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An Incidental Discovery in Dental Imaging: A Case Report of Bilateral External Auditory Canal Cartilage Calcification on CBCT

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ABSTRACT

Calcification or ossification of elastic cartilage of the external ear is an uncommon finding in routine clinical practice, and most documented cases involve the auricular cartilage, often referred to as petrified ear. In contrast, calcification confined to the cartilaginous external auditory canal is exceptionally rare. These lesions are typically asymptomatic and incidentally detected on radiographs.

This report describes a case of symptomatic isolated bilateral cartilage calcification on the external auditory canal. A cone beam computed tomography (CBCT) scan ordered for temporomandibular joint assessment incidentally detected these calcifications.

CBCT with high spatial resolution and accurate anatomic localization confirmed the presence and precise location of the cartilage calcification, a finding not readily identifiable in conventional two-dimensional imaging.

This case highlights the importance of careful and systematic review of the entire CBCT scan, as incidental findings can sometimes explain a patient's vague symptoms. These incidental findings can also reveal rare conditions located in the maxillofacial region.

Keywords: External auditory canal calcification, Cartilage calcification, Petrified ear, Elastic cartilage ossification, Cone beam computed tomography, Incidental finding, Maxillofacial imaging.

1. Introduction

The external ear is a structure made of both bone and cartilage and is divided into two parts: the auricle and the external auditory canal (EAC). Clinically, the external ear is easily accessible and can usually be evaluated by simple inspection or an otoscopic examination; therefore, imaging is not always necessary to make a diagnosis (1). When imaging is deemed necessary, conventional computed tomography (CT) is usually the preferred initial modality and is used primarily to assess the osseous structure of the ear. It remains the preferred technique for showing subtle or early changes in this structure (2).

Cone beam computed tomography (CBCT) offers several practical advantages over traditional CT, including a lower radiation dose, high spatial resolution, and flexible two-dimensional reconstructions (3). Although CBCT is most widely used in dental practice, it has also gained a role in head and neck imaging, nasal cavity assessment, and target delineation in conformal radiotherapy (4). In many clinics, CBCT is obtained for dental or temporomandibular joint (TMJ)-related reasons, and the external ear area is often overlooked unless a gross abnormality is noticed. CBCT examinations acquired for dental or TMJ assessment frequently include the EAC within the field of view. Consequently, oral and maxillofacial radiologists are well positioned to detect these uncommon incidental findings (4,9).

Calcification of elastic cartilage within the external ear region is a rare finding (5). Most published case reports describe involvement of the auricular cartilage, a condition known as 'petrified ear', which may occur after frostbite, trauma, or endocrine disorders, such as Addison's disease and acromegaly (5-7). In contrast, calcification limited to the cartilaginous portion of the EAC is rarely reported and is usually detected incidentally in cross-sectional imaging (8). Calcification of the cartilage in the EAC is still considered unusual, and only scattered case descriptions exist. It is often asymptomatic, although some patients report local discomfort during sleep (8).

The anterior wall of the EAC forms the posterior boundary of the TMJ (2), so any change in this wall may be mistaken for or even contribute to TMJ-related symptoms. In the present case, the finding on the CBCT scan was an incidental discovery; however, it helped explain the patient's symptoms and demonstrated that subtle changes in the ear canal can complicate the interpretation of TMJ-related complaints.

2. Case Report

A 22-year-old female presented with a tight sensation in the ear region within the canal, accompanied by discomfort at maximal mouth opening. This had started approximately nine months prior to presentation. From the patient's history, she reported noticing a prominence within her EAC and had sought medical advice from an otolaryngologist (ENT). She noted that the discomfort was more pronounced when using ear pods and felt that her ear passage had become smaller, a perception she attributed to the prominence within the canal.

On clinical evaluation, findings were unremarkable; there was no hearing impairment or vertigo. The otolaryngologist did not identify or palpate any prominence within the canal. The patient subsequently attended the oral medicine clinic for TMJ assessment. On examination, she had no limitation in mouth opening and no signs of joint dysfunction at the time of assessment. She did not have any clinical signs suggestive of bruxism.

No history of frostbite, trauma, chronic otitis externa, previous ear surgery, or systemic endocrine disease was elicited.

CBCT examination of the TMJ region was performed at a private imaging centre using two separate limited-field acquisitions, one for each side. Both acquisitions were obtained at 90 kV and 4 mA, with an exposure time of 5.6 seconds and an isotropic voxel size of 150 µm. The acquired volumes included the corresponding TMJ, external auditory canal, and adjacent temporal bone. Multiplanar review demonstrated bilateral thin, curvilinear amorphous mineralizations following the contour of the lateral cartilaginous third of the external auditory canals. The findings were separate from the tympanic plates and adjacent osseous canal walls, with no continuity with bone, canal-wall expansion, exostosis, osteoma, erosion, or associated soft-tissue mass. The TMJs and surrounding osseous structures were unremarkable (Figure 1).

Additional investigations were ordered for the patient. Audiometry confirmed normal hearing thresholds. Laboratory investigations were all within normal limits; these included serum calcium, phosphate, and parathyroid hormones. Cortisol, thyroid function, and IGF-1 were also normal.

The diagnosis of idiopathic bilateral cartilage calcification/ossification of the cartilaginous external auditory canal was made clinicoradiographically in the absence of metabolic or endocrine abnormalities. The patient was managed conservatively and advised to avoid prolonged ear-pod use to minimize local pressure. At follow-up (at approximately three and six months after the initial assessment), the patient reported persistent, but stable, mild discomfort, with no progression of symptoms or change in clinical findings.

Written informed consent was obtained, authorizing the publication of clinical details and CBCT scan images. All images were de-identified, and no identifying patient information was included. This report was prepared in accordance with the Declaration of Helsinki.

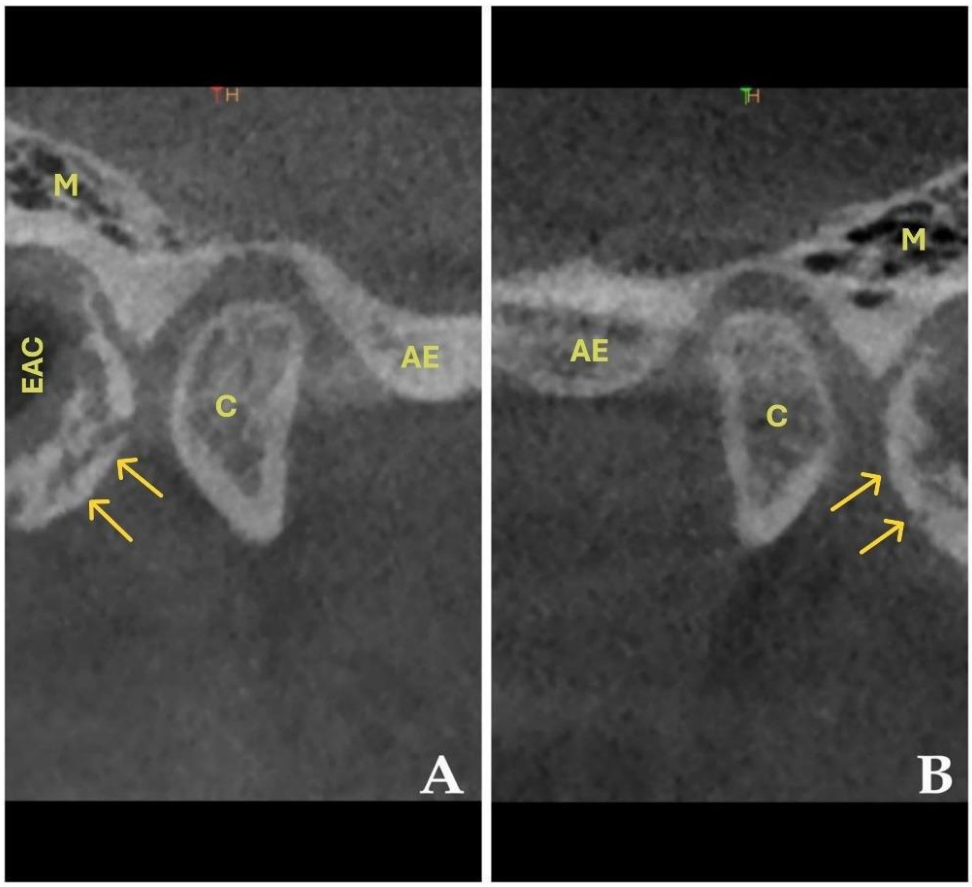


Figure 1. Corrected sagittal CBCT sections of the right (A) and left (B) temporomandibular joint regions. Thin, curvilinear mineralization is seen along the cartilaginous wall of each external auditory canal (arrows). The mandibular condyle (C), external auditory canal (EAC), articular eminence (AE), and mastoid air cells (M) are labelled

3. Discussion

In radiographic imaging, distinguishing between calcification and ossification of cartilage may be difficult. Both manifest as radiopaque entities within normal radiolucent areas. Consequently, they are often grouped under the same umbrella term, 'cartilage calcification/ossification' (1). Pathologically, calcification is defined as the deposition of calcium salts within the cartilage matrix, whilst ossification refers to the formation of bony tissue that may contain osteocytes and sometimes marrow spaces (1).

Several potential causes for external ear calcification are cited in the literature. Local factors include frostbite, recurrent minor trauma, or chronic perichondritis; systemic conditions, such as Addison's disease, diabetes mellitus, or acromegaly, can also be contributory (1,7). External ear calcification can be considered idiopathic when no specific cause is identified following a thorough clinical examination. In general, external ear calcification most frequently affects the auricle, referred to as the 'petrified ear'; however, isolated involvement of the EAC appears to be relatively uncommon (7-9).

The exact mechanism remains unclear. A prevalent theory suggests a dystrophic process, in which calcium is deposited in degenerated cartilage (1). Another theory proposes that chronic irritation, whether mechanical or inflammatory, can trigger metaplastic bone formation (1). Based on the literature, most cases present as incidental discoveries in older patients who report no direct symptoms (7,8). To our knowledge, reports describing symptomatic isolated bilateral EAC cartilage calcification in a young adult without systemic disease remain extremely limited. The present patient's presentation deviates from this pattern, as she is a young, healthy individual who experienced mild otological and temporomandibular discomfort, suggesting an idiopathic aetiology, although a minor, forgotten past injury cannot be definitively excluded.

Reviewing the literature provides a helpful overview. Schubert et al. reported that idiopathic bilateral auricular ossifications with partial canal extension are usually clinically silent; however, in some patients, progressive narrowing of the canal may eventually necessitate surgical intervention (8). That report also emphasized the rarity of ossification of the EAC cartilage and noted that when symptoms do occur, they are often limited to discomfort when the patient lies on the affected side during sleep (8). In a different etiological context, Lee et al. documented bilateral auricular and EAC calcification in a patient with acromegaly, highlighting a clear association with endocrine disease (7). More recent work by Brooks et al. characterized a commonly encountered presentation of multiple, small, bilateral, cartilage-like calcific deposits around the EAC, almost always detected incidentally on CBCT scans (9). The present case complements these findings by documenting a symptomatic presentation in a young adult with no systemic disease, reinforcing the importance of clinical awareness of this entity even in atypical demographic groups.

On CBCT, the appearance is quite specific: thin, curvilinear, dense opacities that follow the contour of the cartilaginous canal wall without causing bony expansion or remodeling (9). Recognizing this pattern is key to distinguishing it from other entities. For instance, exostoses are broad-based bony growths, whilst osteomas are typically single and pedunculated. Synovial chondromatosis, a differential in the TMJ region, presents with numerous intra-articular loose bodies (10). Tympanosclerosis can also cause calcification, but usually involves the tympanic membrane or middle ear structure, not the EAC (1,4). Calcium pyrophosphate deposition disease (CPPD) may produce crystal deposits in periarticular tissues around the TMJ and EAC region, and although it typically affects older individuals, it can mimic calcification on cross-sectional imaging (11). Accessory tympanic plate ossicles, recently characterized as a distinct osteological entity, represent ossified auricular cartilage fragments attached to the tympanic plate and may appear as discrete opacities at the junction of the auricle and the EAC (12). Calcification of the cartilaginous Eustachian tube is another rare incidental finding detectable on CBCT that can be confused with periarticular calcifications in the TMJ region due to its proximity (13,14). The absence of bone destruction or an associated soft-tissue mass in this case makes a neoplastic process highly unlikely.

This case offers a practical reminder for those in oral and maxillofacial radiology. A CBCT scan of the TMJ is never limited to a study of the condyles and fossae. The standard field of view systematically captures adjacent anatomy, including the full length of the EAC (4,9), and subtle findings, such as EAC cartilage mineralization, are unlikely to be detected on conventional panoramic radiographs (15). Given that the anterior EAC wall forms the posterior boundary of the TMJ, pathology in one area can easily mimic or refer symptoms to the other (1). Therefore, a disciplined, comprehensive review of the entire image volume is crucial, as this practice helps prevent misattributing symptoms from an incidental EAC finding to a TMJ disorder and allows the radiologist to identify rare, but significant, abnormalities (4,9).

Table 1. Reported cases of external auditory canal cartilage calcification/ossification

Author (Year)	Age	Sex	Location	Bilateral	Symptoms	Systemic Disease	Imaging	Management
Schubert (2011) (8)	70	F	EAC	Yes	Discomfort during sleep	Recurrent otitis externa	CT	Conservative
Harker et al. (2019) (5)	60	M	Auricle	Yes	None (asymptomatic)	None (idiopathic)	Radiograph	Conservative
Lee and Lim (2025) (7)	NR	M	Auricle and EAC	Yes	Mild aural fullness	Acromegaly	CT	Conservative (7-yr follow-up)
Valea et al. (2024) (6)	Variable	Variable	Auricle	Variable	Variable	Endocrine disorders (Addison's, acromegaly, DM)	CT/ Radiograph	Varies (treat underlying disease)
Brooks et al. (2025) (9)	Variable	Variable	EAC (Cartilaginous)	Yes (all)	None (incidental)	None reported	CBCT	Not treated (incidental)
Present case* (2025)	22	F	EAC (Cartilaginous)	Yes	Canal tightness, discomfort at max. opening	None (idiopathic)	CBCT	Conservative No symptoms progression at 6 months

*EAC: External auditory canal; CT: Computed tomography; CBCT: Cone beam computed tomography; N/A: Not available; NR: Not reported; M: Male; F: Female. *Present case.*

Several limitations of this report should be acknowledged. First, this is a single case report, and generalizable conclusions cannot be drawn. Second, no histopathological confirmation was obtained; therefore, a definitive distinction between calcification and ossification cannot be made on imaging alone, and the terms calcification/ossification are used interchangeably throughout. Third, longitudinal follow-up was limited to two short-term clinical reviews at approximately three and six months, and no repeat imaging was performed; therefore, the long-term clinical and radiographic behavior of these lesions remains unknown.

Finally, as the case was identified from a TMD patient cohort, a degree of selection bias cannot be excluded.

4. Conclusions

Bilateral EAC cartilage calcification is an uncommon finding that is usually asymptomatic. Nevertheless, its close anatomic relationship with the TMJ means that any resulting sensation may be misdiagnosed as jaw-related pain or dysfunction. This report highlights the importance of careful and thorough assessment of CBCT scans in patients presenting with orofacial pain. A conservative follow-up approach is generally appropriate for cases without significant canal obstruction or progressive symptoms.

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Conflict of Interests

The authors declare no conflict of interests.

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