (33%)	1 (11%)	2 (22%)	1 (11%)	1 (11%)

Table 7.6: *Frequency of lower limb arrangements in the 20 burials with a void – rigid container outcome from Black Gate in which position could be assessed*

Supine/Slight rotation				Body resting on its side		
Adducted	**Slight adduction**	**Flexed left and extended**	**Flexed left**	**Extended and slight adduction**	**Extended and adducted**	**Flexed**
5 (25%)	1 (5%)	1 (5%)	1 (5%)	2 (10%)	9 (45%)	1 (5%)

Examination of the excavation documentation of the 26 burials with a void – rigid container outcome revealed that grave cut shape did not appear to differ greatly within the group, or from the overall description for cuts throughout the whole cemetery. Information on grave cuts was only available for 11 burials with a void – rigid container outcome (11/26, 42%), but where it was the cuts are variously described as rectangular with rounded corners, sub-rectangular and in one case an elongated lozenge. Again, the dimensions of the grave cut were not recorded for every burial. In those graves that had measurements, only one cut measured less than 0.50m in width, BG612, and half measured over 0.70m (5/10)[16] (Table 7.7 and Table E12). None of the burials appeared to have any stone inclusions, such as ear muffs, within the containers. This does not exclude the possibility of head supports made entirely from organic materials which have completely decomposed. The absence of stone supports is in contrast to burials from the confirmed coffin sample, where coffined burials were found to contain stones placed around the cranium at St Oswald's and Worcester Cathedral (Chapters 4 and 5), and also in the burials determined to be void – rigid container from the analysis of the burials from Worcester Cathedral (Chapter 6). Items which could be referred to as grave goods were found in five graves; for example, a coin was found in BG427. The lack of inclusion of items commonly described as grave goods among burials with a void – rigid container outcome is consistent with the low incidence of items found within graves throughout the whole cemetery and is characteristic of the late Anglo-Saxon period (see Chapter 3).

[16] The length and depth measurements have not been presented. In five burials the length of the cut had been truncated and the depth measurement compromised in at least six burials.

Table 7.7: *Grave cut shape and dimensions of burials with a void – rigid container outcome from Black Gate (obtained from excavation archive held by John Nolan)*

Skeleton	Description of shape	Dimensions (Metres)
BG454	Rounded rectangle	? x 0.85 x 0.17
BG487	Rectangular rounded corners	2.20 x 0.87 x 0.65
BG555	Rectangular	? x 0.70 x ?
BG568	Not recorded	1.80 x 0.76 x 0.50
BG612	Rectangular	1.05 x 0.43 x 0.20-0.30
BG619	Elongated lozenge	1.90 x 0.54 x 0.48
BG622	Probably rectangular	1.38 x 0.58 x 0.20
BG626	Sub-rectangular	0.95 x 0.58 x 0.20
BG642	Rectangular	1.40 x 0.50 x 0.18
BG645	Rectangular	1.80 x 0.60 x 0.30
BG656	Sub-rectangular	0.84 x 0.58 x 0.13

7.2.2 Burials in a void

A total of 44 burials were designated as decomposing within an original void, but one whose origin could not be confidently assigned to rigid wooden container (44/232, 19%) (Table E13). Skeletal positioning in this group differed very little from those recorded in the 26 burials with a void – rigid container outcome. Indeed, the types and patterns of externally displaced skeletal elements and those maintained in potentially unstable positions were similar to those recorded in the 26 burials with a void – rigid container outcome. Frequent observations included the external displacement of the ankle and foot bones (24/24, 100%), the *ossa coxae* (33/38, 87%), femur (25/39, 64%), and the fibula (24/30, 80%) (Table E14). Bones such as the *ossa coxae* (20/38, 53%), the humeri (10/42, 24%), and the ribs (6/43, 14%)

were found supported in potentially unstable positions (Table E15). The main skeletal feature uniting 36 of the burials in a void was the presence of external displacement clearly indicative of decomposition in a rigid void (36/44, 81%). In 14 of these burials (14/36, 39%) this external displacement and/or skeletal elements supported in potentially unstable positions displayed a linear alignment. In the remaining eight burials (8/44, 19%) there was more limited external displacement with skeletal elements displacing relatively close to the original volume of the corpse, however, for these burials the presence of inconclusive direct archaeological evidence identified the presence of a wooden barrier (Table E16).

The key difference between the burials with a void – rigid container outcome and those in the void groups was the limited archaeological evidence available for the latter, which meant that burial forms other than a container could not be confidently excluded. In burials where the skeletal elements were supported in potentially unstable positions, grave cuts had not been identified/recorded leading to an inability to determine the source of the support. The direct archaeological evidence identified by the excavators in 13 graves was not considered to represent conclusive evidence for the presence of a coffin, discussed below. The crucial feature distinguishing void and indeterminate burials is that the extent of the external displacement was considered sufficient in those burials classed as burials in a void, to allow the exclusion of decomposition in a filled space, with the corpse interred directly into the grave, and clothing or a shroud/loose wrapping to be the source of the barrier resulting in delayed in-filling.

Of the 44 burials with a void outcome 31 had a prior determination by the excavators of plain earth, and 13 were reported by the excavators to contain evidence suggesting they were potentially coffined (Table E17). The excavator’s prior determinations were problematic to confirm. The evidence was either, not recorded in enough detail to ascertain the exact location of the wood fragments or soil stains, or else the direct archaeological evidence indicated wood was present above the corpse. As discussed in Chapters 3 and 4, wood stratigraphically above the skeletal remains could represent either a coffin lid or a wooden grave cover. In the absence of grave cuts, the skeletal evidence alone cannot distinguish between the two burial forms conclusively, unless it exhibits extensive external displacement, which was not present in these burials. For this reason, these 13 burials were determined to have a void, rather than a void – rigid container outcome. Moreover, there was evidence to suggest the use of durable covers within dug out earthen graves in use alongside containers at the cemetery. Several uncoffined burials have been determined to be interred in dug out earthen graves containing only a durable cover rather than coffins due to the arrangement of the individuals and/or the size of the grave cut (see 8.2.5 below). Furthermore, Mahoney Swales (2012: 30) discusses that some of the cists did not have associated stone lids and that potentially these may have had wooden covers, as suggested by Boddington (1996: 38-43). As most of the cist burials displayed evidence for decomposition in a void (see 8.2.5), this suggests seems to have merit and as such further supports the use of wooden covers at Black Gate. Furthermore, the surrounding burial soil was not considered to be fine-grained, introducing the potential for the grave cut to have retained its integrity; thus, in conjunction with a durable rigid cover in a dug out earthen grave, to have created a void similar to that found within a rigid container.

Of the 44 burials with a void outcome, 14 exhibited evidence for decomposition in a long-lasting, rigid, rectilinear/parallel-sided void, with skeletal elements forming a linear alignment (14/44, 32%) (Table E18). This is clearly seen by the formation of the extensively displaced foot and hand bones aligned on the left side and the foot bones aligned along the east end of the grave, in BG351 (Figure 7.8). Despite compelling evidence for decomposition in a void, the location of the grave cuts had not been identified/recorded and therefore the sides of the grave could not be excluded as the source of the barrier against which the skeletal elements had aligned and therefore the burials did not meet the criteria for void – rigid container. A further 22 burials were assigned to this group of burials in a void based on the extent of skeletal displacement, even though no linear alignment of skeletal elements was identified (22/44, 50%). The direction and distance of the external displacement was considered comparable to that seen in other burials in a void, thus indicating a relatively long-lasting external void with a rigid barrier. This level of external displacement clearly could not have taken place if decomposition occurred in a filled space. In BG347 this was seen by the displacement of the mandible, humeri, *ossa coxae*, left femur and right tibia (Figure 7.9). However, the source creating the void could not be identified.

Figure 7.8: *An example of a burial with a void outcome from Black Gate displaying a linear alignment of displaced skeletal elements. BG351, on the left side the linear alignment is formed by the extensive displacement of the hand and foot and by the foot bones aligned along the east end of the grave (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Figure 7.9: *An example of a burial with a void outcome displaying external displacement indicative of decomposition in a void, BG347, rotation of the femora, displacement to the left and anterior of the right tibia (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In the remaining eight burials (8/44, 19%) a combination of limited external displacement and direct archaeological evidence allowed a void burial outcome. The displacement of bones in these cases could be justified as occurring in an original void. For example, in burial BG249 external displacement was limited to the posterior/lateral fall of the *ossa coxae* and the inferior/posterior/medial movement of the bones of the ankles and feet. Excavation documentation indicated the presence of wood in graves, leading the excavator to consider the possibility of a wooden coffin or other wooden structural feature. However, either the location of the wood was not recorded, or it was stratigraphically above the skeleton and was therefore deemed insufficient to support a coffin burial determination. In burial BG277 the excavation notes remark on the presence of wood in the grave but the skeletal patterning is remarkably similar to that found when decomposition occurs in a filled space. There is limited evidence for external displacement, the possible fall in an inferior direction of the mandible away from the maxilla and the displacement of the right metatarsal bones in superior and inferior directions. There is evidence of bones supported in potentially unstable positions; the ribs, appearing to have been supported the vertebrae; the *ossa coxae* and the sacrum. A number of possible explanations exist, that the wooden container was not robust and almost immediately allowed the voids within to in-fill with sediment and/or that the corpse was placed into a narrow receptacle and the bi-lateral pressure restricted the normal movements expected under gravity into internal voids within the corpse and left limited space external to the corpse for bones to displace into (Figure 7.10). Interpretation in this case is restricted by the image quality in the area of the bones of the foot and ankle.

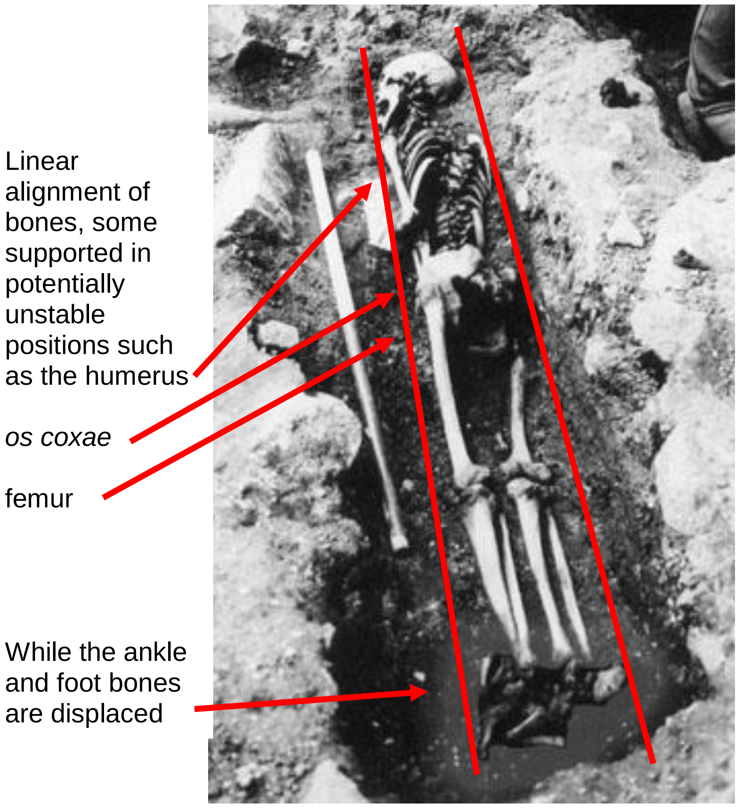


Figure 7.10: *BG277 displaying more limited evidence for decomposition in a void. Limited to the displacement of the tarsal and metatarsal bones. The linear alignment appears tapered but this is most likely due to distortion produced by the angle the photograph was taken in. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In 29 burials with a void outcome (29/44, 66%) bones were recorded supported in potentially unstable positions (Table E15). Figure 7.11 illustrates burial BG610 which displays clear evidence for decomposition in a void but the ankle and foot bones of the left foot appear supported in their original positions, potentially unstable. In five burials these supported elements contributed to a linear alignment – wall effect (5/29, 17%). For example, in BG282 the slightly medial rotation of the left humerus is aligned with the supported left *os coxae* and potentially a talus (Figure 7.12, also see Figure 7.10). This support was found to be unilateral or bi-lateral, however, as discussed above (7.2.1), the presence of only one side of the corpse displaying lateral support does not provide any assistance in distinguishing its source. The source of this lateral support could not be determined, as the grave cut had not been identified/recorded.

Figure 7.11: *Example of a burial with a void outcome displaying bones supported in potentially unstable positions. BG610 The left calcaneus, talus and navicular appear to be supported in approximate original positions (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

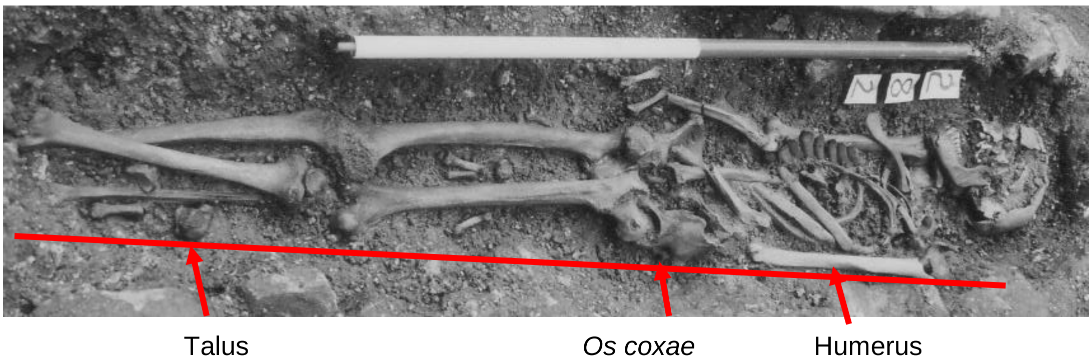


Figure 7.12: *Linear alignment of skeletal elements in BG282 – left humerus, left os coxae and talus. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In only 13 burials could evidence for compression of the upper body be assessed. Skeletal indicators for compression of the upper body were recorded in four burials (Table E19). In BG351 this main evidence for compression came from the bi-lateral narrowing of the rib cage and the anterior and superior rotation of the scapulae. Whereas, in BG053 the compression only appeared to have affected the right side, with the scapula rotated anteriorly/superiorly and a verticalisation of the clavicle.

The overall position of the body does not significantly differ from the void – rigid container burials (Table 7.8 and Table E20). A similar proportion of individuals are supine, 36% (30% in burials with a void – rigid container outcome). The frequency of corpses buried resting on their sides and displaying a slight rotation is overall comparable. This may indicate that being placed on either the left or right side, rather than in a supine position, could occur in various forms of original void. The overall position of the upper and lower limbs was again fairly comparable to the void – rigid container burials, tending towards a more compact arrangement (Tables E21-E22).

Table 7.8: *The frequency of burial positions in the 44 burials with a void outcome from Black Gate*

Supine	Body resting on its right side	Body resting on its left side	Slight Rotation right	Slight Rotation left	Unclear
16 (36%)	20 (45%)	3 (7%)	1 (2%)	2 (5%)	2 (5%)

7.2.3 Indeterminate Burials

All 67 burials categorised as indeterminate burials displayed evidence for expected natural movement of bones into internal secondary voids and limited external displacement (67/232, 29%) (Table E23). The evidence from the spatial distribution of the skeletal elements was not considered clear enough to establish decomposition in a long-lasting, rigid void. Skeletal elements identified as having displaced into external voids included the cranium (11/31, 35%), mandible (23/42, 55%), the *ossa coxae* (40/53, 75%), and the bones of the ankles and feet (32/32, 100%) (Table E24). The types of skeletal elements found displaying external displacement were not considered to be significantly different to those in either the void – rigid container or void groups, but rather the extent they had displaced. The external displacement recorded among the indeterminate burials saw skeletal elements move over a smaller distance than in the burials from the void and void – rigid container categories, with elements generally remaining closer to the original volume of the corpse. Over half of the 67 burials exhibited the maintenance of appendicular skeletal elements (47/67, 70%), in which bones such as the *os coxae* (31/53, 58%), humerus (26/56, 46%) and the scapula (16/45, 35%), were frequently found supported in potentially unstable positions (Table E25). Again, the type of skeletal elements appeared not to differ from those in the preceding two groups, or indeed from those in the uncoffined group. However, the overall spatial distribution of the bones did not display either a clear linear alignment, that could be classed as a box-effect, nor a clear body-shaped contoured outline, the identification of which would have assisted in differentiating between the object that provided the support.

For the 67 indeterminate burials the difficulties in determining burial form, and thus the reason why they were assigned to the indeterminate rather than void and void – rigid container categories, were threefold and related to a lack of available information. First, the source of the barrier creating the void could not be identified and may not have been a wooden coffin. Excavators reported direct archaeological evidence possibly pertaining to the presence of a wooden container in only six graves (6/67, 9%). Second, due to the reduced extent of the external displacement seen among the indeterminate burials, decomposition within a filled space and movement within a flexible object, such as clothing or a loose shroud, could not be excluded. The size and shape of these voids would be also dependent upon the body mass of the individual, enhanced by the presence of clothing or a shroud or other textile wrapping, accounting for variations in displacement. Moreover, the general grave fill composition at Black Gate, which contained varying proportions of clay, would not have precluded the creation of relatively stable body-shaped voids. Third, the form of support resulting in the maintenance of skeletal elements in potentially unstable positions could not be deduced from either the extent of the external displacement or from the inclusion of other archaeological evidence – the location of the grave cut or the presence of inconclusive evidence such as wood fragments. Due to the absence of any direct archaeological evidence the excavators' determinations for 61 burials had been plain earth (61/67, 91%), with just six having the possibility of interment in a wooden container considered. The evidence the excavators had used to these determinations was unclear from the excavation documentation and in all five cases there was inconclusive evidence for decomposition in an original void (Table E26).

There are further reasons why burials presenting the three features of indeterminate burials at Black Gate may indicate the original interment was indeed made within a wooden coffin. The evidence obtained from the confirmed coffin burials (see Chapter 5) has shown that skeletal elements will not always move into external space, unless their original position was unstable under gravity. Therefore, an absence of extensive skeletal displacement alone, is not considered sufficient to exclude the possibility of burial in a wooden coffin. Moreover, skeletal elements placed in unstable positions as decomposition occurs and are frequently reported as displacing externally, such as the *ossa coxae*, may be maintained in an approximate original position due to the support offered by the adjacent coffin side. The narrow width of late Anglo-Saxon coffins was established in Chapters 3-5. Although we do not know the width of the coffins at Black Gate, as it could not be established from the fragments of wood recovered from any adult grave, we can make some inferences that they were similarly narrow. Evidence outlined in sub-section 7.2.1, above, provides evidence for the sides of the coffin exerting a degree of bi-lateral pressure on the appendicular skeleton (through support of appendicular skeletal elements in unstable positions). Thus, body position from numerous graves appears to indicate the use of narrow containers at Black Gate. This potentially increases the difficulty in distinguishing between a shrouded corpse, which can also display a bi-lateral compression of the upper body, and narrow coffin, especially as the two could be used in combination.

External void integrity and longevity will also have an influence on the potential for movement of bones. As discussed in Chapter 5, the longer a void is present, the more potential exists for taphonomic factors to act upon the disarticulated bones and displace them. The converse is also true, if the barrier is less durable the void within may be compromised earlier in the decomposition sequence, resulting in a more rapid delayed in-filling and maintenance of the more persistent articulations which had yet to decompose. Ingress of soil reduces space around the corpse limiting movement, fixing bones in their current position. While it cannot be known how long voids exist for, a void within a wooden container or under a durable cover in a dug out earthen grave will last relatively longer than one created by a more malleable and less durable substance such as fabric.

Examples of the 47 burials in which skeletal elements were supported in potentially unstable positions include, BG191, where the right scapula is anteriorly rotated and appears to have maintained connection at the gleno-humeral joint, the humerus is medially rotated and the *os coxae* upright. There is evidence for external displacement on the left, of the head of the radius and *ossa coxae*, and the bones of the feet (Figure 7.13). Where the upper limbs are in an abducted position, as in BG498, the humeri are supported in a medially rotated position but the *ossa coxae* have displaced (Figure 7.13). As discussed previously, this could relate to body mass, with the upper limbs having to allow for a larger thoracic and abdominal mass, this mass would then allow greater room for the fall of the *ossa coxae*. As can be seen in these two examples, this support was found to be unilateral in some burials and bi-lateral in others.

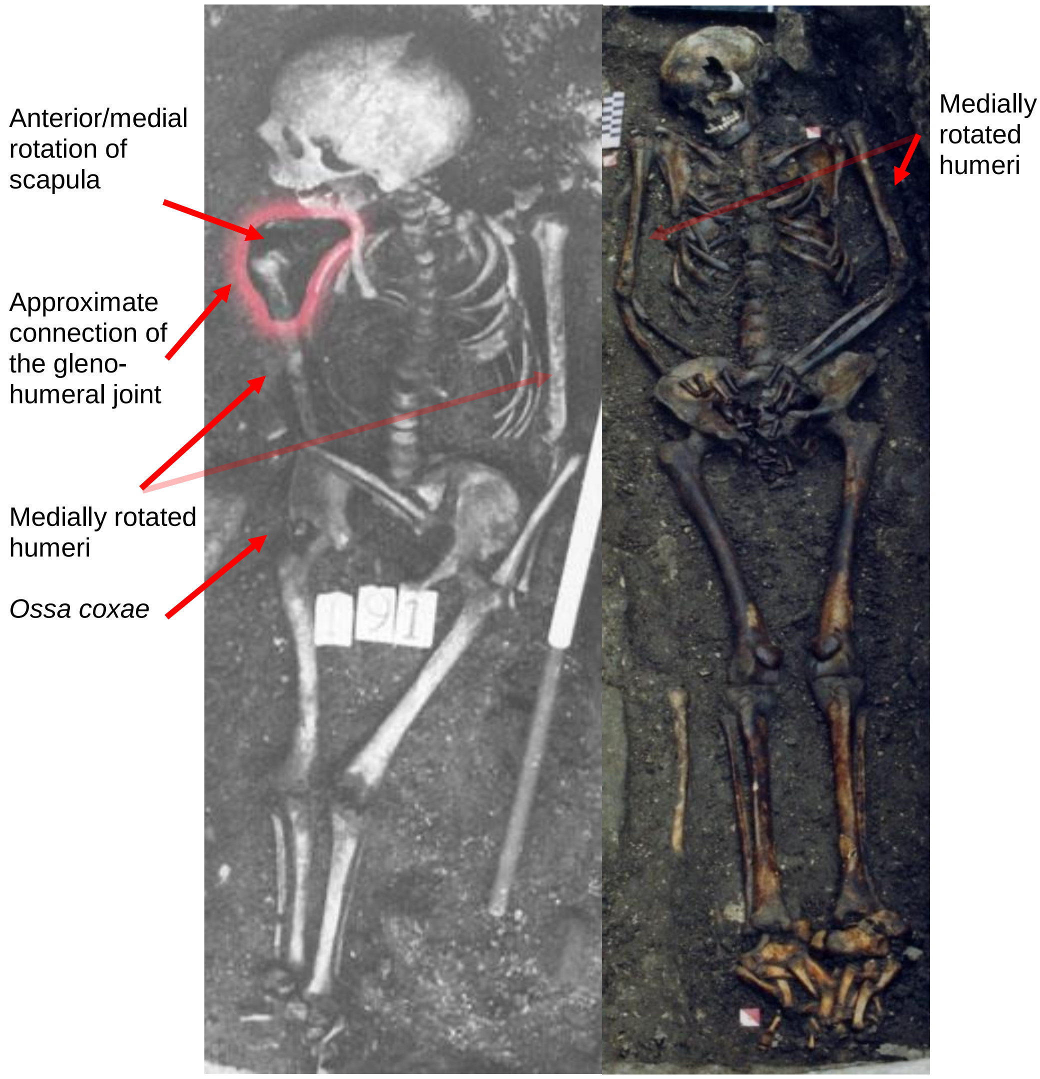


Figure 7.13: *Examples of skeletal elements supported in potentially unstable positions in indeterminate burials. Left – BG191, where the right scapula is anteriorly rotated, appearing to have maintained connection at the gleno-humeral joint, the humerus is medially rotated and the os coxae upright. Right – BG498, the upper limbs are in an abducted position and the humeri are supported but the ossa coxae are displaced. (Images Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In 20 burials (20/67, 30%), no skeletal elements were maintained in potentially unstable positions (Table E27). These burials are displaying Castex and Blaizot's (2017: 282) flat, thin layer of skeletal elements, however, they are not able to provide any of the other confirmatory skeletal or archaeological forms of evidence required to confirm the presence of a coffin (Figure 7.14).

Figure 7.14: *Examples of burials with an indeterminate outcome from Black Gate with no skeletal elements supported in potentially unstable positions. Top – BG572, displaying an external lateral fall of the ossa coxae, an anterior rotation of the cranium and posterior/inferior fall of the mandible. Bottom – BG246, displaying an anterior rotation and damage to the cranium, a posterior/inferior fall of the mandible, an exterior lateral fall of the ossa coxae and a posterior/inferior fall of the ankle and foot bones. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Compression of the upper body was recorded in nine burials (9/35, 26%) (Table E28). No direct archaeological evidence for clothing was recovered from any of the 67 graves, however, pins were recorded in two burials, potentially suggestive of shrouds. As discussed in Chapter 2, skeletal positions have been identified that could potentially relate to burial in clothing and shrouds. The problem with these burials is that any skeletal evidence indicative of bi-lateral compression, as seen in BG034 could have resulted from the grave cut, as this has not been identified (Figure 7.15). The presence of clothing could be indicated by the position of the right patella in BG469 (Figure 7.16). The patella appears to be supported in a potentially unstable position resting on the medial anterior surface of the femur and tibia. Some form of leg covering could have stabilised the patella as decomposition of the surrounding soft tissue occurred rather than allowing it to fall medially into the area between the lower limbs (Also see patella in BG498, Figure 7.12). In BG610 there is evidence for disarticulation of the joints between the left tibia and fibula, however, the articulations in the left foot have been maintained, inferring the presence of support for the foot in the form of footwear or a wrapping. The presence of skeletal indicators for clothing and shrouds does not prohibit burial in a wooden coffin – some interments may have included both. Indeed, burials from the analysis of the 78 confirmed coffins in Chapter 5 also displayed skeletal evidence which could infer the presence of shrouds, demonstrating the two are not exclusive forms of burial. In the cases of the indeterminate burials at Black Gate, the presence of clothing or wrapping could explain a lack of extensive displacement, even within a coffin, as the skeletal elements as they disarticulate may be retained within a smaller area within the coffin until the textile has also decomposed. While there is nothing in these burials that produced a clear challenge to the plain-earth burial classification allocated by the excavators, these results do introduce the possibility of variation in treatment of the corpse prior to burial.

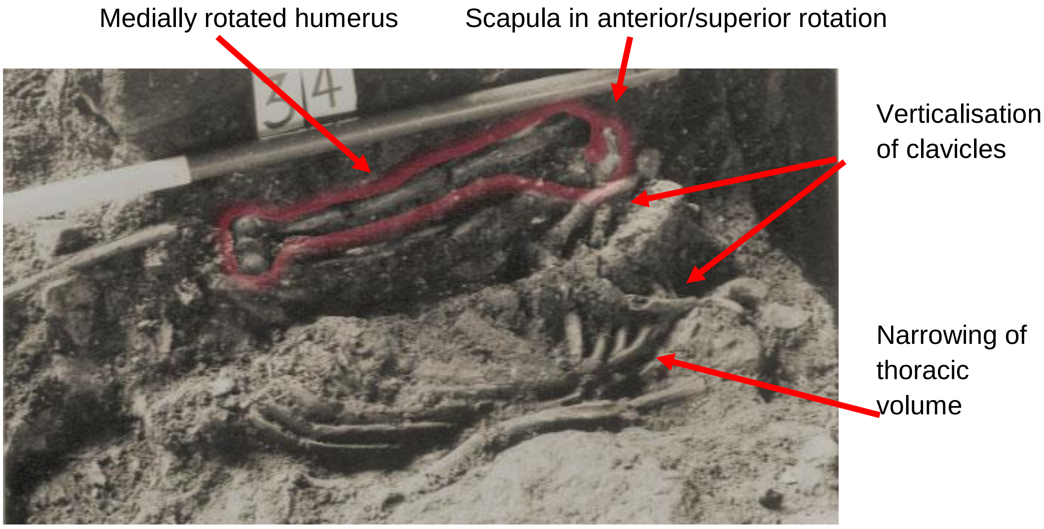


Figure 7.15: *Skeletal evidence for bi-lateral compression of the upper body (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Figure 7.16: *Possible skeletal evidence for clothing on the lower body (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Differences in the position of the corpse were apparent between the burials in this group and those in the void – rigid container and void outcomes discussed above. A total of three individuals had been buried in a prone position and, although some individuals had been placed on their sides, these accounted for a smaller proportion of interments (Table 7.9 and Table E29). There appeared to be no logical reason why burial in a prone position should necessarily prohibit interment in a wooden coffin. In the case of the prone burials, the inconclusive evidence, provided by a limited amount of external displacement, for decomposition in a void and the presence of support for bones in potentially unstable positions led to the designation of indeterminate burials.

Table 7.9: *Frequency of burial positions for the 67 indeterminate burials from Black Gate*

Supine	Prone	Body resting on its right side	Body resting on its left side	Slight Rotation right	Slight Rotation left	Unclear
44 (66%)	3 (4%)	12 (18%)	2 (3%)	2 (3%)	2 (3%)	2 (3%)

7.2.4 Uncoffined Burials

A group of 95 individuals were deemed highly unlikely to have been originally interred within a wooden coffin (95/232, 41%) (Table E30). This group included both plain-earth burials, and other forms of funerary elaboration. Due to this variation, there are no overarching key skeletal characteristics that define this group of burials. These 95 burials were divided into, those exhibiting evidence for decomposition in a filled space (58/95, 61%), those in which the location of the cut in respect of the skeletal remains excluded the use of a coffin (18/95, 19%), those displaying evidence for decomposition in a void, but not one provided by a wooden coffin in nine burials due to the arrangement of the corpse at interment (9/95, 9%), and in one burial due to the extent of the displacement. There was also an individual whose skeletal analysis would have placed them into the indeterminate group, however, the relationship of the skeletal elements with a burial stratigraphically below it, provided an uncoffined determination (discussed below). The eight individuals interred within stone cists were also analysed and determined not to have been coffined (8/95, 8%).

Out of the 49 burials determined to be uncoffined and displaying evidence for decomposition in a filled space, all but four had been recorded as plain earth by the excavators (4/49, 8%), containing no direct archaeological evidence for a wooden coffin. BG155, BG252, BG288 and BG294 had been previously classed as potential coffined burials by excavators. A combination of evidence led to these burials having an uncoffined outcome. There was a lack of detail as to why this deduction had been made by the excavators combined with little evidence for decomposition in a void. For example, in BG288, the only evidence for external displacement was the inferior/posterior fall of the mandible, and the cranium was supported in an anterior/inferior rotation by what was possibly a head niche constructed from the grave cut itself (Figure 7.17). Duday and Guillon (2006: 146) comment on this contradiction between direct archaeological evidence and that of decompositional environment obtained via skeletal analysis, suggesting that this incongruity is the result of the decomposition of the coffin commencing before complete disarticulation of the corpse. This theory was considered, but rejected for this burial due to the factors described above.

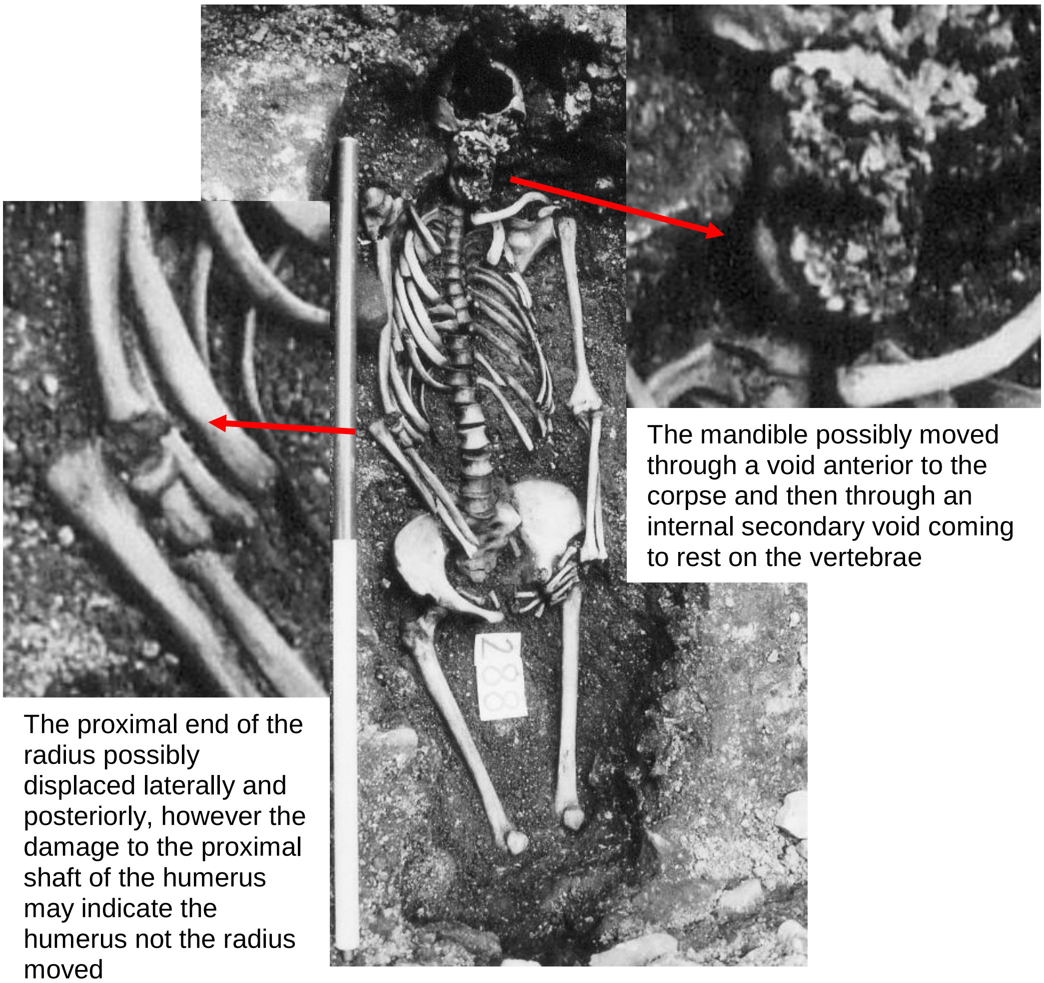


Figure 7.17: *Burial BG288 displaying skeletal evidence for decomposition in a filled space. Potential external displacement is limited to the fall of the mandible and possible lateral and posterior movement of the right radius. The ossa coxae have been maintained in an approximate anatomical position. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Of the 58 burials with evidence for decomposition in a filled space, 18 displayed only internal displacement of skeletal elements (18/58, 31%) (Table E31). These burials displayed only the natural movements expected during decomposition of soft tissue, including displacement of the clavicles, ribs and sternum and radii in all burials in which they were visible (Table E32). Other bones not displaced into internal secondary voids were supported in approximately original positions, both stable and unstable. For example, BG002 was placed resting on the right side of the corpse. Under gravity the left ribs, scapula, humerus, radius and ulna have fallen to some extent into the void created by the decomposition of the thoracic viscera, however, they have maintained their relationship with each other, possibly indicating a short time between the creation of the voids and the in-filling of sediment. The left *os coxae* has been maintained in an approximate original position (Figure 7.18). The retention of some thoracic volume seen in BG002 is in contrast to BG158 and BG115, where the ribs appear to have collapsed fully flat.

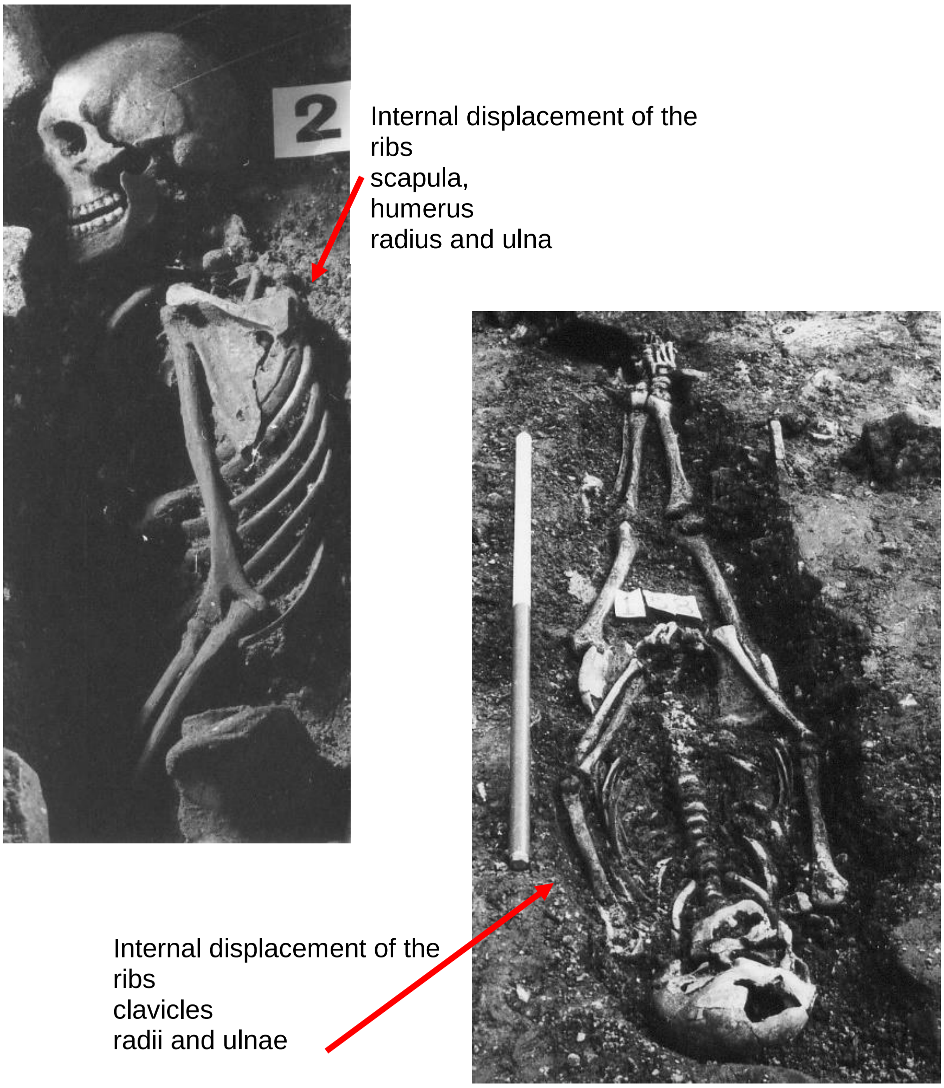


Figure 7.18: *Examples of uncoffined burials displaying internal displacement of skeletal elements Left - BG002, interred resting on its right side, displaying a fall of the left ribs, scapula, humerus, radius and ulna into the voids created by the decomposition of the thoracic viscera. The left os coxae is maintained in an approximate original position. Right – BG158, interred in a supine position, displaying a posterior fall towards the posterior of the ribs, clavicles, radii and ulnae. The ossa coxae, humeri, mandible and bones of the right foot are maintained in approximate original positions. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

The majority of the burials displaying evidence for decomposition in a filled space exhibited the limited external displacement of skeletal elements, which together with bones supported in potentially unstable positions, represented a body contoured outline (40/58, 69%). Skeletal elements exhibiting displacement into what were considered to be external voids, were more limited and included the bones of the mandible (13/30, 43%), the *ossa coxae* (7/35, 20%), the femur (10/34, 29%) and the ankles and feet (16/19, 84%) (Table E33). For example, BG042, the left humerus has fallen behind the scapula and the mandible has fallen to rest on the vertebral column (Figure 7.19). The relationship to a burial stratigraphically beneath it, in conjunction with the only external displacement being the potential posterior fall of the cranium, provided further confirmation for BG315 being classed an uncoffined burial (Figure 7.20). The left scapula and ribs of BG315 look to be at the same stratigraphic level as the left scapula and humerus of BG316. However, BG315 does not appear to have disturbed the skeletal elements of the burial beneath, BG316 has retained rotation of the scapula and gleno-humeral joint in connection, nor have the ribs of both burials become mixed. It appears BG315 was placed over BG316 at some point in time before complete decomposition had occurred of BG316.

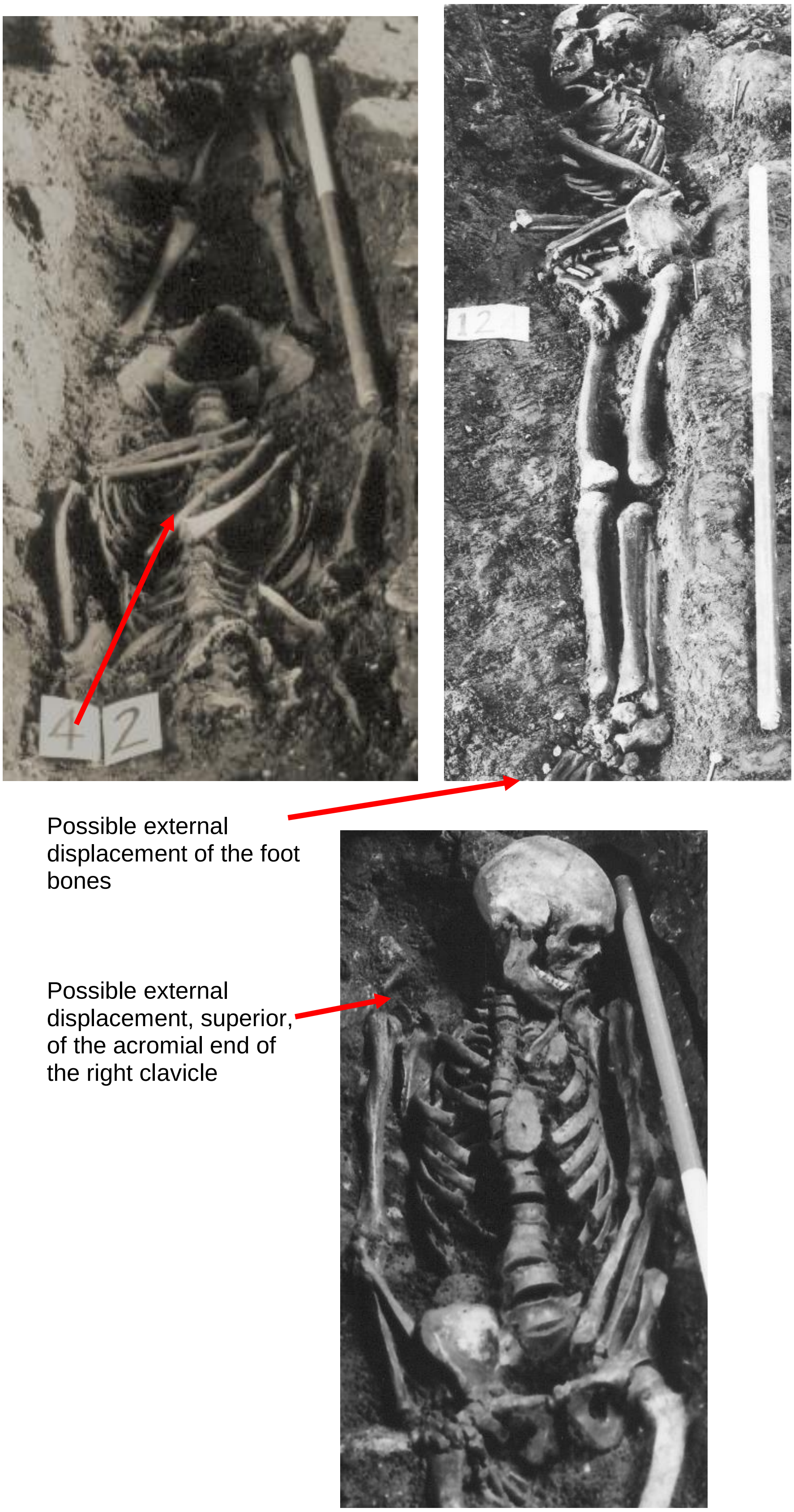


Figure 7.19: *Examples of uncoffined burials with limited external displacement of skeletal elements. Top left – BG042, the left humerus has fallen behind the scapula and the mandible has fallen to rest on the vertebral column. Top right – BG124, inferior fall of the metatarsal bones. Bottom – BG334, posterior/inferior fall of the bones of the feet, also display extensive displacement, and the movement in a superior direction of the acromial end of the right clavicle. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

As with burial BG315, for BG160 the presence of a coffin appears to be ruled-out by the skeletal element's relationship with a burial stratigraphically beneath them (Figure 7.20). BG315 displayed evidence for decomposition in a filled space, but the skeletal elements in BG160 appear flattened, possibly indicating decomposition occurred in a void. Further evidence could come from a tibia which has been placed over the femora, however it has not been ascertained if this bone definitely belonged to this individual. Again, skeletal elements from the upper-most burial have displaced to the level of the lower burial, which would be difficult if BG160 had been interred in a coffin. If a coffin had been placed over the burial beneath damage would be expected to the skeletal elements, but this was not the case.

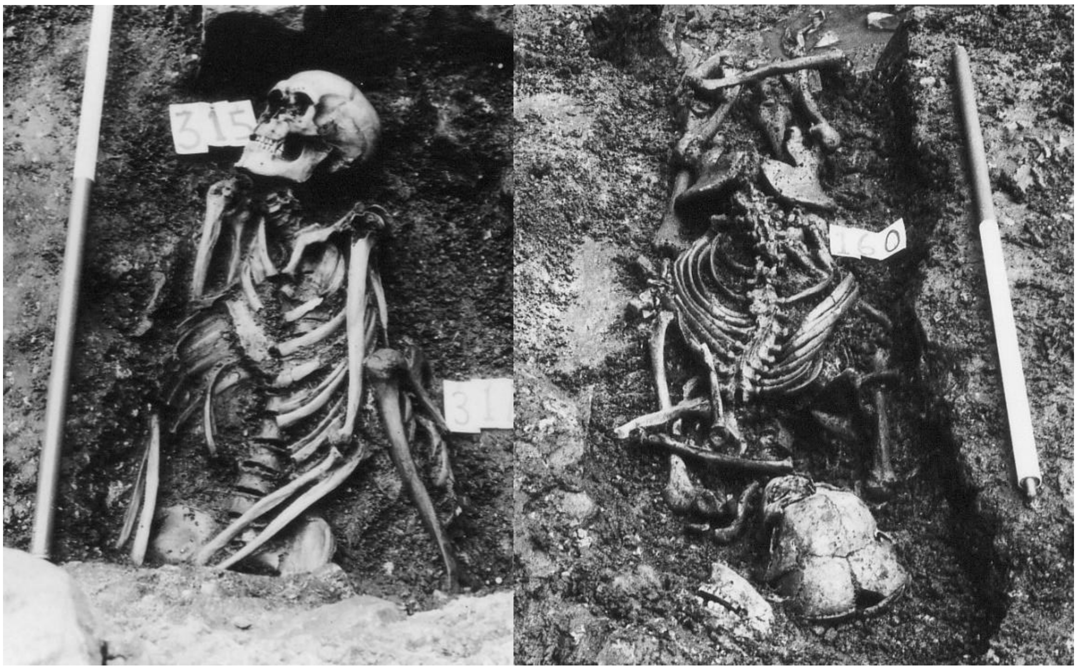


Figure 7.20: *Examples from Black Gate cemetery of burial determined to be uncoffined through their relationship with other burials. In both burials the skeletal elements are in contact with the individual stratigraphically below. Left - BG315, determined to have decomposed in a filled space due to no evidence for external displacement of bones. Right – BG160, determined to have decomposed in a void due to the lateral displacement of the ossa coxae (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In most graves the fill and surrounding cemetery soil was not considered to be fine-grained, rather it contained a higher proportion of clay. As discussed in the preceding section (8.2.3), limited amounts of displacement were then considered reasonable at Black Gate, as progressive in-filling was improbable due to the prevailing sediment type and delayed in-filling was therefore expected. Furthermore, the presence of a non-rigid barrier, such as fabric, would potentially allow for small movements to occur within its volume. The disparity recorded in displacement of skeletal elements could, therefore, relate to differences in how the corpse was prepared for burial and resulted in variation in the timing of delayed in-filling. Furthermore, as raised by Roksandic (2002: 107), the differences could be attributed to variation in the body mass between individuals.

BG315 (figure 7.20 above) appears to display evidence for bi-lateral compression of the upper body, narrowing of the thoracic volume, verticalisation of the clavicles, the anterior/superior rotation of the scapulae and the medial rotation and anterior/adduction of the humeri. Due to the apparent relationship with BG316 beneath it this constriction could not be the result of a bi-lateral pressure exerted by the grave cut. Instead, this compression more than likely representing a corpse buried in a tightly wrapped shroud.

The grave cut appears to have been the cause of the compression in a number of burials, for example, BG620, where the cut is adjacent to the medially rotated humeri (Figure 7.21). In graves such as BG033, the grave cut had not been identified. The bi-lateral compression observed could therefore, have resulted from a narrow grave cut or a shroud. A shroud is also suggested by the arrangement of the femora, which appear adducted (Figure 7.21).

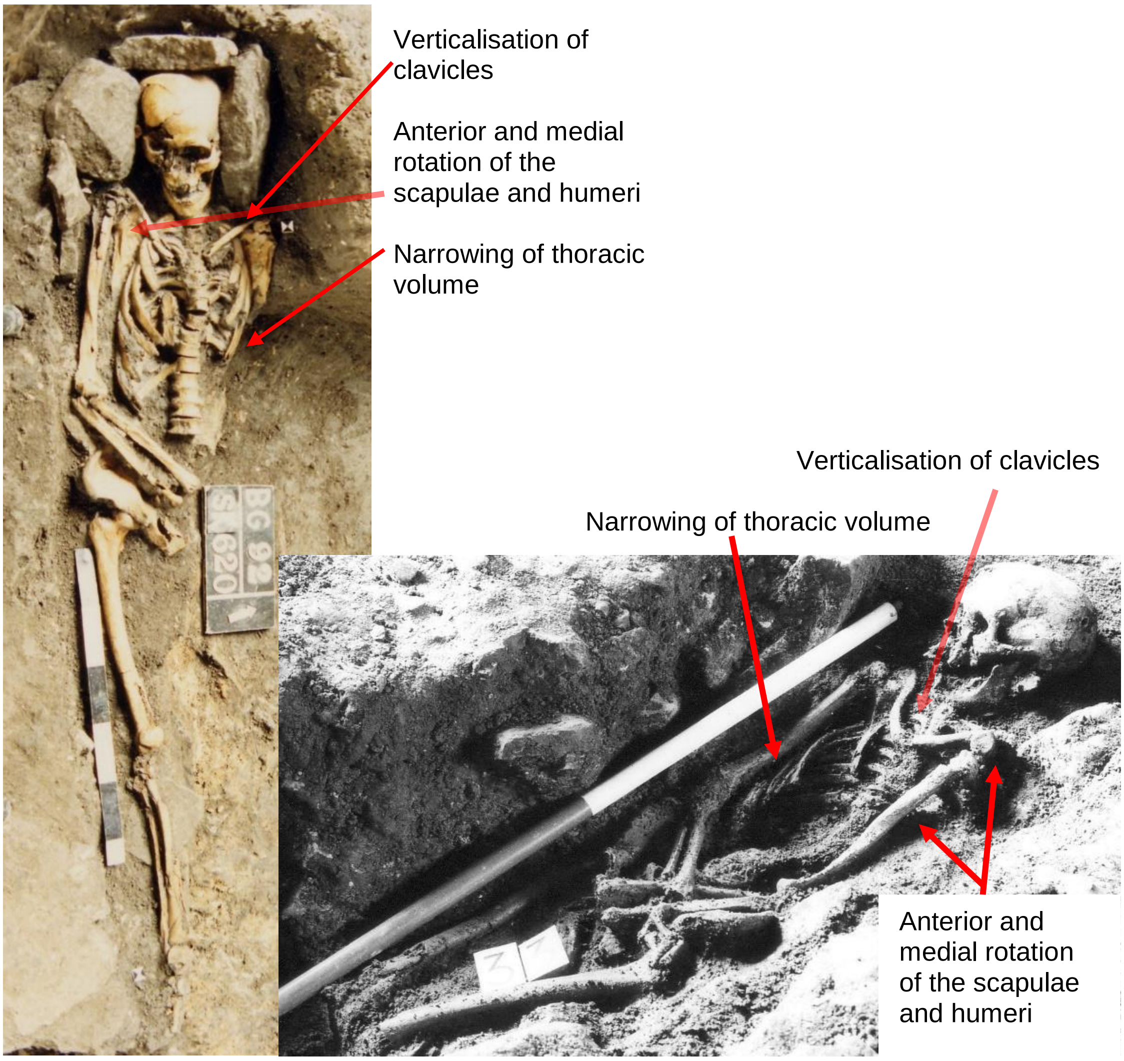


Figure 7.21: *Examples of uncoffined burials displaying skeletal features for bi-lateral compression of the upper body. Above – BG620, with verticalisation of the clavicles, anterior rotation of the scapulae. Below – BG033, with verticalisation of the clavicles, anterior rotation of the scapulae, anterior and medial rotation of the humeri and a narrowing of the rib cage. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

In 18 burials the location of the grave cut in relation to the skeletal remains introduced doubt as to whether the grave could have accommodated a coffin (18/86, 21%) (Table E34). In three cases there was evidence for decomposition in a void, which suggested these individuals were interred beneath durable covers within dug out earthen graves. For example, in BG534, the corpse has not been placed centrally into the grave; the right *os coxae* has fallen laterally and is resting adjacent to the grave cut, the right ribs also appear in close proximity to the cut. On the left side the left humerus has displaced laterally and the left radius has separated from the ulna distally and displaced close to the grave cut (Figure 7.22). In all other cases it was unclear from the available skeletal evidence, whether the corpse had decomposed in a filled space or a void. For example, in BG491, the left humerus and *os coxae* appear supported by the adjacent grave cut, although, there is some evidence for limited external displacement on the right, with the lateral fall of the *os coxae*. This is potentially evidence for a loose durable shroud or a burial beneath a durable cover in a dug out earthen grave with the corpse only resting adjacent to one side of the grave cut (Figure 7.22).

Figure 7.22: *Examples of burials determined to be uncoffined based on their relationship to the grave cut. Left – BG534 and Right – BG491 (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

The overall arrangement of the corpse in nine burials was considered to exclude them from being buried in wooden coffins, as they would not have fitted into any container resembling the type of wooden coffin/chest found in the late Anglo-Saxon period (9/86, 10%) (Table E35). The overall arrangement could be considered to conform to a square rather than a long and thin rectangle, with the lower limbs in a flexed position and the corpse resting more to either the right or left side. Of these nine burials, seven displayed clear evidence for decomposition in a void, and it was therefore considered that these seven burials probably represented inhumations in dug out earthen graves under durable covers (Figure 7.23). One burial, BG271, presented evidence for decomposition in a filled space and was determined to be a plain-earth burial. For BG341, the possibility that this was a plain-earth burial could not be excluded based on skeletal evidence alone, as there was no clear distinction between whether decomposition had occurred in a filled space or in a void. BG341, was one of the potential two simultaneous burials of two individuals in this uncoffined group of eight burials, the other being BG176 with BG176a. BG341 appears to have been buried associated with BG345, who was not suitable for assessment as part of this sample (Figure 7.24). In another burial, BG420, the extent of the skeletal displacement appeared to excluded it from having decomposed in a coffin, it was more plausible for this burial to have been beneath a durable cover within a dug out earthen grave.

Figure 7.23: *Examples of burials determined to be uncoffined based on the original position of the corpse. Left – BG428 and Right – BG660 (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

Figure 7.24: *Skeleton BG341, an uncoffined burial based on its original position, resting on its right side with the lower limbs flexed and its relationship to another burial (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

The taphonomy-based method was also applied to eight adult burials (8/86, 8%), even though the graves clearly contained stone cists (Table E36). These burials provided direct archaeological evidence for burial form, however, as has been discussed in the preceding Chapter (3 and 4) grave elaborations and variations in burial form are often found combined. Indeed, Nolan (2010: 220) refers to a non-adult cist that contained evidence for a wooden coffin. It was deemed prudent, therefore, to include these burials in the analysis. In five graves there was external displacement of skeletal elements (5/8, 63%). For example, in BG375 the clavicles, mandible and *ossa coxae* had entered external voids, while in BG499 bones appeared extensively displaced (Figure 7.25). Both of these cists had been found with cap stones covering the cists. Of the eight cist burials in the sample four hand stone covers (4/8, 50%) (Table E36). Stone covers/slabs were not found for the majority of cists at the cemetery, leading to suggestions that wooden covers had been used (Mahoney Swales 2012: 30). The evidence for decomposition in a void would support this conclusion. In three burials confident determinations of burial environment could not be made (3/8, 37%). In two burials (2/8, 25%), this was as not enough of the skeletal elements were visible, while in burial BG377, there was limited external displacement, restricted to a lateral movement of the left humerus and ulna and a posterior/inferior fall to the base of the bones of the feet (Figure 7.26). Nevertheless, the spatial distribution of the skeletal elements in all eight burials, combined with the shape created by the cists, did not suggest that these individuals were also provided with wooden containers. The skeletal remains in all eight burials were in close proximity to the sides and/or ends of the cists. In comparison, the general trend for rectangular wooden coffins the cists were more anthropomorphic, being tapered in shape and/or including head niches (Figure 7.25 and 7.26).

Figure 7.25: *Examples of cist burials with externally displaced skeletal elements. Left BG375 and Right BG499. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

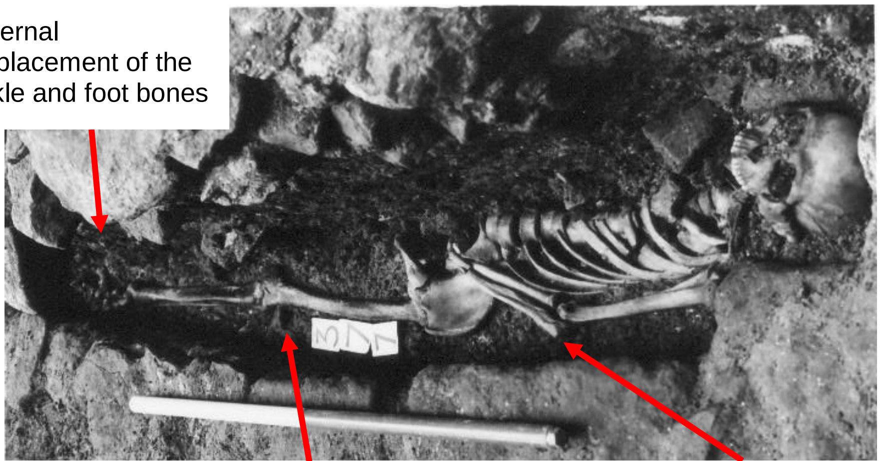


Figure 7.26: *BG377, a cist burial displaying more limited evidence for decomposition in a void. The left os coxae has remained upright and the left humerus in medial rotation. (Image Copyright Newcastle City Archaeological Unit, Newcastle City Council)*

The overall position of the corpse at interment differed little from the arrangements discussed from the other burial outcomes (Table 7.10 and Table E37). The main difference was for the burials whose position excluded them from being buried in a coffin, these did not conform to the general trend for compact arrangement of the limbs. There appeared to be a slight increase in prone burials, when compared to the void – rigid container and void outcome groups. Of these 95 burials 15 were excavated with stones placed around the area of the head, considered to represent ear-muffs and headboxes, of these seven were in cist graves.

Table 7.10: *Frequency of burial positions for the 95 uncoffined burials from Black Gate*

Supine	Supine with flexed legs	Prone	Body resting on its right side	Body resting on its left side	Slight rotation right	Slight rotation left
54 (56%)	4 (4%)	5 (5%)	25 (26%)	2 (2%)	2 (2%)	3 (3%)

7.3 Discussion

The method developed in this study has determined with confidence that 26 burials (26/232, 11%) from Black Gate were originally contained within rigid wooden containers (void – rigid container). Specifically wooden coffins were identified in 11 burials (11/26, 42%). Wooden chests were identified in two burials (2/26, 8%), with a further two found to have been either wooden coffins or chests (2/26, 8%). A further 57 individuals have been shown to have decomposed in an original empty space (57/232, 25%). For 13 of these 57 burials (13/57, 23%), the evidence suggested decomposition in a dug out earthen grave supplied with only a durable cover and no rigid container. However, for the majority of burials (44/57, 77%), the evidence available could not determine whether the void resulted from the presence of a container, or from the presence of a cover within a dug out earthen grave. For 15 individuals (15/232, 6%), burial without a coffin was confirmed, due to proximity of the grave cut to the bones, although, the results were unable to clarify if these were indeed plain-earth burials or rather an alternative form of burial had been utilised. Furthermore, 59 individuals who decomposed in a filled space were identified (59/232, 25%), confirming the prior plain-earth determination made by the excavators with positive evidence. In over a quarter of burials (67/232, 29%) the evidence was not able to differentiate confidently between decomposition in an original empty void and decomposition in a filled space with a flexible barrier. Thus, conclusions could not be made about burial form in these 67 burials.

Based on the presence of direct archaeological evidence, excavators had previously concluded that within these sampled burials only 37 individuals (37/232, 16%) had potentially been buried in wooden containers. Of these 37 burials, 14 were determined to be burials in void – rigid container (14/37, 38%), 13 burials in an undetermined void (13/37, 35%) and six burials had an indeterminate outcome (6/37, 16%). Of the burials considered by the excavators to potentially have been interred in wooden containers four had an uncoffined outcome in this study (4/37, 11%).

The taphonomy-based method identified a further 12 burials with a void – rigid container outcome (12/232, 5%), 31 burials in an undetermined void (31/232, 13%) and 13 individuals who appeared to have decomposed in a void beneath a cover in a dug-out earth grave (13/232, 6%), that had previously been labelled as plain-earth burials by excavators. Thus, the results of this study have increased the number of individuals identified as not plain-earth burials but interred in some form of void to 83 (83/232, 36%). These findings suggest that at Black Gate, plain-earth burial may not have been the predominant funerary practice. Rather an array of options was in use – wooden coffins, chests, dug out earthen graves containing only a durable cover, stone cists, headboxes, ear muffs, stone, and wood lined graves, shrouds and plain-earth burials. Indeed, the provision of a wooden container may have been as common as interring an individual directly into the grave and backfilling around them.

In contrast to Worcester Cathedral and Elstow Abbey cemeteries, a range of burial positions were identified at Black Gate cemetery: supine, resting on the right or left side, prone, extended or flexed. There appeared to be no relationship between overall position of the body and burial within a wooden container; those in supine, prone and individuals buried resting on their sides were found in both void categories and in the uncoffined category. Individuals buried in a supine position dominated (123/229, 54%). However, variation was present in the specific arrangement of the upper and lower limbs. There did not appear to be any specific predominant limb arrangement, nor any relationship between how the upper and lower limbs were positioned. Nevertheless, a compact arrangement of limbs occurred most frequently. A significant minority of individuals were placed resting on either their right or left sides (65/228, 29% right and 11/228, 5% left). Based on the results it was not considered that resting on one side could be conclusively linked to interment within a wooden container, as individuals in all categories were found interred resting on their sides. Rather burial position may be suggestive of a deliberate ritual action. Alternatively, interring an individual on their side could have been carried out for practical reasons – the grave is not as wide and therefore takes up less space, or was the result of movement of the corpse during transportation and placement into the grave. Nolan (2010: 212) suggests that it is unlikely that these individuals were interred in coffins/chests, as bodies would not be expected to rest on their sides in containers. He proposes that these individuals were more likely to have been placed in lined graves and supports this inference with the evidence that a large number of graves containing traces of wood have no evidence for base boards (Nolan 2010: 212). Skeletal positioning analysis has not been able to resolve this issue, as decomposition in a lined grave with a cover may result in similar skeletal displacement to that occurring in a container.

Stoodley (1999: 56) has suggested that prone burials in late Anglo-Saxon cemeteries might be evidence for coffins placed the wrong way up in a grave. At Black Gate there were eight individuals determined by skeletal analysis to be buried in prone positions. While three of these had an indeterminate outcome, five were determined to be uncoffined (see 7.2.5). This implies that this explanation of careless burial cannot account for all cases of prone burial. It seems more probable that, as suggested by Hadley (2010: 108), these individuals have been deliberately placed in a prone position, linked to ritual practice, possibly as an act of penitence, as opposed to these positions resulting from accidental movement, or haphazard placement into the grave. Nevertheless, an explanation of accidental movement, or else a less than careful placement of the corpse into the grave, could explain the positioning of the 16 individuals who display a slight rotation to either the right or left. This tilting of the body could occur in either a coffin, or when a corpse is directly placed into a grave.

Wooden containers at Black Gate appear to vary in width relative to their occupant, as demonstrated by the evidence for compression of the upper body and laterally supported skeletal elements, the extent of skeletal displacement and burial position. In burials where the corpse has been laid into a container in a supine position, there are examples of the container being wider than the shoulders, so that the body was flat on the base. While in other cases, the containers must have been narrower, as they exerted bi-lateral pressure on the upper body. In those burials in which the individual had been placed resting on either their right or left side, logic dictates that these containers would have been narrower, else why was the corpse not supine? Unless the coffin was actually placed into the grave on its side and thus, its dimension effectively rotated, with what appears to be the width actually the depth of the coffin. Nevertheless, there is still evidence for variation, as some skeletal elements have been supported to a greater extent, while in other burials the bones have had the space to fall to rest on the base beneath.

Chapter 8 – Analysis of the Late Anglo-Saxon Burials from Elstow Abbey

8.1 Introduction to the Cemetery at Elstow Abbey

The remains of Elstow Abbey are situated in the north of the parish of Elstow, south of Bedford, Bedfordshire (Figure 8.1). The manor of Elstow and the Abbey, founded in c.1078 A.D. as a Benedictine nunnery, are recorded in *Domesday Book* (Morris 1977: 53,4 Folio217r). Haslam (1986: 43-44) has collated evidence to argue that Elstow could have been the location of an early Minster. The name Elstow may suggest the foundation had earlier origins – the Old English "*stow"* means "holy place". Moreover, inclusion of Elstow in the 11th-century deanery of Bedford suggests an earlier religious centre, as the deanery was potentially based on prior ecclesiastical dependencies. Perhaps the strongest evidence for an early church at Elstow comes in the form of a fragment of cross shaft base, whose design dates it to the 8 to 9th centuries A.D., incorporated into the east wall of the church (Baker 1969: 30-31). The Abbey continued as a nunnery until its dissolution c.1539 A.D., when large parts of the monastic buildings were demolished (Wigram 1885: 183). The original nave survived, however, and appears to have remained in use as the parish church (Wigram 1885: 183). In the 17th century a mansion house was built on the site, adjacent to the church, but this too was abandoned in the later 18th century and eventually demolished (Wigram 1885: 183). Today, the church continues to serve the local community.

Figure 8.1: *Geographical location of Elstow Abbey (A). (Created using GeoBatch Map Data © 2017 GeoBasisDE/BKG©2009 Google, Inst. Geogr Nacional)*

The late Anglo-Saxon cemetery at Elstow Abbey was excavated by Mr D. Baker and Mr P.G. Tilson for Bedfordshire Archaeological Society and Portsmouth Polytechnic, between 1965 and 1972 (Baker 1966: 22). The excavation was set up for research purposes, to explore changes in use of the site over time, but also as a training opportunity for students (Oake 2007: 3; Baker 2014: 1). The excavations focused on areas to the north-east, east and south-east of the present church, avoiding the area containing the 19th/20th-century cemetery. These excavations exposed a long sequence of occupation, of which the earliest feature was a ring ditch potentially dating to the Bronze Age, located to the east of the church (Baker

1969: 28; 1971: 56). Roman activity was evidenced by slots, pits and post holes, two coins and a number of fragments of pottery (Baker 1966: 24). A cremation dated to the 6th century A.D. was recovered, as were fragments of pottery dating to the 5th/6th century A.D. (Baker 1969: 28). The excavators suggested that these fragments could indicate the presence of further cremations, and thus an early Anglo-Saxon burial site, but the evidence was insufficient to be conclusive (Baker 1971: 55).

The excavations also revealed 375 inhumations and three charnel pits.[17] Excavators determined, based on the location, clustering and stratigraphy of the burials in relation to the Abbey and its phases of construction, these represented two spatially-distinct cemeteries, with one area to the east of the church where graves of the two cemeteries appeared to overlap. Excavators determined these were separate cemeteries (Baker 2014: 1-2). The earlier cemetery, located mainly to the south and east of the present-day church, contained at least 279 individuals. The inhumations were mainly in a single phase, although in areas of more intensive burial, up to three phases could be identified (Baker 2014: 3). The date of the foundation of the cemetery is unknown, but it was argued by the excavators to be around the 8th century, based on Christian characteristics of the burials (D Baker pers. comm. 2015), and supported by the dating to the 8th to 9th century A.D. of a pot, one of the few items found deliberately placed into a grave (Baker 1969: 30). The foundations of the Abbey buildings constructed in 1078 and the early to mid-12th century truncated a large number of burials, providing a *terminus ante quem* for the burials in those areas and those stratigraphically related to them (Baker 2014: 1-2). The second cemetery, situated to the north of the present church, dated to the later

[17] The total minimum number of individuals (MNI) has not been fully calculated from the charnel and disarticulated material. The charnel pits were originally counted in the MNI. A further nine individuals were identified during post-excavation osteological analysis from in what had been taken to be single grave contexts.

medieval period by its association to the 11th-century Abbey buildings, contained at least 104 individuals. The three charnel pits are also thought to be medieval in date and result from disturbance to late Anglo-Saxon burials when the Abbey was constructed (D Baker, pers. comm. 2015), however, there is currently no further evidence to support this hypothesis.

The late Anglo-Saxon burials were in an extended, supine position with heads to the west, aligned in approximate north-south burial rows and with few grave elaborations or grave goods. Two graves contained soil stains from decomposed wood, and a third grave contained a few nails, suggesting the use of wooden linings or coffins. No further evidence was identified for elaborations or inclusions to graves, suggesting either a largely homogenous burial ritual, or that archaeologically-invisible forms of variation had been utilised.

The excavations did not reveal any trace of an earlier church contemporary with the late Anglo-Saxon burials, thus no direct support was provided for the hypothesis of the presence of a Minster church. Baker (1971: 57) suggests any evidence for such a structure may reside beneath the still-upstanding parts of the Abbey. Nevertheless, Christian burials were not always closely associated with a church in the late Anglo-Saxon period, and as such there may be no remains of an earlier church to find at the site (Buckberry 2010; Cherryson 2010; also see Chapter 3).

The excavations of the Abbey site have yet to be fully published. Baker published three interim reports of the ongoing excavations at the Abbey in the *Bedfordshire Archaeological Journal* (1966, 1969 and 1971) and it is from these, and the unpublished excavation archive held by David Baker, that the majority of the information about the cemeteries has been taken for the present study. At the time of writing, a publication of the site based on the data held in the archive is in preparation (D Baker pers. comm. 2015). Osteological analysis of the skeletal material has been undertaken on two occasions, firstly by Brothwell and Grant and, subsequently in the 1980/90s, by Stirland with Jackman (Baker 2014: 3). However, neither study provided a complete inventory for all skeletal material (Baker 2014: 3). For burials where age at death was not previously determined, the author's own assessment of age at death from the photographs was used. This was based on stages of epiphyseal fusion as given in Schaefer *et al.* (2009)[18].

The late Anglo-Saxon cemetery from Elstow was selected for inclusion in this study for several reasons. Although the later-medieval cemetery has been utilised in research projects (e.g. Keeping 2000; Gilchrist and Sloane 2005), little attention has been paid to the late Anglo-Saxon cemetery. This lack of integration into current research means any findings derived from the current project will be original and may facilitate the future inclusion of the site into other synthetic studies. The apparent lack of funerary variation in the structure and elaboration of the late Anglo-Saxon graves also requires investigation. The environmental conditions at the site are not conducive to organic preservation and wooden coffins would not be expected to survive if they had originally been provided. An archaeothanatological approach to the burials from Elstow therefore holds the potential to reveal whether burial practices at the site were really as uniform as they appear. This question of burial variation is also directly pertinent to the question of whether the site could have been the location of a Minster church. Higher status burial grounds associated with Minster churches tend to display wider variation in funerary practices, compared to lower status cemeteries (Hadley and Buckberry 2005: 137-138). Finally, as the excavations were not carried out to modern standards with no standardised recording of graves, this site affords the opportunity to evaluate the

[18] Age assessment was required only to differentiate mature from immature individuals. Assessment from photographs in this situation was acceptable, but would not be reliable as a means of accurately recording age at death.

archaeothanatological method developed in this study in less-than-ideal circumstances, where there is little supporting excavation documentation beside the photographs.

8.2 Results

Results were obtained for 55 adult burials (Table F1). The 55 burials were grouped into categories dependent upon the potential for burial in a wooden container. Results indicate 58% were buried in some form of void, 11% were not coffined and the remaining 31% produced inconclusive results (Table 8.1).

Table 8.1: *The results for the potential burial form for the 55 burials from Elstow Abbey*

Void - rigid container	Void		Indeterminate	Uncoffined
2 (4%)	30 (54%)		17 (31%)	6 (11%)
EA070	EA003	EA057	EA004	EA001
EA154	EA009	EA060	EA005	EA052
	EA007	EA061	EA011	EA077
	EA017	EA062	EA012	EA152
	EA018	EA063	EA013	EA153
	EA019	EA071	EA023	EA178
	EA021	EA085	EA046	
	EA027	EA094	EA047	
	EA028	EA096	EA056	
	EA039	EA100	EA064	
	EA041	EA103	EA121	
	EA045	EA144	EA146	
	EA048	EA151	EA163	
	EA053	EA177	EA171	
	EA055	EA200	EA172	
			EA199	
			EA308	

8.2.1 Burials in a void – rigid container

Application of the taphonomy-based method determined that two of the 55 burials were originally contained in wooden containers with the highest degree of confidence (2/55, 4%), EA154 and EA070 (Table F2). Both burials displayed externally displaced skeletal elements (Table F3). In EA154 was determined to be a coffined burial based on the presence of external displacement and skeletal elements maintained in unstable positions at a distance from the grave cut. The skeletal elements displaying external displacement were the mandible, right clavicle, left radius and ulna, left *os coxae*, patellae and the bones of the feet. Other than the mandible these bones all remained relatively close to their original positions (Figure 8.2). The bones supported in unstable positions were the right humerus (medially rotated and anterior), the left humerus (anterior), scapulae (anterior rotation) and right radius (neutral). Due to a lack of direct archaeological evidence, EA154 had been regarded by the excavators as a plain-earth burial, however, the combination of skeletal evidence and grave cut information has overturned this categorisation.

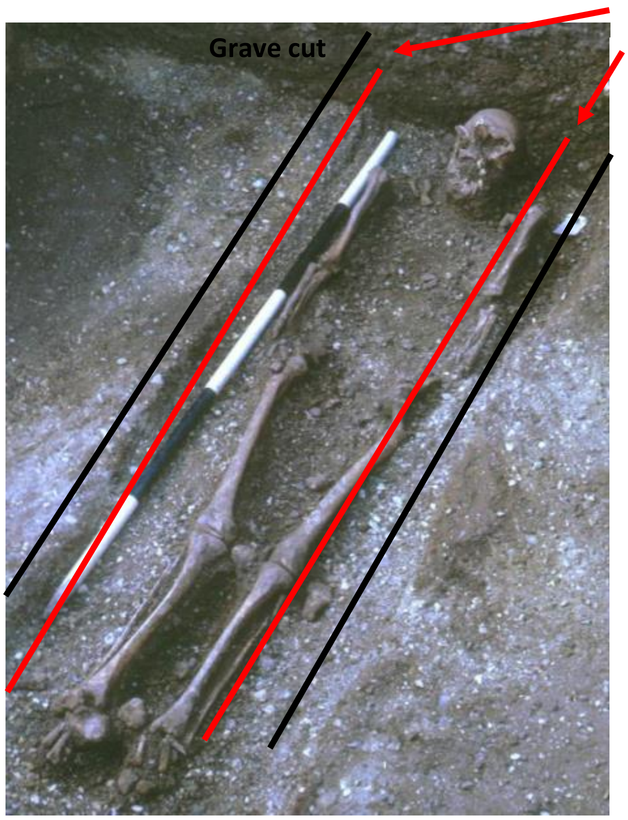


Figure 8.2: *EA154 an example of a burial determined to be void – rigid container based on lateral support of skeletal elements, the medially rotated and anterior position of the right humerus, the anterior position of the left humerus, the anterior rotation of the scapulae, and right radius in a neutral position, at a distance from the grave cut. (Photograph by permission of Mr David Baker)*

EA070 is the only burial in the sample to have been identified as coffined by the excavators. Traces of preserved wood fragments and staining measuring 0.48m were found on the base of the grave beneath the skeletal remains and in places to the sides of the grave. The external displacement present appeared limited to the lateral fall of the *ossa coxae* and movement, in a lateral and inferior direction, of a rib. Without the presence of the soil stain in the grave, this individual would not have been classified as buried in a void – rigid container based on taphonomic skeletal evidence alone (Figure 8.3).

Figure 8.3: *Burial EA070 with direct archaeological evidence used by the excavators to infer the presence of a wooden coffin. Staining present on the base of the grave beneath the skeletal remains (Photograph by permission of Mr David Baker)*

Both burials appeared to be in a supine position, with the upper limbs extended along the sides of the corpses and the lower limbs displaying slight adduction. Neither burial displayed any evidence for compression of the upper body. Indeed, both individuals appeared to have been placed into coffins wide enough to accommodate the full width of the corpse, as evidenced by the supported humeri, scapulae and right radius in EA154 (Figures 8.2).

Grave cut information was sparse at Elstow Abbey, with excavators finding little difference between the grave fill and the sediment the graves were cut into (D Baker, pers comm. 2015). A grave cut was only recorded for one burial, EA154; the cut was described as rectangular, with rounded corners and no measurements were documented. However, the excavation drawings clearly show the location of the cut corresponding to its location in the photograph, at a distance from the bones.

8.2.2 Burials in a void

A total of 30 burials were designated as decomposing in an unidentified original void (30/55, 54%) (Table F4). The burials in this group all displayed external displacement of skeletal elements, ranging from limited to extensive. The bones most frequently exhibiting external displacement included the *ossa coxae* (26/26, 100%), the femora (22/27, 81%) and the bones of the feet (18/18, 100%) (Table F5). Of these 30 burials, 16 were also found to contain skeletal elements supported in potentially unstable positions (16/30, 53%) including, the *os coxae*, humerus, ribs, scapula, radius, and ulna (Table F6). A total of 15 burials presented a linear alignment of skeletal elements (15/30, 50%), with a high degree of external displacement of bones, freed from relatively persistent joints, the common feature in the other 15 burials (15/30,50%) (Table F7). Both skeletal features suggest decomposition in a void with a solid, relatively long-lasting barrier. However, it was not possible to establish for any of the 30 burials whether a container or the grave cut and a cover had acted as this barrier.

The main feature differentiating between a void – rigid container outcome and void category was the lack of direct archaeological evidence for wooden containers recovered from any of the graves from which to establish a container as the source of the void around the corpse. Nor were any grave cuts identified. Furthermore, even though there was extensive skeletal displacement in 19 burials (19/30, 63%) the information on the sediment was not sufficient to determine the longevity of a dug out earthen grave, as it had been for Worcester Cathedral. The excavators recorded the burial soil at Elstow Abbey as neither fine-grained nor excessively clay based, containing a high percentage of organic matter and with a high-moisture content. It was also highly likely that the water table had been higher in the past before a new drainage system was installed in the area (D Baker pers. comm. 2015). Even though as discussed in section 5.4 water action is known to destabilise a wall of sediment (DeCamp 2007), the information available was limited and it was considered that burial forms other than a container could not be confidently excluded. Nevertheless, in these burials with a void outcome, external displacement was still observed to be greater than that solely attributable to movement of a skeletal element under the force of gravity, and this feature was decisive in differentiating between a void and an indeterminate outcome. In burials classed as decomposing in a void, the skeletal movement was considered sufficient to allow the exclusion of decomposition in a filled space, with clothing or a shroud/loose wrapping to be the source of the barrier resulting in delayed in-filling. In the absence of direct archaeological evidence for the presence of a wooden coffin, the excavators had determined all 30 interments were plain-earth burials.

In 15 burials displaced skeletal elements presented a linear alignment. This delimitation most frequently included one *os coxae* and humerus (Table F8). In EA028, the proximal humerus, the sternum, the right radius, a metacarpal and a hand phalanx all form a linear alignment to the right. While on the left, the inferior angle of the left scapula, the medial epicondyle of the left humerus, the proximal ulna, several hand phalanges and two metacarpal heads also formed a linear alignment (Figure 8.4). In four burials (EA007, EA021, EA100 and EA103) the linear alignment consisted of extensively displaced bones (Table F9). Figure 8.5 shows EA100, where a linear delimitation was present both to the right and left sides; the ribs, clavicle, mandible, vertebra and pubic bone aligned to the right, and the scapula, ribs, vertebrae and *os coxae* to the left, all of which were displaced. The linear alignment in eight burials (8/15, 53%) also included skeletal elements supported in potentially unstable positions. In EA009, this saw the right *os coxae* supported in a displaced position and aligned with two, displaced, bones of the right hand. While in EA200, the humeri and left radius were maintained in approximately original positions (Figure 8.6).

Figure 8.4: *Example of a burial with a void outcome displaying linear alignment of displaced skeletal elements. EA028 displaying linear alignment on the right of the right proximal humerus, the sternum, the right radius and hand bones. On the left side, the inferior angle of the left scapula, the medial epicondyle of the left humerus, the proximal ulna and a number of hand phalanges and two metacarpal heads form a linear alignment. (Photograph by permission of Mr David Baker)*

Figure 8.5: *Example of a void outcome burial displaying a linear alignment of extensively displaced skeletal elements. EA100 the displaced ribs, clavicle mandible, vertebra and pubic bone aligned to the right, and the scapula, ribs, vertebrae and os coxae to the left. (Photographs by permission of Mr David Baker)*

Figure 8.6: *Examples of a burials with a void outcome displaying linear alignment of displaced skeletal elements, in combination with bones supported in potentially unstable positions. Left – EA009, displaying the right os coxae supported in a laterally displaced position. Right – EA200, displaying the maintenance of the medially rotated humeri, and the left radius in a neutral position. (Photographs by permission of Mr David Baker)*

The spatial distribution of bones in EA060 required further interpretation (Figure 8.7). On the left side there is a clear alignment of a displaced rib shaft with the ulna. The left *os coxae*, although showing some lateral displacement, as evidenced by the separation of the pubic bones, has been supported in an unstable position. The left femur and tibia are laterally rotated, but the foot does not appear to be rotated to the left, suggesting the lateral rotation is taphonomic and linked to the displacement of the *os coxae*. On the right side there appears to be a linear alignment, more medially located than the lateral position of the right ilium. A number of plausible explanations have been considered for this pattern of bones. The individual could have been buried wrapped in a durable shroud and placed inside a container, or in a dug out earthen grave containing only a durable cover, with the left side of the body adjacent to the container/grave side. As decomposition occurred the shroud would retain the skeletal elements, but upon its decomposition a secondary void, not previously accessible, would become available to the now freed skeletal elements, and those on the right have moved under gravity into this new space. Those bones on the left have been delimited, and supported, by the proximity to a lateral rigid barrier. Alternatively, decomposition occurred in empty space, and the pattern observed has resulted from human interaction with the decaying corpse. If a new grave was dug which truncated the burial on the left, it is possible that the remains of this individual were then pushed towards the right, presenting a more linear alignment of elements on the left. Decomposition would have been advanced when this disturbance occurred, as the ribs have been displaced in a superior direction outside the original thoracic area of the corpse.

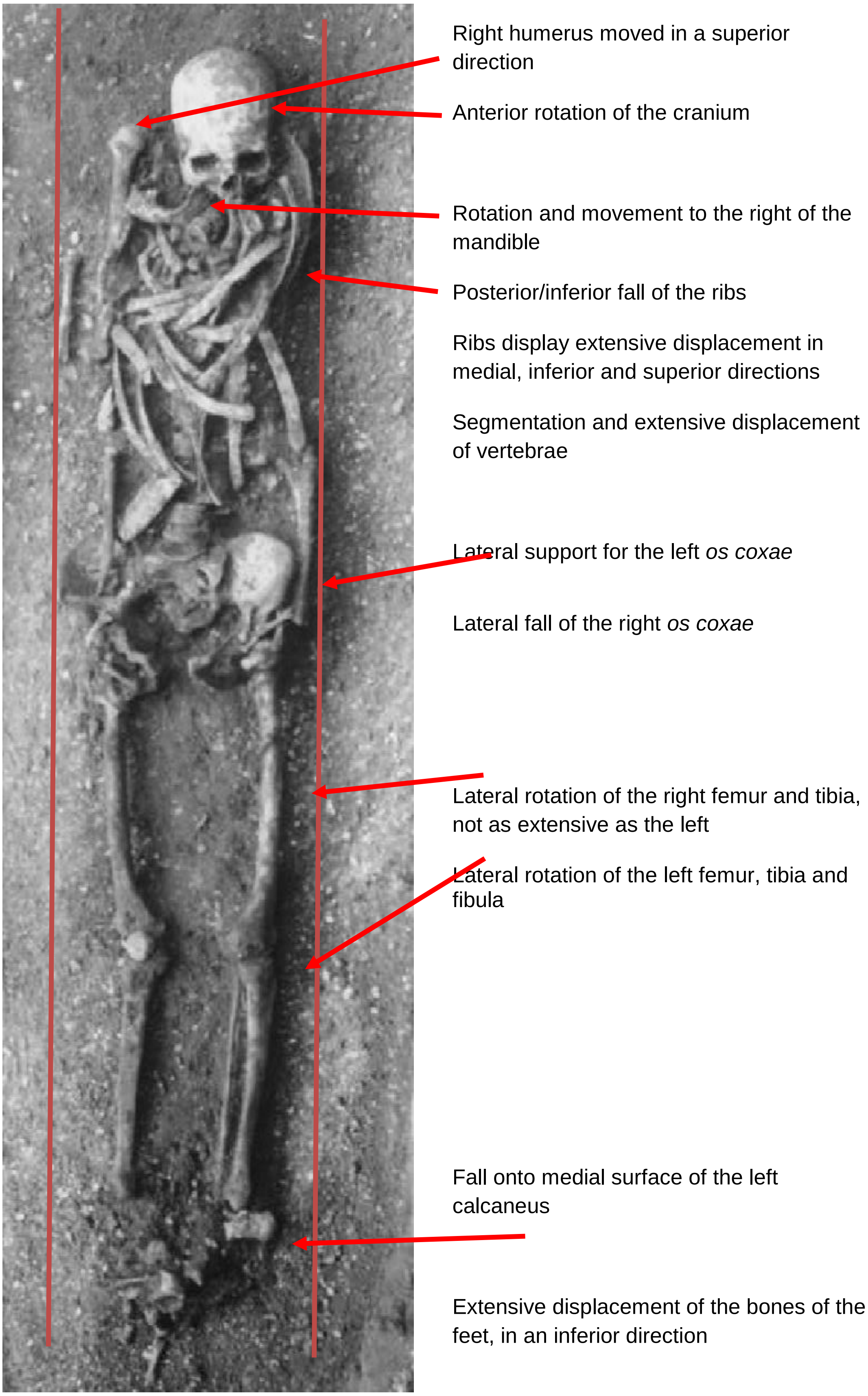


Figure 8.7: *Burial EA060 (Photograph by permission of Mr David Baker)*

In the remaining 15 burials with a void outcome (15/30, 50%), the skeletal displacement had not formed a clear linear delimitation. Nevertheless, displacement appeared to be retained in a limited area, not dispersed outside what could reasonably be viewed as the bounds of a container. This displacement exceeded that attributable to movement under gravity alone from positions of instability. In three of these 15 burials (3/15, 20%), it appeared that every bone visible was extensively displaced from its original position, with the bones having moved in all directions (superior, inferior, medial and lateral) (EA017, EA018 and EA027) (Table F9). The extensive skeletal displacement in EA017 included displacement in a superior direction of the cranium and its rotation to rest on the frontal bone and the medial movement of the femora (Figure 8.8). The extensive displacement could be the result of human manipulation of a disarticulated corpse. The patterning of the bones, in approximate anatomical order, lead to the determination that this was evidence for a void present when the bones moved, by whatever taphonomic factor affected them.

Figure 8.8: *Example of burials determined to be void based on extensive skeletal displacement. EA017, displaying external displacement of the cranium, atlas, clavicle, vertebrae, femora, tibia, tarsal bones and metatarsals. The bones appear to have remained in an approximate anatomical order superior – inferior. (Photographs by permission of Mr David Baker)*

In the other 12 burials (12/15, 80%) displaying relatively extensive skeletal displacement the bones remained closer to their original positions. For example, in EA055, the thoracic area displays broken fragments of rib which have dispersed to the right outside the original volume of the corpse (also includes a fibula), the proximal ends of the left radius and ulna have fallen posteriorly to the base beneath, the *ossa coxae* have fallen laterally, opening out, the metacarpals are jumbled in the area intermediate to the mid shaft of the femora, the right distal femora has possibly displaced medially, the tibiae have rotated and the right now rests on its anterior surface anterior to the fibula, and the bones of the feet are extensively displaced in the area intermediate and inferior to the distal tibiae (Figure 8.9).

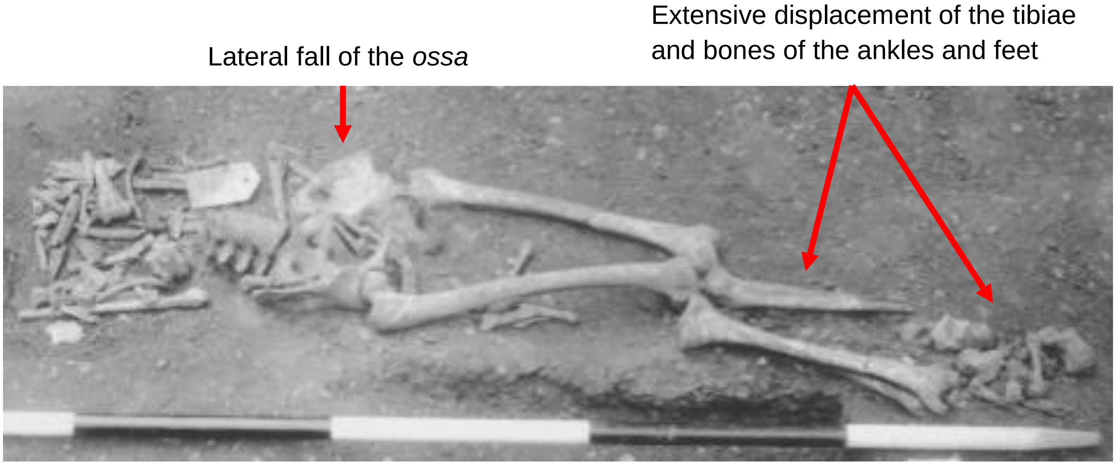


Figure 8.9: *EA055, a burial with a void outcome, with external displacement of the ossa coxae, lateral fall, and extensive displacement of the tibiae and bones of the ankles and feet above that expected under gravity alone. The upper body appears to have suffered damage and the bones are fragmented and displaced. (Photographs by permission of Mr David Baker)*

Skeletal elements supported in potentially unstable positions were recorded in seven of these 15 burials (7/15, 47%). In EA048, this is the anteriorly and superiorly rotated right scapula and a medially rotated and anterior position of the right humerus. While in EA151, the right *os coxae*, although displaying some lateral fall appears not to have fully fallen posteriorly to rest on the base beneath (Figure 8.10). However, the displacement of the right ulna, tibia, fibula and a number of metatarsal bones has placed them in positions further right than the right ilium. This further lateral displacement of other bones suggests that it might not be the grave cut, or container side that is the object supporting the right *os coxae*. One explanation could be, that it is the presence of the right radius, which has moved medially and is now behind the *os coxae*, that is supporting the bone in its current position, rather than an object providing lateral support. The displacement to the right could be evidence of disturbance to the grave and these bones have moved into a secondary void, for example, a new grave cut. The medial displacement of the left fibula and foot bones appeared to have formed a linear alignment, not related to the original outline of the void. Rather, it is potentially an indication of bones being moved out of the way for the insertion of a new interment. As observed in EA060, there is a linear alignment of displaced bones on the upper right side of the corpse, involving the humerus, ribs, radius and a vertebra. It is unlikely that this positioning results from a compression from a tight shroud as the lower limbs appeared not to be in adduction. The right humerus, radius, ribs and vertebrae appeared to have been moved medially to the left, as opposed to the lower limb bones, which have moved to the right. This probably indicates two difference taphonomic events affecting this individual’s skeletal remains.

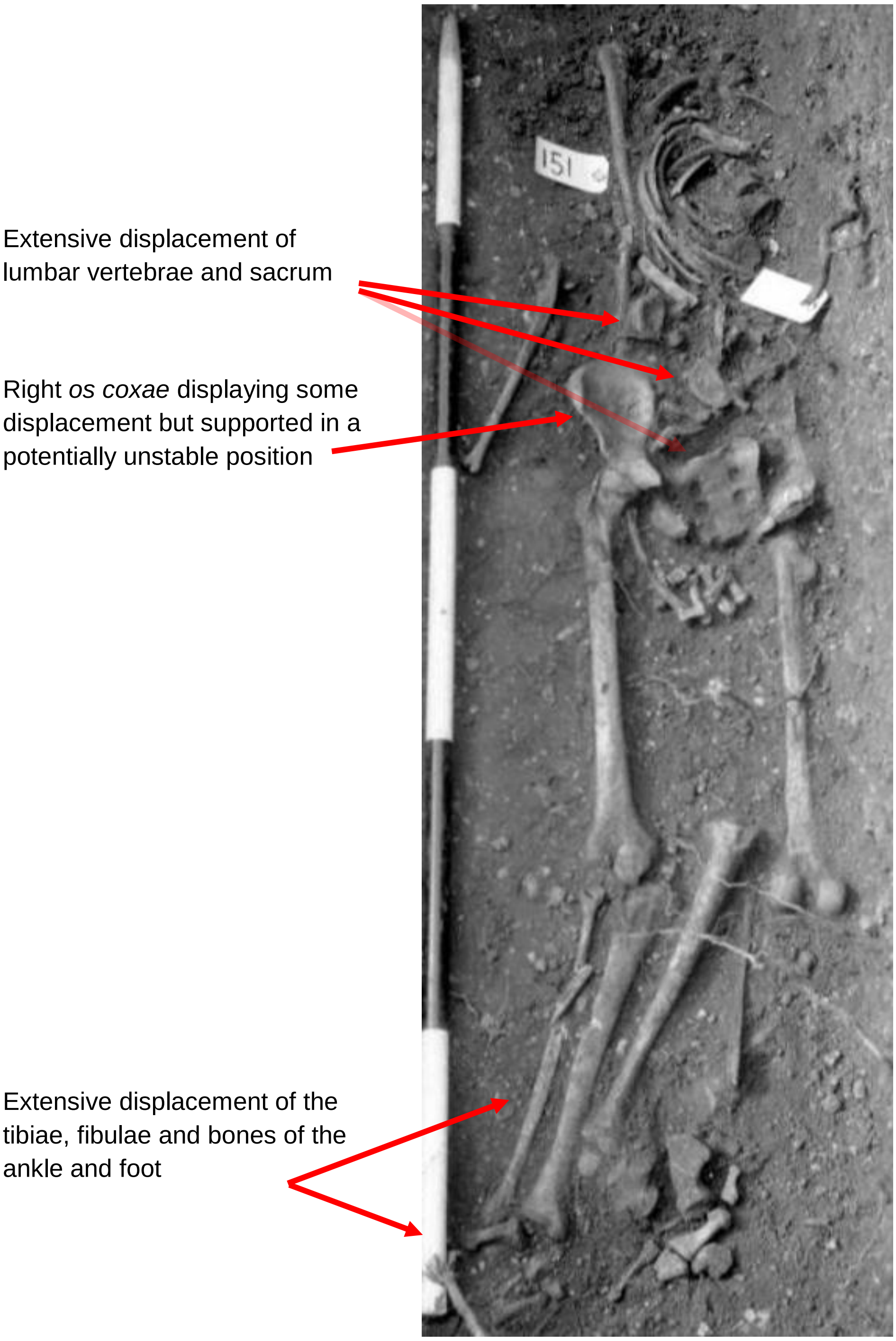


Figure 8.10: *EA151 displaying some lateral support of the right os coxae and external displacement of the tibiae, fibulae, bones of the feet and possibly the right ulna, more extensive than attributed to expected movement under gravity alone. (Photographs by permission of Mr David Baker)*

The right humerus in EA177 appears to be supported in a medial rotation, however, the bone itself has been displaced medially and is probably being supported by the adjacent rib shafts (Figure 8.11). The external displacement of the cranium and mandible in EA177 appears to be the result of a pot falling under gravity and pushing the cranium in a posterior/superior direction and laterally to the right, and the mandible, which had displaced in a lateral and superior direction, to the left of the pot.

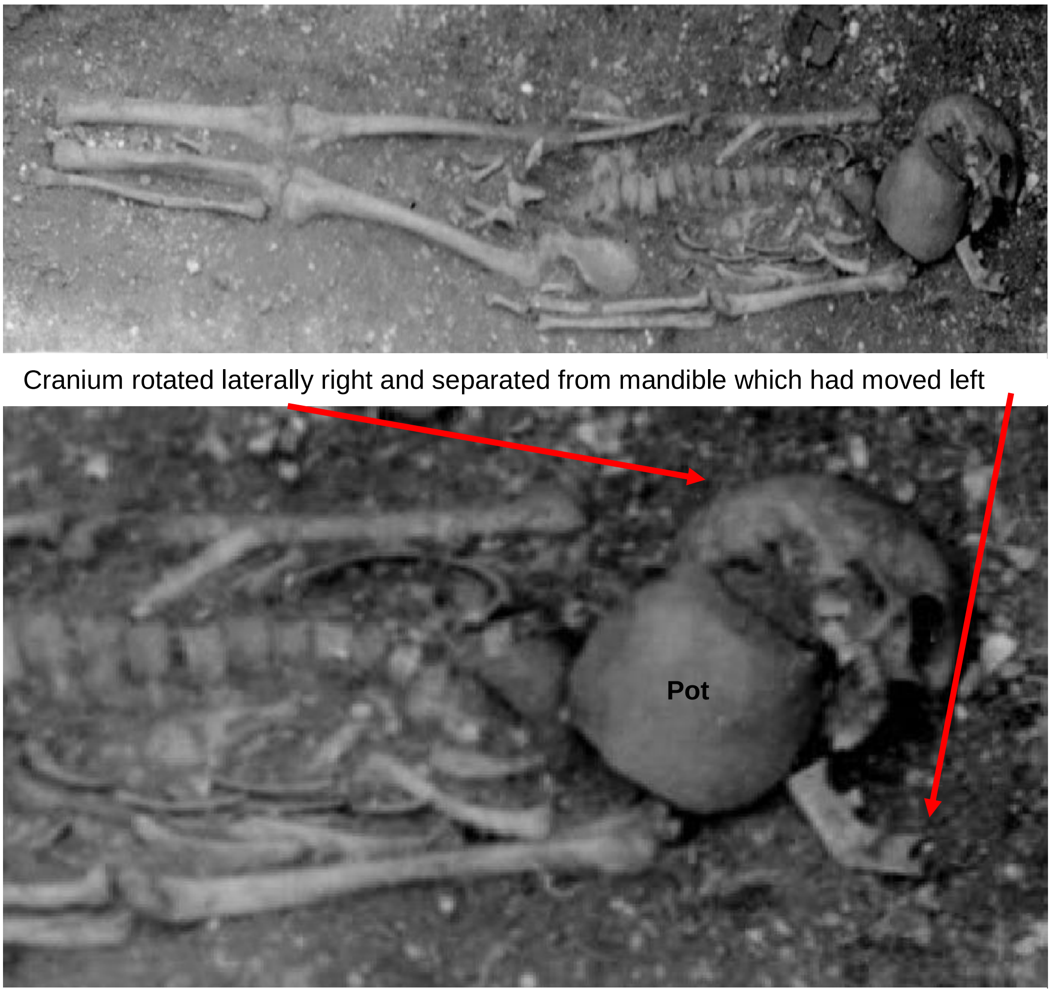


Figure 8.11: *EA177 in which the cranium and mandible have been displaced by a pot. (Photographs by permission of Mr David Baker)*

An assessment for the presence or absence of compression of the upper body could only be made in seven of the 30 burials with a void outcome (7/30, 23%). Of these seven burials, three individuals appeared to display potential evidence for bi-lateral compression of the upper body (EA048, EA063 and EA085). In EA063, the clavicles appear verticalized, the sternal ends of the ribs more medial positioned presenting a narrowing of the thoracic volume, and the humeri, although not rotated onto the medial surface are adjacent to the ribs. The lateral fall of the *ossa coxae* and potential displacement of the humeri, suggest that this individual may have been wrapped in a shroud before being placed in either a wooden container or directly into a dug out earthen grave beneath a durable cover. The more labile articulations have begun to decompose while the restriction imposed on them from the shroud is still in effect. Subsequently, as the shroud decomposes this allows the appendicular elements to laterally displace into the more secondary void of the container (Figure 8.12). This lateral displacement has also occurred in EA085; but the movement of bones is wider spread than resulting from decomposition under gravity alone. This may again suggest the use of a shroud. In EA048, it appears that the source of the compression was a durable object, likely the side of the container or grave cut, as the this was evidenced by the support of the anteriorly/superiorly rotated right scapula and the medial rotation and anterior and medial position of the right humerus. The overall appearance of the elements also looked more bi-laterally narrowed than that expected in a supine corpse, suggesting decomposition occurred in a narrow container or narrow dug out earthen grave containing a durable cover.

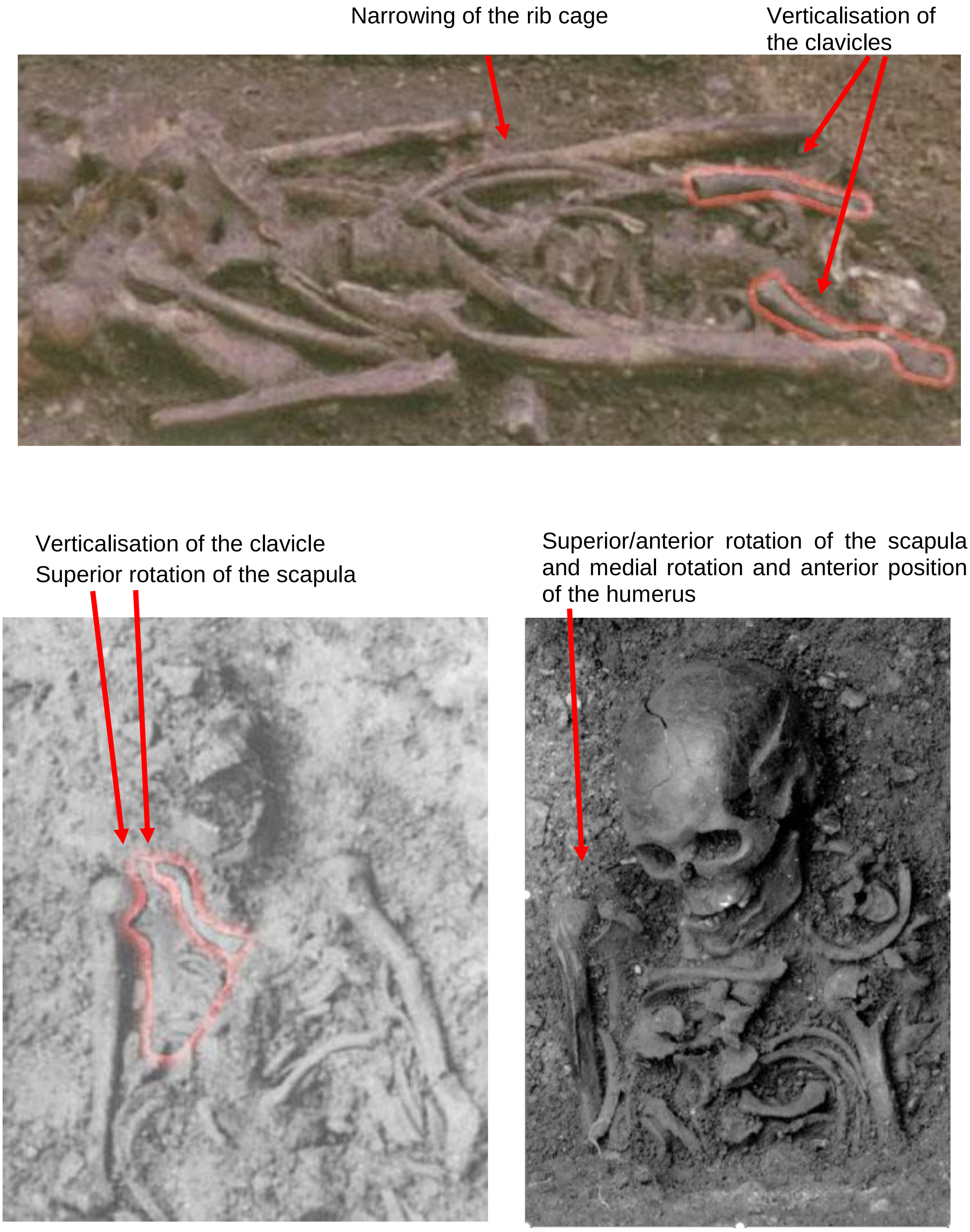


Figure 8.12: *Burials with a void outcome displaying possible skeletal indicators for compression of the upper body. Top – EA063, displaying verticalized clavicles and a narrowing of the rib cage. Bottom left – EA085, displaying a verticalized right clavicle and possible superior rotation of the right scapula. Bottom right – EA048, displaying anterior and superior rotation of the right scapula and a medial rotation and anterior position of the right humerus. (Photographs by permission of Mr David Baker)*

Due to the extensive displacement present, determining the original position and arrangement of the corpse at burial proved difficult in three burials, EA017, EA027, and EA100, extensive displacement rendered the identification of the original position of the corpse impossible. In 26 burials the predominant orientation of the displaced skeletal elements suggested burial in a supine position (Table F10). In the remaining burial, EA103, the possibility of the corpse having been buried resting on its left side, or at least having been rotated to the left could not be excluded, as the position of the cranium and lower limbs suggested either an original position enhanced by displacement, or else, a displacement to the left before the disarticulation of the joints of the lower limbs (Figure 8.13). Arrangement of the upper limbs varied, with flexed and extended forearms almost equally represented (Table 8.2 and Table F11). However, there did appear to be a trend towards the upper limbs being placed adjacent to the trunk of the corpse. For example, in EA200 the left upper limb was probably in a neutral position with the hand resting against the lateral thigh or on the anterior surface, with the wrist flexed (Figure 8.11). In only two burials, EA028 and EA009 the upper limbs were placed in a more anatomical position. There were more individuals with their lower limbs in an extended position as those displaying adduction of the lower limbs (Table 8.3 and Table F12). When comparing the upper and lower limbs, there did not appear to be any correlation in arrangement (Table F13).

Figure 8.13: *EA103 a burial possibly resting on, or rotated to, the left side. The lower right limb has displaced with the connection maintained between the femur and the tibia, indicating it was positioned over to the left, or displaced before the disarticulation of the knee joint. The cranium also displays a rotation to the left. Is clear displacement to the left of the ribs, vertebra and metatarsals. (Photographs by permission of Mr David Baker)*

Table 8.2: *Frequency of upper limb arrangements in the 15 burials with a void outcome in which arrangement of both limbs could be assessed*

Extended	Flexed	One limb flexed/one limb extended
6 (40%)	4 (27%)	5 (33%)

Table 8.3: *Frequency of lower limb arrangements in the 18 burials with a void outcome in which arrangement could be assessed*

Extended	Adducted
11 (61%)	7 (39%)

8.2.3 Indeterminate Burials

Seventeen interments from Elstow were designated indeterminate (17/55, 31%) (Table F14), they lacked the information necessary to enable burial form to be determined. These 17 burials exhibited minimal external movement of skeletal elements. The skeletal elements most frequently found displaying external displacement were the *ossa coxae* (12/14, 86%) and the bones of the feet (6/8, 80%) (Table F14). However, this external displacement was at a much-reduced level, appearing to represent only movement attributable to gravity, rather than have been influenced by any additional taphonomic processes, as was the case in the void – rigid container and burials in a void. Only a single burial contained bones displaying extensive internal skeletal displacement, with bones rotated and dispersed around the thoracic and pelvic areas. In nine burials skeletal elements were found supported in potentially unstable positions. These included the *ossa coxae* (4/14, 29%), the bones of the feet (3/8, 38%), and the cranium in one burial (1/9, 11%) (Table F15).

There were two reasons why these 17 burials were assigned to the indeterminate category. First, the skeletal evidence was not considered sufficient to differentiate between decomposition in a filled space or a void. External displacement was not extensive, nor did it form linear alignments. The lower limb bones, in particular, presented less displacement than recorded in the void – rigid container and burials in a void groups and skeletal elements were not widely dispersed. In the nine burials in which bones were supported in potentially unstable positions, this did not show a clear linear (box-shaped) outline, indicative of a rigid linear support, or one that maintained a body-shaped outline of supported bones, which could be attributed to a soft flexible barrier. The second reason was a lack of archaeological evidence, including limited grave cut data and lack of surviving wood, soil stains or metal work. This meant that the physical limit against which bones in unstable positions were supported could not be determined. All 17 burials had previously been determined by the excavators to be plain-earth burials due to the lack of any archaeological evidence in the graves to the contrary.

Out of the 17 indeterminate burials, there were eight interments in which no skeletal elements appeared to be supported in potentially unstable positions. In EA005 the *ossa coxae* have fallen laterally, opening outwards, the head of the right radius has displaced laterally, and the right patella has fallen posterior/laterally and moved in a superior direction to a position adjacent to the mid-shaft of the right femur (Figure 8.14). The ribs appear bi-laterally compressed, which may indicate a tight item of clothing. Alternatively, it could indicate a tight shroud, although this is not consistent with other skeletal evidence: the humeri are not medially rotated and could only have adopted their current position in a tightly shrouded burial if a secondary void had been created into which they have been able to move laterally. This could, perhaps, indicate a shrouded burial in a container, however, as the scapula and clavicles are not visible this cannot be confirmed. The lateral fall of the ossa coxa is again seen in EA056, this time accompanied by an anterior rotation of the cranium and an inferior/posterior fall of the mandible, movement of the hand bones, and a separation of the right radius and ulna. It is not possible in this case to determine if this movement of the skull was external, or solely internal – the latter could be the case if the cranium was already rotated anteriorly with the mandible resting on the chest at time of burial. The ribs are fragmented in EA056, and as seen in EA005 they may have been subjected to bi-lateral compression (Figure 8.14). In EA046 there appeared to be a general flattening of the skeletal elements, however, this may be attributed to pressure from above, as there is a lot of damage to the bones visible. The left femur has been displaced and repositioned at right angles across the burial (Figure 8.15). However, it was felt that this, in itself, was insufficient corroboration of a void at the time of decomposition and the full reasons why this one element was so significantly displaced remain unclear.

Figure 8.14: Examples of indeterminate burials with no skeletal elements supported in unstable positions. Left – EA005 and Right – EA056. *(Photographs by permission of Mr David Baker)*

Figure 8.15: *EA046, in which the left femur is lying at right angles across the right distal femur (Photographs by permission of Mr David Baker)*

In the nine burials exhibiting skeletal element/s supported in potentially unstable positions, this was most frequently either the *ossa coxae*, or the bones of the feet (Table F16). In EA146 and EA163 the *ossa coxae* appeared to have been supported in approximately anatomical positions, as did the left humerus in EA064 (Figure 8.16). Whereas, in the other six burials the bones were supported in displaced positions. For example, in EA011 the *ossa coxae* had begun to fall laterally, but have been supported in their current position, before they had completely fallen flat. It is also possible that the left radius is also being supported in a potentially unstable position adjacent to the left ilium (Figure 8.19). In three burials, support for the bones appeared to derive from an object located inferiorly (Figure 8.17). The left talus in EA004 has displaced to a certain degree, as the trochlea has disarticulated from the distal tibia. And, although the image is limited, the talus looks supported in its anatomical orientation, with a slight rotation to the left. In all three burials the source of this support is unknown. It is plausible that this object could have been the end of the grave cut, or container, or else have been provided by footwear or direct contact with sediment.

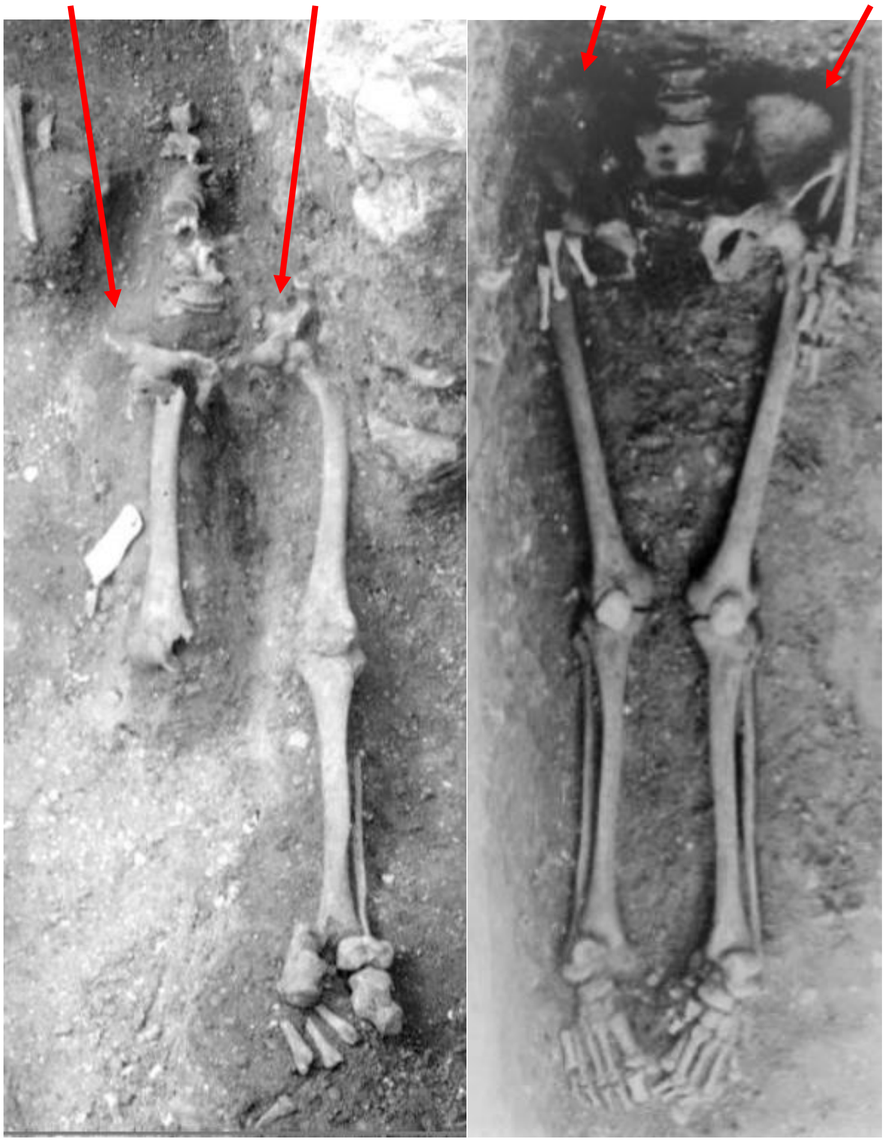


Figure 8.16*: Indeterminate burials with supported ossa coxae. Left – EA146, ossa coxae maintained in approximate anatomical position. External displacement of the foot bones. The right calcaneus has moved medially, the left calcaneus and talus have fallen posterior/inferiorly. The three metatarsal bones have rotated so the heads are now superior. Right – EA011, ossa coxae have displaced, falling laterally. However, before they have completely opened out, they are now supported in an unstable position. The foot bones display limited external displacement only falling posteriorly to rest on the base. They have retained approximate anatomical connections between the cuneiforms, metatarsals and phalanges with the main internal/external displacement occurring at the articulation of the talus and navicular.*

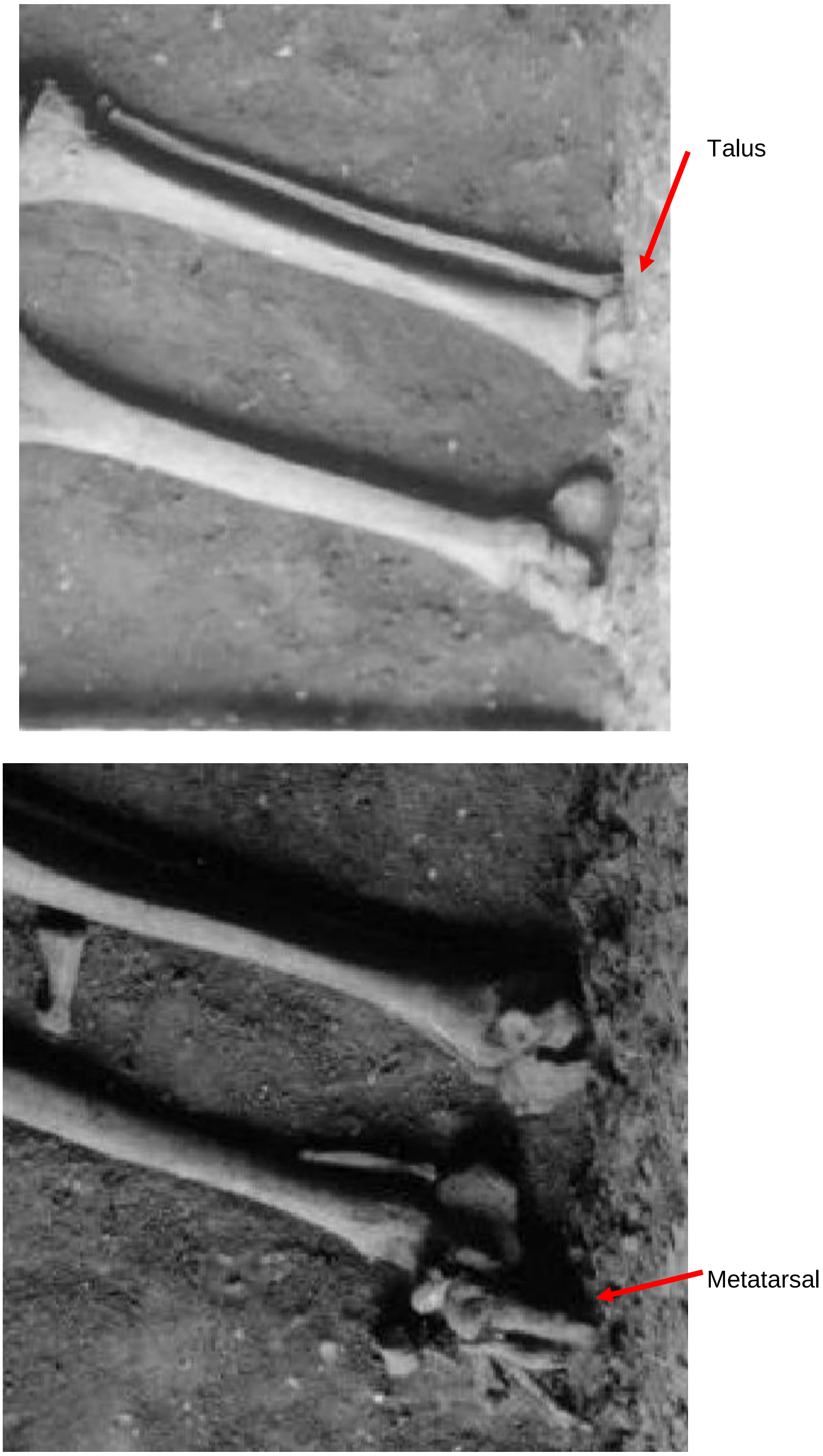


Figure 8.17*:* *Examples of supported potentially unstable foot bones. Above – EA004, supported left talus. Below – EA013, right metatarsal appears stratigraphically higher than other metatarsals. (Photographs by permission of Mr David Baker)*

The only burial displaying clear evidence for extensive internal skeletal displacement in excess of that expected in a naturally decomposing corpse was EA064, Figure 8.18. The left ribs and clavicle appear to have fallen posteriorly, retaining approximate anatomical locations, but the vertebrae are disarticulated and displaced throughout the thoracic area. There is also the possibility of compression of the upper body. The fragments of clavicles appear verticalized and the four left ribs that are visible indicate compression from the adjacent medially rotated left humerus. This could indicate a shroud; though, the left tibia has displaced laterally, extending outside what would be expected in a tight shroud. The extensive internal displacement provides evidence for taphonomic processes acting on this corpse in addition to gravity, for example earthworm movement.

Figure 8.18: *EA064 displaying extensive internal skeletal displacement. (Photographs by permission of Mr David Baker)*

The only other burials with potential evidence for compression of the upper body were EA012 and EA172. The clavicles in EA172 appeared verticalized, the left ribs narrowed and the left scapula was potentially anteriorly rotated (Figure 8.19). If the scapula was anteriorly rotated, then the humerus has disarticulated from the glenoid fossa, falling posteriorly. However, due to the angle of the photo it is difficult to confirm this. The skeletal elements on the right appear more disturbed with the humerus displaced in an inferior and medial direction, and the ribs have moved medially.

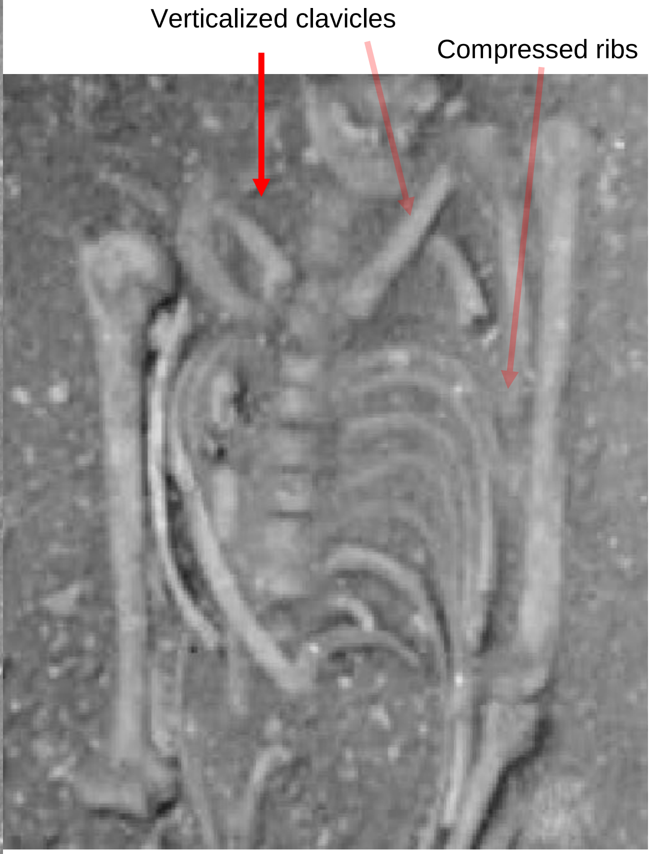


Figure 8.19: *EA172 displaying skeletal evidence for compression of the upper body. (Photographs by permission of Mr David Baker)*

As with the previous two groups of burials, all 17 individuals designated as indeterminate burials were interred in a supine position. The position of the upper limbs varied, however, there were more individuals displaying extended forearms as opposed to flexed (Table 8.4 and Table F17). The arrangement of the lower limbs appeared to favour an adducted position over an extended one (Table 8.5 and Table F18). Again, there appeared no relationship between the arrangement of the upper and lower limbs. Nevertheless, as recorded in the previous two categories a fairly compact arrangement of the limbs predominated (Table F19).

Table 8.4: *Frequency of upper limb arrangements in the 13 indeterminate burials in which arrangement could be assessed*

Extended	Flexed	One limb flexed/one limb extended
7 (54%)	4 (31%)	2 (15%)

Table 8.5: *Frequency of lower limb arrangements in the 14 indeterminate burials in which arrangement could be assessed*

Extended	Slight adduction	Adducted
3 (21%)	3 (21%)	8 (58%)

8.2.4 Uncoffined Burials

Six burials were determined to be uncoffined (6/55, 11%) (Table F20). All displayed expected natural internal displacements of elements, including the ribs (6/6, 100%), vertebrae (6/6, 100%) and clavicles (5/5, 100%) but external displacement was limited and restricted to the bones of the feet (4/4, 100%), the cranium (3/3, 100%), mandible (4/4, 100%), and less frequent the clavicle, humerus, radius, ulna, hand bones, *os coxae* and foot bones (Table F21). Skeletal elements were found supported in potentially unstable positions in all six burials (Table F22). These included the humeri (2/5), and the *ossa coxae* (6/6). All six burials had previously been recorded as plain earth by the excavators, as none contained any direct archaeological evidence for a wooden coffin.

The key shared features among the uncoffined burials were limited external displacement and the support of appendicular elements in approximately original positions. This patterning suggests decomposition in a filled space, where sediment is the source of the support. Internal displacement and disarticulation of joints was not surprising as the sediment at Elstow is described as containing a high proportion of organic matter and, in places, had high soil moisture content making conditions wet. Even if a corpse were interred directly in contact with this sort of sediment, it would be unlikely that direct in-filling would take place quickly, and as such internal displacement under these burial environmental conditions was to be expected. It is possible that the corpses were buried wrapped in a loose shroud or clothing, as this would also allow for the limited external displacement observed. Indeed, there does appear to be evidence of shrouding or clothed burial. In EA178, the left *os coxae* is maintained in an approximate original position, as are the laterally rotated tibiae. The bones of the feet are supported in potentially unstable, displaced, positions. This displacement is limited, but still appears to represent movement through an external void. There is internal displacement of the ribs and left femur, which has fallen medially from a position of slight lateral rotation. And although the left patella has fallen posteriorly, this movement is medial and considered possible in a shrouded burial (Figure 8.20).

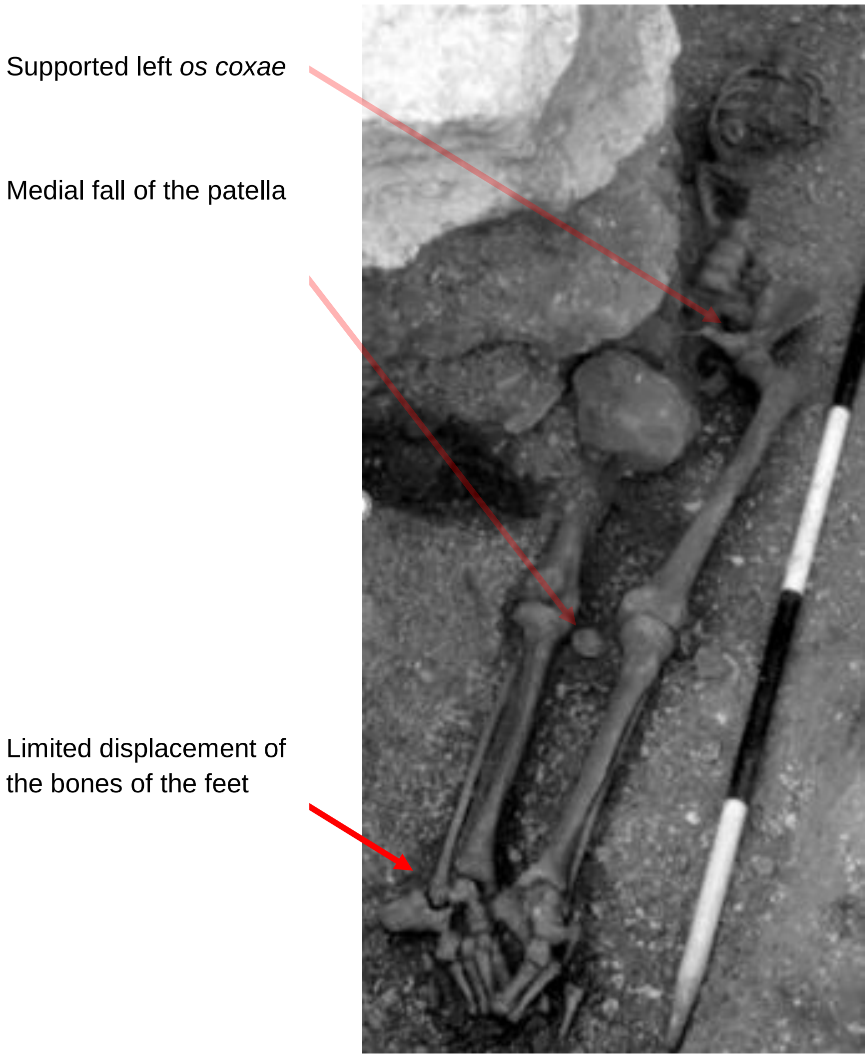


Figure 8.20: *EA178 an uncoffined burial from Elstow Abbey, displaying limited displacement and bones supported in unstable positions. (Photographs by permission of Mr David Baker)*

Additional evidence for the use of shrouds in three burials, comes from the support of appendicular skeletal elements, and the position of any displaced bones, corresponding to an outline of the corpse, rather than a linear wall effect, as would be provided by a rigid structure such as a coffin side. In EA052, this is seen in the support of the right humerus in medial rotation and an anterior position, the support of the right radius, and the position of the right ulna. The displaced hand bones, on disarticulation have fallen posteriorly into the area of the decomposing soft tissue volume of the thigh. The left ulna has moved away laterally to the left from the rest of the bones and is broken into two pieces, this displacement appears contradictory to the pattern displayed by the majority of the skeletal elements. This is probably the result of later disturbance of the burial, as the distal end of the humerus is also missing. The femora appeared laterally rotated, and the head of the right femur has disarticulated from the acetabulum. The likely reason for this, as the *ossa coxae* have not displaced laterally, is the truncation of the distal femora, causing a movement of the head (Figure 8.21). There is also evidence in these three burials for lateral compression of the upper body (Figure 8.22). There is possibly a verticalisation of the clavicles and a narrowing of the rib cage in EA152. While in EA077, there is medial rotation of the left humerus and the right scapula is rotated in an anterior/superior direction. The right *os coxae* has fallen laterally, generally taken as an indicator for some sort of void. It is clear some disturbance has occurred to the burial, probably an animal burrow. This could have caused the displacement observed in the right *os coxae* by creating a void medially, into which the bone has displaced, giving the appearance of a lateral opening out. Due to the forearm being laterally adjacent to the right of the pelvis, this may also have allowed more potential for lateral displacement into an internal area as the soft tissue of the upper limb decomposed.

Figure 8.21: *EA052 with possible skeletal evidence for a shroud – possible verticalisation of the clavicles*, *right humerus in medial rotation and in an anterior position, the support of the right radius, and the position of the right ulna. (Photographs by permission of Mr David Baker)*

Figure 8.22: *Example of compression in an uncoffined burial at Elstow Abbey. EA077. Narrowing of the thoracic volume, verticalisation of left clavicle, medial rotation of left humerus. External displacement of the posterior fall of the bones of the feet and the anterior rotation of the cranium with the left humerus, left os coxae and left patella maintained in unstable positions (Photographs by permission of Mr David Baker)*

All six individuals were interred in a supine position. The overall arrangement of the limbs appears compact in five out of the six burials; with the upper limbs flexed over the pelvis as in EA052 and EA152, or with one upper limb flexed and the other adjacent to the torso, as in EA077 and both upper limbs in an extended position adjacent to the trunk of the corpse in EA001. However, in EA153 the upper right limb is resting away from the torso of the corpse, in a pronated position (Figure 8.23). The lower limbs appear to have been arranged in adduction in five burials, and possibly only slight adduction in the sixth (EA001) (Table F23).

Right upper limb in an extended pronated position

Figure 8.23: *EA153 an uncoffined burial displaying a less compact arrangement of the upper right limb (Photographs by permission of Mr David Baker)*

8.3 Discussion

The results of the taphonomy-based analysis of the 55 burials from Elstow has revealed that two individuals had been buried in wooden containers, one specifically a coffin. In a further 30 interments, the spatial distribution of elements has confirmed that decomposition took place in an original external void, and not in direct contact with the surrounding earth. Unfortunately, the source of the void could not be distinguished between a container and a dug out earthen grave with a durable cover. Of these 32 burials, only a single burial had been identified as interred in a wooden coffin by the excavators. Thus, the method applied in this study has identified a substantial additional number of burials that decomposed in an original void. Moreover, these findings have presented supporting evidence for previous but unsubstantiated conclusions that six burials were unlikely to have been interred in wooden coffins and were in fact plain-earth burials. In 17 graves, the skeletal evidence alone proved unable to distinguish between decomposition in an original empty space and decomposition in a filled space with a flexible barrier between the sediment and the corpse, thus no firm conclusion could be drawn about coffin use.

This study has revealed the potential for wooden containers to have been a frequently utilised form of burial in the late Anglo-Saxon cemetery at Elstow Abbey; a hitherto unknown fact. Excavators had only previous identified a single wooden coffined burial from the 55 sample burials (1/55, 2%). When the individuals identified as void – rigid container and buried in a void in this study are added to this data, the number of possible contained burials rises to 32 individuals (32/55, 58%), thus, over half were potentially buried in a container.

The main skeletal evidence for the presence of an original empty void, and therefore potential presence of wooden containers, at Elstow Abbey was extensive skeletal displacement. The most extreme form of displacement was observed in 14 burials with less extensive, but still significant external displacement recorded in a further 16 burials. It is reasonable to suggest that the taphonomic events giving rise to this sort of extensive skeletal displacement may not be the same for all burials, based on the differences observed in the spatial distribution of the skeletal elements. David Baker noted that the water table had lowered in the local area following the installation of a new drainage system in the 20th century (D Baker pers. comm. 2015). This suggests the possibility that fluctuations in ground water levels could be responsible for some of the extensive skeletal displacement observed. Duday (2009: 38) agrees that this is a plausible source of bone movement inside coffins, and this was clearly seen in the wooden coffins at Barton-upon-Humber (see Chapter 5). The excavators do not discuss the impact of water but instead cite root action as the main source for the disturbance seen across the burials at Elstow (D. Baker pers. comm. 2015). Indeed, in a number of photographs (e.g. EA100 and EA151), fairly large plant roots can be seen in close proximity to the skeletal remains (Figures 8.4 and 8.14). Bioturbation of bones by plant roots has been discussed by Paris *et al.* (2017: 71, 81) and McKinley (2016: 87). While the former only discuss a vertical mixing of skeletal elements, one of the five burials discussed by McKinley at Woodlands, Adwick-le-Street (SY) appears from the image contained in the report to have bones displaced in the horizontal plane (McKinley 2016: fig. 8). It is conceivable that plant roots do account for some of the displacement of bones at Elstow. Observation of root etching on the bone's surfaces might have provided additional evidence to explore this hypothesis, however the skeletal remains were not available for analysis. Due to the intensive use of the cemetery, with excavators reporting frequent occurrences of newer grave cuts truncating older ones, human intervention could also account for some of the displacement observed. In a number of burials, the skeletal remains do appear to have been deliberately moved aside, for example EA017 and EA151 (Figures 8.2 and 8.14). This might provide a reasonable explanation for the displacement of the left femur in EA046, which is at a right angle to the midline resting across the right femur. Furthermore, a delay in burial could be a cause of the displacement observed, especially of the bones freed from relatively more labile articulations, such as the hands, feet, sternum and ribs. As discussed by Brothwell (1987), this could be brought about by extensive travel, or, alternatively, a delay in burial due to seasonal freezing of the ground and an inability to dig a grave. If, as has been suggested by Haslam (1986: 43-44), Elstow was the location of an early Minster, it is possible the dead were transported over some distance in order to be buried in a prestigious location. Moreover, a delay in burial may have formed part of the local burial rites, and as such decomposition would progress above ground for a time before interment. For the level of displacement observed, decomposition would have had to occur within the coffin, as opposed to in a shroud with the subsequent deposition into a coffin, as the skeletal elements extend outside the volume that could be expected in a wrapped corpse.

There did not appear to be one overall specific arrangement of the upper or lower limbs, with a range of variations of position recorded. Nor were there any apparent relationships between limb arrangement and those burials with either a void – rigid container or uncoffined outcome. In all cases the arrangement of the corpse appeared fairly compact with the upper limbs adjacent or lying over the torso of the corpse. This could be interpreted to mean that whether an individual was provided with a container did not influence how they were finally positioned at burial at Elstow Abbey.

An evaluation of the extent of skeletal displacement, and evidence for compression of the upper body and lateral support of appendicular skeletal elements, revealed that container size appeared to be variable at Elstow Abbey. As discussed in Chapters 3 and 5, late Anglo-Saxon coffins appear to be narrow in width. At Elstow Abbey, while there is evidence for some narrow containers, such as EA048 and EA100 (Figures 8.15 and 8.4), others appear to have been significantly wider, allowing the occupant to be less restricted by the sides of the container, for example, EA041 and EA154 (Figures 8.8 and 8.6).

Chapter 9 – Discussion and Conclusions

The primary research aim of this thesis was to examine the utility of an archaeothanatological approach as a tool for the reconstruction of original burial form. This led to using such an approach to identify late Anglo-Saxon wooden coffined burials. This aim was achieved, firstly, by an examination of skeletal positioning in burials in which physical remains of late Anglo-Saxon wooden coffins had survived. The findings of this preliminary study were interpreted in conjunction with previous research which had established how skeletal positioning might be used to infer burial form. Next, this dataset was used as the foundation for the development of a taphonomy-based method, aimed specifically at identifying late Anglo-Saxon coffined burials in situations where no direct archaeological evidence for a coffin remained. Finally, this method was applied to graves from three late Anglo-Saxon cemeteries and the findings compared to previous assessments of coffined burial. Each of these three sections contained an in-chapter discussion which summarised their respective results. The current chapter expands upon these previous discussions, in three main sections. Section 9.1 begins by presenting and reviewing the combined findings from all three sites. Section 9.2 then considers the effectiveness of the method created in this thesis for the identification of coffined burials, reflecting on the potential and limitations of this strategy. Finally, section 9.3 addresses the implications of this study for late Anglo-Saxon research and for funerary archaeology in a broader sense. The chapter concludes with a consideration of potential avenues for future work.

9.1 Combined Results from the Analysis of the Three Late Anglo-Saxon Cemeteries

Across the three sites, the application of a taphonomy-based approach found a total of 54 graves to have originally contained wooden containers with the highest degree of confidence (54/326, 17%). Of these 31 were identified as being wooden coffins (31/54, 57%), two were wooden chest burials (2/54, 4%) and two interred in either coffins or chests (2/54, 4%). A further 75 burials provided strongly suggestive evidence for decomposition in a void, but one that could not conclusively be determined to be a wooden container (75/326, 23%). A total of 105 burials were determined to be uncoffined (105/326, 41%), leaving 92 burials for which the decompositional environment could not be confidently ascertained, meaning the presence of a wooden container could be neither confirmed nor excluded, due to a lack of information (92/326, 28%) (Table 9.1).

Table 9.1: *The combined results from all three sampled cemetery sites (326) for the determination of potential burial forms*

Cemetery	Void – rigid container	Void	Indeterminate	Uncoffined
Worcester Cathedral	26 (67%)	1 (3%)	8 (21%)	4 (10%)
Black Gate	26 (11%)	44 (19%)	67 (29%)	95 (41%)
Elstow Abbey	2 (4%)	30 (54%)	17 (31%)	6 (11%)
Combined total	54 (17%)	75 (23%)	92 (28%)	105 (32%)

The approach taken in this study has revealed that 24 more burials decomposed in a rigid wooden container than had been previously determined, meaning that 17% of the total sample has been confidently established to have originally been buried in a rigid wooden container (Table 9.2). Of these 24 burials, newly identified as interred in a wooden container, 22 have been identified as wooden coffins/chests (22/24, 92%). Identification of a rigid wooden container utilised a combination of evidence. All burials exhibited some degree of displacement of skeletal elements into original external voids. This skeletal data was supported by archaeological evidence in the form of the location of the grave cut and traces of wood in the grave. Wooden coffins were identified by skeletal material supported in potentially unstable positions or forming a linear alignment at a distance from the grave cut. In two burials a chest was determined from the presence of a lock in one grave and a lock and metal straps in the other. The evidence was unable to differentiate between coffins and chests in two burials as corner bracket have been found in relation to both types of wooden container at other sites (see Chapter 3). Excavators had previously inferred the potential presence of wooden coffins at all three sites from the presence of various archaeological evidence including preserved wood, soil stains, voids and metal fittings. This had resulted in the identification of a total of 53 potential coffined burials (53/326, 16%). This number is almost the same as the total number of burials receiving a void – rigid container outcome (54). Nevertheless, there has been an overall increase in wooden coffins and containers. The findings from Worcester Cathedral resulted in a substantial increase in the identification of wooden containers, with the taphonomy-based approach both corroborating the excavators' prior determinations and identifying a sizable number of previously unknown burial containers. At Black Gate the results were more complex and this affected the clarity of the results. This study identified 12 previously unknown coffined burials, however, the overall total number of coffined graves at Black Gate (void – rigid container) has reduced following reanalysis (37 down to 26). For 19 burials, the archaeological evidence used by the excavators was not considered sufficient to confidently support a void – rigid container outcome, even in combination with skeletal evidence for decomposition in an original external void (discussed in Chapter 7, sections 7.2.2 and 7.2.3). Thus, these burials received only a void or indeterminate outcome. This study also determined that four burials were uncoffined based on evidence for decomposition in a filled space, even though the excavators had found evidence for wood in the graves and suggested possible coffined burials. For 23 burials the archaeothanatological analysis could not support the inferences made by the excavators for the possible presence of containers based on the presence of wood in the grave, mainly due to limited information (23/326, 7%)

Table 9.2: *Comparison between excavator's previous coffin determinations and the results of this study, of burials in a void – rigid container, from across all three cemeteries*

Cemetery	Number of wooden containers previously identified by excavators	Number of wooden containers identified in this study Void – rigid container	Number of new wooden containers identified in this study	Number of new wooden coffins identified in this study
Worcester Cathedral	15 (38%)	26 (67%)	11	10
Black Gate	37 (16%)	26 (11%)	12	11
Elstow Abbey	1 (2%)	2 (4%)	1	1
Combined total	53 (16%)	54 (17%)	24	22

For the purposes of the general discussion of contained burials here, it was deemed acceptable to consider amalgamating the result from the void – rigid container and void categories. The results in both categories saw clear evidence for the presence of a relatively long-lasting original external void surrounding the corpse. The difference between the two groups lay in the presence of archaeological evidenced confirming the presence of a wooden container for the void – rigid container category burials. There is a lack of archaeological evidence for late Anglo-Saxon dug out earthen graves containing only a cover, although this potential burial form needed consideration. Therefore, on the balance of probabilities these burials are all suggestive of wooden containers. The four burials with an indeterminate outcome from Worcester Cathedral considered to possibly also represent burial in a wooden container due to sediment type were also add. Combining the results from the void – rigid container and void categories increases the potential number of contained burials to 133 and would mean over a third of individuals were potentially interred in some form of wooden container (133/326, 41%). This would potentially represent an overall increase in wooden containers of 282%, with a further possible 90 burial containers discovered (Table 9.3). The greatest potential increase in wooden container provision was seen as Elstow Abbey. An additional 31 burials provided strongly suggestive evidence for the presence of a wooden container – decomposition in a relatively long-lasting void. There the proportion of individuals buried in wooden containers would rise, to over half of those analysed.

Table 9.3: *Comparison between excavator's previous coffin determinations and the results of this study when the categories of void – rigid container and void burials are combined, from across all three cemeteries*

Cemetery	Number of wooden containers previously identified by excavators	Number of burials with evidence for decomposition in a void identified in this study (combination of void – rigid container and void categories)	Number of new burials identified as possible interments in a wooden container
Worcester Cathedral	15 (38%)	31 (79%)	16
Black Gate	37 (16%)	70 (30%)	43
Elstow Abbey	1 (2%)	32 (58%)	31
Combined total	53 (16%)	133 (41%)	90

The approach taken in this study has challenged the suggestion that the default description for burials without archaeological evidence of coffins should be plain-earth graves. A total of 90 burials originally described as plain-earth graves were reclassified throughout this study as decomposing in a void (90/326, 28%). Reassessment indicated that 24 of these decomposed in a wooden container (void – rigid container), of which 22 were wooden coffins/chests and 66 decomposed in and some form of external void (void outcome) (Table 9.4). Furthermore, evidence of grave cuts in close proximity to bones and grave furniture showed that 13 individuals (13/326, 4%) were placed into dug out earthen graves beneath durable covers (uncoffined) and were therefore inconsistent with plain-earth burials. This increased the total number of burials with evidence for an alternative form of burial determination to 103 (103/326, 32%). Elstow had the highest number of burials reclassified (31/55, 56%). Across the three sites proportionally more burials for which the excavators had either left undetermined or classed as plain-earth by default had evidence for decomposition in an unspecified void (66/326, 20%). The identification of 23 burials the excavators had potentially determined to have been contained was also questioned by the taphonomy-based method. In 13 of these interments (13/23, 57%), this study has corroborated the excavator's interpretations that these were not plain-earth burials, however, it did not fully support the conclusions that the original burials were placed in a wooden container. For six burials (6/23, 26%) the evidence was insufficient to obtaining a burial form (indeterminate). In the remaining four burials the skeletal analysis suggested decomposition in a filled space, and not a void, as would have been expected in a wooden container. The results have also substantiated the prior conclusions of the excavators that 30 individuals were interred in wooden containers (void – rigid container) and 67 interments (uncoffined) were plain-earth burials. For several of these plain-earth burials, the results indicated the possibility of loose or tight shrouds, and clothing.

Table 9.4: *Burials for which the excavator's previous plain-earth determinations have been challenged, broken down by cemetery*

Cemetery	Void – rigid container	Grave containing a cover only	Void – unidentified source	Site total
Worcester Cathedral	11 (28%)	2 (5%)	5 (13%)	18 (46%)
Black Gate	12 (5%)	11 (5%)	31 (13%)	54 (23%)
Elstow Abbey	1 (2%)	0	30 (55%)	31 (56%)
Combined total	24 (7%)	13 (4%)	66 (20%)	103 (32%)

The results signify that the identification of coffined burials was achievable utilising an archaeothanatological-based methodology. The following section critically evaluates these results, to explore the limitations and potential of the method developed in this study.

9.2 A Critical Evaluation of the Archaeothanatology-Based Method

This study set out to examine whether an archaeothanatological approach could be used to reconstruct original burial form, with the specific aim of identifying late Anglo-Saxon wooden coffin burials. The summary of results provided in 9.1 demonstrates that the method developed in this study has been able to identify evidence of variations in original burial form, including wooden coffins, wooden containers, dug out earthen graves containing only a durable cover, shrouds and clothing, and plain-earth burials. While in some cases the findings of this study corroborated the excavator's previous determinations for burial form, in a significant number of burials the taphonomy-based approach detected previously unknown burial forms (see Tables 9.2-9.3). These results confirm that taphonomic analysis can reveal new information about original burial form, even in the absence of direct archaeological evidence. Despite the apparent success in exposing hitherto unknown wooden coffins and containers, the method developed in this study has not been without its problems. Some of the issues relate specifically to the method created here, while others reflect more generic methodological limitations encountered previously in other retrospective taphonomy-based studies. Therefore, to evaluate whether the method developed used in this study is fit for purpose, both the reasons for its success and the problems encountered need to be explored.

This project aimed to develop a method to identify late Anglo-Saxon wooden coffin burials using archaeothanatological principles. This involved combining new data on the effects of decomposition within a wooden coffin, obtained from the analysis of 78 confirmed coffined burials dated to the late Anglo-Saxon period, with taphonomic information on corpse decomposition and skeletal displacement, extracted from published literature. The value of such an approach was that it allowed for the unique characteristics of late Anglo-Saxon wooden coffins to be integrated into the development of the method. Creating a method specifically aimed at the identification of coffins may appear to contradict Duday and Guillon's (2006: 119) recommendation that recording and analysis should take place *a priori* – without a set purpose, to ensure no bias exists in evidence collection. The identification of patterns and repetition is key to understanding and interpreting funerary data (Duday 2006: 36), and thus it was deemed that directing this study towards the identification of a specific funerary practice was appropriate. Nevertheless, the overall interpretation made using the information collected was focused, and potentially biased, as it did not allow space for detailed interpretations of alternative funerary practices. This was due to the focus on the identification of wooden containers

The analysis of the confirmed coffin burials revealed that variation existed in the spatial positioning of skeletal elements, indicating there was no one specific configuration of bones that related to decomposition in a wooden coffin. Rather, there was a range of characteristics that frequently appeared in combination in the coffined burials – external displacement, internal displacement, support for appendicular skeletal elements and the linear alignment of bones. Furthermore, it was also clear that the introduction of other taphonomic processes aided the identification of decomposition in a void, by increasing the extent of the external displacement; the most notable being the ingress of water into the coffins at St Peter's, which resulted in bones extensively displaced by floating. However, the findings suggested that extensive external skeletal displacement may not always be present in a contained burial and conversely could potentially be present in other external voids. As such, alone it would not always provide strong enough evidence from which to determine the presence of a coffin. The apparent trend for late Anglo-Saxon wooden coffins to have a narrow width, with the container sides supporting appendicular skeletal elements in potentially unstable positions, demonstrated the need to exclude other sources of skeletal support.

These observations have provided a means to examine archaeothanatological principles relating to decomposition in a wooden coffin, in an archaeological, rather than an experimental setting. Forensic experiments, although informative on aspects such as disarticulation sequences, cannot replicate the impact of burial over hundreds, and possibly thousands, of years. As such, data concerning the expected patterns of bone positioning in coffins and plain-earth graves was obtained from a range of previous studies, forensic and archaeological case-study based. The findings of the present study did not appear to present any challenges to this published literature. Rather, they supported the indicators used by other researchers in determining coffined burials – presence of decomposition in a void and the linear alignment of elements (Duday 2009: 32-38; Blaizot 2014). In highlighting the narrow width of late Anglo-Saxon coffins, an often-used skeletal indicator for decomposition in a void – the lateral fall of the *ossa coxae* (see for example Duday 2006: 40 and Harris and Tayles 2012: 232) – was not recorded as frequently as expected. Instead, the coffins exerted a bi-lateral delineation on the skeletal remains. Although as pointed out by Duday (2009: 40), the source of a bi-lateral delineation can include a coffin or the grave cut, it is often used as an indicator for the presence of a shroud, especially in conjunction with skeletal evidence for constriction of the upper body and a body-shaped contour (Nilsson Stutz 2006: 219-221). While this is still a valid inference, the findings from this analysis of confirmed coffin burials highlight that coffins arguably produce similar effects, and therefore their use must always be considered alongside shrouds when discussing funerary practices responsible for constricted burial in the late Anglo-Saxon period.

The method was applied to three late Anglo-Saxon cemeteries, each containing differing proportions of burials excavators had previously concluded were coffined, plain-earth or had been left with an undetermined burial form. Skeletal position consistent with burial in a void was identified at all three cemeteries, demonstrating that the suite of skeletal characteristics identified and tested in this study were consistent across sites with varying preservation conditions, and that the method was reproducible. Indeed, the consistent identification of skeletal positioning indicative of decomposition in a void in graves which had also produced traces of wood and soil stains, established that skeletal positioning confirmed, and therefore could be used in conjunction with, other archaeological evidence in a standardised method to identify coffined and contained interments. Moreover, the method demonstrated it had the ability to go beyond direct evidence commonly used by excavators (wood/metal), revealing further, previously unidentified, coffined/contained burials, and only through the use of skeletal positioning analysis of these wooden containers exposed. The identification of wooden coffins and containers was not the only indicator of success; the method was able to use positive evidence to identify plain-earth burials.

In applying the method to the burials at the three late Anglo-Saxon cemeteries a number of issues were encountered. The identification of the grave cut was important but proved problematic. Castex and Blaizot (2017: 282-284) consider the identification of the grave cut as vital for identifying a coffined burial. Indeed, at Worcester the majority of burials in the void – rigid container category had been identified by the location of the grave cut at a distance from either a linear delimitation of bones, and/or skeletal elements supported in potentially unstable positions. Whereas, at both Elstow and Black Gate grave cuts had proved elusive to the excavators. The inability to identify grave cuts resulted in an indeterminate outcome for a number of burials. These burials exhibited limited external displacement of skeletal elements and bones supported in potentially unstable positions, however, without ascertaining the location of the grave cut, this could not be ruled out as a source of support for the bones. Although this study did reveal certain circumstances in which a wooden container could be detected without a grave cut, its absence was a key factor in a significant number of burials being classed as void rather than void – rigid container, even though they displayed many similar skeletal characteristics. The evidence showed that many individuals in burials without defined grave cuts decomposed in a void, and therefore they were not plain earth. However, without the presence of a relatively well-preserved coffin, or the presence of metalwork strongly suggestive of a portable container, it may not be feasible to resolve whether the source of the void was provided by a coffin, chest, lined grave with a cover or a dug out earthen grave containing only a durable cover. The main difference between these forms is that coffins are portable containers, whereas fully-lined graves with covers are constructed within the grave itself. But both appear to separate the corpse from the earth. Williams (2015: 98) discusses the issue of determining the source of a void, rather opting for the term “closed portable container” as opposed to coffin. A dug out earthen grave containing only a cover above the corpse also does not place the corpse in direct contact with the soil, other than the base on which it lies, however only the cover provides a rigid barrier. These forms would all supply an original external void of varying size and longevity. While it may be more practical, and simplify the method, to amalgamate the void – rigid container and void categories when discussing the use of contained burials, it is important to emphasise the potential this has to falsely conflate many forms of funerary practice into a single category. Thus, the decision was made to differentiate the burials where the presence of a rigid wooden container, be it a coffin or fully-lined grave with cover, could be determined from the possibility of a dug out earthen grave containing a cover, or those burials inn which the distinction could not be confidently made.

Over a quarter of all burials presented skeletal indicators of burial form that were inconclusive for the presence of either an external original void, or burial in direct contact with the earth – an indeterminate outcome (28%). The main issue for these burials was a lack of information relating to a specific form of burial. Indeed, these interments were just as likely to be in containers as plain-earth burials, or something else entirely, as yet unidentified. Although the method allowed for these inconclusive burials, the numbers had not been expected to be so large. The variation in these 92 burials could be accounted for by differences in taphonomic history. The identification of wooden containers is most clear when the remains display a substantial amount of external displacement, and conversely plain-earth burials are best identified by a lack of external displacement. That there were differences in the taphonomic processes acting on the corpses was clear, both between sites and between burials. There were differences in sediment type between sites, water levels, root action and human disturbance, between individual graves. A significant factor would have been container integrity, as this would have affected the amount of time the original void around the corpse was accessible by the skeletal elements. A longer lasting void, would offer the potential for greater movement of skeletal elements by other taphonomic forces.

With regards to the lateral fall of the *ossa coxae*, the author took a more cautious approach than has been employed in other studies. It was not completely clear from the published literature how much movement can occur before the displacement of the *ossa coxae* becomes external, rather than internal; there are no specific measurements to indicate how far a lateral fall of *ossa coxae* has to be. If the bones are completely flat, they would appear to have entered external space, yet, as discussed by Duday (2009: 35) the *ossa coxae* will, if no progressive infilling occurs, first fall posteriorly, displacing into the area now created by the decomposition of the gluteus minimus, medius and maxius muscles, which on all but emaciated individuals is a relatively extensive area of soft tissue mass. Furthermore, the sacrum by virtue of the decomp of the viscera of the pelvic region can move anteriorly creating space medially for the *ossa coxae* to move into. The question remains of how all of this internal displacement effects the lateral fall of the *ossa coxae*, especially when in retrospective analysis specific measurements of each individual skeletal elements may not exist, as was the case across all of the sites used in this study. Moreover, the body mass of soft tissue of each individual will vary, dependent on factors such as; biological sex, males and females carry mass differently; diet, which can be linked to social status; and health. If an individual is carrying an increased volume of soft tissue around the pelvic area, this would provide additional space, once it decomposed, for the *ossa coxae* to move within. There also appears to be no definitive understanding on how long body voids can last in differing sediments, and what effect the presence or absence of a flexible barrier can have on the, albeit small, void around the corpse. Thus, it was considered that movement could not be confidently attributed to the presence of an original rigid external void.

This study did identify the potential use of shrouds and clothing in a small number of graves, and at Black Gate the use of durable covers within dug out earthen graves, which could explain some of the variation seen in the spatial arrangement of bones. As it was outside the scope of this thesis, the use of these burial forms has not been extensively explored for each cemetery, beyond acknowledging their potential use, as inferred from the skeletal observations. The identification of these other aspects of funerary treatment may hint at why it proved difficult to attribute definitive forms in all cases – funerary practices were too variable, and therefore there is no real consistency in burial form to find.

There is a loss of three-dimensional data when using photographs, resulting in a difficulty in assessing vertical displacement. Moreover, distortion was introduced in some burials by taking photographs at an oblique angle. This lack of depth perception in a photograph was compounded, at all three sites, by limited depth measurements for individual bones. At best, levels had been taken at the cranium, pelvis and feet. However, this data proved less than informative when attempting to assess specific movements of individual bones. This limited data on skeletal positioning and displacement on the vertical axis resulted in the situation where it was easier to identify horizontal movements as external displacement. This may have led to movements involving a vertical displacement being wrongly interpreted as internal rather than external. Although this issue would have had an effect on all burials, this would have had the greatest impact on the interpretations of burials which did not have extensive external skeletal displacement, mainly those with an indeterminate outcome. Furthermore, an unexpected issue arose related to difficulties in assessing vertical displacement. All of the confirmed coffined burials had been supine, yet, at Black Gate there were a number of individuals in a prone position or buried resting on either their right or left side. In these non-supine burials, it was more difficult to see all skeletal elements, and be sure exactly how bones had displaced. Moreover, skeletal indicators for the effects of shrouds, clothing, and footwear may be masked.

A number of problems encountered appeared to relate directly to a retrospective analysis. All of the cemeteries used in this thesis had been excavated a number of years ago, and the quality and quantity of the information contained in the archives varied, with none of the sites excavated to current standards. It was nevertheless, considered important to use sites such as these, as large numbers of cemeteries were excavated and recorded to less than ideal standards. Information is known to be lost throughout the taphonomic history of a burial, including the excavation process (see Chapter 2), and those who employ an archaeothanatological approach in the field specifically caution that information will be permanently lost if it is not captured at the time of excavation (Duday *et al.* 1990; Knüsel 2014: 27). As pointed out by Nilsson (2006: 39), the overall effectiveness of any retrospective analysis is linked to the quality of the post-excavation archive. While it has been possible to obtain information from a retrospective re-analysis of post-excavation material, the quality of the data does appear to have had an effect on aspects of this research. Furthermore, a considerable number of burials at Elstow had no photographic record, resulting in the reduction of the number of burials onto which this method could be applied, which in-turn decreased the accuracy with which the true prevalence of coffined burials could be ascertained. Thus, the results obtained support Duday and Guillon's (2006: 118) comments that data quality will affect the quality of interpretations.

Some of the issues raised above may possibly be negated if archaeothanatalogical analysis was carried out in the field at the time of excavation. Information pertinent to a taphonomic analysis, such as the relationship between archaeological evidence and the skeletal elements, can be ascertained by the person carrying out the analysis, rather than being interpreted second hand. However, as most excavation is now undertaken in the UK by commercial archaeology companies, with tight deadlines and budgetary constraints, it may be impractical to expect a move to mirror the French where an on-site osteoarchaeologist or biological anthropologist is available to carry out *in-situ* analysis, or to radically alter recording guidelines, to increase the amount of data captured on site. Instead, the use of photogrammetry may offer a solution to some of problems encountered by using traditional photography and recording methods. Photogrammetry allows a three-dimensional reconstruction to be created by computer software from multiple photographs of the skeletal elements taken from numerous angles. Indeed, a number of commercial archaeology companies are now routinely employing photogrammetry when excavating human skeletons (R Birtwistle pers. comm. 2018). Sachau-Carcel *et al.* (2015) successful utilised photogrammetry when exploring burials in the Saints Peter and Marcellinus catacomb, Rome, by recreating the entire structure of two mass graves. They reported this facilitated the reconstruction of funerary practices and the management of the dead (Sachau-Carcel *et al.* 2015: 40). Photogrammetry may never be able to replace *in-situ* analysis in taphonomy-based assessment but may provide a preferable alternative to 2D photographs in the future.

In summary, this study supports the findings of previous researchers, establishing that by employing archaeothanatological principles, information pertaining to the original funerary treatment of a corpse can be retrieved from post-excavation archived material. Furthermore, in revealing hitherto unknown wooden coffins and containers and positively identifying plain-earth burials, the results have confirmed that the analysis of the spatial distribution of skeletal elements can provide evidence for burial form in the absence of direct archaeological material. Certainly, if this analysis had not taken place a significant number of graves would have remained with an invalid, default determination of plain-earth burial. Moreover, the method showed that plain-earth graves could be determined using positive, as opposed to negative evidence. While the inherent variation of funerary practices, as evidenced by the seemingly infinite ways of treating the dead observed in ethnographic studies, means that no method will ever be able to identify and categorise all possible burial forms, this approach has demonstrated the value of a taphonomy-based approach and why it should be routinely included in all funerary archaeological analysis.

9.3 The Implications for Funerary Archaeology of the Late Anglo-Saxon Period

The cemeteries at Worcester Cathedral, Elstow Abbey and Black Gate were, in part, chosen because they contained burials determined to be plain-earth graves by the excavators. While excavation documentation did not specify a burial to be "plain earth" through the identification of any specific feature, the categorisation appeared, instead, to be based on a lack of evidence suggesting any other type of burial form. This situation is not uncommon; examples abound of excavators inferring late Anglo-Saxon burial form based on negative evidence (see for examples, Wade-Martins 1980; Johnson 1983; and Gilmour and Stocker 1987), even though they were surely aware of the issues of differential preservation of certain materials that could have been used in funerary practices. This apparent lack of concern for poor interpretative practice is most likely a result of the widely-held opinion that late Anglo-Saxon funerary practices were uniform and, therefore, there was nothing else to discover about them (Lucy and Reynolds 2002: 3). Thus, where plain-earth graves were expected, they have been found. This situation has been compounded by a limited knowledge of existing methods, such as archaeothanatology, that could assist in the recreation of original burial form, and therefore identify otherwise invisible funerary practices. Even though this view that late Anglo-Saxon burials were simple and uniform has now been challenged by the exposure of a wealth of variation in treatment of the dead, this has left us with a predicament. Plain-earth burial has been regarded as the normative burial form for the late Anglo-Saxon period (Daniel and Thompson 1999: 85; Buckberry 2007: 118), yet, there is neither positive evidence to confirm this to be the case, nor any clear reason to hypothesise it was. While recent research has acknowledged the problem (see Chapter 3), there have been only limited attempts at trying to identify solutions to the issue. As highlighted in Chapter 3, the analysis of skeletal movement and positioning within the grave has been employed sporadically in the identification of burial forms from late Anglo-Saxon cemeteries. Although, this has not translated into any large-scale uptake of this approach. Thus, the introduction of a standardised methodology to identify funerary treatments applied to the corpse, even in the absence of direct archaeological evidence, presents an opportunity to advance our understanding of the actions undertaken in response to death in the late Anglo-Saxon period, and question the predominance of plain-earth burial.

The results of this study have successfully enabled a re-evaluation of the prevalence of coffined/contained and plain-earth burials across the three late Anglo-Saxon cemeteries. The new data has demonstrated that wooden containers, and to certain extent specifically wooden coffins, were used more frequently than can be recognised from direct archaeological evidence alone. While widely hypothesised (for example see Buckberry 2004: 172; Cherryson 2005: 118-121; Mahoney Swales 2012: 25-26, 33-34; Gilchrist 2013: 385), this finding has never been as clearly demonstrated as it is here. While the use of direct archaeological evidence for identifying wooden coffins and containers has been confirmed in this study as valid, the findings from this research demonstrate that reliance on this source of evidence alone is presenting a biased picture of coffin provision, at both the level of individual cemeteries, and across the wider late Anglo-Saxon period.

From across the three cemeteries, a total of 24 previously unidentified wooden containers (24/326, 7%), of which 22 were coffins/chests, were recorded. If the burials with a void outcome are also considered, this number increases to 90 (90/326, 28%). The impact of improved identification of wooden coffins and containers varied between the three sites and was most marked at Elstow Abbey. Here, prior to this study, wooden coffins had only been identified in three graves based on ephemeral evidence: soil stains left by decomposing wood were identified on the base of one grave and along the right side in another, while a single nail believed to be from a coffin was recovered from the third. Of the sample used in this study only a single burial had been considered as coffined by the excavators. The application of a taphonomy-based method revealed a total of 32 burials in a void (combined void and void – rigid container), of which 31 were reclassified from plain-earth graves. This changes the view of funerary practices at Elstow Abbey substantially. Instead of what appeared to be a fairly uniform burial rite with few coffins, there is now evidence that potentially as many as 58%, if the void – rigid container and void categories are combined, were buried in some form of void (32/55, 58%). At both Black Gate and Worcester Cathedral, excavators had already inferred burial within a wooden coffin for a number of individuals based on the survival of direct archaeological evidence. Nonetheless, the re-analysis presented in this thesis has still revealed previously unknown wooden coffins and containers and provided substantiation in cases where the direct archaeological evidence was less than conclusive. The impact of differential preservation across individual cemeteries like Black Gate and Worcester Cathedral suggests that, even where direct evidence has been found for wooden coffins and containers, it does not follow that this is a true reflection of the total number. The significance of this finding for late Anglo-Saxon funerary studies is that current prevalence of coffin burial must be seen as significant underestimates and broader conclusions drawn from them re-evaluated to account for a rite that was likely more common than plain-earth burial.

The discovery that a considerable number of graves with a prior plain-earth designation were in fact burials in wooden containers has illustrated that an absence of direct archaeological evidence for a container provides an insufficient basis on which to identify plain-earth burials. Yet, this identification of plain-earth burials using negative evidence has been common practice. For example, 50 of the 69 individuals excavated within the north-east bailey of Norwich Castle (No) were designated “simple” plain-earth burials on account of them having no identifiable features to the contrary (Ayers 1985: 19, 57-58). The remainder of the graves included three plank lined graves, inferred from staining and ledges within the grave cut, and 16 graves with a range of chalk packing, flint-lining and ear muffs. At Norwich, organic preservation was similarly poor to that at Elstow and thus we might expect a large number of wooden containers to have gone unnoticed. At Ailcy Hill, Ripon (NY) excavators identified nine possible wooden coffins/chests in the phase 2 and 3 graves, dating to the mid-late Anglo-Saxon period (Hill and Whyman 1996). For the other nine graves, no specific mention was made as to burial form, rather it appeared that the inference was that these were likely plain-earth burials. Indeed, both Buckberry (2004) and Craig (2010) in their doctoral research treated these graves as plain-earth. At St Martin’s, Wallingford (Ox), excavators commented that the majority of graves appeared to be plain-earth burials, possibly wrapped in winding sheets, due to an absence of evidence for wooden coffins or shroud pins (Soden 2010: 66). In other cases, the determination of burials as plain-earth is not as explicit, rather it is inferred from the way the graves are described. For example, Graham and Davies (1993: 36) merely comments that there was no evidence found for coffins at Trowbridge (Wi), leaving the reader to assume the burials were then plain earth.

In addition to revealing which so-called plain-earth burials are more likely to have originally held wooden containers, the present study has also established that it is possible to generate positive evidence for the identification of plain-earth burials. A total of 67 individuals (67/326, 21%) were confidently determined to have decomposed in a filled space, indicative of a plain-earth burial. The positive identification of 67 plain-earth graves confirms that burial without a rigid container was indeed in use, as has been reported across the majority of late Anglo-Saxon cemeteries, albeit in smaller numbers than had been assumed. As only 21% of the sample were confirmed to be plain-earth burials, this suggests that the majority of burials were elaborated, in one way or another, and therefore presents a potential challenge to the broad over-view of the predominance of plain-earth burial in the late Anglo-Saxon period. Indeed, at Worcester Cathedral, the identification of a further 10 individuals in coffins and one in wooden container increased the total from 15 (15/39, 38%) to 26 (26/39, 69%) and revealed that substantially more than half of all burials sampled at this site were provided potentially with coffins. It appears that the number of plain-earth burials has been exaggerated.

The high prevalence of evidence for contained burials identified in this study is important, as it challenges the accepted theory that late Anglo-Saxon funerary practice was dominated by simple, relatively uniform, plain-earth graves. This widely-held supposition stemmed from the perception that the decline in grave goods, so visible in graves of the preceding centuries, heralded the commencement of a more homogeneous form of burial (Blair 2005: 240-241). This uniformity in burial form has been shown to be invalid by more recent studies (see Chapter 3). This theory of uniformity has been replaced with the generalisation that in the late Anglo-Saxon period, plain-earth burials were more numerous, and therefore represented the principle form of burial, punctuated by a variety of lesser used forms and elaborations (see Cherryson 2005: 91). It is easy to understand why this conclusion was reached, when the majority of burials in a cemetery appear to offer no direct evidence for any alternative form of burial or elaboration. However, as the results from Worcester Cathedral and Elstow Abbey have shown, this presumption of the dominance of plain-earth burials in late Anglo-Saxon cemeteries may be far from correct. At both sites plain-earth burials appeared to represent a smaller proportion of burials, with contained, potentially coffined, burials accounting for over half of the burials sampled. The findings of this study may then have far-reaching implications for the presumed dominance of plain-earth burials. Although, as this study has only looked at three cemeteries, complete revision of the overall frequency of plain-earth burials, and their place in the funerary rites of the late Anglo-Saxon period, may not yet be justified. What is abundantly clear is that this study has demonstrated both a need to change our approach and established a method by which this can be achieved.

In addition to revealing that 54 burials decomposed in a void within a rigid container and confirming 67 plain-earth burials, the taphonomy-based approach determined that 13 individuals had been buried in dug out earthen graves beneath a durable cover without any additional solid lining of the grave, and 75 graves provided evidence for decomposition in an original void, which may or may not have been the result of a wooden container, but for which the exact funerary form cannot be determined. As discussed in Chapter 3, there is limited archaeological evidence for the use of dug out earthen graves provided with a wooden cover only in the late

Anglo-Saxon period. A few rare examples of preserved wood covers were found at Swinegate York (NY), while at Caister-on-Sea excavators found roves in the grave and interpreted these as reused boat planks used to cover the corpse or lids to coffins (Darling and Gurney 1993). Wooden covers would be susceptible to the same issues of preservation and identification as wooden coffins/containers, possibly to a greater extent, as they would be even less likely to have any metal components. Further evidence for wooden covers at Black Gate comes from the evidence for decomposition in a void of corpses in stone cists. Not all stone cists were found with associated cover stones, and as suggested by Rodwell (2001: 71) at Wells Cathedral, these may instead have had wooden covers. Nolan (2010: 212) suggests the use of covered and wood-lined graves at Black Gate, as an alternative interpretation of the traces of wood found in a number of graves. This is a plausible suggestion, and without associated metal work to definitively differentiate between a fully wood lined grave and a portable coffin, one that remains valid.

For a substantial proportion of burials (92/326, 28%) the prior determination of plain-earth was challenged, but the skeletal evidence presented here was only able to suggest a range of possible alternatives. In these cases, the potential for the provision for a wooden container could not be excluded, nor could burial beneath a durable cover in a dug out earthen grave. There also appeared to be evidence for the use of loose and tight shrouds, and clothing, including gloves and footwear. Evidence for variation in how the body was prepared for burial has been found at other late Anglo-Saxon cemeteries. Cherryson (2005: 51-52) provides a synthesis of the evidence for clothed burials in the Wessex region of England, while documentary sources refer to both clothed and shrouded interment (Thompson 2004: 108). In questioning the default plain-earth determinations in a considerable number of burials and finding evidence for alternative forms of burial and treatments of the corpse, the data obtained in this study has confirmed that late Anglo-Saxon funerary rites were even more varied than had been appreciated.

Besides underestimating the prevalence of wooden coffins and other forms of funerary rite, previous studies are also likely to be drawing inaccurate conclusions about the role and provision of coffins and containers in late Anglo-Saxon funerary rites. Studies which endeavour to explore and interpret relationships between social identity and funerary expression by comparing individuals interred in coffin burials to those in plain-earth burials are doing so without correctly classifying people into these categories. For example, Buckberry (2007) investigated the relationship between skeletal evidence for biological sex and age at death of individuals and the form of burial they were afforded at six mid to late Anglo-Saxon cemeteries in Yorkshire and Lincolnshire. She reported that there appeared to be no association between burial in a wooden coffin and an individual's biological sex (Buckberry 2007: 120). She did, however, find increased age at death was associated with coffin provision at three sites, with no infants buried in wooden coffins at St Andrew's Fishergate, York (NY), St Mark's Lincoln (Li) and St Peter's Barton-upon-Humber (Li). Furthermore, she noted that few young adults at St Peter's were interred in coffins and the general trend across all six sites was for increased coffin use with increasing age of the deceased. In all cases, evidence for coffins was based on direct archaeological data, a method which this study has found to be unsound. Any revision of the number of coffins that would arise from the re-analysis of the six sites using skeletal positioning analysis could, potentially, alter the findings of all parts of Buckberry's study. In future, researchers will need to reassess the conclusions drawn by excavators/previous publications for funerary practice, else continue to base their interpretations on potentially flawed evidence.

In addition to exploring the provision of coffins in cemeteries, studies of late Anglo-Saxon burials frequently compare funerary practices between cemeteries.

Hadley (2010: 104) discusses that the largest concentration of enclosed graves, and charcoal burials, has been found in cemeteries associated with minsters and cathedrals, using this to support the notion that the dissemination of Christian ideals of burial practice was not uniform. However, the results provided here demonstrate that organic preservation is too variable to facilitate comparisons of coffin provision between sites. Indeed, the percentage increase in proportion of coffins identified at the three sites varied greatly. Thus, the comparison made by Hadley (2010: 104) between minster and cathedral cemeteries and burial grounds not associated with high-status churches is potentially flawed. Instead, it may be that more individuals were surrounded in a variety of materials at minster and cathedral cemeteries, but that the practice of containing a corpse was far wider spread, with the provision of possibly simpler, less-elaborate wooden coffins in use as less high-status burial grounds. Or alternatively, the ability to identify more accurately the proportion of wooden coffined burials in cemeteries may actually lead to a clearer separation of practices between burial sites.

The results of this study do not provide an answer to whether coffin burials were regarded as a higher-status form of interment. Craig (2010: 138) comments that the construction of a wooden coffin may be a greater investment in time and money, compared to a plain-earth burial. With a fully-lined wooden grave a compromise between the two. The evidence presented here suggests substantially more people were buried in coffins than we thought, and thus has implications for reassessment of how high-status a rite coffin burial may actually have been. A caveat must be provided here: the present study has only examined three cemeteries, thus, it does not provide sufficient evidence to completely re-evaluate the general perceptions of the role of coffins, whether they were an elaborate form of burial or just part of normal funerary practice. Indeed, an increase in number alone may not help clarify the situation, as other contextual factors such as resource availability will have an impact on coffin provision. If wooden coffins were considered a more standard burial form, then variation may still exist, not in the provision of the coffin itself, but in the form and design of a person's coffin, and through this medium, social display represented (Hadley 2011: 297). Support for this suggestion comes from archaeological evidence, which has shown that variation exists in the form wooden coffins can take; from those carved from tree trunks, those constructed entirely out of wooden parts, those using nails as fixings to those displaying superfluous metal work, and the apparent reuse of domestic chests (see Chapter 3). As we cannot see the majority of late Anglo-Saxon wooden coffins, we do not know if they were carved, painted, wrapped or lined with material, or covered in flowers. It is likely that the relationship between wooden coffin provision and status is a complex one, intimately linked to local factors, and as such must be interpreted on a site by site basis.

Thompson (2002: 232-238) has argued that coffins served to contain the body during burial, a practice which responded to Christian ideas about bodily purity (discussed in Chapter 3). The suggestion here that more individuals were interred in coffins than has been previously appreciated is consistent with Thompson's argument – if medieval society found the decomposing body repugnant and dangerous, then containing the body in more cases would, perhaps, be expected. This may suggest that the influence of Christian doctrine relating to bodily corruption and sin permeated widely throughout society. However, to truly evaluate whether there has indeed been a significant increase in wooden coffin provision during the late Anglo-Saxon period, and to ascertain the relationship to Christian ideology, the extent of their use has to be first ascertained, and then understood, for the preceding and successive periods. Is the use of coffins already well founded before the 9th century, and its use merely a continuation of funerary practice? Does coffin use continue in the same way in the late medieval period? To obtain answers to these questions the prevalence of wooden coffins in these periods must also be verified, using the method developed in this study.

In sum, this research suggests a widespread revision of the methods by which we identify burial containers in the archaeological record is needed. Re-evaluation of sites which have been excavated using skeletal positioning analysis from site photographs and archives has been shown to be a viable approach. Indeed, there are few cemeteries that would not benefit from an archaeothanatological analysis. The results from Black Gate, for example, show that an even more diverse range of burials forms was in use than had been previously identified. This may assist in determining the origins of the cemetery and its population, as explored by Mahoney Swales (2012), bring clearer comparisons between other cemeteries. Although pursuing this opportunity is beyond the scope of this study. Moreover, new sites under excavation should be subject to archaeothanatological analysis while human remains are *in situ*. It has been widely known for a considerable time that there were more individuals buried in wooden coffins than direct archaeological evidence could expose. Researchers admit that this is the case, but rather than seeking direct means of addressing this issue, it has been accepted as something that is unfortunate, but unavoidable. The results of this study prove that we are indeed being misled as to the prevalence of wooden containers, including coffins, in late Anglo-Saxon burials by reliance on direct archaeological evidence. These results then question the validity of inferences drawn for burial form based on this evidence, including many studies which seek to understand both the significance of the provision of coffins to people of varied social identities and the purpose of coffins in the wider funerary rites of this period.

9.4 Potential for Future Work

This final section presents suggestions for further research that would complement and expand on the findings of this study.

The scope of this study was restricted to the analysis of adult burials, due to the limited data on the application of archaeothanatological principles and taphonomic studies on the burials of non-adults. The analysis of non-adults is potentially more complex due to the increased number of skeletal elements and the limited data on the relative timing of disarticulation of the more numerous articulations present. This is further complicated by differences introduced related to the age of the deceased, as degree of bone fusion will alter accordingly with increasing age. There is clearly a need to investigate to the same standard as has been achieved for adults, non-adult decomposition, disarticulation and skeletal displacement. Indeed, for the late Anglo-Saxon period, evidence has emerged for variation in the funerary treatment of non-adults, echoing that found in adult burials (Buckberry 2007; Mahoney Swales 2012:266-268; Craig-Atkins 2014; Sofield 2015). However, unless a more accurate picture of funerary practices can be attained, it will not be clear whether the practices for non-adults are the same as those afforded to adults or are in fact completely different. The ability, therefore, to apply a taphonomic analysis to all burials would generate the potential for a broader, more encompassing interpretation of funerary practices.

Another constraint on burial analysis was imposed by the quality of the post-excavation archive. While there is nothing that can be done to improve the retrospective analysis of sites which have already been excavated, a move towards photogrammetry and the creation of 3D models instead of photographs has the potential to solve a number of the problems encountered in this study. To this end, the benefits of photogrammetry need to be communicated to commercial archaeology companies, to increase its application, and to researchers, to emphasise its value in taphonomic research. Further research is needed to adapt and test the archaeothanatological approach when applied to 3D data. A greater awareness of taphonomy-based methods is required among both excavators and researchers for the interpretation of graves. Due to the prioritisation at time-pressured commercial archaeology excavations approach of this kind may be seen as time consuming and low on the list of priorities. Nevertheless, the results of this research have provided evidence for the benefits of undertaking detailed spatial recording of graves. By educating excavators and researchers about how archaeothanatology works this would increase their understanding and potentially raise the profile of such an approach during commercial archaeological excavations. Going forwards, if researchers fail to incorporate an archaeothanatological approach into funerary studies, this will result in the continuation of potentially flawed conclusions.

Beyond the scope of this project was an osteological analysis of the skeletal remains themselves. However, while researching coffins and how coffins are identified it became clear that a physical examination of the bones may have been beneficial. Assessing the bones for damage may present patterns that could be related to burial form. Papers, such as Berryman *et al*. (2006: 167), discuss the presence of coffin rub, whereby skeletal elements in direct contact with the hard surfaces of the coffin would display more excessive erosion than other bones. Clough has hypothesised a potential link between lines found inside crania, the result of retained decomposition fluids, and burial within a coffin (S Clough pers. comm. 2016). This still requires further investigation, including an analysis of the encrusted material (S Clough pers. comm. 2018).

The author made suppositions on the longevity of grave integrity and therefore the longevity of the original external void in a dug out earthen grave with a durable cover. These were, based on anecdotal comments on durable covers in earth cut graves creating an external void, and common sense. An original external void created by a durable cover within a dug out earthen grave, while potentially not as long-lasting as a void in a container, due to the stability of the grave cut and the issue of sediment falling into the voids, could allow an almost comparable amount of external displacement of bones. However, this is an area that requires more research. Controlled experiments or the use of more modern data, where wood is more likely to have preserved in greater amounts, may allow differentiation between wooden coffins, containers and covers to be explored. Further investigation may find evidence that alters the presumptions made in this study, and the method developed here would require amendment.

As raised in section 9.3 above, the findings from this small-scale study suggest a re-analysis of late Anglo-Saxon funerary practice is required. This would entail applying the taphonomy-based method to previously excavated graves to ensure a more accurate interpretation of burial form and treatment of the dead is achieved. Once a clearer picture of late Anglo-Saxon funerary practices has been achieved, a re-evaluation of conclusions drawn from older, potentially flawed, evidence is necessary. This will impact studies based on archaeological evidence, but also those to have used archaeological data to support explorations of the socio-cultural context of burial practices, such as that by Thompson (2004). The application of a taphonomy-based method should then be extended to burials from other periods as a routine part of funerary archaeology, to increase in the identification of “hidden” burial practices.

Overall, the present study has demonstrated how the application of a taphonomy-based assessment can have a positive impact on research into the burial record. This thesis presented evidence enabling the identification of burial containers in graves for which no independent archaeological evidence survives. Use of this method has successfully enabled a re-evaluation of the prevalence of containers and plain-earth burials. Although limited in this study to three cemeteries, this thesis has revealed the extent to which reliance on direct archaeological evidence for wooden containers has created, and is perpetuating, a biased picture of late Anglo-Saxon funerary practices. Moreover, the findings presented here demonstrate the need for better incorporation of an archaeothanatological approach into funerary research in the UK, ideally commencing at the point of recording.

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