



Anthropology Section - 2016

A83 Increasing Precision in Age Estimation From the Female Os Pubis: A Composite Technique With >80% Accuracy to Within Ten Years of Actual Age

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After attending this presentation, attendees will be familiar with the implementation of a new, continuum-based technique for estimating age from the female os pubis exhibiting 83.9% precision to within ten years of actual age (Author: 96.5%, Observer 1 (Ob1): 82%, Ob2: 74.9%, Ob3: 82.2%) and a further 67.7% precision to within five years of actual age (Author: 85.9%, Ob1: 56%, Ob2: 66.7%, Ob3: 62.2%).

This presentation will impact the forensic science community by introducing a highly effective, supplementary aging technique to be employed alongside those already in regular use for the estimation of age from the pubic symphysis. Additionally, as it is Computed Tomography (CT) based, this presentation will also add to the growing body of literature advocating for the adoption of proactive medical imaging into biological profiling research, as well as to that of age estimation in the living.

Age estimation from the pubic symphysis continues to be one of the most frequently researched and innovated topics in the field of forensic anthropology. Historically, methodologies have fallen into two distinct paradigms: phased, archetypal “picture-matching” techniques versus equation and weighted variable-based component systems. The methodology introduced by this presentation seeks to bridge this gap by combining the traditional, user-friendly “picture-matching” approach with both component and numbered variable elements and by placing morphological change along a continuum, allowing for variation as well as differences in individual senescence.

The proposed technique, the Truesdell Composite Method (TCM), was developed with the assistance of a mixed British sample of 585 female volunteers, all with verified ages (16 years to 93 years of age) and detailed life histories (gathered by this study in a series of face-to-face interviews cross-referenced with hospital records). In addition to parity, potentially confounding variables such as height, weight, race, activity level, diet, alcohol consumption, tobacco use, medications, infection and/or disease in or around the pelvic area, osteoarthritis and/or osteoporosis, hormone supplementation, and the use of birth control were also taken into account (though none bore any significance on accuracy). For comparison, both left and right pubic bones (volume rendered from CT) were assessed for each individual using the Suchey-Brooks Method for aging the os pubis, the Hartnett Method, and the TCM.^{1,2}

Subjects were placed into appropriate Suchey-Brooks ranges an average of 89.4% of the time (86.3%, author excluded), but only 49.4% (49.9%) of the time was the mean within a decade of the actual age and, within that, only 27% (26.9%) of the time was it within five years of the actual age. This is likely a reflection of the sample’s propensity toward older individuals (~50% over 65 years). The Hartnett Method fared less well overall, with subjects being placed into appropriate ranges 75.5% (70.4%) of the time but, within the ranges themselves, fared slightly better than Suchey-Brooks with means within ten years of actual age 65.4% (59.6%) of the time and 39.1% (33.2%) within five years. When using the TCM, estimations to within ten years of actual age increased to 83.9% (79.7%) and to 67.7% (61.6%) within five years. For Suchey-Brooks, this constitutes a 34.5% (29.8%) increase in precision to within ten years of the actual age and a 40.7% (34.7%) increase in precision to within five years. For the Hartnett Method, precision to within ten years was increased by 18.5% (20.1%) and to 28.6% (28.4%) within five years.

The proposed technique was not designed to replace established methodologies, whose reliability and efficacy are not in question. Instead, by bringing together the best and most effective aspects of two disparate paradigms, it seeks simply to increase precision, and therefore practitioner confidence (especially regarding older individuals), within the existing framework of the methodologies themselves.

Reference(s):

1. Brooks S. Suchey J. Skeletal age determination based on the os pubis: a comparison of the Ascaadi-Nemeskeri and Suchey-Brooks Methods. *Human Evol* 199-0;5:227-238.
2. Hartnett K. Analysis of age-at-death estimation using data from a new, modern autopsy sample - part 1: pubic bone. *J Forensic Sci* 2010;55(5):1145-1151.

Age Estimation, Pubic Symphysis, Medical Imaging

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