H22 Sex Determination From the Hyoid Body

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The goal of this presentation is to elucidate the utility of using measurements of the hyoid body to estimate sex.

This presentation will impact the forensic community and/or humanity by demonstrating how the hyoid bone can be used to estimate sex in situations where critical skeletal elements for estimating sex are not available or as additional data for sex estimation.

Previous studies have shown that the hyoid bone is sexually dimorphic and can be utilized for sex determination of unknown skeletal remains. These studies are based on numerous measurements taken from x-rays or digital photographs. The current study illustrates that sex can be readily determined from three measurements, which can be obtained from the hyoid body directly. The method presented here will offer a relatively simple and reliable procedure for sex determination, particularly in instances of fragmentary, commingled, and/ or sparse remains.

Skeletonized hyoid bodies of 203 individuals (N= 132 males and 71 females) from an autopsy sample were measured in this study. Twentynine individuals under the age of 20, however, were eliminated due to confounding issues associated with growth and developmental processes. Age ranged from birth to 92 years with a mean age of 43.5 years. After individuals under the age of 20 years were eliminated the sample was composed of 114 males and 60 females. Three measurements were obtained to the nearest tenth of a millimeter using sliding calipers including, midbody height, maximum body height, and maximum body breadth. While each measurement was analyzed separately to understand the strength of discrimination between the sexes, it was determined that composite measurements may better discriminate between the sexes. The measurements were analyzed using SPSS 12.0.

Using an Independent Samples T-test the significance ($p<0.05$ confidence interval) for midbody height, maximum height, maximum breadth, and composite scores for maximum height plus maximum breadth and maximum breadth plus maximum height and midbody height demonstrated that the hyoid body is sexually dimorphic. The sectioning point between males and females was calculated by determining the mean from the two averages of the male and female groups. Using the sectioning point, the predictability of each measurement and composite measurements are as follows (mean +/- standard deviation). Using a sectioning point of 10.7 mm. for midbody height, 72% of males (11.4 +/-1.1 mm) and 80% of females (9.9 +/-1.2 mm.) were correctly identified. Using a sectioning point of 23.3 mm. for maximum breadth, 84% of the males (25.4 +/-2.6 mm.) and 83% of the females (21.2 +/-2.4 mm.) were correctly identified. Using a sectioning point of 11.3 for maximum height, 80% of males (12.1 +/-1.1 mm.) and 83% of females were correctly identified. Using a sectioning point of 34.6 mm. for the composite score of maximum breadth plus maximum height, 82% of the males (31.7 +/-
3.2 mm.) and 88 % of females were correctly identified. Using a sectioning point of 45.3 for the composite score of maximum breadth plus maximum height plus midbody height, 89% of males (49 +/-3.7 mm.) and 88% of females were correctly identified.

One important observation in this study is that there appears to be increased growth of the hyoid bone through the twenties and then stabilization of the hyoid dimensions after the age of thirty. This is especially apparent with the younger males who have a greater tendency to cluster with the females at a younger age. This may demonstrate a later cessation of hyoid bone growth for males.

In this study individual measurements discriminated between the sexes with great predictability values. When the composite of all three measurements were used sexual dimorphism increased for both males and females to almost 90% predictability. This easy, low technology and replicable method may be used to efficiently determine or confirm sex in cases where traditional skeletal elements to determine sex are absent or in commingling situations. However, caution should be used if it is suspected that the remains are from a subadult or young adult. In addition, data set limitations did not warrant comparison of different populations

Sexual Dimorphism, Hyoid Body, Forensic Anthropology

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