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OSTEOSARCOMA OF MANDIBLE: A DIAGNOSTIC QUANDARY, CASE REPORT AND A SHORT REVIEW

Oral Pathology

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ABSTRACT

Osteosarcoma (OS) is a primary malignant bone tumour with a worldwide incidence of 3.4 cases per million people per year. Diagnosis of the tumour is important especially in early stages for better treatment and prognosis. These neoplasms often show typical clinical behaviour as well as varied radiological appearances.The dentists must be careful in evaluating the clinical and radiologic clues. The aim of this case presentation is to emphasize the importance of dentists on diagnosis and prognosis of oral malignancies.

KEYWORDS

Osteosarcoma, jaw bones, osteoid

INTRODUCTION

Osteosarcoma is a malignant tumour characterized by the direct formation of bone or osteoid by the tumour cells[1]. In 1805, the French surgeon Alexis Boyer first used the term "Osteosarcoma[2]." Majority of craniofacial osteosarcomas occur in skeletally mature patients in contrast to those that affect the appendicular skeleton[3]. Jaw lesions comprise only 6.5% of all osteosarcomas and sometimes, they are referred to as gnathic osteosarcomas[4].

There are numerous variants of osteosarcoma of jaw bones, but these are generally classified into two types, primary and secondary[5]. The etiology of primary type is unknown; it may be due to genetic influence or other environmental factors. Environmental factors such as ionizing radiation and chromic oxide, a radioactive scanning agent have been incriminated. In older patients, this lesion has been found secondary to benign bone lesions such as Paget's disease and fibrous dysplasia.Genetic mutations in tumour suppressor gene P53 and mutated retinoblastoma gene have been claimed to be amongst other etiologic factors[3].

Here we present a case of osteosarcoma which clinically presented as a swelling of left angle of the mandible.

CASE REPORT

A 33 year old male patient reported to the department of Oral Pathology and Microbiology, Government Dental College Thiruvananthapuram with the chief complaint of swelling on the left side of face since 3 months. The patient's medical and dental history was unremarkable, and the patient did not seem to have any harmful habits.

Extraoral examination revealed an expansile, firm mass on the left angle of the mandible about 8x6 cm size. The overlying skin was normal. Mouth opening was reduced and tenderness was present. Paraesthesia was detected in the lower lip and in relation to teeth in lower left quadrant.

CT was taken and it revealed an abnormal heterogeneously enhancing soft tissue lesion measuring 7.2x5.8 cm arising from the angle for a distance of approximately 4cm anteriorly along the inferior border of second and third molar on the left side. The lesion appears to extend medially to parapharyngeal region abutting the mylohyoid muscle medially and buccinator laterally. Few nonenhancing areas noted within the lesion suggestive of necrotic changes.

Based upon the clinical and radiographic findings, a provisional diagnosis of ameloblastoma was given. Differential diagnosis of the lesion included malignancy and central giant cell granuloma. Incisional biopsy from left mandibular posterior alveolus was performed and it revealed predominance of multinucleated giant cells as well as areas of haemorrhage in the connective tissue stroma. Based on the clinical, radiographic, and histopathological correlations, the diagnosis of central giant cell granuloma was given. The patient was referred to RCC, Thiruvananthapuram for a second opinion as the lesion showed rapid enlargement. Another incisional biopsy was taken and the histopathological examination revealed features of central giant cell granuloma. However the rapidity of growth and aggressiveness of the lesion prompted a strong suspicion of malignancy and a further biopsy was performed. Microscopy revealed areas of giant cells and cellular atypia with foci of bone permeation. Based on these histological features and correlating with clinical and radiographic findings the diagnosis of osteosarcoma was established.

Figure 1: Clinical photograph showing swelling over left side of the face

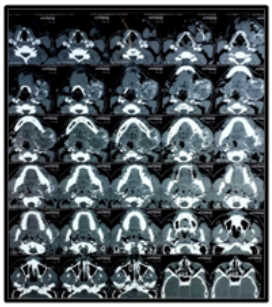

Figure 2: CT showing an expansile lytic lesion of left mandibular angle

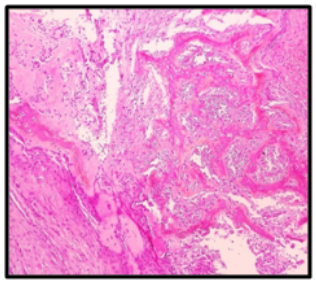

Figure 3: Photomicrograph showing neoplastic osteoid formation

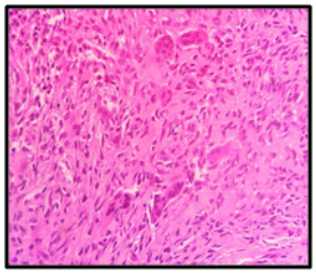

Figure 4: Photomicrograph showing areas of giant cells in the connective tissue stroma

DISCUSSION

Osteosarcoma is a primary malignant bone neoplasm characterized by osteoid synthesis by malignant osteoblasts. The jaw bone is considered to be the most common site in the head and neck region[6]. Jaw lesions tend to occur at an older mean age(fourth decade versus second decade for non-jaw lesions)[7]. The mean age according to Garrington et al ranges from 34 to 36 years[3]. Although the jaw osteosarcomas involving the mandible and maxilla display a predilection for males, some studies display slight predilection for females. Forteza et al stated that the maxillary tumours were predominant in females. There is a nearly equal involvement of the maxilla and the mandible[7]. The mandibular tumours arise more frequently in the posterior body and ramus, whereas the maxillary tumours are discovered more commonly in the alveolar ridge, sinus floor and palate[8].

Clinically, osteosarcoma of long bones presents as pain during activity compared to osteosarcoma of jaw bones where swelling rather than pain is the commonest finding[3].Although about 90% of osteosarcoma of long bones show soft tissue extension, a few patients complain of swelling[9].

Radiography is the initial imaging modality in the evaluation of bone tumours[2]. Clark et al. (1983) classified the radiographic pattern of osteosarcoma of the jaw into lytic, sclerotic, and mixed types[10]. In the present case, it was observed that the lesion was lytic in appearance. If the tumour invades the periosteum, many thin irregular spicules of new bone may develop outward and perpendicular to the surface of the lesion producing the so-called 'sun ray appearance'[3].Periosteal new bone formation with lifting of the cortex leads to the appearance of a Codman's triangle.Garrington et al. (1967) mentioned that radiographic evidence of a symmetrically widened periodontal membrane space is a significant early finding in osteosarcoma of jaw[2].

The importance of special investigations such as computerized tomography (CT) and magnetic resonance imaging (MRI) lies in assessing the size of the lesion for staging, intramedullary and extramedullary involvement, tumour calcification and invasion into adjacent tissues[3].

The WHO histologic classification of bone tumours divides OS into central and surface tumours, with a number of subtypes under each group[11]. Conventional OS is the most common histologic type and accounts for approximately 75% of all cases[12]. Depending upon the predominant type of extracellular matrix present, osteosarcomas are categorized into osteoblastic, chondroblastic, and fibroblastic subtypes[3]. Chondroblastic osteosarcoma is the most common histologic type and is associated with the best survival rate[10].

Avani et al reported a case of osteosarcoma involving left posterior maxilla and the histopathological examination showed many proliferating, atypical and neoplastic osteoblasts. Intermittent tumour osteoid was also seen in most areas. Areas of atypical chondroid tissue were seen with large chondrocytes. Areas of focal calcification were also evident[13].

Jithendra et al reported a case of osteoblastic osteosarcoma involving right posterior region of mandible and the histopathological examination revealed large sized pleomorphic cells with hyperchromatic nuclei which were arranged in an irregular fashion. These cells were malignant osteoblasts. The tumour cells were found to deposit atypical eosinophilic osteoid.Few giant cells were also noticed[4].

Kaur et al reported a case of osteosarcoma involving the mandible and histopathological examination revealed round to ovoid tumour cells arranged in the form of sheets or lobules in a scanty stroma. Stroma exhibited numerous blood vessels packed with red blood cells and foci of tumour osteoid[8].

Manisha et al reported a case of fibroblastic osteosarcoma involving left posterior region of mandible and the incisional biopsy revealed proliferation of spindle shaped anaplastic fibroblasts and osteoblasts with irregularly shaped hyperchromatic nuclei. The findings were suggestive of osteosarcoma (fibroblastic type)[2].

Lavanya et al described a case of osteosarcoma of the right posterior mandible, which clinically presented as soft tissue growth from the gingiva.Incisional biopsy of the lesion was performed, and the hematoxylin- eosin stained section showed highly cellular connective tissue stroma, predominantly composed of neoplastic spindle cells that exhibited pleomorphism and hyperchromatism. Abundant neoplastic osteoid formation with varying degrees of calcification was seen within the stroma. The neoplastic bone showed typical peripheral rim of malignant osteoblasts as well as entrapped pleomorphic and hyperchromatic cells[6].

Kumaraswami et al reported a case of telangiectatic osteosarcoma involving left posterior region of mandible. Incisional biopsy was performed and histopathological examination revealed large and small blood filled spaces separated by strands of neoplastic malignant mononuclear cells intermingled with benign appearing multinucleated osteoclastic giant cells. Abnormal mitosis was frequently seen. In some areas, streaks and strands of tumour osteoid were seen surrounding the tumour cells[14].

In our case incisional biopsy was taken and histopathological examination revealed predominance of multinucleated giant cells and areas of haemorrhage in a fibrous connective tissue stroma which prompted the diagnosis of central giant cell granuloma. However the clinical aggressiveness of the lesion raised a strong suspicion of malignancy and further biopsy was done. The further biopsy from the deeper tissue revealed areas of osteoid formation by the neoplastic osteoblasts. Areas of multinucleated giant cells interspersed among fibrovascular connective tissue were present in the repeat biopsy also. On review of the initial slides which were diagnosed as central giant cell granuloma, hyperchromatic and pleomorphic cells were seen permeating through the osteoid tissue. The osteoid tissue was very meagre at the periphery of the section.

The diagnosis of osteosarcoma must be verified histologically with a biopsy before initiation of treatment. The evidence of direct osteoid formation by neoplastic cells is considered to be an essential criterion for its diagnosis, and microscopic evidence of neoplastic bone, even if it is very minimal, confirms its diagnosis[6]. Immunohistochemical detection of MDM2 and CDK4 may provide as useful diagnostic tools. The universal TNM staging system is not commonly used for sarcomas because of their rarity to metastasize tolymph nodes. The system used most often to formally stage bone sarcomas is known as the Enneking system[3]. It is based on grade (G), site (T), and metastasis (M) and uses histologic, radiologic, and clinical criteria[2]. Histopathologic grading of this neoplasm is done according to Broder's grading system, based on degree of cellular anaplasia shown by tumour cells.

Wide radical resection is the treatment of choice for osteosarcoma of jaws with clearance margins of 1.5–2 cm. Surgery and adjuvant chemotherapy and radiotherapy may be required sometimes. In mandible, hemimandibulectomy is commonly preferred[3].

The metastatic rate of jaw osteosarcomas range from 6 to 51% and the most common site for the metastasis is lungs accounting for almost 20%[13,3].

CONCLUSION

Osteosarcomas of jaw bones are extremely rare, representing about 6.8% of all osteosarcomas and 1% of all head and neck malignancies. Since there is overlap of clinical and radiographic features between osteosarcoma and central giant cell granuloma, the predominance of macrophage derived multi nucleated giant cells in a granulomatous background should not deter the pathologist from a diligent search for malignant osteoblasts and neoplastic bone formation depending upon the aggressiveness of the lesion; osteosarcomas however show osteoid formation by the neoplastic cells which is not seen in central giant cell granuloma and is considered to be an essential criterion for its diagnosis. Thus a thorough clinical, radiographic and histopathological evaluation of any suspicious lesion in jaw bones is mandatory in diagnosing its pathology at an early stage.

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