CASE REPORT

Early Ossification of Thyroid Cartilage

Golghate TD[1], Tambe SV[1], Meshram MM[2], Kasote AP[3], Rahule AS[3], Thakre BP[1]
Assistant Professor[1], Professor & Head[2], Associate Professor[3]
Department of Anatomy, Government Medical College, Nagpur, MS, India.
http://dx.doi.org/10.18049/jcmad/219a11

Abstract

Generally ossification of thyroid cartilage begins after 2nd decade and completed by the end of 6th decade of life. In this case report, early ossification of thyroid cartilage was observed during routine skeleton examination of medico-legal case. The bones were of human male of about 25 to 30 year of age. The thyroid cartilage was fully ossified. This early complete ossification of the thyroid cartilage signifies either malignancy or metabolic disorders. So, the knowledge of this anatomic variation would be helpful for early detection of different pathological conditions.
Key words: *Malignancy, Metabolic disorders, Ossification, Skeleton, Thyroid cartilage.*

Address for correspondence: *Dr. Shivpal V Tambe, Assistant Professor, Department of Anatomy, Government Medical College, Nagpur -440003. India.*
Mob: +918888707352, +918888954813, E-mail: shivtambe@gmail.com

Introduction

Ossification and calcification of the laryngeal cartilages have been widely investigated. Among these the thyroid, cricoid, and greater part of the arytenoid cartilages consist of hyaline cartilage that undergoes calcification and ossification as part of the ageing process. Premature calcification of cartilage in both the larynx and trachea is a rarity. Ossification commences about the 25th year in the thyroid cartilage and somewhat later in the cricoid and arytenoids. By the 65th year, these cartilages may be completely converted into bone. [1,2] The female thyroid cartilage never ossifies completely, leaving the ventral half cartilaginous. [3] A good understanding of the anatomy and the knowledge of variations in the laryngeal cartilage ossification is important for all clinicians especially while interpreting head and neck radiographs of patients who exhibit anatomical or functional deviations from normal.

In our case, we found complete ossification of the thyroid cartilage by around 25 to 30 years. This knowledge of anatomic variation will be useful for clinicians for diagnosis of various disorders.

Case Report

Skeleton of unknown species, age, and sex which came to our department for routine medico-legal investigation in sealed parcel. Parcel was opened and we noted the different bones in it. These were skull, mandible, and broken pieces of humerus, tibia, femur, hip bone, ribs, vertebrae and the thyroid cartilage. After examining all the bones, it was found that the skeleton remains are of human male around 25 to 30 years of age. The thyroid cartilage was then examined grossly, kept for maceration and precipitation test was performed. Thus, it was confirmed that the cartilage was ossified i.e., it became a bone and it was no more a merely cartilage.

Discussion

The framework of the larynx is made up of cartilages that are lined by mucous membrane, connected by membranes and ligaments, and moved by muscles. The thyroid cartilage is a major cartilage of the larynx. The skeleton of the larynx consists of 3 unpaired cartilages (thyroid, epiglottis, and cricoid) and three smaller paired cartilages (arytenoid, cuneiform,

and corniculate cartilages).The thyroid cartilage consists of two laminae of hyaline cartilage that meet in the midline in the prominent V angle of the Adam apple.The posterior border of each lamina is drawn upward into a superior cornu and downward into an inferior cornu. On the outer surface of each lamina is an oblique line for the attachment of the sternothyroid, the thyrohyoid, and the inferior constrictor muscles.[4,5]

The thyroid, cricoid, and greater part of the arytenoid cartilages consist of hyaline cartilage that undergoes calcification and ossification as part of the ageing process. The terms ‘‘calcified’’ and ‘‘ossified’’ are often used synonymously but calcification always precedes ossification when cartilage becomes transformed into bone. Premature calcification of cartilage in both the larynx and trachea is a rarity. [4]

Many authors have studied the thyroid cartilage ossification process using radiographic features for age estimation of individuals. The recent advances in imaging techniques would enable more precise evaluation of the ossification of the thyroid cartilage. Although a correlation between civil age and morphological changes was found, these methods based on thyroid cartilage ossification were not accurate enough for the assessment of individual age. [6] The degree and frequency of ossification of the thyroid and cricoid cartilage were lower in the females than in the males, especially in the anterior parts of the cartilages. [7]

Primary cartilaginous lesions of the larynx are relatively uncommon. In one of the case noted there was bilaterally pseudocystic lesion of the thyroid cartilage which was suggestive of progressive calcification, pathologic analysis showed features suggesting a dystrophic lesion with no evidence of malignancy. This might be due to repetitive microtrauma related to muscular overuse probably led to inflammatory changes at tendinous insertions on the laryngeal cartilage and resulted in dystrophic ossification of the laryngeal cartilage. [7]

In one of the 3-D CT demonstrated case there was medial convexity of the ossified thyroid complex (the lateral thyrohyoid ligament and superior cornu of the thyroid cartilage). So we can say the inflexible ossified laryngeal cartilages in elderly patients may not return to normal alignment following traumatic displacement. [8]

Although the thyroid cartilage frequently shows ossification after 20 years of age, it is not rare to see ossification below that age of 10 years. It has been shown that estimation of an individual’s age can in some cases be done by taking advantage of the degree of progression of thyroid calcification so long as the cartilage has remained preserved. This method has been used in paleoanthropology and forensic medicine to estimate the age of unknown skeletal remains. [9]

The variability of ossification of the laryngeal cartilage makes prediction of a pathologic condition from plain films unreliable. Frequently, the partly ossified cartilages create a diagnostic problem for the radiologist examining for foreign bodies. Within the laryngeal complex, the superior margin of the cricoid lamina often ossifies early, before the remainder of the signet portion of the cricoid. This linear ossification is often mistaken for a foreign body. [10,11,12]

In our case report, we determined the approximate age of the deceased by examining all bones in the skeleton which came to our department for medico-legal investigation and it was found to be around 25-30 years. We observed the thyroid cartilage which was almost completely ossified (Figure -1). As the ossification never complete by this age, it might be pathological and this might be due to metabolic disorders or malignancy. So, the knowledge of this anatomical variation would be useful for the clinicians to interpret different clinical condition.

Conclusion

From the above medico-legal case examination, it is concluded that there is early ossification of the thyroid cartilage. So the knowledge of this anatomical variation would be useful to interpret different clinical conditions.

Source(s) of support: *Nil*
Conflict of Interest: *None declared*

References

1. Mupparapu M, Vuppalapati A. Ossification of laryngeal cartilages on lateral cephalometric radiographs. Angle Orthod 2005; 75(2): 196-201.
2. Goldbloom RB, Dunbar JS. Calcification of cartilage in the trachea and larynx in infancy associated with congenital stridor. Pediatrics 1960; 26: 669-673.
3. Jurik AG. Ossification and calcification of the laryngeal skeleton. Acta Radiol Diagn (Stockh) 1984; 25(1): 17-22.
4. Snell RS. Clinical Anatomy by Regions. 8th ed.New Delhi: Wolters Kluwer/Williams & Wilkins, 2008, pp-308.
5. Gray's Anatomy. The Anatomical basis of Medicine and Surgery. 38th ed. Edinburgh: Churchill Livingstone,1995, pp-1638-1641.
6. Dang-Tran KD, Dedouit F, Joffre. et al. Thyroid Cartilage Ossification and Multislice Computed Tomography Examination: A Useful Tool for Age Assessment?. Journal of Forensic Sciences 2010; 55(3): 677-683.
7. Galline J, Marsot-Dupuch K, Bigel P, Lasjaunias P. Bilateral dystrophic ossification of the thyroid cartilage appearing as symmetrical laryngeal masses. AJNR Am J Neuroradiol 2005; 26(6): 1339-41.
8. Avrahami E, Harel M, Englender M. CT evaluation of displaced superior cornu of ossified thyroid cartilage. Clinical Radiology 1994; 49(10): 683-685.
9. Vlcek E. Estimation of age from skeletal material based on the degree of thyroid cartilage ossification. Soud Lek 1980; 25: 6–11.
10. Von Glass W, Pesch HJ. Zum. Ossification principle of the laryngeal skeleton of the human and mammals. Comparative anatomic studies. Acta Anat (Basel) 1983; 116(2): 158-67.
11. Kirsch T, Claassen H. Matrix vesicles mediate mineralization of human thyroid cartilage. Calf Tissue Int 2000; 66: 292-297.
12. Salman RA, Kinney LA. Calcified thyroid cartilage. Oral Surg Oral Med Oral Pathol 1990; 70: 806–807.