Cyst-like change in the thyroid cartilage: A developmental variant in children

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Abstract

Neck sonography is frequently encountered on ultrasound lists in the paediatric patient population. Anecdotally, one of the most frequent clinical indications is the investigation of a neck lump. While performing an ultrasound of the neck, structures other than those routinely assessed, such as the thyroid cartilage and mandibular cortex also come into view. Occasionally, pathology in these structures is also encountered, albeit less frequently. The purpose of this case report and review is to illustrate the ultrasound, computed tomography and magnetic resonance imaging appearances of cyst-like changes in the thyroid cartilage that are encountered in children, particularly in early adolescence.

Keywords

Thyroid cartilage, cysts, ultrasound, developmental variant, paediatric

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Case report

A 16-year-old male patient presented to the radiology department for an ultrasound of his neck with a history of intermittent swelling in the left submandibular area. On ultrasound, the palpable swelling corresponded to a prominent submandibular lymph node that was of normal architecture. The lymph node was not significant by imaging size criteria and demonstrated normal vascularity on colour Doppler studies. A few smaller lymph nodes were also noted bilaterally. Normal appearances of the thyroid gland and of the parotid and submandibular glands bilaterally were demonstrated. Incidentally, two well-defined, homogeneously hypoechoic, avascular structures were identified in the thyroid cartilage bilaterally (Figure 1(a) and (b)). At the time of the scan, the impression of benign, cystic cartilaginous lesions was made. However, a magnetic resonance imaging (MRI) of the neck was advised for further assessment and to exclude any sinister pathology.

Corresponding to the two focal areas of abnormality identified on ultrasound, two small well-defined areas of signal abnormality that were of high signal on the fat-suppressed sequence (Figure 2(a)) and of intermediate

signal on the T1-weighted sequence (Figure 2(b)) were seen. Apart from a few lymph nodes that were accepted to be within normal limits, no other abnormality was present.

On the follow-up ultrasound scan acquired two months later, the hypoechoic thyroid cartilage lesions appeared stable in size and sonographic characteristics. No new focal cartilaginous lesions were identified.

Discussion

Focal lesions of the thyroid cartilage are rare. Cases of chondromas, chondrosarcomas, degenerative cysts of the thyroid cartilage, possible post-traumatic cysts and another that may have been associated with post-radiotherapy cystic degeneration have been described in

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Figure 1. (a) Sonographic images of the right side of the neck in transverse section demonstrating symmetrical, bilateral, well-defined, hypoechoic structures in the lamina of the thyroid cartilage, (b) two hypoechoic lesions with the impression of posterior acoustic enhancement in the right thyroid cartilage lamina on sagittal imaging and (c) avascularity of the lesion is seen on colour Doppler studies.

the adult population.^{1,2} Differentials of inflammatory and infectious lesions have been suggested.

A review of the literature has not revealed any reported cases of focal cystic or solid lesions in the thyroid cartilage in the paediatric population. A review of cervical imaging in our department has, however, revealed that focal changes similar to the case we

describe are encountered in the thyroid cartilage as an incidental finding on ultrasound, computed tomography (CT) and MRI imaging. These appearances are commonly seen in the adolescent age group and anecdotally, only among boys. Figure 3 illustrates two examples, where CT scans of boys aged 13 (Figure 3(a)) and 17 (Figure 3(b)) demonstrate symmetrical

Figure 2. Axial MRI images of the neck demonstrating a well-defined high signal lesion in both thyroid laminae on the STIR sequence (arrowed) (a) and isointense signal characteristics of the lesions on the T1-weighted sequence (b).

hypoattenuating foci within the thyroid cartilage. As per the definitions used in the article by Zan et al.³ on the CT appearances of the arytenoid cartilage, foci of soft tissue attenuation within hyaline cartilage may be considered as 'nonmineralised' cartilage, high attenuation foci as 'calcification'. Ultrasound images from two other boys aged 13 (Figure 4(a)) and 14 (Figure 4(b) and (c)) reveal symmetrical hypoechoic foci similar to the case presented. The varying degree of echogenicity within these foci may relate to the stage of mineralisation.

Endochondral calcification is a process, whereby a temporary cartilaginous structure is transformed to a permanent calcific framework, which is more suited to withstanding the mechanical forces sustained in adult life. Calcification of the laryngeal cartilage is postulated to occur secondary to tensile forces created by the contraction of attached muscles.⁴ By the period of adolescence, most of the physal plates have fused, and the majority of the skeleton has become ossified. The process of mineralisation, calcification and ossification of the thyroid cartilage, however, commences only once the larynx has reached its maximal dimensions and this usually occurs between the ages of 15 and

Figure 3. (a) Axial CT image of the neck of a 13-year-old boy and (b) of a 17-year-old boy at the level of the thyroid cartilage, demonstrating well-defined, symmetrical, hypoattenuating lesions in each thyroid lamina (arrows).

20 years, possibly slightly later in females than males.^{5,6} Calcification of the cricoid and arytenoids tends to happen after thyroid cartilage calcification.⁷ The predicted pattern of calcification in both sexes starts at the postero-inferior border of the inferior horn of the thyroid cartilage with most of the thyroid cartilage in the male population being ossified by the approximate age of 70.⁵ Partial calcification of the thyroid cartilage tends to occur in the female population, with the anterior half of the cartilage remaining cartilaginous.⁵ Regions which remain unossified within the thyroid laminae, often till late adulthood, are described as radiolucent 'windows'.⁸

In our experience, cyst-like changes within the thyroid cartilage have been most commonly identified in the adolescent group, are in the majority of cases present in both thyroid laminae and are generally in symmetric locations in the posterior half of the inferior aspect of the thyroid laminae. The exact reason for

Figure 4. Sonographic images of the thyroid laminae in a 13-year-old boy (a) and 14-year-old boy (b, c) revealing hypoechoic lesions with variable internal echoes (arrows) which may be related to the varying stages of mineralisation.

these appearances is unclear. The temporal nature and location of these observations lead us to hypothesise that the findings observed are developmental and are likely related to the pattern of mineralisation and calcification that occurs in the adolescent age group.

Conclusion

Calcification and endochondral ossification of the thyroid cartilage occur in a predicted pattern with an onset in the adolescent population. Incidental cyst-like changes in the thyroid cartilage are occasionally noted on multimodality imaging in the paediatric population.

These appearances are thought to represent a developmental variant that relates to the process of mineralisation and calcification. In our opinion, changes in the thyroid cartilage similar to the ones described above, when identified in a paediatric patient, should be regarded as incidental findings that are of no clinical significance.

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Ethical approval

Written consent was obtained from the parent of the child to publish the images and details of the case.

Guarantor

KC.

Contributorship

KC researched the literature and wrote the first draft of the manuscript. SA guided in the preparation of the manuscript and collated the cases.

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