

Triticeal cartilage calcification: radiographic features in plain radiographs

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ABSTRACT | The triticeal cartilage (TC) is a tiny oval-shaped cartilage located at the lateral border of the thyrohyoid membrane between the hyoid bone greater horn and the thyroid cartilage superior horn. The exact function of TC is unknown; it has been proposed that TC was the site of the attachment for the triticeoglossus muscle. On panoramic radiographs, calcified TC may be observed in the soft tissues of the pharynx region, positioned inferior to the greater horn of the hyoid bone and adjacent to the superior border of the C4 vertebrae. The major concern of a calcified TC found incidentally in a routine radiographic examination is the differentiation between this alteration and other calcified tissue manifestations that require additional investigations, such as carotid calcified atheroma artery or other neck pathology such as foreign bodies. Thus, this report describes 3 cases in which TC calcifications were incidentally found in panoramic radiographs.

DESCRIPTORS | Panoramic Radiograph; Oral Diagnosis; Hyaline Cartilage; Cartilage.

RESUMO | **Calcificação da cartilagem tritícea: características radiográficas** • A cartilagem tritícea (TC) é uma pequena cartilagem de formato oval localizada na borda lateral da membrana tireo-hioídea entre o corno maior do osso hioídeo e o corno superior da cartilagem tireoídea. A função exata do TC é desconhecida; sugere-se que a TC é o local de inserção do músculo trireoglossos. Nas radiografias panorâmicas, a TC pode apresentar-se calcificada, posicionando-se inferiormente ao corno maior do osso hioídeo e adjacente à borda superior da vértebra C4. O principal diagnóstico diferencial da calcificação da TC é a presença de ateroma calcificado da carótida, o que requer investigações imagiológicas adicionais. Este relato descreve e discute três casos em que as calcificações da TC foram incidentalmente encontradas em radiografias panorâmicas.

DESCRITORES | Radiografia Panorâmica; Diagnóstico Bucal; Cartilagem Hialina; Cartilagem.

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INTRODUCTION

Triticeal cartilage (TC) is a tiny oval-shaped hyaline¹ cartilage located at the lateral border of the thyrohyoid membrane between the hyoid bone greater horn and the thyroid cartilage superior horn.² Usually, TC is positioned bilaterally, but not rarely can also be positioned unilaterally or absent.² The exact function of TC is unknown; it has been proposed that TC was the site of the attachment for the triticeoglossus muscle;³ or that it strengthens the thyroid ligament; although the most accepted theory is that TC has no determined function in humans.²

Similarly to other laryngeal cartilages, the TC manifests a tendency to calcify;² however, the exact pattern of this calcification remains unknown.⁴ TC calcification is not usual, and may vary from 5% to 29%.⁴ Despite the fact that calcification is not directly related to ageing,² it is generally accepted that TC calcification is similar to thyroid cartilage calcification, beginning in the second life decade and ending around 65 years of age.⁵ Furthermore, TC calcification does not differ between genders.²

TC calcification is usually asymptomatic, and it is incidentally detected in routine radiographs. There are a few cases in the literature in which patients with calcified TC presented symptoms^{3,6} such as progressive solid-food dysphagia,³ foreign body sensation, and odynophagia.⁶ When symptoms are present, further examination such as that of computed tomography are necessary, and surgical treatment should be applied.^{3,6}

On panoramic radiographs, calcified TC may be observed in the soft tissues of the pharynx region, positioned inferior to the greater horn of the hyoid bone and adjacent to the superior border of the C4 vertebrae.⁷ Most calcified laryngeal cartilages, including TC, can be diagnosed exclusively by panoramic radiographs, except when presenting positioning and morphological variations.⁷

A major concern of a calcified TC found incidentally in a routine radiographic examination is the differentiation between this alteration and

other calcified tissue manifestations that requires additional investigations, such as carotid artery calcific atherosclerosis⁸ or other neck pathologies such as foreign bodies.⁴ Hence, the objective of this report is to describe three cases of TC recognized in plain radiographs asked as routine in dental practice, emphasizing its radiographic features in these examinations in order to help clinicians in the differentiation of TC calcifications from other neck pathologies that require additional investigations.

CASE REPORT

CASE 1 – History, clinical findings, imaging evaluations

A female Caucasian patient (38 years old) was referred to radiographic examination in order to initiate oral rehabilitation. Patient had no clinical complaints and her medical history was unremarkable. Extra-oral examination demonstrated absence of facial or neck asymmetry or any palpated bulging. Intra-oral examination did not show any abnormal finding.

The panoramic radiograph revealed a round-shaped radiopacity nearby the third and fourth vertebrae, in both sides. Below the round-shaped radiopacity it could be noticed an elongated structure, with protuberances in their inferior areas, also on both sides. Also, calcification of stylohyoid ligament was verified, particularly on the left side (as observed in Figure 1).



FIGURE 1 | (A): The calcification has a round shape, laterally to the third cervical vertebrae; (B): note the elongated shape with irregularities near the fourth cervical vertebrae.

The patient was then referred to her physician for further evaluation and imaging examinations such as ultrasonography (these images are not available). The initial concern of the physician was the round-shaped radiopacity (as demonstrated in figure 1A), whose main differential diagnosis was bilateral carotid calcific atherosclerosis. A second differential diagnosis, based on the panoramic radiography, was bilateral phleboliths.

Another differential diagnosis to this case, considering Figure 1B, was laryngeal cartilage calcification or even calcification in the thyroid gland surface.

CASE 2 – History, clinical findings, imaging evaluations

A 20 years old female Caucasian patient was referred to radiographic examination in order to apply. As in case 1, patient had no clinical complaints and her medical history was unremarkable. Extra-oral and intra-oral examinations did not demonstrate any alterations. Panoramic radiographs showed bilateral round-shape radiopaque areas (as observed in Figure 2 A) and the first diagnostic hypothesis was bilateral carotid artery calcified atheroma in this case. Hence, further examination was requested, and the patient underwent a lateral telerradiograph.



FIGURE 2 | Round-shape radiopaque bilateral areas showed in a panoramic radiograph.

In the lateral radiograph, it was possible to observe the calcification of the TC, as well as of

the thyroid superficies, with an irregular shape and irregular radiopacity areas (Figure 3). Other diagnosis hypotheses were calcified laryngeal cartilages or calcifications in the thyroid surface.



FIGURE 3 | The calcification can be observed near the laryngeal cartilages, excluding the hypothesis of calcified atheroma.

CASE 3 – History, clinical findings, imaging evaluations

A male Caucasian patient (55 years old) was referred to routine radiographic examination. Again, patient had no clinical complaints and her medical history was unremarkable. No intra-oral or extra-oral alterations were observed. Panoramic radiographs showed bilateral multiple irregular radiopacities indicating soft tissue mineralization. On the right and left sides of the radiograph, the radiopaque areas are located laterally and inferior to the hyoid bone. In this specific case, calcified carotid atheroma was not considered an initial diagnosis, except for the right side, which had a tubular aspect (Figure 4). Another diagnosis hypothesis was laryngeal cartilage calcification. In addition, calcification of stylohyoid ligament was verified.

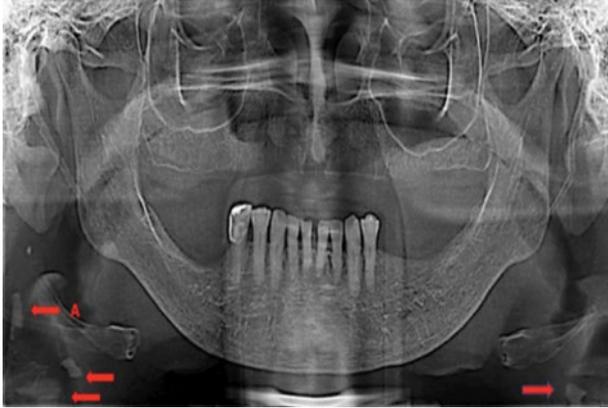


FIGURE 4 | Multiple irregular radiopacities observed in the panoramic radiograph.

In summary, particularly to the second case reported, and except for the third case, the diagnostic hypotheses included phleboliths or bilateral calcified lymph nodes aside from calcified carotid atheroma. An interesting finding is the presence of stylohyoid ligament calcification in all cases. No previous correlation between stylohyoid ligament and TC calcifications were mentioned in the literature. Patients were all referred to their physicians and oriented to do regular follow-ups.

DISCUSSION

The hyaline structure nature of TC, has a considerable radiologic significance since hyaline cartilage exhibits a propensity to calcify or even ossify according to advanced ageing.⁹ However, TC calcification represents a variable developmental process rather than progressive degenerative or senescent change, and no association with the degree of calcification and age was previously reported in the literature.⁸ Furthermore, no correlation between TC and gender or calcium status were found in the literature.

On the panoramic radiographs, as well as in other plain radiographs often requested in clinical routine dentistry, a number of calcified tissue alterations can be detected, including TC and, more frequently and troublesome, carotid calcific atherosclerosis. Similarly to TCs, carotid calcific atherosclerosis

can present similar imaging features in plain radiographs, notably in panoramic radiographs, such as multiple radiopaque areas, round, elongated, drop-shaped, spindle, irregular or linear⁸ in a similar anatomical area in the radiograph. The differentiation between TC calcification and carotid calcifications is crucial to the proper referring of the patient to adequate treatment and further examinations. A suggestion for the differentiation of carotid calcifications from TC or other laryngeal cartilages calcification is to use the horn of the hyoid bone as a reference; nevertheless, in some cases, this bone may be too low to be observed on panoramic radiographs, which may complicate the differentiation between both calcifications.⁷ Another suggestion is to observe if the radiopaque area is bilateral: TC calcifications more frequently tend to involve both sides of the radiographic image, rather than carotid calcifications.

Another diagnostic hypothesis to TC calcifications may include calcification of other laryngeal cartilages⁷ or radiopacities in submandibular glands (such as sialoliths), phleboliths, calcified lymph nodes and tonsilloliths.⁹

CONCLUSIONS

In conclusion, TC calcification is not usually verified in plain radiographs. It is frequently asymptomatic and observed as an incidental finding in imaging examinations. Due to its imaging features in panoramic radiographs, it can be misdiagnosed as a calcified atheroma of the carotid artery.

REFERENCES

1. Jurik AG. Ossification and calcification of the laryngeal skeleton. *Acta Radiol Diagn (Stockh)*. 1984;25(1):17-22.
2. Wilson I, Stevens J, Gnananandan J, Nabeebaccus A, Sandison A, Hunter A. Triticeal cartilage: the forgotten cartilage. *Surg Radiol Anat*. 2017 Oct; 39(10):1135-41. doi: 10.1007/s00276-017-1841-z
3. Alsarraf R, Mathison S, Futran N. Symptomatic presentation of an enlarged, ossified triticeal cartilage. *Am J*

- Otolaryngol. 1998 Oct;19(5):339-41. doi: 10.1016/S0196-0709(98)90010-2
4. Ahmad M, Madden R, Perez L. Triticeous cartilage: prevalence on panoramic radiographs and diagnostic criteria. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2005 Feb;99(2):225-30. doi: 10.1016/j.tripleo.2004.06.069
 5. Hatley W, Samuel E, Evison G. The pattern of ossification in the laryngeal cartilages: a radiological study. *Br J Radiol.* 1965 Aug;38:585-91. doi: 10.1259/0007-1285-38-452-585
 6. Mesa Marrero M, Villarreal Salcedo M. Symptomatic presentation of calcified triticeal cartilage. *Acta Otorrinolaringol Esp.* 2009 Aug;60(1):75-6. doi: 10.1016/S2173-5735(09)70104-8
 7. Çağırankaya LB, Akkaya N, Akçiçek G, Boyacıoğlu Doğru H. Is the diagnosis of calcified laryngeal cartilages on panoramic radiographs possible? *Imaging Sci Dent.* 2018 Jun;48(2):121-5. doi: 10.5624/isd.2018.48.2.121
 8. Alqahtani E, Marrero DE, Champion WL, Alawaji A, Kousoubris PD, Small JE. Triticeous cartilage CT imaging characteristics, prevalence, extent, and distribution of ossification. *Otolaryngol Head Neck Surg.* 2016 Jan;154(1):131-7. doi: 10.1177/0194599815615350
 9. Carter LC. Discrimination between calcified triticeous cartilage and calcified carotid atheroma on panoramic radiography. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2000 Jul;90(1):108-10. doi: 10.1067/moe.2000.106297