H83 Burned Beyond Recognition: Attempts to Destroy Evidence of Death

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The goals of this presentation are to illustrate differences among postmortem and perimortem effects of burning to osseous tissues as a means to destroy evidence of death or identity; to describe techniques for identifying signatures of perimortem trauma in extremely burned skeletal remains, especially cranial bone; to demonstrate utilities of actualistic modeling as a tool for analyzing difficult cases of burned human remains; and to provide examples of intentional attempts to destroy human remains and traumatic evidence with fire.

This presentation will impact the forensic community and/or humanity by introducing techniques for differentiating perimortem and postmortem trauma in burned human remains.

Analysis of burned human remains presents many challenges since fire alters familiar personal features of hair, skin, fingerprints, and unique facial soft tissues used for visual identification. More extreme cases require additional methods developed in anthropology and odontology to assess the biological profile, unique features of osseous and dental tissues for personal identification, and presence or absence of traumatic injury. Intentional use of fire to obscure or destroy human remains complicates these analyses but does not render them impossible. Contrary to popular belief, burning human remains whether fleshed or as dry bone, does not completely destroy all evidence. Such cases are difficult to process since heat degrades organic structures of bone, creating embrittlement, deformation, and fragmentation of bone. Accompanying dynamic changes of human tissues with heat, external factors of impacts with fallen debris or intentional reduction by the assailant further complicates analysis of surviving remains. Experienced anthropologists recognize skeletal structures of age and sex in fragmentary bone, but analyzing traumatic injury in remains intentionally burned to destroy evidence of death during the perimortem or postmortem interval presents a challenging task for reconstructing fatal events.

The authors conducted a comparative study involving cases of traumatic death and intentional burning from repatriated Guatemalan sites known for indigenous genocide by their military within the past 30 years and experimental human cadaver burn research to test identification techniques of traumatic injury in cranial and long bones. For the control sample, the researchers replicated perimortem blunt force trauma in five fleshed crania, removed soft tissue, burned specimens in a dry or partially fleshed state, and compared signatures of skeletal injury with four traumatized crania and long bones burned in the flesh to examine differences of perimortem and postmortem burn patterns.

Presence of soft tissue contributed to visual differences between fleshed perimortem burn patterns and postmortem burning of partially fleshed or dry bone. Through experimental burn research with human cadavers it is understood how different anatomical areas of the body burn predictably from known distributions of soft tissues (skin, muscle, fat) around each bone. Fleshed specimens with perimortem trauma exhibited a range of color changes to bone, showing progressive heat damage over large exposed bones of the upper face and vault versus skeletal structures deeply protected by lower facial and neck muscles that remained unburned or less severely compared to the exposed vault. Dry or partially decomposed specimens with perimortem trauma presented different burn patterns with more consistent blackening and calcination of the exposed bone and teeth lacking soft tissue protection. Color changes were valuable distinguishers of perimortem from postmortem burning episodes.

Perimortem traumatic injury was more difficult to discern in fleshed and defleshed specimens. Intact cranial bone fractured naturally from heat stress. Preexisting traumatic fractures undergoing thermal alteration appeared different than natural heat-related fractures. Disruptions or weakness in bone structure from fractures, impacts, or penetration became early failure points as bone shrinks from heat exposure, intensifying these discontinuities and producing permanent deformation. Heat causes fractures to open and remain exposed, producing an eroded, worn, weathered appearance opposed to heat-related fractures created by shrinking in dry charred and calcined bone. Characteristics of traumatic and heat-related fractures should be examined following cranial reconstruction and not on individual fragments. Perimortem fractures produced in green bone were also compared to postmortem fractures in grease-free dry bone to simulate a prolonged postmortem interval and features of non-lethal breaks in bone (environmental and taphonomic factors noncontributory to death).

Known features of traumatic injury for experimental specimens were compared to reconstructed skeletal remains of the genocide victims excavated in Guatemala. Field samples examined consisted of

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individuals violently murdered and burned to destroy evidence of death or identity(1). Field cases were independently analyzed to test the validity and reproducibility of traumatic signatures in experimental research as an effective tool for modeling forensic casework. Successful techniques for identifying features of preexisting trauma in burned bone will be presented for use in the forensic community. Examples of both known traumatized features and case examples will be used to demonstrate effective techniques for identifying traumatic injury in burned human remains.

References:

1. REMHI (Recovery of Historical Memory Project) and ODHAG (Human Rights Office of the Archdiocese of Guatemala) *Guatemala Never Again!* Orbis Books Maryknoll, New York. 1999.

Burned Bone, Traumatic Injury, Postmortem Burned Bone

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