Peripheral osteoma of the mandibular alveolar ridge arising from a tooth extraction site: A case report and review of literature

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Периферен остеом близо до алвеоларния ръб на долната челюст, произлизащ от място на екстрахиран зъб – описание на клиничен случай и преглед на литературата

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Abstract:

The primary aim of this study is to investigate the potential etiological factors involved in the occurrence and progression of mandibular osteoma, as well as to delineate its clinical characteristics and the available diagnostic and treatment approaches. In addition, the publication presents a clinical case involving a vestibularly positioned osteoma located in the distal portion of an edentulous segment of the right mandibular alveolar ridge. We report a clinical case involving a 63-year-old patient who presented with a slowly enlarging, firm, and painless swelling on the crest of the right mandibular alveolar ridge, corresponding to the area of tooth No. 46, which had been extracted many years earlier. Based on the analysis of the clinical and radiological findings, the presence of a slowly enlarging, firm mass attached to the vestibular aspect of the mandibular alveolar ridge by a thin bony isthmus (pedicle) was consistent with a diagnosis of peripheral osteoma, and the patient was subsequently referred for appropriate treatment. Although osteomas of the jawbone are relatively uncommon benign osseous lesions characterized by reactive bone proliferation, they can be challenging to differentiate from other tumors or tumor-like entities, particularly when they arise in atypical anatomical locations.

Key words: peripheral osteoma, vestibular aspect, lower jaw

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Резюме:

Основната цел на настоящото изследване е да се проучат евентуалните причини за възникване и развитие, както и клиничните особености на остеомите на долната челюст, и да се опишат методите за диагностика и лечение. В публикацията се представя и клиничен случай на остеом, разположен вестибуларно, в дисталния отдел на обеззъбен участък от алвеоларния гребен на мандибулата вдясно. Представяме клиничен случай на 63-годишен пациент, който имаше оплаквания за бавно нарастваща твърда и безболезнена подутина, близо до билото на алвеоларния гребен вдясно, в областта на зъб 46, който е бил екстрахиран преди доста време. На базата на анализа на клиничните и рентгенологичните данни за бавно нарастваща подутина с твърда консистенция, фиксирана към и близо до билото на алвеоларния гребен на вестибуларната повърхност на долната челюст, посредством тънък костен провлак (краче), пациентът бе насочен за лечение на периферен остеом. Въпреки че остеомите на челюстните кости

Резюме: представляват сравнително редки доброкачествени костни лезии, които се характеризират с реактивен костен растеж, понякога трудно се отдиференцират от други тумори или тумороподобни образувания, особено когато се разполагат в нехарактерни за тях локализации.

Ключови думи периферен остеом, вестибуларна повърхност, долна челюст

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Introduction

Osteomas of the maxillofacial region are rare benign bone formations originating from either the endosteum or the periosteum. According to their origin and anatomical distribution, they have traditionally been classified as central, peripheral, and extraskeletal osteomas, the latter occurring within soft tissues [1]. In 2017, the World Health Organization (WHO) updated its classification, placing osteomas primarily into two categories: central and peripheral [2, 3]. Clinically, peripheral osteomas of the maxillofacial skeleton typically present as solitary, unilateral, immobile, well-circumscribed masses that are mushroom-shaped or pedunculated, usually ranging from 10 to 40 mm in size. Their growth is slow and painless, and symptoms generally arise only when they reach considerable dimensions, resulting in facial asymmetry or functional disturbance [4, 5].

Within the maxillofacial region, peripheral osteomas – although uncommon – occur more frequently than central osteomas and predominantly affect men around 50 years of age [6, 7, 8]. Other studies, however, report an approximately equal distribution between genders [4]. Regarding localization, craniofacial osteomas are most often found in the paranasal sinuses, particularly the frontal, ethmoidal, and maxillary sinuses. They are less frequently encountered in the jawbones, the mandibular angle and ramus specifically, [9] followed by the condylar process, the inferior border of the mandibular molar region, and, less commonly, the maxillary body. When comparing the jaws, peripheral osteomas occur more often in the mandible, especially in its distal portions, and are predominantly located on the lingual surface [10]. Overall, they account for approximately 4% of benign tumors in the maxillofacial area [11].

The aim of the present publication is to examine the probable etiological factors associated with osteomas of the jawbones – specifically the mandible – along with their clinical characteristics, diagnostic methods, treatment approaches, and differentiation from other similar lesions. Additionally, we present a clinical case of a peripheral osteoma located vestibularly near the crest of the alveolar ridge in an edentulous area – an atypical site for mandibular osteomas.

Case Report

In November 2024, a 63-year-old male patient visited the Medical Diagnostic Centre at the Faculty of Dental Medicine, Medical University of Varna, Bulgaria, with complaints of a slowly enlarging, painless, firm swelling in the oral cavity, located in the region of teeth No. 46 and No. 47. The lesion caused no paresthesia, pain, or difficulty with mastication or speech; however, according to the patient, it had recently begun to increase in size more rapidly. The patient reported that tooth No. 46 had been extracted 10 years earlier, after which a slow, painless, and gradual bony swelling developed in the same region.

Extraoral examination revealed no facial asymmetry on the right side. Mouth opening was within normal limits, with no deviation of the mandible during movement. Intraorally, a bridge restoration was present, replacing the missing tooth. A firm, immobile mass measuring approximately 8-10 mm × 12 mm was palpated at the site of tooth No. 46, with mucosa of normal color and without signs of inflammation.

A CBCT scan was performed, revealing a lesion with a mature bone structure similar to that of the mandible, showing dense radiopacity interspersed with small lacunar areas of lower mineralization. The lesion demonstrated well-defined margins and was connected to the alveolar crest by a thin bony isthmus or pedicle at the site of missing tooth No. 46. No additional pathological changes were observed in the surrounding mandibular architecture, nor was there involvement of the roots of adjacent abutment teeth.

Based on the clinical and radiographic findings, surgical excision under local anesthesia was planned, taking into account the patient's general health and antihypertensive medication. Written informed consent was obtained after the patient was thoroughly informed about the provisional diagnosis and the proposed surgical management.

Intraoperatively, a mucoperiosteal flap was raised using an intrasulcular horizontal incision from teeth No.44 to No.47, supplemented with a vertical oblique incision in the region of tooth No. 44. After careful elevation of the flap, the lesion was visualized, exhibiting a smooth surface and coloration similar to the surrounding bone. The mass was removed using a Lindemann fissure bur under copious irrigation, excising to clinically healthy bone. The bridge restoration was preserved, as no involvement of abutment tooth roots or additional pathology was detected. Given that osteomas represent reactive bone growth, 2-3 mm of bone beyond the lesion margins were removed. Sharp edges were smoothed, the surgical site was irrigated with saline, and the flap was repositioned and sutured with 3/0 silk. A rubber drain was placed and secured to prevent hematoma formation. The excised specimen was submitted for histopathological examination.

On postoperative day 10, sutures were removed. Healing progressed uneventfully, with no signs of edema or pain. Histopathological analysis revealed mature bone tissue with variably sized lacunae containing small amounts of fibrous connective tissue. These findings confirmed the diagnosis of a peripheral osteoma of the mandible (osteoma mandibulae).

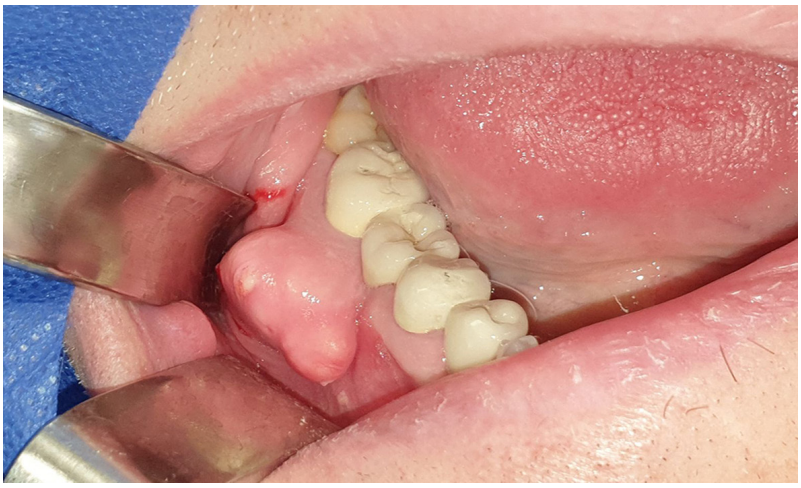

Fig. 1. Preoperative view of mandibular osteoma in the area of tooth No. 46

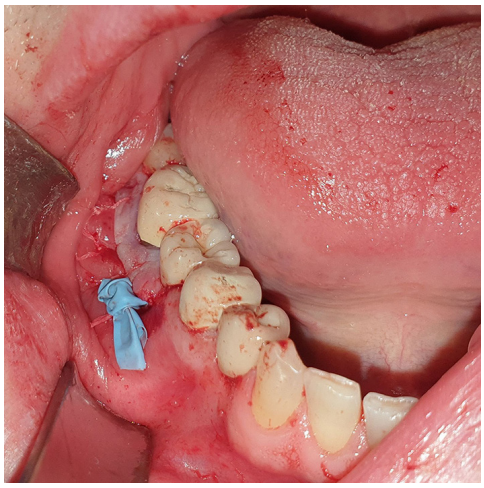

Fig. 2. Intraoperative view of the lower jaw after removal of the osteoma mandibulae in regio 46

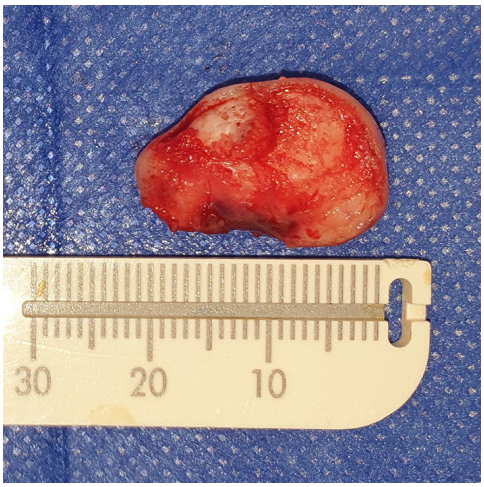

Fig. 3. The removed osteoma of the lower jaw

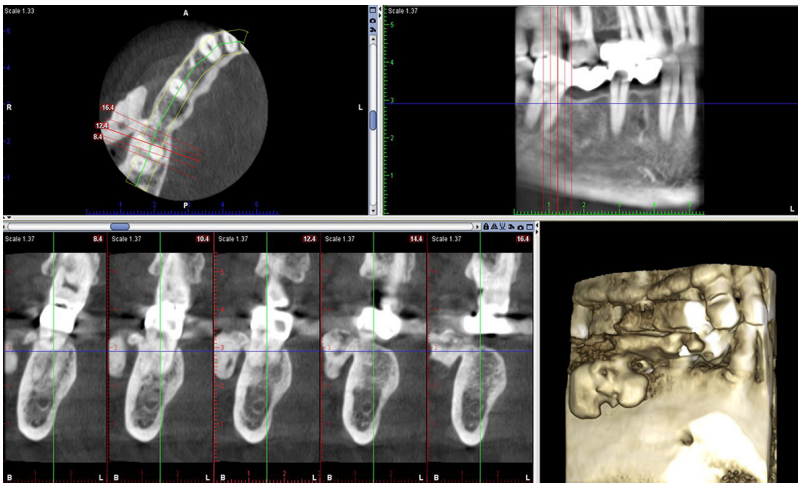

Fig. 4. CBCT of the lower jaw before removal of the osteoma in regio 46

Discussion

Peripheral osteoma of the jaws is an uncommon benign lesion composed of well-differentiated compact or cancellous bone and is characterized by slow yet expansive growth. It typically presents as a solitary, immobile mass that develops on a pedicle and is often described as having a mushroom-like morphology. These lesions most frequently arise in the craniofacial bones – particularly the frontal and ethmoidal bones and the paranasal sinuses [12] – and less commonly within the jaws. Mandibular osteomas are usually solitary, slowly enlarging, painless formations and are often discovered incidentally during imaging studies or when their size becomes sufficient to produce symptoms. In some cases, they may cause functional disturbances, such as limitation or deviation during mouth opening when located in the condylar region, or aesthetic concerns related to facial asymmetry [1]. Although they most commonly arise on the lingual surface of the mandible near the inferior border in the premolar and molar regions [4, 11], as well as in the ascending ramus, they may occasionally occur in atypical sites, including the alveolar ridge of an edentulous mandibular region.

In the case we present, the peripheral osteoma of the mandible was localized vestibularly in the alveolar process region corresponding to missing molars No. 6 and No.7, where the overlying mucosa exhibited normal coloration and consistency identical to that of the surrounding alveolar tissues.

In edentulous areas near or on the alveolar ridge, bony exostoses are typically encountered more frequently. These are usually the result of unsmoothed residual bone edges along the vestibular alveolar wall. Exostoses present as broad-based bony protuberances with limited growth potential, whereas osteomas may continue to enlarge indefinitely and often arise from a narrower pedicle [13]. Mandibular osteomas are also more prevalent than maxillary osteomas [14].

The etiology of jaw osteomas is still not completely understood. They have been regarded both as true neoplasms and as developmental anomalies [15]. Several contributing factors have been proposed, including trauma, jaw fractures, inflammatory processes, infected cysts, hematomas, and, less commonly, traumatic tooth extractions. According to the “traumatic theory,” trauma may act as a triggering mechanism that induces reactive bone proliferation, which could explain the occurrence of osteomas along the mandibular body, particularly on the inferior border or buccal aspects – areas that are more prone to mechanical injury [4]. Other authors suggest that trauma stimulates cytokine activity and accelerates reparative processes within the alveolar bone, leading to bone hyperplasia [16]. Bone hyperplasia combined with mechanical traction of muscle insertions has been widely considered the most plausible explanation for the development of jaw osteomas [15].

Another explanation, the “reactive theory,” proposes that osteomas may originate from an existing bone lesion – such as a bone cyst – that undergoes remodeling and spontaneously transforms into an osteoma [17]. Although theoretically possible, this mechanism is more consistent with centrally arising osteomas. The influence of muscle attachments has also been emphasized and forms the basis of the “muscle theory,” supported by the observation that many reported jaw osteomas occur in areas of muscle insertion [6]. Nonetheless, no definitive evidence explains why osteomas develop in certain individuals and not in others. Furthermore, the available theories do not sufficiently clarify why mandibular osteomas are predominantly found on the lingual surface, despite the fact that muscular traction is generally stronger on the buccal aspect.

Additional factors described in literature as contributing to the development of these benign osseous formations include genetic and embryologic abnormalities, as well as hereditary syndromes, such as Haberland syndrome, acromegaly, and Opitz G/BBB syndrome [6, 18].

For instance, a recent publication reported a higher incidence of peripheral osteomas in patients with a hereditary predisposition to adenomatous polyposis, who also carry an increased risk of colorectal carcinoma [19]. A strong association has also been documented between the occurrence of jaw osteomas and Gardner syndrome [1].

Histopathologically, three subtypes of osteomas have been described: compact, cancellous, and mixed. Compact osteomas consist predominantly of dense, mature lamellar bone with scattered small marrow spaces. Cancellous osteomas are characterized by trabecular bone interspersed with abundant fibroadipose marrow. The mixed subtype displays features of both compact and cancellous osteomas in varying proportions [20]. The compact (cortical) variant is reported more frequently in men, whereas the cancellous type is more common in women [21].

The preliminary diagnosis of osteoma of the jaws – particularly the mandible – is based on patient history, clinical examination, and imaging studies. Patients typically report a slowly growing, painless swelling that is functionally asymptomatic and often detected inci-

dentally. Mandibular osteomas located lingually near the inferior border may be palpated or detected during head extension or on imaging. Larger lesions of the ascending ramus or condyle may cause facial asymmetry or deviations during mandibular movement. Intraorally located osteomas generally remain asymptomatic until they reach a size that interferes with oral function or prosthetic rehabilitation, as in the presented case.

Paraclinical imaging modalities that support the diagnosis of “osteoma mandibulae” include orthopantomography (OPG) and cone-beam computed tomography (CBCT). Peripheral osteomas appear as well-circumscribed, oval, radiopaque masses that may arise from a pedicle or a broad base, without affecting adjacent soft tissues. CBCT offers distinct advantages over OPG with respect to brightness, contrast resolution, visualization of the lesion in three planes, and assessment of its relationship to surrounding structures, enabling more accurate localization, density assessment, and boundary definition. CBCT has become a routine modality in dentomaxillofacial imaging [22]. It permits acquisition of very thin slices – down to 0.1 mm – which allows optimal evaluation of hard tissues and detection of osseous formations such as osteomas. Compared with conventional multi-detector CT (MDCT), CBCT delivers 5- to 20-time lower radiation doses [24], is less expensive, and requires less space [23]. Furthermore, CBCT enables precise measurement of osseous structures with deviations typically < 1% [23, 25]. It reliably identifies the precise location and structural type of bone lesions, including osteomas, and facilitates optimal planning of surgical access – particularly in anatomically complex or difficult-to-reach regions [26].

Although clinical presentation and imaging characteristics often strongly suggest the diagnosis, definitive confirmation requires histopathological evaluation.

The differential diagnosis of peripheral osteoma includes periostitis chronica, exostoses, bone sequestra, condensing osteitis, peripheral ossifying fibroma, osteoid osteoma, complex odontoma, and – when located lingually - sialolithiasis of the submandibular or sublingual glands. Histologically, both osteomas and exostoses are composed of mature bone tissue [3]. In contrast to osteoma, ossifying fibroma is circumscribed by a thin sclerotic radiolucent rim separating it from surrounding bone [21]. Peripheral ossifying fibroma is a reactive fibro-osseous lesion most commonly located in the anterior maxilla [27]. Osteoblastomas differ from osteomas in that they tend to grow more rapidly, are often painful, and appear radiographically as radiolucent lesions [10, 13]. Osteoid osteoma generally occurs at a younger age and is rarely found in the maxillofacial region [14].

The presence of multiple osteomas in the maxillofacial skeleton may indicate Gardner syndrome, which is also characterized by unerupted or supernumerary teeth, odontomas, adenomatous polyps, and various skeletal anomalies. Some authors recommend excluding Gardner syndrome whenever multiple peripheral osteomas are detected, as early identification of adenomatous polyps is essential to prevent their frequent malignant transformation into colorectal carcinoma [1, 14]. Histological evaluation is mandatory, especially for centrally located osteomas, despite their typically benign appearance. Recurrence or malignant transformation of peripheral osteomas after excision has not been reported. Nevertheless, distinguishing them from other benign bone lesions is crucial, particularly given the rare but documented occurrence of mandibular osteoblastoma undergoing malignant transformation into osteosarcoma [28].

Treatment of osteomas is primarily surgical, although intervention is not always immediately necessary. This depends on the lesion’s location and its clinical behavior as a benign, slow-growing mass. Small, asymptomatic osteomas discovered incidentally may be monitored periodically with CBCT. However, surgical excision remains the definitive treatment. Depending on the location of the lesion – extraoral, intraoral, or combined – surgical access may be selected to ensure safe and efficient removal while preserving adjacent vital structures. Mandibular osteomas located along the body of the mandible are often removed for cosmetic reasons or to prevent future functional impairment. Radical excision is performed to healthy bone margins, following the principles of minimally invasive surgery [26]. Recurrence is exceedingly rare, and malignant transformation has not been reported [14].

Conclusion

Peripheral osteomas are benign, slow-growing osseous formations. They are relatively uncommon in the jaws, and their occurrence near the alveolar ridge in a completely edentulous area is particularly atypical. Accurate diagnosis is essential, and patients should be appropriately referred for evaluation and potential surgical management.

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