A113 The Validation of a New Age-at-Death Method Utilizing Osteoarthritis (OA) of the Shoulder

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Learning Overview: After attending this presentation, attendees will understand how OA of the shoulder may provide useful information for age-at-death estimation in forensic anthropological contexts.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating that forensic anthropologists may be able to utilize degenerative changes in the shoulder girdle for estimating age at death.

One of the primary challenges faced by forensic anthropologists and bioarchaeologists is generating age-at-death estimates. Recently, Brennaman et al. developed a method for adult age-at-death estimation which utilizes OA of the shoulder.[1] When new age-at-death estimation techniques are developed, it is necessary for other researchers to test the methods; therefore, this study is a validation of the Brennaman et al. methodology. The final sample was drawn from two skeletal collections: the William M. Bass Donated Skeletal Collection (*n*=129) and the 18th–19th-century documented skeletal collection of St. Bride's Church (*n*=60). Following the method developed by Brennaman et al., four joint surfaces were examined for osteoarthritis and scored: (1) the glenoid fossa of the scapula; (2) the head of the humerus; (3) the acromial facet of the scapul;, and (4) the lateral facet of the clavicle.[1] The ordinal scoring system was used to assess and document the prevalence of lipping, surface porosity, osteophyte formation, eburnation, and the estimated percentage of the bone surface area affected by each OA feature. The ordinal scores were tabulated to create composite scores and subsequently utilized to generate age-at-death estimates. Age-at-death estimates were generated using Brennaman et al. and were compared to individuals' real ages to understand the method's bias and inaccuracy.[1]

High inaccuracy scores (right shoulder=28.39; left shoulder=26.36) indicate that the method consistently did not generate accurate age estimates, with most ages underestimated. The scores for the acromioclavicular joint were frequently higher than the scores for the glenohumeral joint. Therefore, to assess whether the acromioclavicular joint surfaces were having a greater impact on the overall composite scores, a paired *t*-test was performed. The paired *t*-test results indicate that the lateral facet of the clavicle and the acromial facet had the greatest impact on overall composite scores in both the Bass Collection and St. Bride's Collection samples. Overall, the results from this study suggest that OA of the acromioclavicular joint may be a stronger indicator of age than OA of the glenohumeral joint.

There were several problems noted during the present research: (1) while numerous studies have shown that there is a correlation between OA and age, the variability in its presentation and prevalence was apparent in this study; (2) porosity was not common on the glenoid fossa and humeral head, and eburnation scores were low for all joint surfaces, except for a few severe cases; and (3) this method requires all four joint surfaces to be present, which will not always be the case in forensic and archaeological contexts. Additionally, future research of OA on the acromioclavicular joint surfaces may lead to the development of a new method of age-at-death estimation utilizing only this joint complex.

Reference(s):

1. Brennaman A.L., Love K.R., Bethard J.D., Pokines J.T. A Bayesian Approach to Age-at-Death Estimation from Osteoarthritis of the Shoulder in Modern North Americans. *Journal of Forensic Sciences.* 2017;62(3):573-84.

Age-At-Death, Osteoarthritis, Shoulder