H28   **Pubic Symphyseal Age Estimation from Three-Dimensional Reconstructions of Pelvic CT Scans of Live Individuals**

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After attending this presentation, attendees will understand the growing role of computed tomography (CT) and digital imaging technology in forensic anthropology, specifically how these techniques are applied to age estimation of both living and deceased individuals.

This presentation will impact the forensic science community by demonstrating how three-dimensional CT (3D-CT) technology can aid in anthropological assessment of live individuals as well as remains that are not completely skeletonized, thus expanding the purview of forensic anthropology.

Age estimation is a critical component of the biological profile in forensic anthropology. The pubic symphysis has been widely studied and is thought to be a reliable indicator of skeletal age; however, traditional pubic symphyseal aging techniques rely on access to the bony pelvis, which is not always feasible. Such is the case with fleshed or partially-decomposed remains as well as living, undocumented individuals. In recent years, 3D-CT technology has been developed to visualize the skeleton digitally. These "digital osteology" techniques are employed by forensic anthropologists to establish aspects of the biological profile. Previous studies have been performed on 3D reconstructions of CT scans of dry pubic bones. The goal of this study is to test the applicability of 3D-CT pubic symphyseal aging to CT scans of living individuals performed using clinical parameters.

A sample of 44 patient abdominal-pelvic CT scans from the Boston Medical Center was analyzed retrospectively for age at the time of the scan. The scans were de-identified in compliance with IRB guidelines, and only the sex of the patient and age of the patient at the time of the scan were recorded. Representation of males and females was approximately equal, and the subjects' ages ranged from 19-89 years at the time of the scan. Three-dimensional images were created using the volume-rendering capabilities of OisriX software and analyzed for age using the Suchey-Brooks criteria for pubic symphyseal age estimation. The assigned Suchey-Brooks age ranges were compared to the age of the patient at the time of CT scan.[1,2] The images were analyzed randomly a second time to test for intra-observer reliability.

The features best visualized in the three-dimensional reconstructions were the symphyseal rim, the ossific nodule, and depression of the symphyseal face. The pubic symphyseal age estimates made based on the 3D images captured the true age of the subject 79.5% of the time, and intra-observer agreement was high (Krippendorff's alpha coefficient of 0.65). In cases in which the true age of the patient was not captured, the errors primarily concerned Suchey-Brooks phases III and IV. All misclassifications were underestimations (i.e. the actual age of the patient was higher than the assigned age range). Idiosyncratic variation in pubic symphyseal morphology could very well account for the majority of the error in this study.

The results of this study demonstrate that three-dimensional reconstructions of clinical CT scans of living individuals are useful for visualizing the pubic symphysis for forensic anthropological age determination. As radiological techniques and imaging software capabilities improve, digital osteology may be utilized even more frequently to assess age and other aspects of the biological profile in fleshed remains and in living individuals.

References:
[1.] Pixmeo, Geneva, Switzerland
[2.] Brooks ST, Suchey JM. Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri Methods. J Hum Evol 1990; 5(3):227-38.

Digital Osteology, Pubic Symphysis, Age Estimation