H33 Morphometrics Using Radiographic Study of Thyroid Cartilage for Age-Estimation in Korean Males

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The goal of this presentation is to show the results of a study on the analysis of the thyroid cartilage of unknown Koreans by morphometrics using radiography for age estimation.

This presentation will impact the forensic community and/or humanity by demonstrating the usefulness of thyroid cartilage for age estimation in Korean males and another method for age estimation using radiographic analysis of thyroid cartilage.

The need for accurate methods for age estimation has increased in the last decade. One reason is the increasing number of unidentified cadavers and human remains, and the other is a rise in cases requiring age estimation in living individuals with no proof of date of birth (Ritz-Timme *et al.,* 2000). Most of earlier studies of age estimation are focused on the hard tissue such as teeth and bones. However, studies about the soft tissue such as cartilage are fewer. The thyroid cartilage, the biggest among the laryngeal cartilages, undergoes endochondral ossification with age. There are several references on the patterns of ossification of the thyroid cartilage, but reports on quantitative analysis of ossification are lacking. The purpose of this study is to estimate the age of the Koreans whose age is unknown, based on radiographic analysis of the thyroid cartilage.

The thyroid cartilages were separated from the larynx and dissected from the surrounding connective tissue. Dedicated mammography was carried out in 124 specimens of the thyroid cartilages including 76 males and 48 females. Radiographed films were scanned and 17 quantitative measurements were carried out with Adobe® Photoshop® CS (version 8.0). Using this program, the scanned radiographs were converted into gray scales, with the command "Histogram," and it was possible to distinguish the pixels for ossification or calcification of thyroid cartilages. These measurements were analyzed using SPSS (version 11.0) statistical software package.

The radio-opacity increased with advancing age in both sexes, but the pattern of ossification was different. The data were divided into four age groups as follows: G0: age below 14 years, G1: age between 15 ~ 30 years, G2: age between 31 ~ 45 years, G3: age above 46 years. The discriminant functions for the age group and multiple regression functions for each age group were obtained for age-estimation of male subjects, but the application for female subjects was still limited due to the small sample size for each age. In male subjects, the ossification appeared first at the posterior border and spread along the inferior border, the anterior angle (anterior border) and the notch, and finally resulted in the formation of the window with advancing age. In female subjects, the ossification appeared first at the posterior border and spread into the middle and the upper part of the laminae, but the front parts of the lamina and midline remained cartilaginous.

This research indicates the thyroid cartilage is useful in estimating the age for Korean male subjects whose age is unknown. Further investigations must be conducted to verify its utility and the application in for female subject.

Thyroid Cartilage, Age Estimation, Koreans

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