H91 Morphometrics of the Korean Thyroid Cartilage for Determination of Sex

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After attending this presentation, the attendee will understand the results of a physical anthropological data of Korean thyroid cartilages applied for determination of sex of Koreans.

This presentation will impact the forensic community by demonstrating the usefulness of thyroid cartilage for sex determination in Korean and another method for sex determination using morphometric analysis of thyroid cartilage.

Each time a forensic anthropologist investigates the morphological characteristics of an unidentified victim who is badly decomposed or found in dried bones, many unknown questions are to be answered.[1] Among them, the answers to biological profile such as ethnicity, sex, age and statue are basic step to identify the victim. The biological profile could be estimated based on the knowledge of physical anthropology which is mainly collected by metric and non-metric characteristics of bones. However, studies about the soft tissue such as cartilage are fewer. The thyroid cartilage is located just below the hyoid bone and is the biggest cartilage in laryngeal cartilage. Similar to other cartilages and bones, thyroid cartilage is known to enlarge its size as the puberty onwards. Its sagittal diameter is nearly doubled during this process. Cho[2] reported the study concerning 22 items of measurement of the Korean laryngeal cartilage in both sexes, but difference between sexes after statistic procedures was negligible. The purpose of this study is to identify the sex based on the morphological analysis of the thyroid cartilage of Koreans.

The thyroid cartilages were separated from the larynx and dissected from the surrounding connective tissue. Specimens were surveyed with digimatic caliper (Mitutuyo Co., Japan) in 110 specimens of the thyroid carti- lages including 69 males and 41 females. In order to measure the angle of cartilage, each specimen was photographed (COOLPIX995, Nikon, Japan) with its anterior, both lateral and superior surface maintaining its anatomical position. Thirty items were measured including 20 surveyed items such as width of thyroid cartilage and ten measured items such as angle of superior horn. After the measurements, the statistic procedures were performed using SPSS software (Version 13.0, Chicago, IL).

The measurement value of distance between superior horns did not show difference between sexes, but other 29 items of measurement did show difference between sexes after the statistic procedures. Male subjects exhibited larger values mainly related with the size of thyroid cartilage such as width, height and length of thyroid cartilage and height of lamina than female subjects ($p<0.01$). On the other hand female subjects exhibited larger values related with the shape of thyroid cartilage such as angle of upper margin of lamina, angle of lamina in lateral view and angle of superior thyroidal notch than male subjects ($p<0.01$). Results of discriminant functions indicate that measurements related with the size of thyroid cartilage are significant factor when considering determination of sex for Koreans. Accuracy for Rt. and Lt. length of thyroid cartilage shows 100%, 99.1%, and Rt. and Lt. height of lamina shows 97.2%, 97.2% respectively. Furthermore, these measurements are convenient to measure at the fields.

This research indicates the thyroid cartilage is useful in determining the sex for Koreans whose age is over twenty. From the results of discriminat functions, it could be suggested that the demarking point as follows: (1) if each side length of thyroid cartilage exhibit larger value than 33.2 mm, then male, or (2) if each side height lamina exhibit larger value than 24.8 mm, then male. A further investigation is now conducting to verify its utility at the autopsy.

References:

1 Pickering RB, Bachman DC. The use of forensic anthropology. Boca Raton: CRC Press, pp 69-96, 1996.

2 Cho CK. Anthropological studies on the larynx in Korean. *The Seoul Journal of Medicine*, 1962;3(1):51-65 (in Korean)

Thyroid Cartilage, Sex Determination, Koreans

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