Cite as: Delantoni A, Matiakis A, Andreadis D, Poulopoulos A: Ultrasonographic diagnosis of osteochondroma of the mandible: a case report. J Ultrason 2022; 22: e200–e203. doi: 10.15557/JoU.2022.0033.

Submitted: 08.01.2022
Accepted: 07.02.2022
Published: 11.07.2022

Ultrasonographic diagnosis of osteochondroma of the mandible: a case report

Antigoni Delantoni[1], Apostolos Matiakis[2], Dimitrios Andreadis[2], Athanasios Poulopoulos[2]

[1] *Oral Surgery, Implant Surgery and Radiology, Aristotle University of Thessaloniki, Greece*
[2] *Oral Pathology, Aristotle University of Thessaloniki, Greece*

Correspondence: Antigoni Delantoni, Oral Surgery, Implant Surgery and Radiology, Aristotle University of Thessaloniki, Greece; e-mail: adelantoni@yahoo.com

DOI: 10.15557/JoU.2022.0033

Keywords
osteochondroma, ultrasonography of osteochondroma, mandibular osteochondroma

Abstract

Aim of the study: The aim of the present paper is to determine the diagnostic features of the rare presentation of osteochondroma in the mandible. The unusual aspect in this case is that the diagnosis was not established with cone beam computer tomography, which is a commonly used radiographic technique in dentistry, but with the use of ultrasonography. **Case description:** Ultrasonography is very useful for initial examinations, avoiding patient exposure to additional radiation and setting the diagnosis in debatable soft tissue involvement of various lesions. In the presented case, even though the clinical presentation was indicative, the cone beam computer tomography evaluation could not confirm the diagnosis, so the final diagnosis was made by ultrasonography. **Conclusions:** With the latest advances in the applications of ultrasonography in the maxillofacial region, an examination of lesions on the floor of the mouth or in the neck area may set the diagnosis in cases where hard tissue imaging does not provide enough information.

Introduction

Osteochondromas (cartilaginous exostoses) are the most frequently appearing tumors of the skeleton, accounting for about 35% of all benign body tumors[(1)]. They are comprised of spongy bone capped by hyaline cartilage, and are attached to the underlying bone by either a pedicle or a broad base. In addition, osteochondromas may have the potential for malignant transformation, since they grow by cartilaginous proliferation and when they become malignant, which is in a small number of cases, they form osteosarcomas. The most common site for lesions involving the mandible are the condylar head and the coronoid process of the mandible[(2–6)].

Case presentation

A 16-year-old female presented to the Department of Dentistry at the Aristotle University of Thessaloniki because of a hard swelling in the lingual aspect of the right lower premolar region. The lesion was reported to have been initially painless, but within a month's time there was slight ulceration of the surface due to tension of the area and mild pain upon palpation. Intraoral examination revealed a nodular shaped lesion lingual to the lower premolar area, at the level of the non-attached gingivae. The lesion was clinically similar to an enlarged torus mandibularis, and clinically resembled a peripheral ossifying fibroma (Fig. 1).

To determine the exact size of the lesion radiographically, a cone beam computer tomography (CBCT) scan was taken. The mandibular cortex demonstrated a localized rupture of continuity, even though no apparent lesion was present. Upon image manipulation, the CBCT showed, lingually to the second left premolar, an arising lesion up to 7.4 mm in size, clearly associated from the lower mandibular cortex, hardly visible on CBCT and appearing only as a shadow attached to the cortex (Fig. 2, Fig. 3). Due to the difficulty with establishing an accurate image of the lesion, an ultrasonographic evaluationwas ordered.

Generally, inconsistencies between the clinical and CBCT findings (no visible bony lesion) lead the team dealing with the patient to performa preoperative ultrasonographic scan, since it has no biological effects as an examination and mayadd to the soft tissue imaging of the region of interest, thus helping to establish a radiographic diagnosis for the pathology that is visible clinically in the internal region of the premolar area of the mandible.

Fig. 1. *Clinical appearance of the lesion intraorally at the lingual part of the mandible in the premolar area*

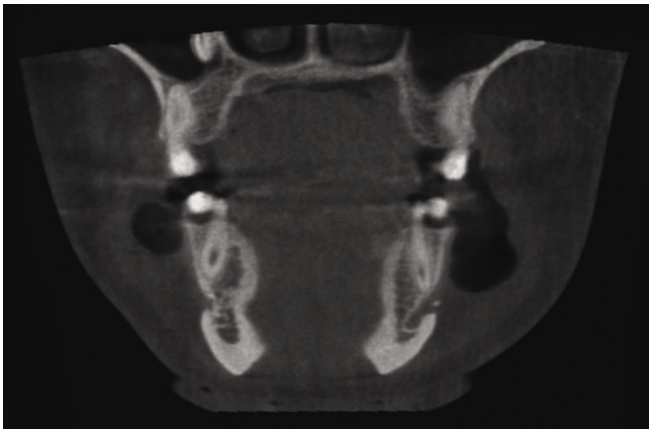

Fig. 2. *Frontal CBCT slice of the mandible with a barely visible exophytic lesion at the mandibular border*

Fig. 3. *Axial slice of the lesion without a clearly visible lesion present*

For the examination, a GE LOGIC S8 color ultrasound unitwas used, with a linear 6–15 MHz probeat 12 MHz. The probe was placed extraorally in the floor of the mouth area (mental region) both parallel and vertical to the cortical mandibular inferior border.

The ultrasound revealed a clearly exophytic lesion with peripheral vascularity and regional rupture of the mandibular cortex. The lesion was measured ultrasonographically, and the maximum diameter was found to be 0.79cm. The diagnosis based on the ultrasonographic examination was that of osteochondroma and in the differential diagnosis peripheral ossifying fibroma and traumatic lesion of the area (Fig. 4, Fig. 5).

An excisional biopsy was performed and three specimens of bony appearance were sent for histopathological examination (Fig. 6). The histology reported a benign lesion with histopathological features of osteochondroma. Two of the three segments that were studied were peripherally covered by fibrous tissueand several layers of chondroid cells. The latter were in regions turned to osteoid with mature osseous content. The base of the lesion was fibrous with low cellularity, with no particular cellular atypia or mitoses (Fig. 7).

Discussion

In the literature, there have been no reports on the ultrasonographic features of osteochondroma of the jaw. Furthermore, there are only a few case reports presenting such lesions in the mandibular body location[7–10].

Osteochondromas form as an exophytic growth from the surface of the affected bone. They may appear in all bones of the body but more frequently in long bones. Since they are formed by endochondral ossification, they rarely present in craniofacial bones, as these are formed by intramembranous ossification[1]. In the literature, based onhistological findings, some claim it to be a developmental aberration, while others present it as a benign tumor[3].

Their origin remains controversial. In the past, they were believed to be caused by herniation of cartilaginous precursor cells through defects in the epiphyseal periosteal cuff allowing for the formation of the lesion[1]. Some argue that precursor cells are displaced from the epiphysis to the metaphysical section of the bone, others believe it to be hyperplasia of the tensional forces at their insertion, while yet others claim that pluripotent cells exist in the periosteum, forming chondroblasts which give rise to osteochondroma[3–4].

Even with the numerous theories not all osteochondroma cases can be explained, and it is not clear whether the lesions are developmental, reparative or neoplastic in nature[1,5].

With regard to the mandible, the cartilaginous developmental sections are in the regions of the condylar head and on either sides of the symphysis. In the mental region, cartilages appear and ossify in the seventhmonth of intrauterine life and form ossicles which become incorporated into the

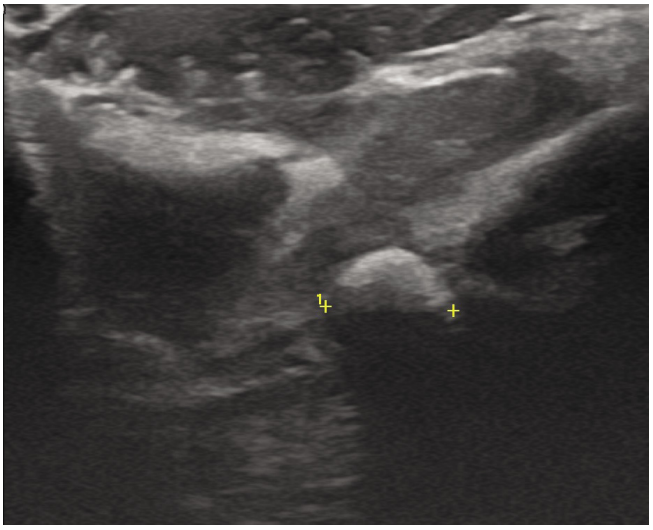

Fig. 4. *US of the lesion, with the exophytic growth from the bone visible*

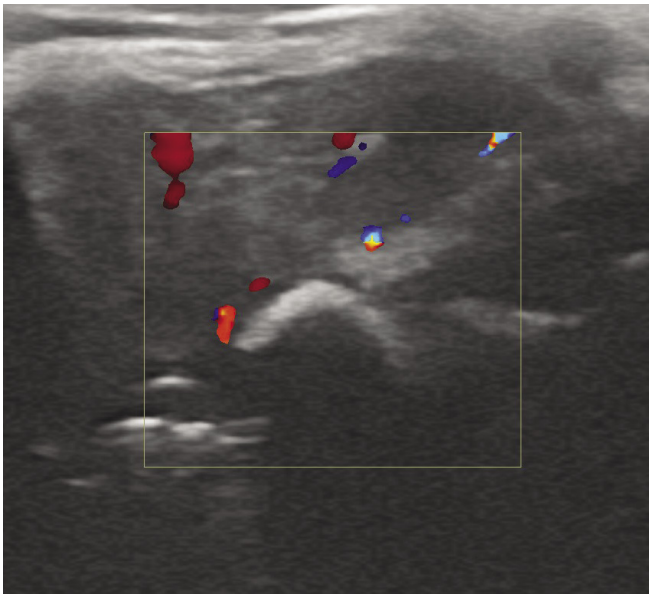

Fig. 5. *Color Doppler of the lesion, with no vasculature observed*

Fig. 6. *Excision of the lesion intraorally*

intramembranous bone. Remains of these cartilaginous origins seem to be the cause underlying osteochondromas found inthis region.

As mentioned above, when dealing with isolated osteochondromas and not congenital osteochondromatosis (autosomal dominant gene), the mandible is rarelyreported as a region for this lesion[11,12]. The locations of osteochondromas in the mandible are the condylar head and the coronoid process (being the areas of cartilaginous development, as previously mentioned) in the vast majority of cases, with few isolated cases involving other parts of the mandible, such as the ramus and body. The particular location lingually of the body of the mandible has not been reported in the literature before, with only two more cases described in the mandibular premolar region, both buccally[13].

The case presented here is unique in that the diagnosis was madeby ultrasonography rather than CBCT, which was the initial examination performed. The CBCT could not demonstrate any clearly outlined lesions, since the imaging characteristics of the lesion and the fibrous elements it contained made the lesion appear similar to soft tissues not readily visualized on CBCT. CBCT was helpful only in excludingtorus mandibularis from the initial differential diagnosis, since the lesion was not visible as a torus would have been. The only finding obtained radiographically from CBCT was a mild roughness of the cortex of the mandible in the region of the pathological condition. The roughness, however, was not clear, and thus a further radiographic examination was performed. To avoid irradiating the patient, and since the lesion was in the soft tissue region of the floor of the mouth, initially an ultrasonographic exam was ordered. A similar procedurehas been described only in a few case reports[14].

Ultrasonography proved helpful with the identification of the lesion. A high-frequency linear probe of 6–15 MHz was used at 12 MHz extraorally. The extraoral study was preferred, since there was pain intraorally in the lesion area and the patient could not tolerate the probe intraorally, and also due to the size of the probe that made it difficult for the patient to accept it.

Ultra-high frequency ultrasound (UHFUS) is a recently introduced technique characterized by the use of ultrasound frequencies between 30 and 100 MHz, with improved spatial resolution at the expense of a shallower depth of penetration, which could have proven useful in this case. Acquiring a UHFUS system is costly, as compared to conventional US systems, although the benefits in terms of image quality and the opportunities for oral mucosa exploration are much higher compared to the conventional US equipment. In this case, there were no UHFUS systems available, and an additional examination with such a probe was not considered required, since the high-frequency probe used supplied adequate information to establishan initial diagnosis for the lesion as seen in the US images.

The examination clearly demonstrated an exophytic lesion arising from the cortex of the mandible. Color Doppler showed low vascularity of the lesion and surrounding areas. The diagnosis of osteochondroma was made, and further radiographic

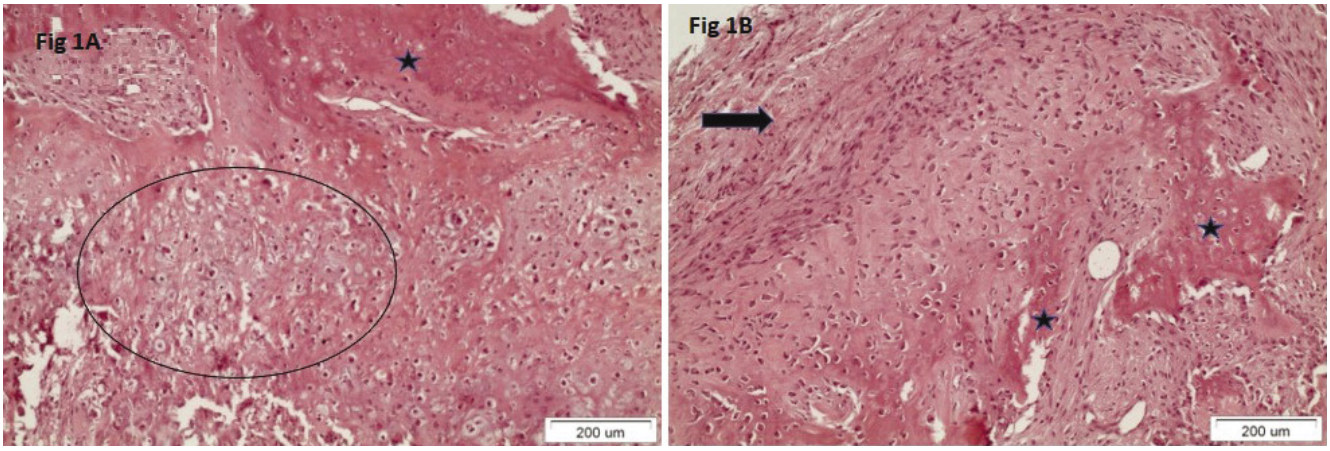

Fig. 7. *Histopathology of the lesion where chondroid cells in regions turned to osteoid with mature osseous content. The base of the lesion is fibrous, with low cellularity and no particular cellular atypia or mitoses*

examination was not requested. The patient underwent excisional biopsy, and the histopathological examination confirmed the osteochondroma diagnosis. Excision of an osteochondroma is usually curative, whereas follow-up by clinical examination and imaging methods may be performed every six months for the first two years and then annually thereafter[15].

Conclusion

With the latest advances in the applications of ultrasonography in the maxillofacial region, an examination of lesions on the floor of the mouth or in the neck area may set the diagnosis in cases where hard tissue imaging does not provide adequate information. Ultrasonography is very useful for initial examinations, avoiding patient exposure to additional radiation and setting the diagnosis in debatable soft tissue involvement of various lesions. This presented case is unique in that even though the lesion originated from the osseous components of the mandible, the diagnosis could not be established based on CBCT findings. Consequently, additional radiographic examinations were necessary to provide indisputable results leading to a conclusive diagnosis. Ultrasonography provided the result needed, without exposing the patient to unnecessary radiation.

Conflict of interest

The authors do not report any financial or personal connections with other persons or organizations which might negatively affect the contents of this publication and/or claim authorship rights to this publication.

Author contributions

Original concept of study: AD, AM. Writing of manuscript: AD, DA. Analysis and interpretation of data: AD, DA. Final acceptation of manuscript: AD. Collection, recording and/or compilation of data: AD, AM. Critical review of manuscript: AD, AP.

References

1. Helfrick JF, Laskin DM: Benign osteogenic tumors of the jaws. In: Laskin DM (ed.): Oral and Maxillofacial Surgery. Vol. 2. St. Louis, Toronto, Princeton, The CV Mosby Company, 1985: 537–557.
2. Kermer C, Rasse M, Undt G, Lang S: Cartilaginous exostoses of the mandible. Int J Oral Maxillofac Surg 1996; 25: 373–375.
3. Koehl GL, Tilson HB: Osteochondromas associated with facial asymmetry and masticatory dysfunction: report of two cases. J Oral Surg 1977; 35: 934–393.
4. Forssell H, Happonen RP, Forssell K, Virolainen E: Osteochondroma of the mandibular condyle: report of a case and review of the literature. Br J Oral Maxillofac Surg 1985; 23: 183–189.
5. Goyal M, Sidhu SS: A massive osteochondroma of the mandibular condyle. Br J Oral Maxillofac Surg 1992; 30: 66–68.
6. Kerscher A, Piette E, Tideman H, Wu PC: Osteochondroma of the coronoid process of the mandible: report of a case and review of the literature. Oral Surg Oral Med Oral Pathol1993; 75: 559–564.
7. Manganaro AM: Osteochondroma of the coronoid process. Gen Dent 1998; 46: 92–94.
8. Constantinides M, Lagmay V, Miller P: Coronoid osteochondroma of the mandible: transzygomatic accsess and autogenous bony reconstruction. Otolaryngol Head Neck Surg 1997; 117: S86–91.
9. Miyawaki T, Kobayashi M, Takeishi M, Uchida M, Kurihara K: Osteochondroma of the mandibular body. Plast Reconstr Surg 2000; 105: 1426–1428.
10. Koga K, Toyama M, Kurita K: Osteochondroma of the mandibular angle: report of a case. J Oral Maxillofac Surg 1996; 54: 510–513.
11. Brady FA, Sapp JP, Christensen RE: Extracondylar osteochondromas of the jaws. Oral Surg Oral Med Oral Pathol1978; 46: 658–668.
12. Marks RB, Carlton DM, Carr RF: Osteochondroma of the mandibular condyle. Report of a case with 10-year follow up. Oral Surg 1984; 58: 30–32.
13. Herbosa EG, Rotskoff KS: Condylar osteochondroma manifesting as Class III skeletal dysplasia: diagnosis and surgical approach. Am J Orthod Dentofacial Orthop 1991; 100: 472–479.
14. Akal ÜK, Or S, Nalçaci R, Orhan K, Günhan Ö: [Osteochondroma (cartilagenous exostosis) of the mandible: acase report]. T Klin J Dental Sci 2000; 6: 163–167. In Turkish.
15. Marx ER, Stern D: Benign neoplasms of bone. Osteochondroma. In: Marx ER, Stern D (eds): Oral and Maxillofacial Pathology: A Rationale for Diagnosis and Treatment. 2nd ed. Chigago, Berlin, Tokyo, London, Quintessence Publishing Company 2012: 822–825.