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SHORT REPORT

Post-mortem Ablation of the Heart: a Medieval Funerary Practice. A Case Observed at the Cemetery of Ganagobie Priory in the French Department of Alpes De Haute Provence

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ABSTRACT The skeletal remains of a medieval warrior were found in an 11th century tomb in the church of Ganagobie Priory in the French Department of Alpes de Haute Provence. Examination revealed evidence of multiple injuries including an arrow in the thorax, several sword blows, and a fractured sternum. The chest had been opened probably to allow removal of the heart after the last fatal blow to the skull. Post-mortem ablation of the heart was a widespread medieval funerary practice among elite classes in northern Europe. Numerous cases have been described involving British and French royalty. The practice was based on a mystical Middle Age belief that the heart was the spiritual and moral centre. After ablation, the heart was buried separately in a high place of holy worship where the living could pray for the salvation of deceased's soul. The rest of the body was sometimes dismembered and boiled to keep only the skeleton. Pope Boniface VIII forbade body boiling in 1299. In France the practice of removing and burying the heart in a sacred worship place continued among royalty, noblemen, and ecclesiastics until the Revolution of 1789. A few cases were reported into the 19th century. Copyright © 2004 John Wiley & Sons, Ltd.

Key words: heart; ablation; sternotomy; thorax; funerary practice; middle ages

The heart held a wide range of symbolic meanings in Middle Age Europe. For this reason it was sometimes removed after death and buried in a high place of religious worship such as a church or monastery. This funerary practice was particularly widespread among royalty, noblemen, and ecclesiastics. The purpose of this article is to report the discovery in Provence, France of the skeleton of a Middle Age warrior who probably underwent post-mortem median sternotomy to allow ablation of the heart

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Description of the archeological site

A medieval cemetery was discovered and excavated during restoration of the Ganagobie Priory in the French Department of the Alpes de Haute Provence. The site extended northward and eastward from the edge of the priory church to the foot of a cliff overlooking the Durance River Valley. Nineteen stone sepulchers originally located outside have been covered during subsequent construction. Discovery of the tombs was made during work to uncover a Roman mosaic in the transept. The present report describes tomb number 10 which intersected with another tomb that had been placed across the lower extremities

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and covered by a small memorial chapel adjacent to the church at approximately the same time. This tomb was included in the first monastic cemetery dated, by the association of radiocarbon dating and archaeological context, to the beginning of the 11the century (Fixot *et al.*, 1996).

The Individual—t 10

The remains of a 50+-year-old man (using the standards of Ferembach, 1980; Lovejoy *et al.*, 1985), estimated stature approximately 1.75 m (Olivier *et al.*, 1978), were found in a grave dug into the ground. The tomb was lined with quadrangular stone blocks assembled with crude cement and featured a compartment for the head. The body had been buried in supine extended position with the hands on the abdomen (Figure 1). The well preserved skeleton displayed extensive evidence of traumatic injury involving the left upper extremity, skull and sternum. In addition to these injuries, which will be detailed in this report, the skeleton presented signs of mild diffuse arthrosis.

Figure 1. Skeletal remains found in tomb 10 uncovered under the church of Ganagobie Priory in the French Department of Alpes de Haute Provence. Arrows indicate wounds located on the left forearm, left elbow, and sternum. This picture also shows the lesion on the upper edge of the external end of the left clavicle and part of the lesion involving the skull.

Figure 2. Bones of the left elbow in anatomical position. The section planes of the humerus and olecranon, on the one hand, from the ulnar shaft, on the other hand, indicate that the blow was struck while the elbow was in flexion at an angle of about 140°.

Description of injuries

The upper edge of the external end of the left clavicle had been transected.

The left humeral condyle was transected diagonally downward and outward. The olecranon process of the left ulna was also cut midway up the greater sigmoid cavity. The section path was diagonal, downward and inward. Since the path of these two wounds followed the same plane at an 140° angle of flexion, it can be assumed that the elbow was transected in the bent position (Figure 2).

The bones of the distal third of the left forearm were also transected. The anterolateral quarter of the diaphysis of the left ulna was divided along a diagonal downward and outward path. The radius displayed a cut involving a quarter of the diaphysis along a diagonal downward and outward path. Detachment of the remaining fragments resulted from secondary fracture.

The skull presented a gaping 180 mm hole crossing the left posterior aspect from the upper part of the left temporal plate to the posterior aspect of the right temporal plate. The wound path was diagonally oriented forward, downward and toward the right (Figure 3).

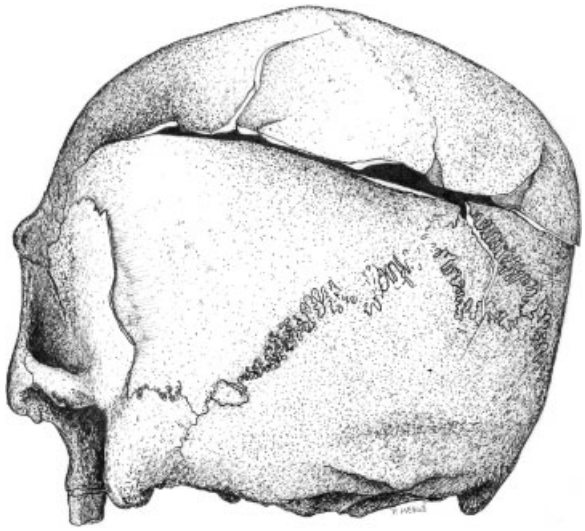

Figure 3. Drawing showing the posteroexternal aspect of the skull. The blow was struck from behind and went through three quarters of the skull vault.

The manubrium and gladiolus were not joined but the xyphoid process was completely calcified. The sternum was divided vertically into three parts. One incision in the sagittal plane completely separated the manubrium and gladiolus. Another, along the right lower edge of the manubrium, split the right side of the gladiolus into two parts thus creating a central band about 1 cm wide extending to the xyphoid process (Figure 4).

The surface of the sectioned bones was smooth and showed no sign of healing.

In addition, a metal arrowhead was found in the chest between the posterior arches of the 9th and 10th right ribs. The tip of the arrowhead pointed toward the back of the body but there was no discernible rib or vertebral damage (Figure 5).

Figure 4. Opening of the sternum. The cut on the left side failed to split the manubrium and thus did not open the chest. The cut through the middle resulted in complete midline sternotomy.

Figure 5. Metal arrowhead found inside thorax (scale in cm).

Interpretation of findings

Anatomical findings were consistent with combat injuries inflicted using one or several sharp edged weapons. None of them exhibits a trace of healing. It is possible to reconstruct the probable scenario and sequence of events.

The victim was hit first between the bottom ribs on the right side by an arrow shot from a distance. Although the relative position of the archer and trajectory of the arrow cannot be known, a plunging arrow shot from above would have perforated the lung while an arrow shot horizontally would have perforated the liver. Neither of these injuries would have been fatal and it is probable that the subsequent injuries were inflicted to finish the victim off. The wounded victim attempted to protect himself with his left arm.

A total of four blows were then struck using one or more sharp weapons wielded with great enough force to cut the clavicle, section the elbow and wrist, and split the skull. The injuries of the left arm would have led to section of muscle and

nerve tissue with the following functional consequences: section of the clavicle with division of the deltoid muscle preventing elevation of the arm; section of the elbow with joint dislocation and almost complete severing of the forearm; section of the forearm: functional disability and almost complete amputation of the hand.

The blows were most likely inflicted in ascending order; i.e. forearm, elbow, and shoulder. With an arrow in his right side, the victim probably offered little resistance. The wound pattern is characteristic of parry lesions. The blow to the left forearm was inflicted on the internal edge of the ulna which was probably turned upward in an attempt to protect the head with the forearm. The elbow was bent when struck. The fourth and final blow to the head was inflicted from behind, after the blow to the shoulder, and split the skull. The attacker must have been on foot and was probably armed with a heavy sword.

The wounds involving the sternum cannot be explained by this combat scenario, since the blow to the head was fatal, or by an uncontrolled frenzy since they are the only lesions other than the sword wounds. The person who opened the chest appears to have struck the sternum twice. The first blow failed to split the manubrium because the point of impact was too low and off centre. The second blow split the full-length sternum in the median sagittal plane. The precision of this blow supports the hypothesis that the purpose was to open the thorax as for a median sternotomy. The most likely explanation for opening the chest is to allow extraction of internal organs and mainly the heart. This was probably done not as an act of mutilation but rather as a medieval funerary practice. Post-mortem ablation of the heart has been described in numerous writings.

Comments

The place and conditions of burial were a major concern for educated classes of medieval society such nobles and ecclesiastics. Nobles maintained close ties to religious orders, churches or abbeys that they founded and/or contributed to lavishly. They wanted to be buried in these sacred places so that their souls could benefit from prayers for their salvation. The possibility of dying far from the chosen burial place was dreaded and bodies could be transported over long distances to be buried there (Golding, 1986).

In the Middle Ages the heart represented the whole body. Unlike modern man for whom the brain is the centre of higher function, medieval Christians saw the heart as the moral and intellectual centre. Saint Augustine contributed much to this attitude by describing the heart not only as the seat of intelligence, will power, memory, emotion, and other feelings but also as the authentic and indivisible source of life. The heart was considered as a receptacle in which a record of each man's life was kept. Artists often depicted the heart as an open book in the chest documenting good and evil deeds for the final judgment (Jager, 2000). God had a copy of this 'ledger' and sometimes made his own entries in the heart of saints. Based on belief in divine entries, the heart of a dead cleric bearing the 'odor of saintliness' was some times removed and examined. It was reported that the hearts of two Italian abbots contained images of Christ and the Holy Family and even nails from the Cross (Park, 1994).

Funerary practices differed greatly between Italy and Northern Europe. This discrepancy was due to a different conception of how the soul left the body. In the South, separation of the body and soul took place immediately while in the North separation was a gradual process. In Italy burial was done at the place of death and could be delayed for a few days by embalming to allow time to organize the funeral. In the North, i.e. France, England and Germany, there was a window of opportunity during which the living at the scene of death could intervene on behalf of the deceased (Park, 1995).

Several funerary traditions developed in Northern Europe but all involved removal and burial of the heart in a specially chosen place. The simplest method in terms of its principle but often short-lived due to poor technique was embalming by salt-curing. This process consisted of removing the heart, burying the rest of the viscera, which decompose rapidly, at the death site, and transporting the body to the final burial place wrapped in an animal hide after washing in wine and fragrances and then salting. This method was described in the *Chanson de Roland*, song CCXIII,

for the bodies of Roland, Oliver, and Archbishop Turpin: *'Their bodies bids open before his eyes; All their hearts in silken veils to wind; And set them in coffers of marble white; (. . .) After, they take the bodies of those knights; Each of the three is wrapped in a deer's hide; They're washen well in allspice and in wine'* (Anonymous, 1028). However putrefaction was often so great that the body had to be buried en route as was the case for the French King Charles the Bald in 877.

Warfare in distant places created special situations. After the death of the crusading King Baudoin the First in Egypt in 1118, his body was eviscerated, salted and transported to Jerusalem to avoid burial in a pagan land (Erlande-Brandeburg, 1975). When Henry the First died in France in 1135 his viscera including his brain and eyes were buried in Rouen and his body was returned to England for entombment in Reading Abbey (Brown, 1981). When Richard the Lion-Heart was fatally injured during the siege of Chalus near Limoges in 1199, he requested that his viscera should be buried on location, his heart in the cathedral of Rouen, and the rest of his body in the Abbey of Fontevreau (Dodson, 1994; Sawday, 1996). At his death in 1216 near Nottingham, King John of England had his viscera buried on location and his heart and body brought back to Worcester (Park, 1995).

Another mortuary tradition used in Northern Europe consisted of removing the heart and other viscera then dismembering the body and boiling the pieces in water mixed with wine and herbs. The viscera were buried on location whereas the skeleton and embalmed heart were returned. With possible variations according to circumstances of death and specific instructions, this method was referred to as the German Custom (*mos teutonicus*) because dismemberment was an early practice of the German nobility and clergy. In 922 this technique was used to transport the body of Bishop Hildesheim from Rome back to the German Empire (Schäfer, 1920). After the death of Louis IX of France (Saint Louis) in Tunis during the Crusades in 1216, his viscera were placed in a church in Sicily while his heart and skeleton obtained by boiling the dismembered body were ceremoniously returned home to France (Legoff, 1996).

The practice of boiling the dismembered body became the centre of controversy after the death of the French King Philip III in Perpignan in 1285. His son and successor Philip the Fair had the heart and viscera removed and the body boiled. The viscera were buried in Narbonne while the heart and skeleton were returned to Paris. The skeleton was entombed in Abbey of St Denis but the heart was left at the church of the Dominicans despite explicit instructions in the dead king's will that the heart also be placed at St Denis. In view of the almost public boiling of the body and violation of the king's last wishes, Pope Boniface VIII, who was already in conflict with Philip the Fair, issued a bull entitled *'Detestande feritatis'* on September 27, 1299 (Brown, 1981). After condemning what he referred to as the 'savage' practice of dismembering and boiling bodies after death, the Pope declared that death on Christian soil should be followed by burial and that remains could not be exhumed and moved until the flesh disappeared naturally into the earth. Violation of these rules led to excommunication and precluded Christian burial of the deceased. Although Boniface VIII restated his position on two different occasions in 1300 and 1303, his orders were not respected after his death. Some theologians asserted that he was a heretic because his concern against bodily partition proved that he did not believed that the divine power could gather scattered parts at the moment of resurrection (Bynum, 1991). The kings of France starting with Philip the Fair obtained dispensations from each newly elected Pope for themselves and their family. When Henry V of England died at Vincennes near Paris in 1422 his body was 'cut up and boiled' before being returned to his kingdom (Franchet, 1933; Dodson, 1994).

The practice of body boiling dwindled after development of effective embalming techniques made it unnecessary. However since the heart retained its symbolic importance, kings, nobles, and ecclesiastics with or without papal authorization continued the tradition of removing and burying the heart, embalmed or not, in a separate place. The construction of tombs in each burial place, e.g. for Richard the Lion-Heart, serves as proof that people of that time attributed equal importance to the heart and the rest of the body. The places of burial for viscera were often unmarked or less elaborate.

When Robert the Bruce, the King of Scotland, died in 1329, his body was buried in Dunfermline after ablation of the heart. In keeping with the king's wishes, his comrade-in-arms, James Douglas, aka 'Black Douglas', took the heart on Crusade to the Holy Land (MacNair Scott, 1996). On the way, Douglas was killed in a battle against the Moors at Teba, Spain in 1330. Tradition holds that just before dying Douglas hurled the receptacle containing Robert the Bruce's heart at the enemy. The heart was recovered and returned to Melrose Abbey in Scotland where a small 'conical casket' containing a mummified heart was found during archeological excavations in 1996 (Bonie, 2002). James Douglas' heart was also removed and is conserved in Saint Bride's Church along with the heart of one of his descendants (MacNair Scott, 1996).

Gradually separate burial of the heart changed from a strictly religious practice to a sentimental, aristocratic, or family tradition. When Queen Anne of Brittany died in Paris in 1514, her body was buried in the Abbey of St Denis and her heart was placed in a golden case in the cathedral of her native realm in Nantes. Until the French Revolution, the hearts of French kings and queens and of their children were placed in the churches of Paris. In 1715 the heart of Louis XIV was placed in the Church of St Paul & St Louis in Paris. After the French Revolution in 1792 all the golden and silver cases containing the hearts of royal family members were melted down upon order of the revolutionary authorities and the mummified hearts were sold to a painter. Since the Middle Ages painters used mummified organic matter as a pigment in oil to produce a paint called 'Mummy Brown'. In any case, the medieval practice of post-mortem ablation of the heart persisted in France even into the 19th century mainly for sentimental reasons. When the Duke of Berry was assassinated in 1820, his widow had his heart extracted and placed in a chapel where it remained until 1965 when it was moved to the Abbey of St Denis (Brown, 1981). In Switzerland the extracted heart of a bishop who died in 1882 was found in the cathedral of Basel (Weber, 1996).

The techniques and instruments used to open the thorax during the Middle Ages are obscure. Ablation was performed by various people. In some cases it was done by someone in the dead man's entourage, e.g. confessor for King John and fellow soldier for James Douglas. These people had little surgical experience but were familiar with cleaning animals killed during hunts. In other cases ablation was performed by non-medical professionals, e.g. a cook for King Baudoin or a butcher for Henry the First of England. The person who removed the heart of the warrior presented in this report probably had to strike the chest a second time after the first blow failed. The warrior's body was buried at Ganagobie Priory but we cannot know where the heart was buried. Since the body was not dismembered, it is likely that the deceased was buried shortly after the chest was opened.

This case is the first described in France at our knowledge. No archeological information have been found concerning the identification of this probable knight. It is comparable with a previous report describing a 12th century knight who probably died while fighting the Moors in Portugal. The skeleton's open sternum was interpreted as a fatal wound but it is likely that this finding was related to the practice of post-mortem heart ablation (Santos *et al.*, 1998). Careful examination of the thorax of high-ranking figures buried in medieval tombs should provide further documentation of this funerary practice based on mystical belief in the power of the heart.

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