



Anthropology Section - 2015

A80 A Reassessment of McKern's and Stewart's Pubic Symphysis Aging Method

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After attending this presentation, attendees will understand how inter-observer error affects age estimates using the McKern and Stewart pubic symphysis method and the impact of such error on forensic casework.

This presentation will impact the forensic science community by drawing attention to limitations of a particular skeletal aging method.

In their 1957 study, *Skeletal Age Changes in Young American Males: Analysed from the Standpoint of Age Identification*, Thomas W. McKern and T. Dale Stewart presented a new “component system” of assessing age from the male pubic symphysis using a reference sample of plaster casts made from the symphyses of 349 American casualties from the Korean War.¹ In 1983, Katz and Suchey published a revised method of symphyseal age determination, a modification of Todd's system that condensed ten phases into six.² Subsequently, this six-phase method has become the standard in American forensic anthropology; however, in the Joint POW/MIA Accounting Command-Central Identification Laboratory (JPAC-CIL), the McKern and Stewart method is used when analyzing the remains of World War II and Korean War casualties, because they are drawn from the same population as McKern's and Stewart's reference sample. This reassessment of McKern's and Stewart's method looks at two questions: (1) how difficult is the method to apply properly; and, (2) how accurate is it when applied to samples drawn from the same population as the reference series?

For the first question, two data sets were assessed. The first is a table of phase scores made available by Lyle Konigsberg, which he and colleagues collected in 1999 from the Korean War symphyseal casts, using both McKern's and Stewart's and Todd's methods.³ Notably, Konigsberg et al. scored the same series of casts that McKern had scored to develop his method. The second is a series of 66 Korean War casualties identified since 2000 for whom full component scores were available.

McKern's discussion of the component system highlights the relationship between the three scores: I≤II≤III. He only recorded 21 combinations within the reference series (vs. 216 possible combinations), which he explained by this chronological relationship. Logically, Konigsberg et al. should have obtained the same combinations; if they did not, this indicates some degree of inter-observer error. However, they observed 21 combinations that violate the general chronological progression, indicating that they applied the method differently. This study rescored 162 of these casts and obtained the same total score on only 45. On 61 casts, this study scored two of the three components the same, and on 40 only scored one the same. On 33 casts, the casts were scored as further advanced than Konigsberg et al. (mean difference of 1.45), while on 84 the casts were scored as less advanced (mean difference of 2.06).

The CIL data set consisted of skeletal individuals who were not in the original reference sample, but were drawn from the same population. A similar pattern was evident: CIL analysts observed 15 of McKern's 21 patterns, as well as 13 not seen by McKern. In both series, scores of 0 appear less frequently than expected, particularly on the second and third components; this is probably due to the absence of reference casts for these values.

For the second question, the symphyseal casts of 50 individuals who were omitted from McKern and Stewart's sample but for whom ages are now available were scored and assigned age ranges to each based on summary component scores. Of the 50, the actual age of 31 individuals fell within the range identified by McKern and Stewart. Thirteen were older than predicted, with a mean difference of 1.67 years between the predicted maximum age and the actual age. Six were younger than predicted, with a mean difference of 1.55 years between the predicted minimum and the actual age.

These results indicate that the McKern and Stewart method is indeed difficult to use accurately, even for experienced physical anthropologists. Furthermore, while the age estimates that it produces are smaller than those of Suchey-Brooks, which is appealing in forensic cases, they may falsely exclude the actual age, particularly if the method is not accurately applied.



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References:

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 3. Konigsberg LW, Hens SM, Jantz LM, Jungers WL (1998). Stature estimation and calibration: Bayesian and maximum likelihood perspectives in physical anthropology. *Yearbook Phys. Anthropol.* 41:65-92.
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Age Determination, Pubic Symphysis, War Dead