Case Report

Brown tumor of hyperparathyroidism with multiple lesions

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Abstract

Brown tumors are rare focal giant-cell lesions that arise as a direct result of the effect of parathyroid hormone (PTH) on bone tissue in some patients with hyperparathyroidism. Browns tumor is a syndrome associated with an increase in PTH levels by parathyroid glands resulting in hypercalcemia. In the present case report, a 44-year-old female patient presented with a rare case of brown tumor with multiple lesions in the head-and-neck region. The recent advance in various diagnostic and biochemical tests helps in early diagnosis of hyperparathyroidism cases. The dentist should be aware of oral manifestations associated with this type of systemic disease.

Keywords: Central giant cell lesion, osteitis fibrosa cystica, osteoclastoma

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Submitted: 02-Oct-2020, **Revised:** 03-Aug-2021, **Accepted:** 06-Aug-2021, **Published:** 28-Feb-2022

INTRODUCTION

Browns tumor is a syndrome associated with an increase in parathyroid hormone (PTH) levels by parathyroid glands resulting in hypercalcemia. Parathyroid glands monitor the serum calcium concentration. In the nonpathologic state, PTH secretion increases in response to low serum calcium concentrations, thereby enhancing calcium reabsorption and osteoclastic bone resorption. When parathyroid glands become abnormal, there is abnormal increase in PTH secretion result in increased reabsorption of calcium and increased bone resorption.

In the present case report, a 44-year-old female from Visakhapatnam reported to the outpatient department with a chief complaint of swelling in the lower left back tooth region. Advised radiological investigations. On cone-beam computed tomography (CBCT), shocking multiple hypodense areas with aggressive bone resorption were observed and on blood investigations observed elevated serum parathormone levels: 890 ng/mL.

CASE REPORT

A 44-year-old female reported outpatient clinic of GITAM Dental College and Hospital with a chief complaint of swelling in the lower left back tooth region for 5 months. On past dental history, the patient gives the history of enucleation and extraction in relation to 35. It was diagnosed as dentigerous cyst on histopathological examination.

On extraoral examination

Swelling was observed on lower one-third of the face on the left side which extending from the left corner of the mouth to tragus anteroposteriorly were as superoinferiorly from alatragal line to 0.5 cm below the lower border of

Access this article online

Quick Response Code:

Website: www.jomfp.in

DOI: 10.4103/jomfp.jomfp_409_20

How to cite this article: Majumdar S, Uppala D, Kotina S, Alekhya B. Brown tumor of hyperparathyroidism with multiple lesions. J Oral Maxillofac Pathol 2022;26:S111-5.

mandible. On intraoral examination, ill-defined swelling with obliteration of buccal vestibule was observed in relation to 34, 36 teeth.

Based on clinical features, a provisionally diagnosed as odontogenic cyst was given. On aspiration, blood-tinged fluid was aspirated.

Radiological investigations

On panoramic radiography, a well-defined radiolucent lesion was observed in relation to 46, 47 and right parasymphyseal region and left posterior mandible and on ascending ramus region [Figure 1]. On the occlusal radiograph, bicortical plate expansion on the left side. CBCT revealed an ill-defined bone with hypodense areas involving alveolus of 17 (right maxilla), right body of mandible, left ramus of mandible and right frontal sinus noted. Bilateral temporomandibular joints (TMJs) showed mild degenerative changes [Figure 2]. On hand and wrist radiograph, subperiosteal bone resorption and metastatic calcium deposition were observed. Posteroanterior skull view: multiple punched out radiolucent areas were observed. Based on the above radiological features, the lesion was diagnosed as multiple osteolytic lesions (multiple myeloma, osteodystrophic lesion, Noonan-like multiple giant cell lesion syndrome, hyperparathyroidism).

The blood reports as shown were serum alkaline phosphatase: 358 U/L, serum calcium: 14.0 mg/dl and serum parathormone levels: 890 ng/ml.

On histopathological examination

The hematoxylin and eosin-stained soft tissue section exhibited loosely arranged stroma with small capillaries and proliferating fibroblasts. The collagen fiber bundles were arranged in whorl pattern. There were abundant multinucleated giant cells present throughout the tissue. These giant cells consisted of 10–15 nuclei and many of them being prominent, thus showing features of active division. These giant cells were distributed near areas of hemorrhage, extravagated blood [Figures 3-5]. Based on the radiographical, histopathological features and blood investigations, it was diagnosed as brown tumor.

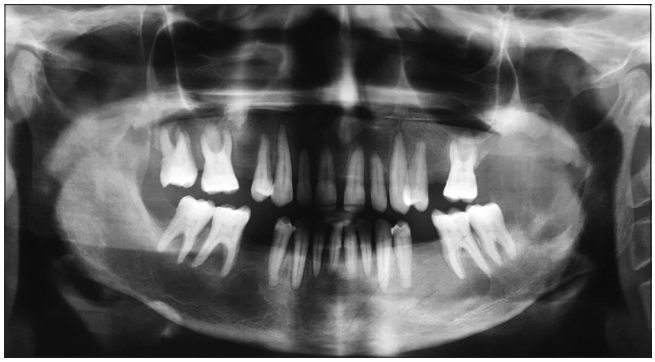


Figure 1: One well-defined radiolucent area in relation to 46, 47 and other parasymphysis region on the right side; one well-defined radiolucent area in relation to 36, 36 which is extending from root apex to beyond the lower boarder; other similar lesion was found on ascending ramus region

DISCUSSION

The parathyroid glands are situated in the thyroid gland, which is not regulated by the pituitary gland, but directly under the control of serum ionized calcium concentrations.[1,2] Hyperparathyroidism occurs in three significant forms as primary, secondary and tertiary [Table 1].[3]

The classic symptoms of the disease are bones, stones, abdominal groans and psychic moans.[4] In developed nations, it is seen in elderly females with mild to moderate hypercalcemia and very few with classic symptoms.[5]

Normal parathyroid

Physiology parathyroid glands constantly monitor serum calcium concentration.[6] This involves a complex calcium-ion sensing receptor mechanism in the parathyroid cells that respond to changes in serum calcium concentration. This mechanism occurs in all normal parathyroid glands to maintain the normal serum calcium levels, i.e., 2.1 and 2.65 mmol/L, which is essential for normal bone metabolism, muscle and nerve physiology.[7,8]

The name "brown tumor" is a misnomer derived from the color, which is caused by the vascularity, hemorrhage and deposits of pigment hemosiderin.[9] It is a nonneoplastic giant cell lesion which is slowing growing and locally destructive. Its vascularity, hemorrhage and hemosiderin impart the characteristic brown color. The PTH has a direct effect on bone.[10-14]

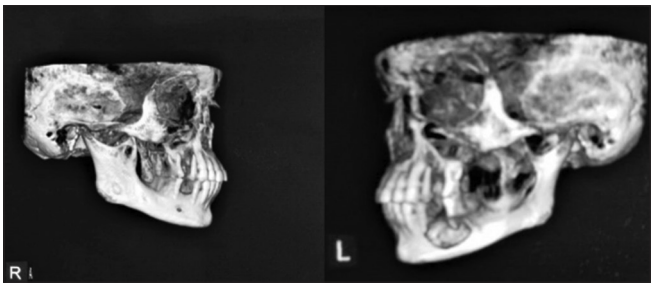


Figure 2: Well defined hypodense bony lesion noted in right body of mandible. Large expansile well defined hypodense bony lesion noted in left Ascending ramus of mandible

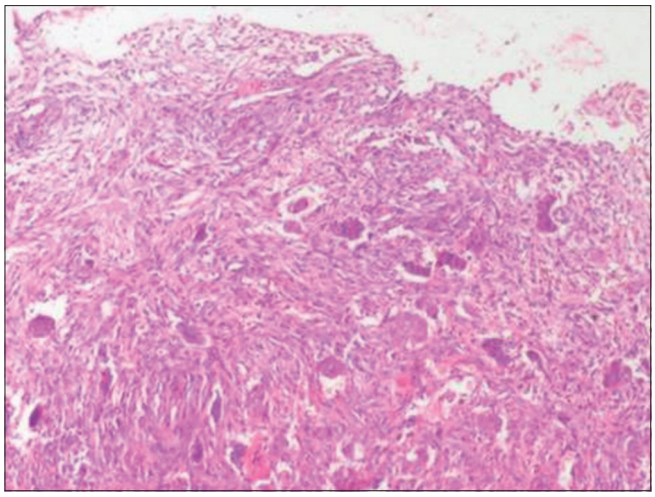


Figure 3: Haematoxylin and eosin stained soft tissue section exhibits loosely arranged connective tissue stroma with haematoxyphilic areas

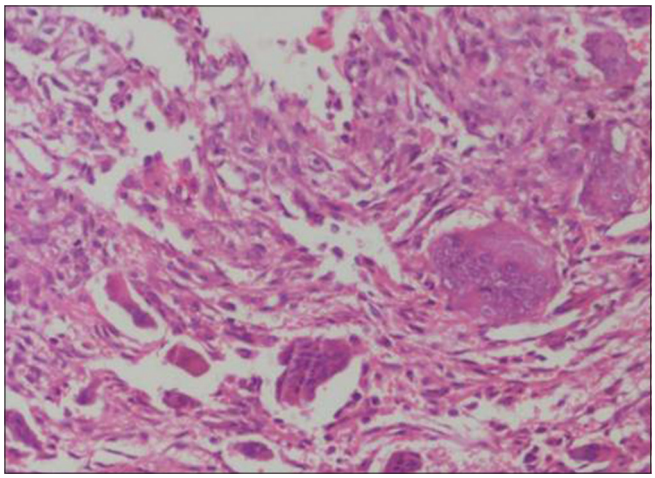


Figure 4: H&E stained soft tissue section exhibits multinucleated giant cells in the loosely arranged connective tissue stroma ,numerous blood capillaries and areas of hemorrhage

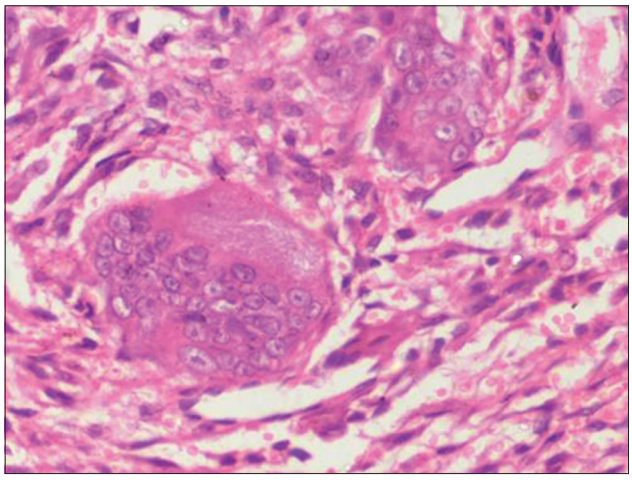
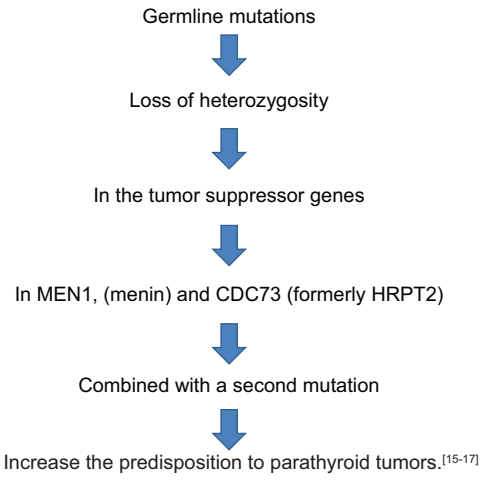


Figure 5: H&E stained soft tissue section exhibits multinucleated giant cells having up to 10-15 nuclei close to the vascular spaces . The connective tissue also exhibits spindle shaped stroma cells in the loosely arranged stroma ,blood capillaries and areas of hemorrhage

Genetic causes of primary hyperparathyroidism



The MEN1 gene is located in 11q14 and consists of 10 exons that encode 610 amino acid proteins referred to as menin. This protein is present in on dividing cells.

Differentiating between a brown tumor and other giant cell tumors may be very difficult, even with histology [Table 2].

Cases of giant cells associated with neurofibromatosis (type 1),[18] Noonan-like syndrome or both have been reported. Histologically giant cell lesions are exhibiting rich osteoclast fields which could not be easily distinguished from cherubim and Noonan syndrome.[19]

A reparative granuloma is different from the brown tumor by the absence of hyperparathyroidism. In histological section shows giant cells in the less dense stroma but more vascularized.[20] Patients with giant-cell tumors associated with hyperparathyroidism and hypercalcemia to differentiate this granuloma from brown tumors.

CONCLUSION

Brown tumor most commonly affects mandible rarely maxilla, but in our case, multiple lesions in skull, mandible, maxilla, TMJ. The recent advance in various diagnostic and biochemical tests helps in early diagnosis of hyperparathyroidism cases. The dentist should be aware of oral manifestations associated with this type of systemic disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal.

Table 1: Classification of hyperparathyroidism[1]

Primary hyperparathyroidism	Secondary hyperparathyroidism	Tertiary hyperparathyroidism
Hyperfunction of parathyroid cells due to hyperplasia, adenoma, carcinoma	Physiological stimulation of parathyroid in response to hypocalcemia	Long term physiological stimulation of parathyroid leading to hyperplasia
Associated with multiple endocrine neoplasms	Associated with renal failure or prolonged dialysis patient	Seen in chronic renal failure patients
Calcium levels increased	Calcium levels normal	Calcium levels increased
PTH levels increased	PTH levels increased	PTH levels more increased
Phosphate levels decreased	Phosphate levels normal	Phosphate levels increased
Caused due to MEN1 and MEN2a	Caused by hyperphosphatemia	Caused due to chronic secondary hyperparathyroidism
Symptoms	Symptoms	Symptoms
Osteoporosis	Muscle aching	Muscle aching
Excessive urination	Weakness	Kidney stones
Abdominal pain	Fractures	Renal failure
Weakness	Bone deformities	Fractures
Depression		
Bone and joint pain		

PTH: Parathyroid hormone

Table 2: Difference between brown tumor and other giant cell tumors

Giant cell granuloma	Giant cell tumor
Occurs in <20 years of age	Occurs in 20-40 years old
Mandible and maxilla are commonly affected	Long bones skull commonly affected
Histopathological features	Histopathological features
Giant cells are in groups located close to hemorrhagic foci	Giant cells are uniformly dispersed
Stroma shows oval cells, many fibroblastic cells and relatively few giant cells	Stroma composed of plump, round and oval cells with a vascular network
More hemosiderin deposition	Less hemosiderin deposition
Giant cells are small, irregular elongated few nuclei	Giant cells are large, round with many nuclei
Osteoid and new bone formations are seen	Osteoid and new bone formation is not seen
Giant cells are haphazardly placed	Giant cells are uniformly placed

The patients understand that their names and initial s will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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