



## Anthropology Section - 2016

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### A11 Age Estimation Using the Sternal End of the Clavicle: A Test of the Falys and Prangle Archaeological Method for Forensic Application

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After attending this presentation, attendees will understand the reliability of a new age estimation method designed to increase the accuracy of aging individuals who were more than 40 years of age.

This presentation will impact the forensic science community by emphasizing the need for and application of age estimation methods that accurately age older individuals. This presentation discusses a new method for estimating age from the sternal end of the clavicle, as described in Falys and Prangle and tests this age estimation method on a modern American sample.<sup>1</sup>

Age estimation is a critical component of the biological profile in forensic and bioarchaeological contexts. The majority of these methods are most accurate for individuals of younger age cohorts, typically those less than 40 years of age. Skeletal degeneration can vary greatly between individuals, making age estimation less accurate for adult individuals. While there are some methods that attempt to age older individuals accurately and precisely, more research must be conducted to expand the range of methods available. Falys and Prangle developed a method for estimating age in individuals who were more than 40 years of age using three characteristics of the sternal end of the clavicle: (1) surface topography; (2) porosity; and, (3) osteophyte formation.<sup>1</sup>

In order to test their method, a sample of 1,510 individuals of known sex and age, ranging from 20 years to 101 years of age (males:  $n=1,112$ , mean=50.57, Standard Deviation (SD)=18.015; females:  $n=398$ , mean=53.065, SD=20.358), were drawn from the McCormick Collection and the William M. Bass Donated Skeletal Collection at the University of Tennessee.

The two estimation methods proposed in Falys and Prangle, regression equation and composite score, were tested to see how well they performed when applied to the collected data.<sup>1</sup> When applied to the collected data, the regression equation produced age estimations within the 95% confidence interval in 47.6% of the male sample and 57.4% of the female sample. Composite scores were calculated and compared to the corresponding age ranges provided by Falys and Prangle.<sup>1</sup> The composite scores of the male sample estimated the age of an individual more accurately than the composite scores of the female sample (male=65.9%; female=58.8%). The lowest estimation accuracy for both males and females was between 70 years to 79 years of age (male=46.0%; female=51.4%). From 80 years to 89 years of age, the accuracy increased for males (76.4%) and females (69.4%).

The sample also included individuals less than 40 years of age in order to test the applicability of this method. Multiple regression equations were generated: (1) individuals more than 20 years of age; (2) individuals less than 30 years of age; and, (3) individuals more than 40 years of age. The results from the multiple regression analyses show comparable Pearson's coefficients for the above-mentioned equations ( $r=0.690$ ,  $r=0.632$ ,  $r=0.611$ , respectively).

Spearman's rank correlation coefficients indicated a correlation significant at the 0.01 level for all three components individually, as well as the composite score. Of the three components, surface topography was most strongly correlated with age for both males ( $r=0.643$ ) and females ( $r=0.590$ ). Unlike the findings of Falys and Prangle, porosity was found to be the least correlated with age for both males ( $r=0.474$ ) and females ( $r=0.514$ ).<sup>1</sup> In addition, when broken down into ten-year intervals (40-49, 50-59, etc.), the correlation coefficients increased with advancing age. This suggests that the method becomes more accurate as the age of an individual increases.

The findings in the present study indicate that the sternal end of the clavicle has potential for use in age estimation in older individuals. Although the present study produced lower correlation coefficients than proposed by the original study in 2014, the results suggest this method has the potential to provide accurate and precise age ranges for older individuals.

#### Reference(s):

1. Falys C.G., Prangle D. Estimating age of mature adults from the degeneration of the sternal end of the clavicle. *Am J Phys Anthropol* 2014;156(2): 203–214.

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#### Age-at-Death Estimation, Clavicle, Forensic Anthropology