



Physical Anthropology Section - 2013

H33 The Difficult Task of Assessing Peri- Mortem and Postmortem Fractures on the Skeleton: A Blind Test on 210 Fractures of Known Origin

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The goal of this presentation is to highlight the difficulties and pitfalls a forensic anthropologist has to face when diagnosing bone fractures as peri-mortem and postmortem.

This presentation will impact the forensic science community by showing how morphological and macroscopic evaluation on bone fractures has to be handled with care since the evaluation of a bone fracture as being peri or postmortem may be difficult, treacherous, and, at times, observer-dependent and thus influenced by knowledge, intuition, and training of the observer. If postmortem fractures can be detected more easily, on the other hand, peri-mortem fractures can be wrongly identified, especially when spongy bone is involved and when time has taken its toll on the remains.

In the field of forensic anthropology, differentiating between peri-mortem and postmortem fractures is one of the most difficult challenges. Indicators of peri-mortem injury have been identified (i.e., "green" characteristics of the fracture or fracture margin color), but most forensic anthropologists realize that determining between peri-mortem and postmortem fractures may be impossible. Few studies have focused on the error rate associated with classifying a fracture as peri- or postmortem. How many times will a postmortem or taphonomic fracture be mistaken for a peri-mortem fracture and vice versa? Which bones present the most difficulty?

The study goal was to evaluate the error rate associated with differentiation between peri-mortem and postmortem fractures. The study method was a blind test of two anthropologists with seven and three years of experience, respectively. Each anthropologist independently examined 210 fractures of known origin and classified the fracture as peri-mortem or postmortem.

Four skeletons were selected from a skeletal collection of 250 individuals who died in 1991 and whose skeletons were exhumed in 2001. These decedents were unclaimed and thus available for scientific research according to Italian Mortuary Police Regulations. Of these four skeletons, one had died of natural causes and three were pedestrians struck by motor vehicles: tram, car, and truck. All three motor vehicle accident victims had numerous blunt force, soft tissue, and skeletal injuries, that were documented during the autopsy.

For all cases, the number and sites of bone fractures documented during the 1991 autopsy were recorded as well as fractures observed on the exhumed remains. Fractures identified during the autopsy were designated as peri-mortem fractures. Fractures observed on the exhumed remains, but not documented during the autopsy were classified as postmortem fractures. The total number of fractures was 210. The two observers blindly scored all 210 fractures on the four skeletons as peri-mortem, postmortem, or uncertain. The results were analyzed by comparing the expected classifications with the observed classifications.

The results showed the observers were more accurate when classifying a postmortem fracture (75% accurate) compared to peri-mortem fractures (~45% accurate). Also, scoring postmortem fractures was easier than peri-mortem fractures; 16.5% of peri-mortem fractures and 7% of postmortem fractures were identified as uncertain. Bones with little cortical bone such as ribs and innominates were more difficult to score than long bones and skull bones.

Globally, this study illustrates the difficulty of differentiating peri-mortem from postmortem fractures in buried human remains. The correct identification of peri- and postmortem fractures is crucial to reconstructing the circumstances surrounding death, but macroscopic and morphological criteria are limited, and sometimes misleading. The study results serve as a cautionary note concerning interpretation of peri- and postmortem fractures as well as an invitation to search for novel methods of analysis (i.e., histology, immunochemistry, electronic microscopy) for differentiating peri- and postmortem fractures.

Blunt Force Trauma, Peri-Mortem, Postmortem