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Review Article

Pathological and clinical features of primary osseous tumours of the jaw

Reena Sarkar*

Professor and Head, Oral and Maxillofacial Pathology, National Dental College Derabassi, Mohali, Punjab, India

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ABSTRACT

Primary bone tumors of the jaw are rare. The neoplastic cells in these tumors are the osteoblasts and osteoclasts. The gnathic bone tumors have also been referred to as borderline. The clinicopathologic approach towards these bony lesions have been reviewed.

1. Introduction

Primary tumors of jaw bone are uncommon [1]. Osteoid-producing primary bone tumors are encountered in gnathic apparatus, albeit far less in incidence as compared to their skeletal counterparts. The neoplasms covered in this review are those in which the osteoid or bone formation and its progenitor cells are responsible for the primary pathology [2].

Osteoid is the homogenously eosinophilic organic nonmineralised matrix of bone, produced by osteoblasts. The main constituent, type 1 collagen determines by its alignment whether the bone is lamellar or woven. The fiber arrangement is parallel to one another in lamellar bone and randomly distributed in woven. Association of reactive elements like giant cells, hemorrhage and edematous non-atypical spindle cell stroma is indicative of secondary repair or fracture callus. In reactive conditions, the bone formation is focal; progressively maturing and the osteoid islands are parallel to one another [3].

Bone producing lesions have overlapping histological features. The term “borderline” has been used throughout the literature for denoting these overlapping features seen in gnathic bone tumors [4]. Their distinct clinical and radiographic characterisitcs are used to provide an accurate diagnosis.

Osseous tumors are defined by the World Health Organization (WHO) as neoplasms that produce an osseous matrix. These lesions are divided into benign and malignant on the basis of their biological behavior [5]. Lesions that are included are the benign tumors—osteoma, exostosis, osteoid osteoma, osteoblastoma, giant cell tumor as well as the malignant neoplasm, osteosarcoma [1,6]. Fibro-osseous lesions like juvenile ossifying fibroma, ossifying fibroma and fibrous dysplasia are excluded from the discussion as they are essentially fibrogenic in origin. Computed tomography imaging shows a benign bone tumor as a well circumscribed lesion with the matrix of the tumor; characteristics such as cortical breakthrough, bone destruction, a permeative pattern and associated soft-tissue masses suggest a malignant bone neoplasm [7].

2. Torus

Exostosis or tori are described simply as bony overgrowths. On the palate, the exostosis occurs posterior to midline and tends to be noticeable only by the third decade. In case of the torus mandibularis, the tumor presents itself in the lingual aspect of mandible opposite the mental foramen. Torus palatinus and torus mandibularis are essentially composed of compact bone with larger specimens associated with cancellous core. Tori are removed only if they are large enough to interfere with speech or denture stability [2].

3. Benign bone tumors

3.1. Gnathic osteoma

Presenting as a superficial mass or at an endosteal location, osteoma is the most common benign tumor of the paranasal sinus

* Tel.: +91 9988222449; fax: +91 8558058355.
E-mail address: reenasarkar@rediffmail.com

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and posterior body of mandible or the condyle. Its incidence is between 0.014% and 0.43% [8].

Osteomas present as unilateral, well defined mushroom like radio opaque bone like mass [9]. Compact osteoma is a slow growing lesion consisting of dense and parallel lamellae of bone interspersed with marrow spaces. No haversian systems can be discerned (Figs. 1 and 2). Cancellous osteomas have trabeculae of bone with intervening marrow spaces and thin cortical bone.

Gardner's syndrome is associated with multiple supernumerary teeth, multiple osteomas, premalignant polyposis coli and multiple epidermal cysts. These osteomas occur at the alveolar ridge to medullary spaces to periosteal surfaces of jaws [2].

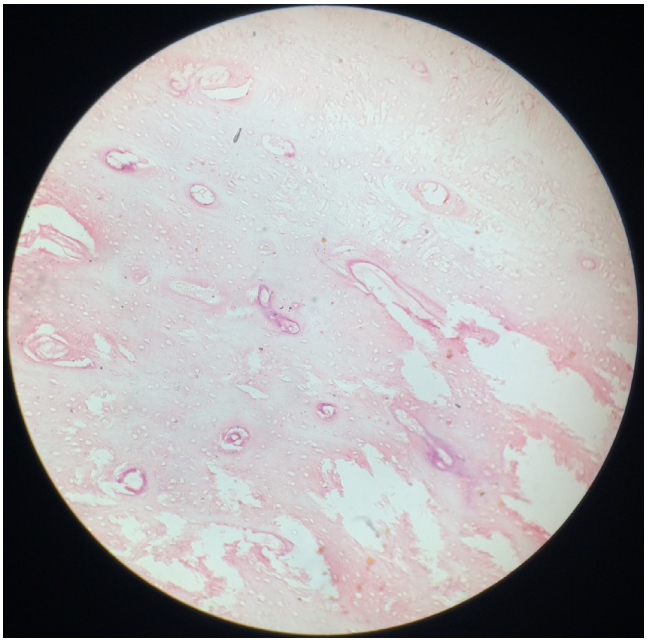

Fig. 1. Compact osteoma with minimal marrow tissue and osteons. Hematoxylin and eosin stain, 100 × .

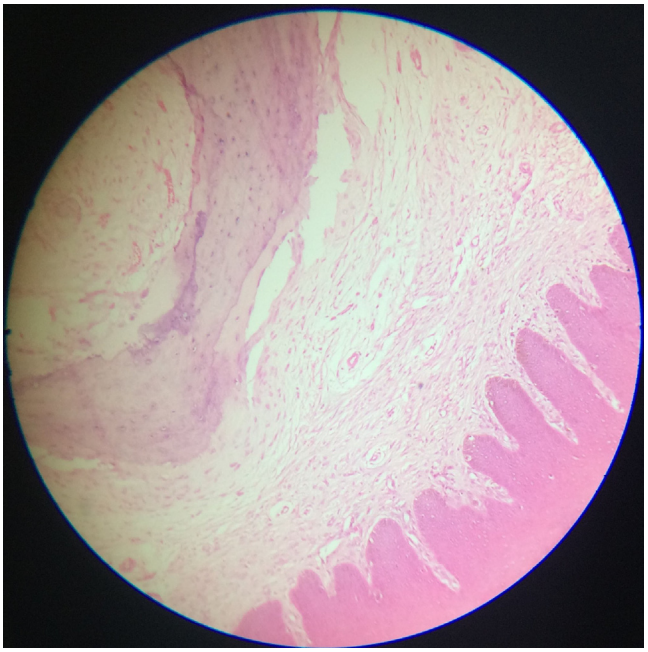

Fig. 2. Peripheral osteoma in gingival region. Hematoxylin and eosin, 100 × .

3.2. Osteochondroma (cartilage capped osteoma)

Primarily occurring in the condylar and coronoid process of the mandible, osteochondroma presents as mushroom shaped ossification beneath a calcified cartilage layer. The microscopic appearance resembles the epiphysis with a cap of hyaline cartilage overlying bone. The bone is usually of the cancellous variety and poorly demarcated from the cortex and medulla of the rest of the jaw bone. Treatment involves complete excision with overlying periosteum. Sarcomatous transformation in the oro-facial region has not been documented.

3.3. Osteochondromatosis

Just as in the case of Gardner's syndrome, the face and jaws are rarely affected. Both osteochondroma and multiple osteochondromatosis cease to grow after pubertal growth spurts. Malignant transformation is rare. The tongue is the most common extraskeletal tissue affected [2].

3.4. Gnathic osteoid osteoma and osteoblastoma [OB]

Although more common than osteoblastoma elsewhere in body, osteoid osteoma is still very rare in the mandible. Osteoid osteoma of the jaw typically occurs in the age range of 5–24 years. The association of pain with osteoid osteoma in gnathic sites is a worrying feature. Since clinicopathologic correlations are important in delineating osteoid osteoma from osteoblastoma, it is safest to characterize all osteoblastic benign tumors of the jaws under the umbrella term of gnathic osteoblastoma. Even if the lesion is small it may well represent an early stage of osteoblastoma [10,11].

3.5. Gnathic osteoblastoma

Gnathic osteoblastoma is a rare, expansile, locally aggressive lesion with a higher frequency in males. Radiographically it usually presents as a medullary radiolucency with radio-opaque foci of more than 2 cm in diameter. Sunray appearance or Codman's triangle has also been reported in up to 25% cases [2]. Also referred to as giant osteoid osteoma, the osteoblasts are large and epithelioid in appearance.

Osteoblastomas that occur as bony outgrowths without evidence of central destruction are termed periosteal benign osteoblastoma. The reported frequency of osteoblastoma in the jaws may be artificially high because tumors are often located in vicinity of a tooth root. Cementoblastoma is the odontogenic counterpart of jaw osteoblastoma.

In more cellular variants of OB, osteoid is difficult to detect. There is a histological continuum between conventional osteoblastoma and osteosarcoma with osteoblastoma variants in the middle [11]. Imaging studies describe OB as an expansile mixed or sclerotic lesion possessing cortical shell with non-specific signal intensity [7].

Osteoblastoma affect the facial region inclusive of jaws in 10% of cases, more so second and third decades. A mandibular predilection is noted. If the lesion is adjacent to teeth it may lead to tooth loosening. Endodontic treatment and extractions may be attempted for alleviating pain attributed to osteoblastoma.

Benign osteoblastoma are well circumscribed with loosely arranged polymorphous small uniform cells, mitosis is rare, and sarcoma giant cells are absent. The tumor is nonpermeative at the borders [12]. Heavily calcified immature bone, also known as “blue bone” may be seen (Figs. 3 and 4). Extensive intralesional hemorrhage in fibro-vascular spindle cell stroma is identified. Secondary aneurysmal bone cyst changes have been seen [13]. Osteoblasts do not fill the intertrabecular stromal spaces [14]. The word “toxic”