A58 An Exploration of the Variation in the Sternal Rib Ends of Infants

Julia R. Prince-Buitenhuys, MA, University of Notre Dame, Dept of Anthropology, 611 Flanner Hall, Notre Dame, IN 46556; Deborrah C. Pinto, PhD, Harris County Institute of Forensic Science, 1885 Old Spanish Trail, Houston, TX 77054; Christian Crowder, PhD, Harris County Institute of Forensic Sciences, 1885 Old Spanish Trail, Houston, TX 77054; Jason M. Wiersema, PhD, Harris County Institute of Forensic Science, 1885 Old Spanish Trail, Houston, TX 77054; Sharon M. Derrick, PhD, Harris County Institute of Forensic Sciences, 1885 Old Spanish Trail, Houston, TX 77054; and Miriam E. Soto Martinez, PhD, Harris County Institute of Forensic Sciences, 1885 Old Spanish Trail, Houston, TX 77054*

After attending this presentation, attendees will understand the gross morphological variation of the developing human rib, in particular at the Costochondral Junction (CCJ) of infants up to one year of age.

This presentation will impact the forensic science community by providing insight into sternal rib morphological variation for infants between 0 and 12 months of age in order to improve the accuracy of fracture identification on the costal surface of the CCJ using macroscopic analysis.

While multiple studies have looked at fracture patterns in infants, little research has been conducted focusing on the topography of the anterior rib at the CCJ. Remote fractures at this location are difficult to identify due to the lack of data on morphological variation during development in normal infant ribs. This study examines the gross morphology of infant rib costal surface at the CCJ in order to establish what features are normal, likely the result of human development, and what may result from other factors, such as remote trauma and possibly pathological changes.

To address this goal, this study reviewed a total of 73 sternal rib ends from 39 individual cases ranging from the ages 0 to 12 months old at the Harris County Institute of Forensic Sciences (HCIFS). All cases but one received Cardiopulmonary Resuscitation (CPR). Case data on age and whether or not remote trauma was observed elsewhere on the skeleton was collected from the Infant Injury Database housed at the HCIFS. Traits on the costal face observed included pits, crevices, and bony spicules. Pits were defined as areas on the bone surface where there were holes or depressions with distinct, relatively sharp edges. Crevices were defined as areas on the costal surface where the bone folds over or into itself. Bony spicules were defined as outgrowths of bone on the costal face that were texturally distinct from the rest of the surface that disrupted the topography and protruded at sharp angles. All characteristics were scored according to presence or absence. Additionally, the number of pits present on the costal surface was tallied.

Pits were found on 57.5% of the ribs. The majority of ribs that had pits had more than one pit present on the surface (43.8% of the total cases). Most pits were found on ribs with ages of 0 to 3 months (76.2%). The correlation between age and the presence or absence of pits approached significance (X^2=16.479, *d.f.*=10, p=0.087); however, there was no correlation between presence of pits and the presence of remote trauma on the skeleton (X^2=0.190, *d.f.*=1, p=0.663). Crevices were found on only 37.0% of ribs. The presence of crevices was not correlated with age (X^2=14.174, *d.f.*=10, p=0.165). Crevice presence also did not correlate with the presence of remote trauma on the skeleton (X^2=0.220, *d.f.*=1, p=0.639). Finally, bone spicules were observed in 28.8% of the cases. The presence of bone spicules was also not correlated with age (X^2=12.157, *d.f.*=10, p=0.275) or with remote trauma on the skeleton (X^2=0.271, *d.f.*=1, p=0.602).

The results suggest that the presence of pits, crevices, and bone spicules are likely part of normal human developmental variation for this age group. The large amount of gross morphological variation observed on the costal face may limit the ability to diagnose subtle remote fractures or fracture healing on the costal surface of the CCJ macroscopically. This study therefore recommends the use of caution in diagnosing subtle remote fractures at the costal surface of the CCJ using macroscopic analysis based on these variants in topography when lacking other definitive indicators of trauma.

Infant Osteology, Rib Morphology, Trauma Analysis