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### A76 Sexual Dimorphism of the Manubrium in a Modern Forensic Sample

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After attending this presentation, attendees will be familiar with metric sex estimation using the manubrium in a modern forensic sample in the United States. Previous studies have used measurements of both the manubrium and the mesosternum to develop sex estimation methods; however, these methods tend to focus on only the manubrium length in combination with the other standard sternal measurements. The objective of this research is to test a sex estimation method using measurements that encompass the overall shape and articular surfaces of the manubrium, rather than just the length, in order to define sectioning points for males and females using the manubrium without the mesosternum.

This presentation will impact the forensic science community by offering further research into sex estimation methods using postcranial skeletal elements. This is important in cases where only postcranial elements are found postmortem due to taphonomic damage or animal scavenging.

Forensic anthropologists estimate sex as part of the biological profile that is created to aid with human identification. For this research, a sample consisting of 303 known individuals (202 males and 101 females) from the Hillsborough County Medical Examiner's Office in Tampa, FL, was used. All individuals in the sample were between the ages of 20 to 86 years old; any cases with arthritic changes to bone, open-heart surgery, or other medical disturbances were excluded. Seven total measurements were collected on processed manubria removed at the time of autopsy. Using sliding calipers, the traditional manubrium length measurement was collected, in addition to six newly defined measurements: superior manubrium breadth, middle manubrium breadth, inferior manubrium breadth, height of right and left costal notch one, and thickness of manubrium body.

A Discriminant Function Analysis (DFA) was run in statistical analysis software to determine which measurement, or combination of measurements, was the most accurate when estimating sex, as well as if any of these results were as accurate as the results found in previously published studies that also incorporated the mesosternal measurements. The highest cross-validation classification rates resulted when using all seven manubrium variables with 90.91% for males and 81.82% for females (86.37% overall). When assessing the individual measurements separately, the inferior manubrium breadth had the highest cross-validation classification rates of 77.14% for males and 81.25% for females, followed by thickness of manubrium body with 76.66% for males and 71.74% for females. The overall cross-validation classification rate was only 68.4% when using only manubrium height (the standard manubrium measurement).

These results are similar to those found by Bongiovanni and Spradley with an overall cross-validation classification rate of 84.12% when using both the manubrium and sternal body measurements.<sup>1</sup> By incorporating additional measurements that were created to capture more of the manubrium shape and morphology of the articular surfaces, the cross-validation classification rates increased to be comparable to those found when using the manubrium and mesosternal measurements. The goal of this study was to explore sexual dimorphism of the manubrium as an applicable technique to use in forensic anthropological casework; the results suggest that the incorporation of the proposed measurements of the manubrium can be used to estimate sex, especially in combination with other sex estimation techniques.

#### Reference:

4. Bongiovanni R, Spradley MK. Estimating sex of the human skeleton based on metrics of the sternum. *Forensic Sci Int* 219:290.e1-290.e7

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#### Manubrium, Sex Estimation, Discriminant Function Analysis