A case of projectile trauma from the medieval Poulton Chapel, Cheshire, UK

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Introduction

Poulton Chapel is a multi-period archaeological site located in the village of Poulton in west Cheshire, UK (Fig. 1). The Chapel lies on the border of Wales. Excavations at this site began in 1995 and over 900 articulated human skeletons have been excavated so far. It has been suggested that this graveyard may contain upwards of 1500 burials (Burrell, 2018). Initial AMS radiocarbon dates suggest the site was occupied from at least the 13th to 16th centuries (Burrell and Carpenter, 2014).

In March 2011, SK535 was excavated. SK535 was a single burial situated on the north side of the Chapel. During excavation it was noted to be in an unusual burial position in comparison to previous skeletons excavated at Poulton. Its right arm was bent at the elbow crossing its thorax with its left in a normal extended position (Fig. 2a). During excavation, under the right arm, within the thorax, appeared a metal objected which on closer inspection was found to be an arrowhead (Fig. 2b,c). Further examination of the arrowhead, including radiographic analysis, showed it to be a Type M7 Bodkin, the first to be found in Cheshire and in situ with a burial.

Materials and Methods

SK535 is part of the Poulton Chapel Collection housed at Liverpool John Moores University, UK. The biological profile (age, sex and stature) of SK535 was assessed using standardised methods (Brooks and Suchey, 1990; Lovejoy et al, 1985; Walker, 2005; Rogers and Saunders, 1993; Phenice, 1969; Stewart, 1979; Buikstra and Ubelaker, 1994 and; Trotter and Gleser, 1952; 1958). Additionally, SK535 was subjected to full macroscopic and microscopic examination. Where applicable, radiographic review (anteroposterior and mediolaterally) were attempted. To evaluate SK535 in greater detail, a right maxillary first molar was extracted and submitted for Accelerator Mass Spectrometer (AMS) radiocarbon dating, paleodiet reconstruction ($\delta^{13}C$ and $\delta^{15}N$) and to investigate geographic origin ($^{87}Sr/^{86}Sr$ and $\delta^{18}O$).

Identification of the arrowhead found in situ within the thorax of SK535 was classified according to Jessop (1996). There are 10 different types of military arrowheads. Through the using of radiographic analysis and Computer Topography (CT) imaging at the University of Liverpool, the metal arrowhead discovered in SK535 can be identified.



Figure 1: Location of archaeological site located in the village of Poulton in west Cheshire, UK.



Figure 2: (A) SK535 in situ at Poulton Chapel. (B) Close up of thoracic cavity with location of the M7 Bodkin arrowhead, the tip and socket are indicated by white arrows. (C) Location of M7 Bodkin arrowhead after removal of the right arm and sternum.

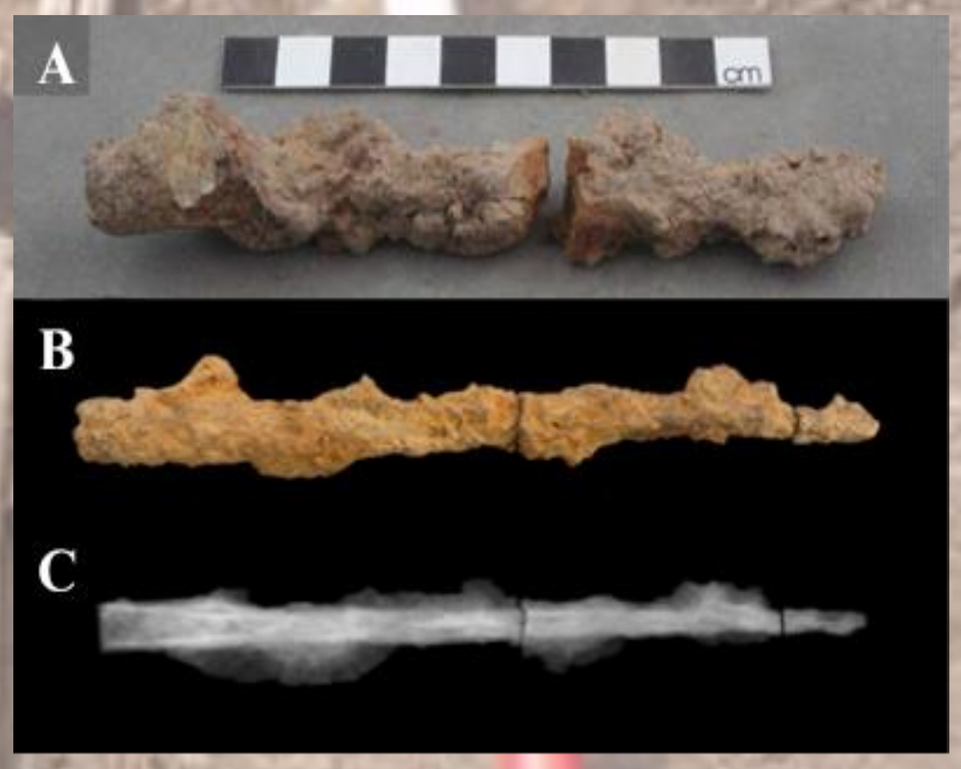


Figure 3: (A) Bodkin arrowhead before conservation B) Bodkin arrowhead after conservation. (C) Radiograph of the Bodkin arrowhead with circular socket which narrows into a very long thin point.

Results

Morphological features of SK535 suggest this skeleton is male. Age-at-death was estimated at 35 to 39 years of age and stature was as follows: 169.70 ± 3.27cm for the femur and 167.98 ± 3.29cm for the fibula. An examination of skeletal pathologies found very little. No abrasions, erosions, cut or animal marks were evident on any of the skeletal elements. There was no skeletal evidence of disease. However, a single healed transverse fracture on the distal aspect of the right ulna was reported (Canavan, 2014). It must be noted that the realignment of this trauma is remarkable, and no scarring was evident during radiographic analysis. This type of fracture is typically the result of a direct blow to the forearm sustained when the arm is raised to protect the head (Judd, 2008). Finally, and unsurprisingly, skeletal elements within the vicinity of the arrowhead presented a red/brown discolouration, likely oxidation staining from the metal of the arrowhead (Canavan, 2014).

Preservation of the molar sample allowed an absolute AMS radiocarbon dates to chronologically place SK535 within the Poulton timeline (AD 1280 to 1320) with a mixed marine and terrestrial diet. The result of the $^{87}Sr/^{86}Sr$ ratios and $\delta^{18}O$ values indicate that SK535 likely originated from an area lying west or south of Poulton Chapel (Evans et al., 2010).
During the excavation, the arrowhead was observed resting above the fourth to ninth right ribs, lying against the ninth thoracic vertebra (Fig. 2b,c). Examination of the object in situ suggested an approximate length of 14cm (Canavan, 2014). Further analysis provided clarification on the size, shape and cross-section of the shaft of the arrowhead. The arrowhead is 16cm in length (Fig. 3a) , has a short circular socket which narrows into a very thin long point with a diamond cross-section (Canavan, 2014). The results of this investigation suggest that this arrowhead is a Type M7 Bodkin arrowhead (Jessop, 1996). There are ten different military arrowhead types (Jessop, 1996) and the Type M7 Bodkin arrowheads was typically used during the 13th Century, which corresponds well with the AMS radiocarbon date of SK535 (1280-1320AD) (Fig. 3b,c).

Discussion

This case study represents a unique and interesting example of an M7 Bodkin arrowhead found in situ within the thorax of SK535. While all arrowheads could be used in war, the military arrowheads have been specifically designed for this. The M7 Bodkin arrowhead is the earliest of the specialised military arrowheads and is primarily designed to penetrate armour and continue through padded coats (Wadge, 2008). However, very few archaeological samples have been reported. Those that have been reported have all been dated to have been in use during the 13th century. The Type M7 Bodkin arrowhead is considered rare and the discovery of this arrowhead in situ within the thorax of SK535 adds further queries to this already sporadic anomaly.

Review of the palaeopathological literature of archaeological case studies with arrowheads embedded or in situ with human skeletal remains are very scarce. In this case study, SK535, the M7 Bodkin arrowhead was recovered from under the right arm, laid under the sternum and identified as resting above the fourth to ninth right ribs, lying against the ninth thoracic vertebra (Fig. 2b,c). This strongly suggests that this individual did not fall on to an arrowhead or that an arrowhead was placed inside the grave cut with SK535. However, this does suggest that SK535 likely suffered substantial soft tissue damage from the entry path of this M7 Bodkin arrowhead. Arrow wounds would have been remarkably common during the 12 to 13th century especially as longbows were generally attributed to the Welsh and later English armies. A wound to the thorax cavity, puncturing the major organs, could lead to an individual bleeding out. Interestingly, the osteological analysis of SK535 did not identify any skeletal evidence of peri- or ante-mortem trauma related to the entry wound of the M7 Bodkin arrowhead. However, it is possible that the M7 Bodkin arrowhead could have entered through the costal cartilage. With this, there is no skeletal evidence of infection in the thoracic cavity, or within the surrounding areas of the arrowhead. This suggests that time of death would have been relatively quick after the initial entry point of trauma.

To summarise, it is likely that SK535 could have been caught in the crossfire and wounded by an arrow carrying the M7 bodkin during medieval 13th century English-Welsh border skirmishes.

References

Brooks, S., Suchey, J.M. (1990). Skeletal Age Determination Based on the Os Pubis: A Comparison of the Acsádi-Nemeskéri and Suchey-Brooks Methods. Human Evolution. Vol: 5. 227-238. **Buikstra, J.E., Ubelaker, D.H.** (1994). Standards for Data Collection from Human Skeletal Remains. Arkansas Archaeological Survey Research Series, No. 44. **Burrell, C.L.** (2018). Skeletal Variation as a Possible Reflection of Relatedness within Three Medieval British Populations. Doctoral Thesis. Liverpool John Moores University, UK. **Burrell, C.L., Carpenter, R.** (2014). Analysis of Human Skeletal Material from the Poulton Research Project: 1995-2012. Archaeological report. **Canavan, S.M.** (2014). 'Arrowman' An analysis of a possible medieval cold case from Poulton Cheshire. MPhil Thesis. Liverpool John Moores Univeristy, UK. **Evans, J.A., Montgomery, J., Wildman, G., Boulton, N.** (2010). Spatial variations in biosphere 87Sr/86Sr in Britain. Journal of the Geological Society London. 167. 1-4. **Jessop, O.** (1996). A new artefact typology for the study of medieval arrowheads, Medieval Archaeology XL. 192-205. **Judd, M.A.** (2008). The parry problem. Journal of Archaeological Science. Vol:35(6). 1658-1666. **Lovejoy, C.O., Meindl, R.S., Pryzbeck, T.R., Mensforth, R.P.** (1985). Chronological metamorphosis of the auricular surface of the ilium: A new method for the determination: of adult skeletal age at death. American Journal of Physical Anthropology. Vol:68. 15-28. **Phenice, T.W.** (1969). A newly developed visual method of sexing in the os pubis. American Journal of Physical Anthropology. Vol:30. 297-301. **Rogers, T., Saunders, S.** (1993). Accuracy of sex determination using morphological traits of the human pelvis. Journal of Forensic Sciences. 1047-1056.**Stewart, T.D.** (1979). Essentials of Forensic Anthropology. Springfield, IL: Charles C. Thomas. **Trotter, M., Gleser, G.C.** (1952). Estimation of stature from long bones of American Whites and Negros. American Journal of Physical Anthropology. Vol:10. 463-514. **Trotter, M., Gleser, G.C.** (1958). A re-evaluation of estimation of stature based on measurements of stature taken during life and of long bones after death. American Journal of Physical Anthropology. Vol: 16, 79-123. **Wadge, R.** (2008). Medieval arrowheads from Oxfordshire. Oxfordshire Architectural and Historical Society. Oxoniensia. **Walker, P.L.** (2005). Greater sciatic notch morphology: Sex, age, and population differences. American Journal of Physical Anthropology. Vol:127. 385-391.

Acknowledgements

The authors would like to thank Alan Wilmshurst and Ray Carpenter of Chapel Archaeology for their support and patience in preparing this article. Thanks, to Robert Hardy, CBE for endorsing his personal time for the early phases of this research and guidance to experts in the field. Thank you to our colleagues, Thom Richardson from the Royal Armouries Museum, Ms. Klemperer from the Potteries Museum, Dr. Russ Savage from the University of Liverpool and Steve Newman Head of Metals Conservation for National Museums Liverpool for all their time, support and advice during the research, CT imaging and conservation of the arrowhead. Thanks to Dr. James C. Ohman during the original supervision of this study and finally, thanks to the Poulton Research Project for supporting this research.