D66 Distinguishing Peri-mortem and Postmortem Fracture Patterns in a Mass Grave Scenario

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The goal of this presentation is to perform experimental research to simulate a mass grave with the intention of identifying the effects of taphonomy on fracture characteristics with relation to time-since-death.

This presentation will impact the forensic science community by showing how the research in this experimental study is novel in its goal to establish fracture characteristics and taphonomic changes within the context of a mass grave. This is significant in that the findings can be used to help establish time-since-death and cause-of-death for investigations involving human rights abuses.

Forensic anthropologists are often asked to assist in the investigation of international human rights violations. A review of the literature indicates that little research has been conducted on the occurrence of features as it pertains to distinguishing the peri-mortem interval from the postmortem interval. The purpose of this study is to perform experimental research to simulate a mass grave with the intention of identifying the effects of taphonomy on fracture characteristics with relation to time-since-death.

The research in this experimental study is novel in its goal to establish fracture characteristics and taphonomic changes within the context of a mass grave. This is significant in that the findings can be used to help establish time-since-death and cause-of-death for investigations involving human rights abuses. Despite the fact that such a study will only record a fraction of lethal injuries, it provides a better understanding of the manner in which taphonomic variables (in a mass grave setting) have the potential to mask evidence of a crime.

To replicate the conditions of a mass grave, a sample of ten intact pig carcasses were used. The sample of ten were euthanized in the same manner (by captive bolt pistol) and were transported to the NCSU field facility to observe taphonomic processes and the effect they have on fracture patterns. In addition to the original injury from the captive bolt pistol, each of the ten pigs received both blunt force and sharp force trauma. All ten pigs were then haphazardly interred together in an open grave to allow for observation and accelerated decomposition. In addition, to evaluate bone degradation, all ten pigs underwent a full body bone density scan prior to placement within the mass grave; they will be scanned again following skeletonization.

Documentation of trauma was conducted through gross morphological assessment, photography, diagrams, and charts; allowing for a detailed comparison to their appearance after exposure. However, this research remains within the initial data collection stage. Prior to the meeting, several macroscopic features will be observed: fracture outline, fracture edge, fracture angle, surface weathering, and color of the fracture surface—fractures will be determined as peri-mortem or postmortem based on these indicators. Observations were also made regarding stage of decomposition, insect activity, scavenging, and daily temperatures/precipitation.

In terms of interpretation, both statistical and morphological analyses will be implemented in order to find correlations between fracture characteristics. Categorical data analysis, such as logistic regression, will also be utilized to determine which specific taphonomic variables have more influence in disguising the peri-mortem interval for each type of trauma (gunshot wound, blunt, sharp). Additionally, variation between peri-mortem and postmortem changes will be examined using chi-square and odds ratio.

The null hypothesis tested is that taphonomic processes do not affect the appearance of peri- and postmortem fractures and it is expected that due to moisture retention from bodily fluids, fractures will appear peri-mortem into the postmortem interval. In addition, the pattern of skeletonization will be evaluated using three-dimensional spatial analysis (GIS). It is expected that the pigs on the periphery of the grave will skeletonize more quickly and the bone damage (fractures) will appear to be more characteristically peri-mortem than the pigs located in the center and bottom of the grave. Thus, this research should display how the conditions of a mass grave will simulate bone damage that will appear peri-mortem for an extended period of time and help establish guidelines for forensic scientists working globally in post armed conflict arenas.

Mass Grave, Fractures, Taphonomy

