H8 Case Studies and Patterns of Postmortem Dismemberment

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The goal of this presentation is to present three case studies on postmortem dismemberment through the joint surfaces, and discuss the patterns of tool mark damage to the soft tissue and surrounding and/or underlying bone.

This presentation will impact the forensic science community by suggesting a protocol for processing and analyzing cases of dismemberment through the joint surfaces.

Two patterns of postmortem dismemberment are commonly discussed in the cutmark literature: one in which the bones of the limbs or torso are transected, and the other in which dismemberment is executed via disarticulation through the joint capsules. However, the latter method is observed at much lower frequencies. A survey of cases from the C.A. Pound Human Identification Laboratory identified 34 instances of postmortem dismemberment over the past 37 years. Of these, 27 (79%) occurred through the bone, while 7 (21%) were through the joint capsules. Recently; however, the Pound Lab has seen an increase in cases of postmortem dismemberment through the joints, with four such cases since August 2007.

The majority of the literature on cutmark analysis focuses primarily on the characteristics of marks made directly in the bone. As such, analysis and interpretation of dismemberment through the joint capsule is often difficult, as many of the cutmarks are often found in cartilage rather than in bone. Additionally, implements typically used to cut through the joints, such as knives or scalpels, have fewer diagnostic class characteristics than saws, making them more difficult to differentiate. With the involvement of the soft tissue, a different approach to the processing and analysis of the remains may aid in identifying characteristics of the tools used in the dismemberment event. The current study provides an overview on how to process and analyze dismemberments through the joints by presenting three case studies, each involving a slightly different approach.

The remains from Case 1 were preserved in formalin by the medical examiner prior to arrival at the lab in September 2008. Dismemberment occurred at the major limb joints and between two cervical vertebrae. Cutmarks were found in the articular cartilage or in the non-articular bone immediately adjacent to the joint surfaces, and had characteristics consistent with a straight-edged (non-serrated) blade. While some tissue was removed during analysis, preservation in formalin precluded a more detailed analysis of the underlying bone.

Case 2, in April 2009, provided an opportunity for exploring different methods of preserving cutmarks in cartilage. Some of the remains were submerged in formalin; other joint surfaces were covered with damp towels to prevent drying and permit eventual examination of the subchondral bone. A cross-cut saw was used to transect the lumbar spine; a knife was used to dismember the shoulder and hip joints. The knife cutmarks were highly variable in morphology, ranging from smooth, straight margins to very ragged, irregular margins. This variability may be an artifact of the remains' exposure to the differing preservation conditions, however the use of two different implements cannot be ruled out. Analysis of the underlying bone failed to provide any further distinguishing characteristics of the knife.

In June 2009, Case 3 arrived at the Pound Lab completely skeletonized. As the remains were fully fleshed at initial recovery, photos provided by the medical examiner's office were used to visually assess the articular cartilage of the major joints. This case displays both patterns of dismemberment, with the shoulders and knees disarticulated through the joint capsules and the proximal femora transected below the lesser trochanters with a hacking implement. The articular cartilage displayed incised defects, gouges and scrape marks, some of which corresponded with defects in the subchondral bone. The morphology of the cutmarks observed within and adjacent to the joint surfaces is consistent with the use of a finely serrated blade.

After examining these three different cases, it appears that the best approach is a two phase analysis starting with an in-depth examination of the soft tissue followed by an analysis of the underlying bone after processing. As the soft tissue must be kept hydrated prior to processing, a prolonged period of analysis can lead to differential preservation conditions that may alter the appearance of the cutmarks. If the analysis is conducted over an extended period of time, preservation of the remains in formalin may be ideal to better preserve the diagnostic features of the cutmarks. It is important to note; however, that this approach largely precludes an analysis of the underlying bone. Further research on knife marks in cartilage and other soft tissue is needed, as these types of cutmarks may contribute valuable information to tool mark analyses in dismemberment cases.

Dismemberment, Tool Mark Analysis, Soft Tissue

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