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Cranial Trauma and Treatment: A Case Study from the Medieval Cemetery of St. Mary Spital, London

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ABSTRACT Excavation of the cemetery of the medieval priory of St. Mary-without-Bishopsgate, Spitalfields, London from 1998–2001, recovered the remains of over 10,000 individuals. Following initial assessment, skeleton 19893 was found to have suffered three cranial injuries caused by a sharp edged implement. The remains were those of a middle aged adult male of around 172.4 cm in stature, truncated at the hips by a later feature. The remaining elements were well preserved. The cranial injuries were well healed, suggestive of some degree of post-traumatic care. Evidence of possible surgery was also found. Soft tissue complications would undoubtedly have followed the assault. Battle related trauma was considered, together with evidence of treatment. Whilst the demographic profile of the individual fitted a plausible one for a professional fighter of the medieval period, no firm evidence of occupation could be provided. The case study indicates both the ability of medieval people to survive major trauma and the wealth of information full analysis of the Spitalfields assemblage will provide the osteological community. Copyright © 2004 John Wiley & Sons, Ltd.

Key words: cranial trauma; St. Mary Spital; medieval; treatment; trepanation

Introduction

The Priory and Hospital of St. Mary-without-Bishopsgate (St. Mary Spital) was located to the east of the City of London and lying adjacent to, and beneath, the 20th century buildings of Spitalfields Market. Founded in AD 1197 (Stow, 1598) and occupied until its dissolution under the reign of Henry VIII, the location of the Priory buildings was known from documentary sources. Mr Frank Cottrill carried out archaeological work during the construction of part of the market between 1935 and 1938, and the Inner London Archaeological Unit (ILAU) and the Department of Greater London Archaeology (DGLA) both excavated in the area during the 1970s and 1980s (Thomas *et al.*, 1997). During the construction of the western part of the market in 1928, G Morant collected about 900 crania and numerous post-cranial elements, which are currently held in the Duckworth Collection Leverhulme Centre for Human Evolutionary Studies at the University of Cambridge. Several of the later excavations also included parts of the cemetery. The most recent work produced 126 articulated burials, analysed by J. Conheeney (in Thomas *et al.*, 1997).

Excavation of an area encompassing the majority of the cemetery of St. Mary Spital began in advance of the development of the site in late 1998, continuing well into the autumn. A second phase of work, beneath the standing Spitalfields market during the autumn and winter of 2000–2001, brought the total number of articulated human skeletons to over 10,000, though many burials were heavily truncated as a result of the inter-cutting of graves and intrusion from later archaeological features. Further excavations from 2001 to 2003, the latest of which followed the demolition of the 20th century market buildings,

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completed the investigations. Almost the entire area of the cemetery has, therefore, been archaeologically recorded.

This case study is based on observations made during the assessment of the assemblage, carried out at the time of the excavation. As analysis is just beginning in earnest, this paper is somewhat speculative and raises questions that the further study of the assemblage may answer.

The skeletal material

The individual under examination was context number 19893, from a burial pit situated to the southwest of an early 14th century charnel house. This pit contained five individuals, arranged in several layers. Skeleton 19893 had been truncated at the level of the second sacral vertebra by a late 17th century cesspit (Figure 1) and it is likely that the femora and tibiae were amongst a large group of long bones re-used as a lining to this later pit. A combination of the stratigraphic evidence (the pits were cut by the construction of the charnel house, believed to have been built *c.* 1310–1320) and radiocarbon dating of some material gives a provisional date in the late 13th or 14th centuries for the burial pit (C. Thomas, pers comm.). The cranium, mandible, arms and vertebral column were well preserved and the remainder of the torso present but fragmentary. None of the bones of the hands was present.

Figure 1. Excavation record photograph of Sk 19893, showing truncation by a post-medieval cesspit. (© Museum of London Advisory Service [MoLAS].)

Methodology

Sex estimation was carried out using standard pelvic and cranial morphological markers (Buikstra & Ubelaker, 1994). Due to incompleteness of the pelvic and cranial regions and pathological lesions, it was only possible to use molar attrition to estimate age (Brothwell, 1981). The age groupings for the original assessment included only one category for adult remains but analysis of the assemblage will use four adult age groupings: young adult (18–25 years), middle aged adult A (26–35 years), middle aged adult B (36–45) years and mature adult (over 46 years). These categories were used in the production of this paper. Stature calculations were carried out using equations provided by Trotter (1970).

Results

Demographic data

Although the pelvic girdle had been truncated (see Figure 2), the left sciatic notch and iliac border remained intact and were distinctly 'male' (Buikstra & Ubelaker, 1994). Traumatic lesions on the occipital prevented assessment of the area of attachment of the nuchal muscles, but all other sexually dimorphic features of the cranium were consistent with those of a male.

The sacrum and innominates were ankylosed at the auricular surface, preventing examination for age assessment. The pubic area was absent and the cranial sutures interrupted by multiple traumatic lesions and post-mortem damage. Examination of molar attrition suggested the individual lay within the 33–45 year age band (Brothwell, 1981). Antemortem loss of the mandibular premolars and first molars, together with considerable wear on all anterior teeth suggested the individual could be placed in the upper part of this age range and referred to as a middle aged adult B.

Unfortunately, only the right humerus could be measured for stature calculation, other long bones being either absent or damaged. The maximum length of this element was 33.1 cm, giving a stature estimate of 172.40 ± 4.05 cm (*c.* 5 feet 8 inches).

Pathology

Skeleton 19893 displayed changes consistent with a sero-negative spondylo-arthropathy, specifically ankylosing spondylitis (AS). The sacro-iliac articulation was completely ankylosed on both sides (Figure 2). Such symmetrical sacro-iliac changes are typical of the first stages of AS, when fusion usually occurs in the lumbar spine and sacroiliac joints before gradually ascending the vertebral column (Ortner & Putschar, 1981; Rogers *et al.*, 1987). Calcification of the anulus fibrosus of the intervertebral discs at the level of T11–12 and L1–2 follows the initial pelvic girdle changes (Aufderheide & Rodríguez-Martín, 1998). Extensive new bone formation throughout the thoracic and lumbar spine of 19893 had resulted in the ankylosis of L1 and 2 (anterior body), T10 and 11 and T8 and 9 (anterior body and apophyseal joints) and T4 and 5 (right anterior body only). Ossification of the invertebral ligaments and involvement of the apophyseal joints were also present. Around 90% of those affected by the condition are males with onset from the late teens to about 35 years (Rogers *et al.*, 1987). A diagnosis of AS is, therefore, also compatible with the estimated age and sex of the individual.

The areas of muscle attachment in both arms were very pronounced, particularly the deltoid muscle on the humeri, as were the interosseous crests of both radii and ulnae. A small process of bone was present on the shaft of the left humerus in the area of attachment of brachioradialis, which allows the flexion of the elbow joint and rotation of the forearm (Gosling *et al.*, 1996). A larger area of extra bone growth, *c.* 20 mm long by 15 mm wide, was noted on the right humeral shaft in the area of attachment of the lateral head of triceps brachii a powerful elbow extensor (Figure 3). Such changes are consistent with myositis ossificans, as a result of damage to the periosteum caused by acute or chronic trauma at an area of muscle insertion (Mann, 1993; Aufderheide & Rodríguez-Martín, 1998).

Cranial trauma

The most pronounced pathological changes noted on the skeleton were those in the cranium.

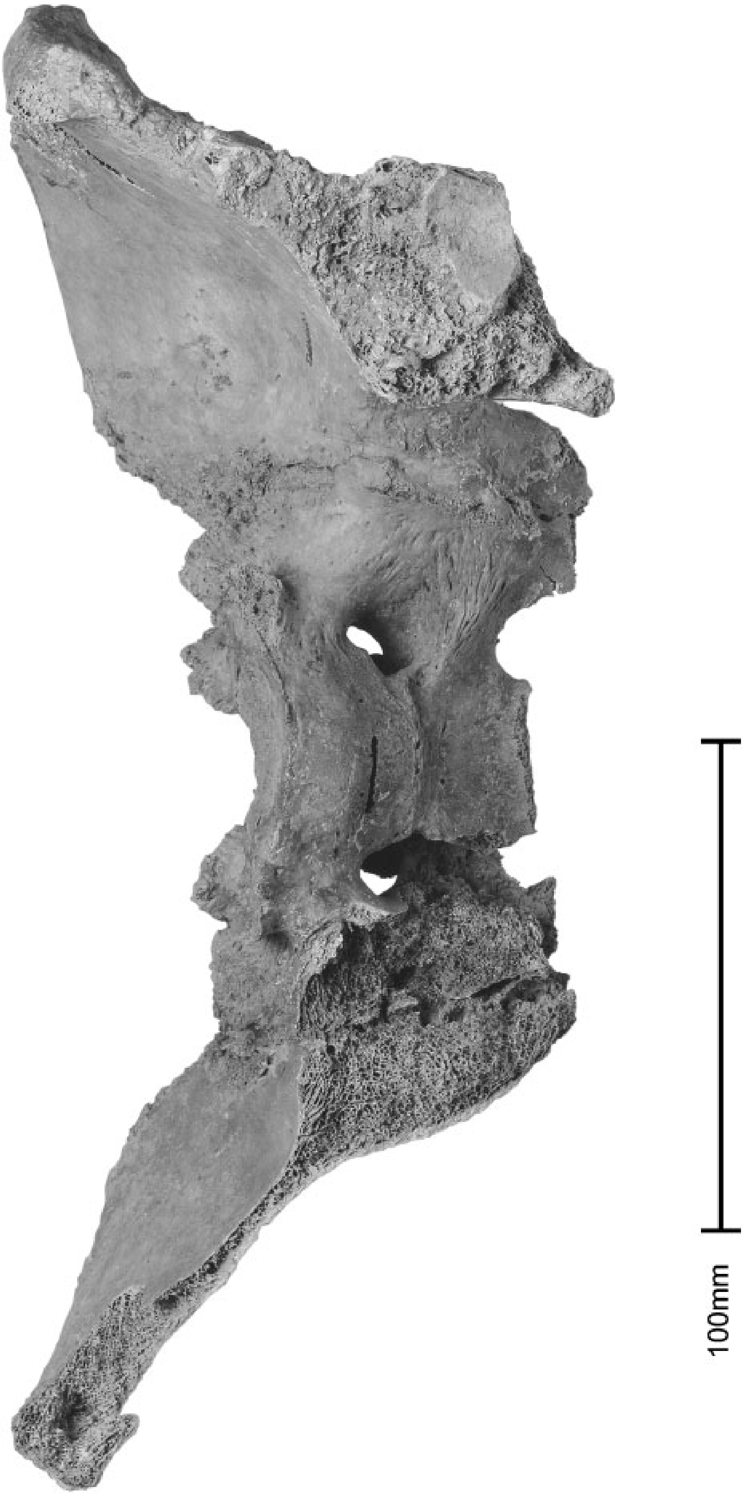

Figure 2. Pelvic girdle showing sacro-iliac ankylosis. (Photograph by Andy Chopping © MoLAS)

Figure 3. Humeral shaft with new bone growth as the result of soft tissue trauma. (Photograph by Andy Chopping © MoLAS.)

Three injuries were present, the first to the right side of the occipital just superior to the highest nuchal line. A linear cut 54 mm across passed at an oblique angle downwards through both tables of the skull. An oval slice of bone *c.* 54 × 25 mm, had been dislodged and displaced inferiorly, then reattached in this lower position. This left an opening 13 mm tall and 27 mm wide (Figure 4) in the occipital. The wound was well healed with a layer of dense new bone almost completely covering the fissure. No radiating fractures were noted.

A smooth area of extra bone protruded several millimetres from the inferior part of the posterior right mastoid. The anterior surface was slightly convex and formed to a point on the inferior side. This protrusion lay in the area of attachment of *splenius capitis* (Figure 4).

The second cranial injury was located on the posterior part of the right parietal, running horizontally, slightly higher than lambda, for approximately 67 mm. Well healed fracture lines radiated from either end of this lesion to the saggital and coronal sutures (Figure 5). At the lateral end of this lesion were two semicircular holes, the superior one slightly larger than the inferior (18 mm and 15 mm respectively). The edges of this lesion were bevelled outwards, the resulting injury being larger on the outer table than the inner one. Overlying the resulting gap in the cranial vault was a small, irregular fragment attached by only a few millimetres of bone. This separated the two oval lesions from the horizontal one (Figure 6). The fragment appeared to be composed of two smaller pieces of bone healed together, as a distinct step ran horizontally through it.

The final wound was located on the right frontal running vertically for 33 mm, approximately 20 mm from the midline. This was well healed and shallow with slight irregularity of the surrounding bone. The right nasal bone had also been fractured on the same alignment (Figure 7).

Diagnosis of the cranial injuries

All the cranial injuries had characteristics consistent with sharp force trauma (Courville & Kade, 1964; Wenham, 1989; Novak, 2000; Symes *et al.*, 2002). Accidental trauma can be considered extremely unlikely due to the nature and number of the cranial injuries, but should be considered as a differential diagnosis for the soft tissue trauma. No starburst pattern or concentric fractures indicative of blunt force trauma (Ramey Burns, 1998) were observed and the healing of the injuries allows taphonomic factors which may cause confusion in such cases (Symes *et al.*, 2002) to be ruled out.

Modern forensic work has shown that at the site of a blunt impact or projectile injury, the mechanical properties of bone lead to bevelling on the opposite side of the cranial vault to that which the force is applied, i.e. the internal wound will be larger than the external one. The pattern seen on the parietal of 19893 would have had to be the result of a penetrating injury of sufficient force to produce external bevelling characteristically seen in low velocity gunshot trauma (Ramey Burns, 1998; Berryman & Jones Haun, 1996). If

Figure 4. Posterior view of cranium showing parietal and occipital injuries and soft tissue trauma to the mastoid. (Photograph by Andy Chopping © MoLAS.)

this were the case, given the nature of the wound on the occipital, it could suggest assault to the head with multiple weapons, and that two blows with different weapons had connected with the same area of the parietal and representing puncture wounds caused by a weapon with an oval profile. It is also possible that the lesions are the result of healing of an area of radiating, comminuted fractures associated with the adjacent blade injury or a stab wound from a bladed weapon (Symes *et al.*, 2002). However, the characteristics of the lesions present the possibility of surgical intervention following the traumatic event.

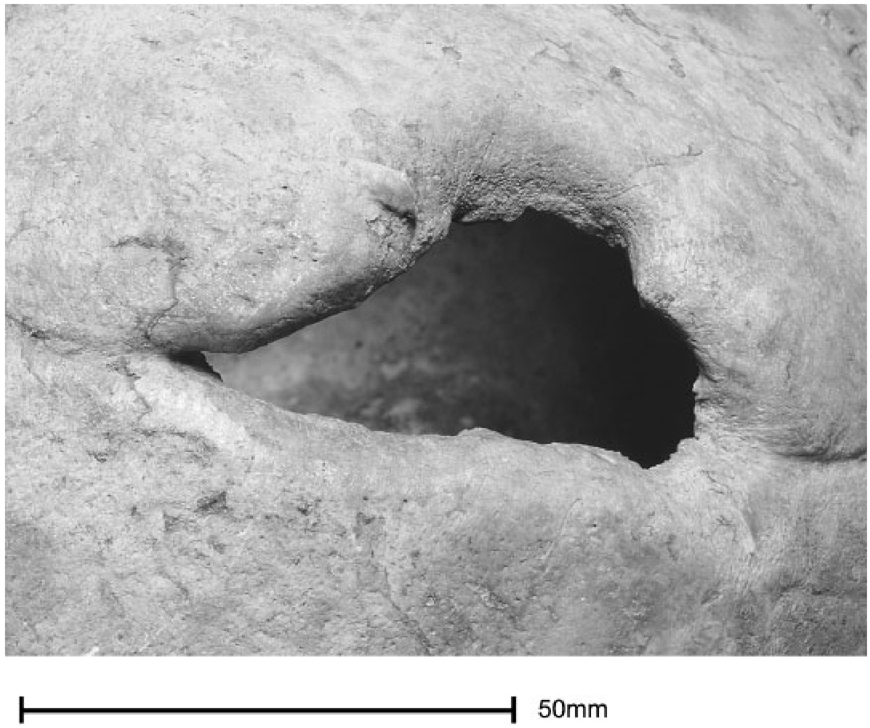

Figure 5. Detail of parietal injury showing bevelled oval lesion. (Photograph by Andy Chopping © MoLAS.)

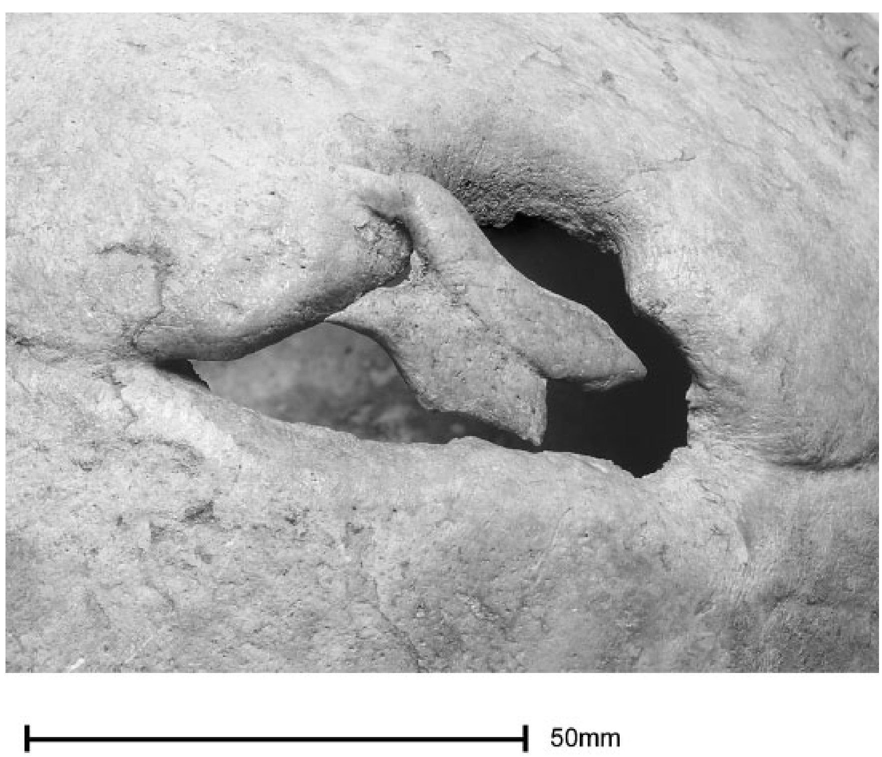

Figure 6. Parietal lesion with fragment in place. (Photograph by Andy Chopping © MoLAS.)

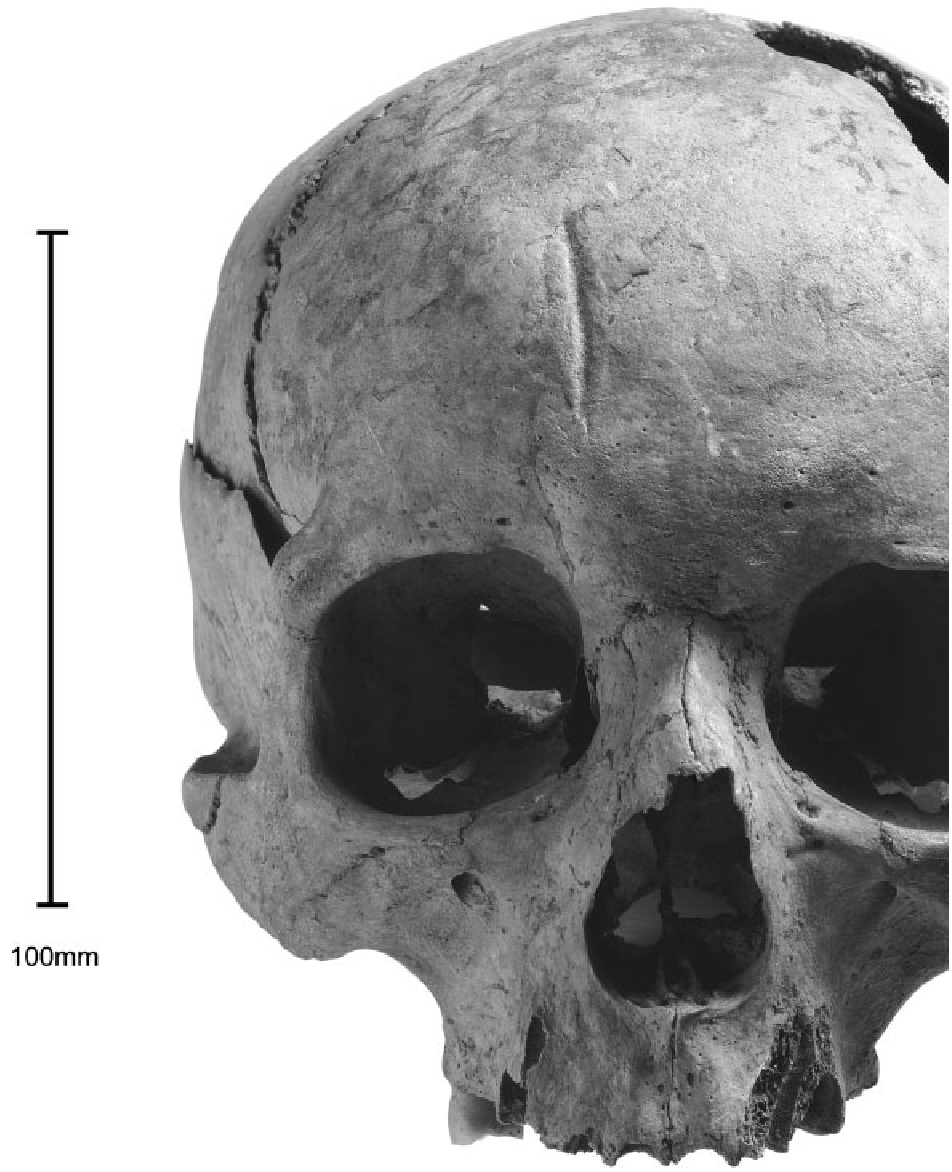

Figure 7. Anterior view showing frontal and nasal injuries. (Photograph by Andy Chopping © MoLAS.)

The angle of the major injuries suggests that both were made with the assailant behind the victim's head. The parietal injury is approximately horizontal whilst the occipital wound is acutely angled, sloping from back to front. Interpretation of this pattern is extremely difficult as it is not possible to determine if the attacker was changing the angle and position of the weapon, or the victim moving, perhaps to avoid blows, or as he fell. All wounds are on the right side of the cranium and the concentration of force on the parietal could have caused the head to move suddenly to the left side, resulting in a whiplash effect and subsequent soft tissue trauma (myositis ossificans) on the mastoid, though this could have been caused by unrelated or relatively minor muscle trauma (Mann, 1993).

The sequencing of the three cranial wounds was not possible, as there were no interconnecting fracture lines visible. Healing rates are

difficult to quantify, as discussed further with regards to treatment, but all cranial injuries appear to have similar amounts of new bone formation suggesting they are contemporary and the result of a single assault.

The irregular, lamellar bone on the surface of the frontal suggests a possible inflammatory response to this injury.

Discussion

Battle related trauma

The type, severity and location of the injuries to 19893 indicate a violent assault with an edged weapon (Ramey Burns, 1998; Courville & Kade, 1964; Wenham, 1989; Novak, 2000; Symes *et al.*, 2002). Was this an isolated incident, or are there any indicators to suggest that the injuries occurred during battle? Hershkovitz *et al.* (1996) attempted to determine if there was a pattern of skeletal changes that could be used to conclude that an individual was involved in hand to hand combat (in this case boxing). In addition to the expected fractures, they noted that certain areas of muscle attachment became enlarged, including the proximal part of the interosseous crest of the radii. Whilst the writers advocate caution in ascribing robusticity to combat related activity, it is interesting to note that 19893 had both well-developed muscle markings and signs of muscle trauma in the arms.

The pattern of lesions is not that seen in domestic violence where blows to the torso are common (Shermis, 1984). However, England during this period had a reputation for high levels of crime, civil unrest and associated interpersonal violence. Mays (1996) presented the example of a Suffolk man who, in 1327, was attacked by a mob who tied him to a tree and cut off his right hand. Whilst only the gentry regularly carried swords (Mays, 1996), other edged tools and weapons would have been more widely available. Studies of modern interpersonal violence show that men are far more likely to be both perpetrators and victims of assaults and are more likely to be attacked by people outside their immediate family group (Walker, 2001).

The size, angle and nature of the lesions suggests the use of a blade longer than 67 mm (the size of the largest cut), although a slicing action can allow a edged weapon to produce an injury that is longer than the blade itself (Wenham, 1989). The presence of fracture lines radiating from the termini of the blade injury has been shown to be more common in axe wounds than sword cuts as the wedge shape of an axe blade splits the cranium open further than the initial cut (Wenham, 1989). As the cranial injuries on this individual had healed it was not possible to definitively match the wounds with a specific bladed weapon, but the presence of terminal fracture on the parietal suggests that such a wedge shaped blade may have been used.

At Fishergate, York, Stroud concluded that the number of superior vault and occipital injuries suggested that no head covering was worn and questions whether military hand to hand combat could produce such patterns (Stroud & Kemp, 1993). An assemblage from a 15th century mass grave at Towton has since shown that multiple head and facial injuries such as those seen in 19893 are common in a battlefield situation (Novak, 2000). Waller (2000) stated that the head is the most common area for attack being the most vulnerable area, and Walker (2001) that the face is often the target area in modern interpersonal violence.

Wenham (1989) concluded that blow to the left side of the cranial vault probably resulted from formalized face to face combat with a right handed assailant, whereas blows to other areas of the skull (particularly the occipital area) indicated less formal fighting, that the victim had been in the process of retreat, or that they had already fallen. Work on remains from Uppsala, Sweden (Kjellström, 2002) found that, whilst parietal and occipital injuries tended to be left sided, frontal assaults resulted in right-sided injuries. However, Sciulli & Gramly (1989) noted that there was no clustering of 'hack' marks on the cranial bones of individuals in a mass grave associated with conflict in late 18th century Ohio. The pattern of injuries in 19893 conforms most closely to that noted by Kjellström (2002) as indicating a frontal assault, however given the inconsistency between the results from different

studies, caution should be exercised when interpreting these observations.

There was an absence of defence wounds in the bones of the forearms, though the hands were not present. Soft tissue injuries without skeletal involvement are possible and low rates of post-cranial injuries have been noted in other archaeological examples associated with battlefield sites, possibly as the result of fighting techniques that were deliberately targeting the head (Kjellström, 2002; Scuilli & Gramly, 1989). Blows to the head may have quickly incapacitated the individual, preventing him from fighting back.

There were certainly ample military campaigns and periods of civil unrest during the 13th century. There were a number of crusader expeditions in the 13th century and several battles on British soil in the same period, notably the 'Baron's War' of the 1260s which saw Prince Edward gathering his troops from the London populace (Smurthwaite, 1984). However, it is important to consider the affect of cultural factors on the patterning of violent injuries. It has been suggested that both viewing and taking part in organized violent and contact sports affects the individual assailant's technique (Walker, 2001). Therefore, the same pattern of injuries could be inflicted by a trained soldier (on or off the battlefield) or by someone who has been culturally exposed to a particular style of military fighting, even if they have not participated professionally.

Boylston *et al.* (2000) stated that stature has been important in the military since Roman times, but found no statistical difference between the heights of males of different ages at Towton, or between Towton and the medieval average. They concluded that, particularly during times of conflict when greater numbers of the general population were recruited, there was great diversity within the army in terms of both age and stature. Skeleton 19893 falls close to the Towton average stature of 171.6 cm and is similarly not significantly different from the average stature of medieval males. The robust nature of this individual would have made him a plausible recruit, as physical build and health status were also considered important for entry into the army (Boylston *et al.*, 2000). Unfortunately, there is insufficient archaeological or osteological evidence to definitively determine whether he was, or had ever been, a professional soldier and any attempts to suggest these injuries occurred in battle must, therefore, remain purely speculative.

Complications of cranial injury

Despite the serious nature of the injuries, no signs of inflammation were noted on either the endo- or ecto-cranial surfaces of the two larger lesions. This may be the result of later remodelling obscuring changes. Only chronic infection would result in bony changes (Weber & Czarnetzki, 2001; Schutkowski *et al.*, 1996). The high vascularity of the surrounding tissue helps to minimize infection (Aufderheide & Rodríguez-Martín, 1998) and lethal infections rarely occur unless the dura mater is damaged, but any injury perforating the inner table of the skull will leave the underlying tissues subject to bacterial invasion (Weber & Czarnetzki, 2001). The Towton excavation contained nine individuals with well healed cranial injuries showing no signs of infection (Novak, 2000) but post-traumatic changes have been seen archaeologically (Weber & Czarnetzki, 2001).

Such severe cranial injuries would be combined with great damage to the overlying tissues. A large wound would have occurred in the facial region, extending from the forehead across the eye to the side of the nose. This injury would have damaged the frontalis muscle and probably the orbital and nasal muscles, all of which are involved in facial expression (Gosling *et al.*, 1996). This would also have left a degree of facial scarring, as well as a slight irregularity to the shape of the nose. The injury to the occipital could have damaged the superior part of the trapezius muscle responsible for the elevation of the scapulae. The contraction of the fibres of trapezius could also have brought about the inferior displacement of the oval bone fragment. Associated laceration of the scalp would have caused considerable bleeding and, presumably, pain.

The degree of brain function impairment is impossible to determine from skeletal remains alone. The depth of penetration of these injuries presents the possibility of damage to the dura, though the apparent lack of infection and the long-term survival of 19893 may suggest this is not the case. Chronic headaches, memory loss,

motor and visual problems and psychological problems may all follow such a severe head injury (Wenham, 1989).

Treatment

The depth of penetration of sharp force cranial trauma and the associated vascular damage is the single factor that most affects individual survival. Laceration of the saggittal sinus and multiple cranial injuries greatly increase the risk of death (Weber & Czarnetzki, 2001). Although the wounds avoided the major blood vessels, their number suggests this individual had a greater chance of succumbing to his injuries. We cannot say with certainty that 19893 lived in the vicinity of the Hospital at the time of the injury, or was ever resident there, but the survival of such dramatic and multiple injuries raises the question of medical care.

The well healed nature of a fracture may not indicate treatment (Merbs, 1989): healing rates vary between individuals depending on age, health status, fracture type, location and so forth, although at least 6 weeks is required for healing of adult cancellous bone and 3 months for cortical bone (Paton, 1992). It may be considered that evidence of osseous reaction indicates that an injury occurred at least 7 days prior to death (Sauer, 1988) and that, under optimum conditions, callus formation takes 1–2 months (Ramey Burns, 1998). Weber & Czarnetzki (2001) quote mean healing times of 6–12 months in adults but once healing has occurred it is extremely difficult to estimate the interval of time which has passed between the assault and the eventual death of the individual (Boylston in press). The remaining gap present in the occipital cannot be taken as an indication that healing was incomplete, as it is common for larger wounds to never heal over completely (Birzle *et al.*, 1985 cited in Weber & Czarnetzki, 2001).

Non-intervention following trauma may help prevent secondary infection, but documentary evidence of the medieval surgical treatment of cranial trauma does exist. Hunt (1992) reproduces a number of illustrations from 13th century texts based on the treatise of Roger Frugard. Diagrams show the consultation of a patient with a headwound, his head bandaged. Cutting away loose skin and removing loose bone fragments cleans the wound. The accompanying text makes reference to treating damage to the dura and pia mater. Several illustrations demonstrate trepanation, either with a trephine or a chisel. Archaeological examples from the medieval period of surgery associated with cranial trauma, both healed and unhealed, have also been found throughout Europe (Buckley & Ó Donnabháin, 1992; McKinley, 1992; Weber & Czarnetzki, 2001). The characteristics of the lesions on the right parietal of 19893 seem compatible with these examples of surgery from the archaeological record, the external bevelling consistent with the 'scraping' method of trepanation (Buckley & Ó Donnabháin, 1992). Despite the danger of infection, Stewart (1958) states that more than 50% of 2000 skulls (from all periods) with trepanation had long-term survival and a further 16% had signs of partial healing. The formation of an extra dural haematoma in modern medical contexts has a 20% mortality rate and it is considered essential that it be drained using a borehole (Thomas, 1999). Trepanation would have been one way that the pressure could be relieved and fragments of fractured bone removed.

The post foundation medieval phases of the previous excavations at Spitalfields produced evidence of a number of plants growing in the environs that could be used medicinally (Davis, 1997). These included sedatives such as black horehound, analgesics like the opium poppy and henbane, and diuretics such as nettle and dandelion (Davis, 1997; McVicar, 1994). Today, in addition to surgery, diuretics are used to reduce pressure by shrinking the brain (Thomas, 1999). Absent from the list but used by the medieval herbalist, is lavender, its oil recently shown to kill streptococcus, pneumococcus, typhoid and diphtheria bacilli (McVicar, 1994). Whilst the presence of these plants does not indicate their use, they could have been available to the medical practitioner in east London.

Representativeness

A brief visual examination of approximately one third (*c.* 300) of the disarticulated crania from

St. Mary Spital, held at the Duckworth Collection, revealed six cases of cranial trauma. All were adult males and all were healed. The lesions ranged from a large (6 cm × 2.5 cm) well healed triangular depression fracture of the left frontal (SF 524) to a small probable depression fracture (SF 283) and included two sharp force injuries on the left frontal of SF 310 and 272, the latter showing signs of an inflammatory response. Initial assessment at St. Mary Spital revealed 16 other individuals with healed sharp force cranial trauma and two probable trepanation cases. Conheeney's work at Spitalfields did not find any cranial trauma (Conheeney, 1997), but other examples have been found in medieval cemetery assemblages in this country.

At St. Nicholas Shambles three out of 234 (7%) 11th and 12th century burials had evidence of cranial trauma, including one possible sword injury. None showed any evidence of healing (White, 1988). The cemetery associated with St. Margaret Fyebridgegate, Norwich produced 413 burials, 10 with cranial trauma. Most of these were male and healing was present in all but two. One individual had multiple sharp force wounds with possible penetrating injuries in the same area of the vault (Stirland, 1996). In addition to the numerous perimortem cranial injuries at Towton, one individual (Towton 16) had a well healed, sharp force injury to the mandible with no signs of infection (Novak, 2000). At St. Helen-on-the-Walls, York, 13 of the 1041 (1.6%) crania had traumatic lesions. All healed injuries were in the 11 male crania affected: four had healed sharp force injuries, two with considerable healing (Dawes & Magilton, 1980). At St. Andrew's Fishergate, two skeletons are described as having cranial lesions 'compatible with the interpretation of healed blade injuries' (Stroud & Kemp, 1993, p. 231). In addition there were 29 males with unhealed sharp force injuries, 16 of whom had cranial injuries. Excavations of a large cemetery dating from between AD 990 and 1536, at Lund in Sweden showed a cranial trauma prevalence rate of 1.9% (44 individuals). Of these, 13 had sharp force trauma and five of these showed signs of healing (Arcini, 1999).

The question of how unusual this individual was within the cemetery of St. Mary Spital, and in medieval London and Britain as a whole, can only be addressed by examination of the entire assemblage and the establishment of population based prevalence rates.

Conclusions

The skeleton under examination was that of a robust middle aged adult male, most likely to be in his forties at the time of death and approximately 172.40 cm (5 feet 8 inches) tall. He had suffered severe cranial trauma inflicted by a sharp edged weapon some years prior to death and also suffered from AS. It is possible that the cranial injuries may have been sustained in battle. The injuries were well healed, possibly with surgical intervention and certainly with care of the individual at time of injury, though the nature and level of this care cannot be determined. It is not clear whether the individual's survival was a result of 'luck' or 'judgement'. There would undoubtedly have been soft tissue complications, perhaps resulting in some impairment of brain function. It is not possible to determine whether there is any significance to the burial of the individual within a cemetery associated with a hospital, though forthcoming work may show whether the location and method of burial suggests any socio-economic differences. The examination of 19893 also provides us with a lesson in not underestimating the ability of past peoples to survive major trauma. As work begins on the analysis of the assemblage as a whole, this paper gives one small glimpse of the wealth of information it will provide.

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