H61 The Use (and Abuse) of the Sacrum in Sex Determination

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After attending this presentation, attendees will have a better understanding of the use of the sacrum in sex determination, the most accurate measurements of the sacrum to use when determining sex, and the accuracy of the new measurements and techniques proposed.

This presentation will impact the forensic community by serving as a metric technique, cross-validated, for identifying sex in fragmentary human remains.

The sacrum has long been thought to be sexually dimorphic. Anecdotal evidence that the male sacrum is "narrower, longer and more curved" than the "wider, shorter and less curved" female sacrum is taught in osteology courses, presented in forensic anthropology references, and generally used in the field. A search of the literature yielded six publications and three published abstracts in which the authors attempted to quantify these morphological differences. The results of these statistical studies were highly varied, and none were conducted on modern American skeletal populations, making them questionable for their used in modern forensic cases.

The current study tests the validity of the use of the sacrum for sex estimation on two modern samples: the William Bass Donated Skeletal Collection at the University of Tennessee in Knoxville and the Maxwell Museum Documented Skeletal Collection at the University of New Mexico in Albuquerque. Both of these collections are of modern individuals who donated their bodies to the collections between the early 1980s and today. Date of birth, date of death, ancestry, and sex are known for these individuals, and medical history is known for many of them. A total of 114 males and 61 females were used in the analysis. Measurements were checked for errors and outliers, and aberrant values were removed. Discriminant function analysis (DFA) was performed on the data using Fordisc 3.0 (Jantz and Ousley 2005) and all reported classification percentages were cross-validated.

Of twelve measurements taken, three variables were found using stepwise variable selection that classified the sample 83% correctly. The single best measurement was the antero-posterior diameter of the first sacral vertebra (AD), followed by the (left) maximum auricular surface length (LA), and the anterior width of the sacrum at the level of the inferior auricular surface (MWI).

These measurements do not reflect the curvature of the sacrum, rather they reflect size and shape differences: males showed higher mean AD and LA but virtually the same MWI as females. Substituting the width of the sacral wings for MWI yielded the same correct classification rate of 83%. Further, the superior sacrum is dimorphic enough that using the transverse diameter of S1 (TD) and AD classified the sample 81% correctly. Using three variables that reflected sacral curvature (curved length, maximum depth of curvature and sacral length) did not classify the sample much better than by chance (61%). There appears to be too much overlap between the sexes in sacral curvature, which is overlooked when exemplary sacra are selected for teaching purposes.

This study indicates that dimorphism in the sacrum is useful for estimating sex from skeletal remains, but sacral curvature does not appear to be useful, at least with the measurements used in this study.

Sex Determination, Sacrum, Anthropology

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