H49 Methods and Techniques for Sorting Commingled Remains: Anthropological and Physical Attributes

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After attending this presentation, attendees will have a basic understanding of the methods and techniques commonly utilized by the federal government for sorting of commingled remains.

This presentation will impact the forensic community and/or humanity by assisting forensic scientists with the sorting and re-association of commingled remains. Methods will be discussed which have been utilized for a number of years in a federal capacity which have greatly improved the processing of human remains in mass fatalities.

With reference to personal identification, one of the most difficult tasks facing forensic scientists is the sorting of commingled human remains. Incidents commonly resulting in commingling of remains include explosions, fires, and genocide involving mass burials. Four major factors that determine the degree of difficulty in sorting commingled remains include 1) the number of deceased involved, 2) the degree of body fragmentation, 3) the degree of biological diversity among the deceased, and 4) the survivability of skeletal structures. The difficulty of sorting remains increases exponentially with the increase of the number of deceased, and the same is true with the increase of body fragmentation. In retrospect the greater the biological diversity among the deceased, and increase in the survivability of skeletal structures can lessen the complexity of sorting commingled remains.

Separation of commingled remains can be accomplished utilizing a combination of anthropological and serological methods. Anthropological methods can be broken down to osteological comparisons based on gross and metrical osteological analysis, and also by physical comparisons which include biological attributes such as hair and epidermal characteristics, evidence of scars, tattoos, pathological conditions or prior surgical intervention. Serological methods can include ABO blood typing and DNA comparisons.

The first step in dealing with commingled remains is the initial triage of the remains. Each body portion/fragment should be carefully examined to insure that it represents a single specimen. In many cases, the remains examined may initially appear as a single anatomical specimen – however, detailed examination can reveal the specimen to be actually composed of two or more anatomical structures that are not physically bound to one another. One cannot assume that the multiple anatomical specimens are from the same individual even though they may have been recovered together, or in close proximity to one another. Once a single specimen is identified it should be x-rayed as well as photographed. Radiographic examination provides a detailed record of what skeletal structures are present and can greatly assist in the anthropological assessment of the specimen/s. Additionally, radiological examination can help limit the amount of soft tissue dissection required for determining what skeletal structures are present. If a question about a certain specimen occurs later in time, it is much easier to access and examine the radiographic record vs. locating and examining the actual specimen.

Although soft tissue structures are important, it is the skeletal structures, which, in many cases, will provide the most meaningful answers relating to human identification. Upon documenting the skeletal and soft tissue structures present, including size and weight of the specimen an anthropological assessment based on gross morphology and/or osteometrics should be conducted. Biological assessment should include if possible sex, age, race, and stature in the case of intact long bones. Age estimates do not necessarily have to be specific, as a specimen can be assigned to a general age group such as infant, child, teen, young adult, middle age or senior. Other techniques, which can be useful in sorting remains, are alternate light sources such as UV lamps. Alternate light sources are particularly useful in the sorting of skeletonized remains. Skeletal elements, which share commonalities of physical make-up, environmental exposure will also share patterns of florescence. Similarity in the physical coloration of a skeletal specimen, such as in the case of tetracycline labeling which results in a yellow discoloration of the bone is also another comparative technique for separating remains. Other physical methods of sorting/re-associating skeletal elements include similarity of size, muscle marking and foramina patterning, articular surface morphology, matching of fracture sites, and articular fit.

Not only is the task of sorting commingled remains difficult but so are the issues concerning the final disposition of remains which cannot be separated or identified. Issues involving cultural or religious burial practices, family objections to common/group burials, and objections to common burial when commingled remains may contain anatomical portions belonging to a terrorist/s are problematic. The purpose of this presentation is to review the primary methods and techniques utilized by the federal government in sorting commingled remains in a number of different scenarios.

Commingling, Identification, Physical Anthropology

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