W11 Interpreting Blunt Force Injuries in Bone: A Hands-On Approach

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Learning Overview: After attending this presentation, attendees will have: (1) participated in several hands-on analyses of blunt force injuries of processed cranial and postcranial remains; (2) received peer and facilitator feedback on their analyses and interpretations; (3) acquired knowledge from a forensic anthropologist and pathologist on how fracture biomechanics methodology is used to interpret and validate fracture patterns and total body trauma in a medicolegal environment; and (4) experienced common errors in analysis and interpretation of broken bones.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing attendees with hands-on experience in analyzing blunt force injuries. Mentored, real-life case experiences are necessary for practitioners to develop expertise within their discipline. Informal, or formal, mentorship is crucial for novices to develop the schema and attitudes necessary for expertise development and self-regulated learning. Practitioners who encountered constraints in their work environment, such as a lack of skeletal resources and/or role models, express disappointment in their work, are less skilled, and are less confident than their mentored peers. In this workshop, current theoretical knowledge will be applied by practitioners and facilitators to assist attendees in using this knowledge in describing and interpreting bone fractures within a medicolegal investigation.

Anthropologists and pathologists are increasingly requested to analyze and interpret bone trauma in a medicolegal setting, but many professionals remain hesitant, ineffective, or unable to adequately address skeletal trauma. Blunt injuries are the most common in a medicolegal setting, with many practitioners receiving little diagnostic training. The absence of the proper utilization of skeletal trauma analysis may be attributed to a lack of understanding of bone biomechanics and exposure to casework and, in many institutions, an absence of adequate reference material from which to learn. Knowledge of basic biomechanics and fracture pattern recognition, with some exceptions, is key to the accurate interpretation of trauma in the human skeleton. Many anthropologists and pathologists learn theoretical bone trauma principles as well as research biomechanics and traumatic injury to bone. However, few practitioners are exposed to the cases in which this theory needs to be accurately applied and in which not all factors involved in producing the injury are known or can be identified.

The approach that allows for the interpretation of fractures lies in the biomechanical response of bone to an injury. "Biomechanical response" refers to the bone's reaction to stress/strain. Under stress, a bone bends elastically and, if the stress dissipates, the bone will return to its original shape. However, if the stress continues and a fracture occurs as expressed in plastic deformation, then the bone will consequently fail. Fracture characteristics, such as compression, tension, and shear, can be used to infer particular features of the force. These are the speed of the force, its duration, its size and strength, and the direction of the force. Simply put, assessing biomechanical forces generates far more interpretable data than "the bone was 'pushed in' here." Bending bone is the root cause of the majority, if not of all, fractures. Therefore, the biomechanical results are predictable, interpretable, and invaluable for forensic anthropologists and pathologists.

Blunt Force Injuries, Osteology, Total Body Trauma Pattern