A85 Investigations Into Age-Related Changes in the Human Mandible

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The goal of this presentation is to examine age-related osteometric changes in the adult mandible.

This presentation will impact the forensic science community by demonstrating that, despite previous claims, mandibular shape changes are more correlated with tooth loss than advancing age.

Recently, Shaw and colleagues argued that the adult mandible changes significantly with age. Using a sample of Computed Tomography (CT) scans from 60 males and 60 females, Shaw et al. examined six mandibular measurements and found that as both male and female individuals aged, there were significant decreases in ramus height, mandibular body height (equivalent to chin height using the Forensic Data Bank definitions established by Moore-Jansen et al. — the latter term will be used here for consistency), and the length of the mandibular body, whereas the mandibular angle increased significantly.[1,2] However, Shaw et al. did not attempt to control for antemortem tooth loss, nor did they utilize the full set of standard mandibular measurements.

In order to more fully investigate the purported mandibular age-related changes, this study used a sample of 319 individuals from the W.M. Bass Donated Skeletal Collection (University of Tennessee (UT) Knoxville) and the Robert J. Terry Anatomical Skeletal Collection (Smithsonian National Museum of Natural History (NMNH)). A single observer collected the ten standard mandibular measurements and scored antemortem tooth loss according to the Eichner Index, which classifies tooth loss based on the presence of occlusal pairs. The sample consisted of 105 females with ages ranging from 17 to 99 years and 214 males with ages ranging from 16 to 84 years (total n=319).

A two-way Analysis of Variance (ANOVA) was used to determine if age, the Eichner Index, and the interaction between the two variables had an effect on the mandibular measurements. The current study found no significant difference between age and any of the standardized mandibular measurements ($p>0.05$, in all instances); however, significant differences were noted between the Eichner Index and three mandibular measurements: chin height ($p<0.001$), corpus height ($p<0.001$), and the mandibular angle ($p=0.031$). Additionally, no interaction was noted between age and the Eichner Index for any mandibular measurement.

The results indicate that no significant osteometric changes occurred in the mandible with increased senility, including ramus height, chin height, mandibular body length, and mandibular angle, as had been previously reported by Shaw and colleagues; however, significant differences between the Eichner Index and chin height, mandibular angle, and body height were found, suggesting that changes in the mandibular dimensions are more highly correlated with antemortem tooth loss than with age. It is widely known that socioeconomic gaps leave a large portion of the population without access to proper dental care; as such, antemortem tooth loss and subsequent mandibular shape changes may begin at an earlier age in these individuals. Alternately, such morphological changes may not occur or may be significantly delayed for those with better access to dental care. Given these findings, it may be necessary to re-evaluate previous notions of mandibular osteometrics and age, as these may be more a consequence of dental health than increased senility.

References:

1. Shaw RB, Katzel EB, Kolz PF, Kahn DM, Girotto JA, Langstein HN. Aging of the mandible and its aesthetic implications. 2010. Plastic and reconstructive surgery 125(1):332-342.
2. Moore-Jansen PH, Ousley SD, Jantz RL 1994. Data Collection Procedures for Forensic Skeletal Material. Report of Investigations No. 48. The University of Tennessee. Knoxville, Tennessee.

Mandible, Age Estimation, Osteometrics