



Physical Anthropology Section – 2007

H38 Ossification of Laryngeal Structures: As Indicators of Age

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After attending this presentation, attendees will understand the reliability of using the fusion of the greater horns of the hyoid and ossification of the thyroid cartilage as age indicators as well as the general trends of these processes.

This presentation will impact the forensic community and/or humanity by demonstrating how radiographic examination of the laryngeal structures from a modern forensic population can provide further data regarding these aging patterns and suggests that, while general trends can be noted, determination of a narrow age range is not possible.

A detailed literature search reveals conflicting conclusions regarding the pattern of ossification of the laryngeal structures, specifically the fusion of the greater horns of the hyoid and the calcification and ossification of the thyroid cartilage. While all studies agree that the two processes occur after the age of 20, there are disputes regarding the reliability of using the patterns of fusion and ossification for age determination.

Although Forensic Anthropology is a rapidly growing field, the reliance of Medical Examiners on anthropological experts is still below par. While skeletal remains or individual body parts are likely to find their way to a Forensic Anthropologist, sending decomposed, fleshed unidentified bodies presents logistical difficulties for many offices. Experienced Forensic Anthropologists may not be available locally, and unless the Anthropologist is willing to retrieve the body from the Medical Examiner's Office, an anthropological examination is unlikely. Radiographic analyses present a compromise to the current situation. Areas known to ossify with age such as the thyroid cartilage and costal cartilages are generally extracted during routine autopsies. The process of taking radiographs of such structures and developing the film can be completed in a matter of minutes, and can be ready for examination even before the autopsy has been completed. Because these radiographic techniques do not interfere with any standard autopsy procedures, it also presents an opportunity for Forensic Anthropologists to study large modern samples. Furthermore, the legal and moral issues faced when attempting to retain bone samples for analysis, are less frequently encountered.

In this study, 106 isolated laryngeal structures removed by the Medical Examiners during autopsy were radiographically examined. Fusion of the greater horns of the hyoid and thyroid cartilage ossification patterns were noted, along with the age, sex, and ancestry of each individual. Statistical analyses were run to determine if any significant correlation existed between the fusion and ossification patterns with age. These data were also analyzed for population patterns or trends to the results of previous studies.

Results conclude that although sexually variant trends may be noted, correlating the degree of ossification to such narrow age ranges as provided by previous studies, is neither practical, nor accurate. Ossification patterns were insignificant between racial groups. Likewise, fusion of the greater horns of the hyoid was proven to be erratic and only useful when fused to conclude that an individual is a middle-aged to older adult.

Traditional studies have presented theories suggesting the hyoid fuses, and thyroid cartilage ossifies with age, and that this information may be used to facilitate age determination. However, these older studies generally establish small sample sizes. The most well known study, conducted by Cerny in 1983 used a sample of five ossified thyroid cartilages to create general trends for age groups, which forensic anthropologists still refer to today. Examining these patterns on a modern, known sample improves and may serve to disprove the reliability of such techniques. Furthermore, a closer investigation may reveal that aging is likely only one of many influences in these processes, where ossification may only be related to age at death in a merely probabilistic way, similar to the probability of undergoing a particular process or event during a particular life span. This scenario is a far cry from the narrow age ranges applied to the hyoid and thyroid cartilage from past studies.

Thyroid Cartilage, Hyoid, Ossification