H23 Forensic Application of Epiphyseal Sequencing

Maureen C. Schaefer, MA, University of Dundee, Anatomy and Forensic Anthropology, Faculty of Life Sciences, University of Dundee, Dow Street, Dundee, DD1 5EH, Scotland*

The goal of this presentation is to revisit historic interest regarding the reported ontogenetic sequence of epiphyseal union. The accuracy of this information is tested in a forensic context and its applicability to assist in the re-association of commingled remains is evaluated.

This presentation will impact the forensic community and/or humanity by providing a test of the reliability of this method to aid the reassociation of commingled juvenile remains. Analyzing the sequence in which the various epiphyses unite can help to identify outlying elements that do not match the predicted developmental pattern of the remaining skeleton, thus indicating that the element may not belong to that individual. Of equal importance, identifying sequential patterns can also facilitate prediction of the likely maturity status of missing elements, thus assisting in prioritization of disassociated bones.

Commingling of remains is a significant problem in the identification of the Srebrenica missing. In an effort to better conceal evidence, the perpetrators of this massacre buried, exhumed, and then re-buried individuals in secondary mass graves. This resulted in mass graves with a high frequency of partial and disarticulated bodies. Many of the bodies that have since been exhumed by archaeologists are incomplete and/or commingled.

This presentation proposes the application of an approach that utilizes prediction of epiphyseal union sequence to identify misplaced skeletal elements in addition to predicting the developmental status of missing elements. This approach is a powerful aid for the re-association of commingled juvenile remains.

A review of the literature displays that the sequence of union has been addressed by several authors in the past but is an issue that has largely been neglected in a forensic context. Stevenson (1924) was the first to consider and identify the order in which the various epiphyses unite. He concluded that, “the sequence of union among the various epiphyses is observed to be exactly the same in every individual.” While Todd (1930) also reaffirmed this statement of exact order progression, (1934) was the first to suggest that ethnicity and perhaps socio-economic class may influence sequence. However he reported that within defined cohorts, order was consistent.

Despite these assurances, this study will show that sequence of union varies considerably. The research was undertaken utilizinga sample of 271 individuals, between the ages 13 to 30 from Srebrenica. Differences in ethnicity and economic status are unlikely to be major influences within this group as the town was reported to be largely ethnically homogenous with no marked socio-economic variation. Contrary to previous research, this presentation will show the value of including data on the sequence of beginning union and not just the sequence of complete union. This is an important distinction as consistent commencement of union in one epiphysis does not ensure that it also completes union first. Establishing dual spectra patterns provides optimal application for use in the sorting and reassociation of commingled remains by maximizing the variables available for assessment.

In conclusion, sequence of union should not be oversimplified if epiphyseal patterns are to be used in a forensic context. Full documentation of sequential variation must be examined for both the commencement and the completion of union if this information is to help with the re-association and identification of misplaced skeletal elements.

Epiphyseal Union, Commingled Remains, Bosnia

 ** Presenting Author*