A24 Bilateral Asymmetry in Age-Related Trait Expression of the Pubic Symphysis and Auricular Surface of the Ilium

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The goal of this presentation is to inform attendees about the consistency in age-related trait expression between the left and right portions of two popular skeletal regions for age-at-death estimation — the pubic symphysis and the auricular surface of the ilium.

This presentation will impact the forensic science community by providing a more nuanced understanding of age-related changes to the aforementioned joint surfaces and how this possibly affects current age-at-death estimation methods.

Currently, there are two major types of methodology for age assessment from the pubic symphysis and auricular surface — phase- and component-based methods.[1-4] Lovejoy et al. and Brooks and Suchey presented phase-based methods for age estimation from the auricular surface and pubic symphysis, respectively.[1,2] These methods are based on the gestalt of surface morphology, where traits are lumped together into phases. When present, both the left and right sides of these surfaces should be assessed. However, phase-based methods do not provide a means for incorporating information from both sides into a cohesive age estimate. This limitation is most obvious when left and right sides show differing morphologies. Component methods, on the other hand, score traits separately and each contributes independently to an age estimate. Buckberry and Chamberlain and Milner and Boldsen present component methods for the auricular surface and the auricular surface and pubic symphysis, respectively.[3,4] Like phase-based methods, Buckberry and Chamberlain suggest that both left and right sides should be scored, but do not provide a framework for incorporating information from both sides into a age estimate. Only Milner and Boldsen provide a means for incorporating left and right scores into a single age estimate.[4] The current study assesses asymmetry in trait expression of the left and right sides of the auricular surface and pubic symphysis to identify possible areas of uncertainty in age estimation.

The primary goal of the present study was to assess the agreement in left and right expression of three age-related traits of the pubic symphysis and five of the iliac auricular surface. The traits of the pubic bone are relief, texture, and margin morphology of the symphyseal surface. The traits of the auricular surface are transverse organization, microporosity, macroporosity, apical change, and retroauricular activity. These traits were scored on different locations of each surface (i.e., superior/inferior demiface) using a condensed scoring system based on Milner and Boldsen.[4] The study sample consists of 97 American White males and females aged between 20 and 66 years from the William M. Bass Donated Skeletal Collection. Left and right agreement was assessed using the Intraclass Correlation Coefficient (ICC). A two-way random model was used, with agreement type 95% tolerance interval. The ICC was used over other agreement statistics because it also accounts for the variability in scores between observations or trait expressions of antimeres.

Overall, the pubic bone shows higher agreement than the auricular surface. Pubic symphysis ICC scores are moderate to strong (symphyseal relief = 0.65, texture = 0.46, and margin = 0.70). Auricular surface ICC scores are poor to moderate (for transverse organization = 0.33, microporosity 0.49, macroporosity = 0.51, and apical change = 0.32).

These results suggest that age-related traits progress differentially between left and right portions. This result is especially true for the auricular surface. Component methods that incorporate left and right trait scores into a single age estimate, such as Transition Analysis, are preferable over phase-based or component methods that do not incorporate left and right scores into a cohesive age estimate.

References:

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