

Brown Tumor of Secondary Hyperparathyroidism: Case Report and Literature Review

Aicha Ibourk^{1*}, Sofia Haitami² and Ihsane Ben Yahya³

¹Resident Dentist, Dental Consultation and Treatment Center, Ibn Rochd University Hospital Center, Casablanca, Morocco

²Professor, Dental Consultation and Treatment Center, Ibn Rochd University Hospital Center, Casablanca, Morocco

³Professor and Head of the Oral Surgery Unit, Dental Consultation and Treatment Center, Ibn Rochd University Hospital Center, Casablanca, Morocco

***Corresponding Author:** Aicha Ibourk, Resident Dentist, Dental Consultation and Treatment Center, Ibn Rochd University Hospital Center, Casablanca, Morocco.

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Abstract

Introduction: Brown tumour of bone (BT), also called osteitis fibrosa cystica is a rare non-neoplastic lesion resulting from abnormal bone metabolism in hyperparathyroidism (HPT). The commonly affected sites are facial bones, clavicle, ribs, pelvis and femur [4]. In the craniofacial region, there are reports of tumors involving maxilla, palatine bone, temporal, nasal, orbit and paranasal sinuses.

Case Report: 43-year-old male patient was admitted in the oral surgery unit due to cellulitis located in the upper half of the right jugal region. Oral clinical examination showed a swelling at the vestibule floor covered with mucosa with normal colour and tissue with absence of 15, 16, 17 and 18. The extraction site is well healed. At the palpation, the lesion was soft, depressible and painful. Panoramic X-ray showed a radiolucent lesion with a radio opaque image related to the sinus in the right maxillary region. A surgical exploration was performed, leading to a giant cell granuloma. The clinical, radiological, histological and laboratory data were leading to the diagnosis of brown tumor of secondary hyperparathyroidism.

Discussion: Brown tumor (BT) of hyperparathyroidism (HPT) is a focal bone lesion caused by increased osteoclastic activity and fibroblast proliferation. The etiology of BT is hyperparathyroidism which can be primary, secondary or tertiary. The incidence of BT has been reported to be 3% in patients with primary HPT, in contrast to 1.5% - 1.7% in patients with secondary HPT. The treatment of a BT depends on several criteria: etiology, extent, location and symptomatology.

Keywords: *Brown Tumor; Secondary Hyperparathyroidism; Bone Diseases*

Introduction

Brown tumor of bone, also called osteitis fibrosa cystica is a rare non-neoplastic lesion resulting from abnormal bone metabolism in hyperparathyroidism (HPT) [1].

Actually, they represent a reparative cellular process rather than a true neoplasia [2,3]. They are known to occur only in the setting of HPT and are considered the most pathognomonic skeletal changes that accompany this disease [3].

The commonly affected sites are facial bones, clavicle, ribs, pelvis and femur [4].

In the craniofacial region, there are reports of tumors involving maxilla, palatine bone, temporal, nasal, orbit and paranasal sinuses. These tumors are more common in the mandible than in the maxilla and are three times more common in women (over 50 years) than men. BT can cause single or multiple lesions. They are usually isolated, lytic, expansive, lesions stimulating bone destruction [3,5]. The location of brown tumors in the maxillofacial region is rare, especially the involvement of both the mandible and maxilla and only a few cases of maxillofacial brown tumors as the first sign of hyperparathyroidism are published in medical literature [21]. The aim of this paper is to describe the diagnostic procedure of hyperparathyroidism resulting in a brown maxillary tumor.

Case Report

A 43-year-old male patient presented with a cellulitis located in the upper half of the right jugal region.

The patient is in good general health. He reported that a swelling appeared after extractions of the right upper molars 1 year before the consultation. He took antibiotics. The swelling continued to disappear and reappear. Clinical examination showed facial asymmetry, with painful symptoms, partial palpebral occlusion and absence of lymphadenopathy.

Oral clinical examination showed a swelling at the vestibule covered by a mucosa of normal color and tissue with absence of 15, 16, 17 and 18. The extraction site is well healed (Figure 1). At the palpation, the lesion was soft, depressible and painful.



Figure 1: *Intra oral examination showed a swelling at the vestibule floor covered with mucosa with normal colour and tissue with absence of 15, 16, 17 and 18.*

Panoramic X-ray showed a radiolucent lesion with a radio opaque image related to the sinus in the right maxillary region (Figure 2).

The computer tomography (CT) findings showed a hypodense lesion with an osteolytic, multilocular, expansive, progressive pattern piercing the cortical bone, extending from the right maxillary region to the sinus (Figure 3).

A prescription of antibiotics is made at a dose of 2g of amoxicillin per day for 7 days.



Figure 2: Panoramic X-ray: A radio opaque image related to the sinus in the right maxillary region.

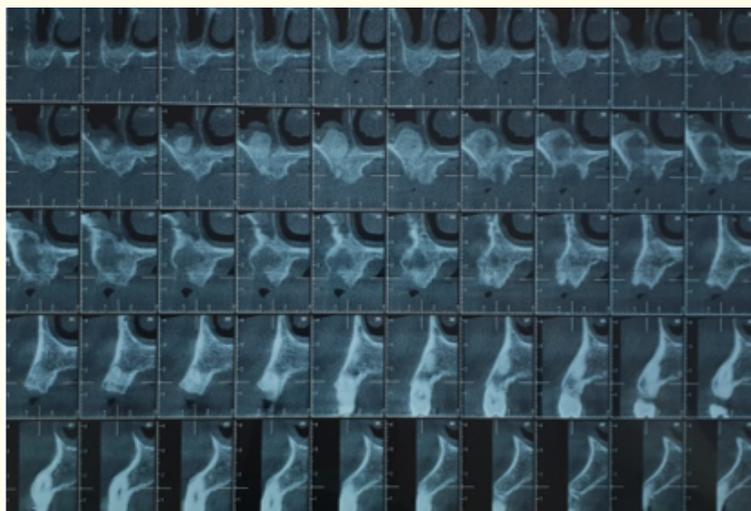


Figure 3: Computer tomography (CT) showed a hypodense lesion with an osteolytic, multilocular, piercing the cortical bone.

A surgical exploration was performed (Figure 4). Pathological examination showed that the tumor was composed of Fibrous stroma associated with multinucleated giant cells.

A phosphocalcic assessment and a parathyroid hormone test were prescribed. The value of parathyroid hormone (PTH) was 115 pg/mL while the normal value was between 8 and 79 pg/mL. Hypo vitaminose D was also recorded. The value was 16.5 ng/ml while the normal value was between 30 and 100 ng/ml.

The clinical, radiological, histological and laboratory data were leading to the diagnosis of brown tumor of secondary hyperparathyroidism.

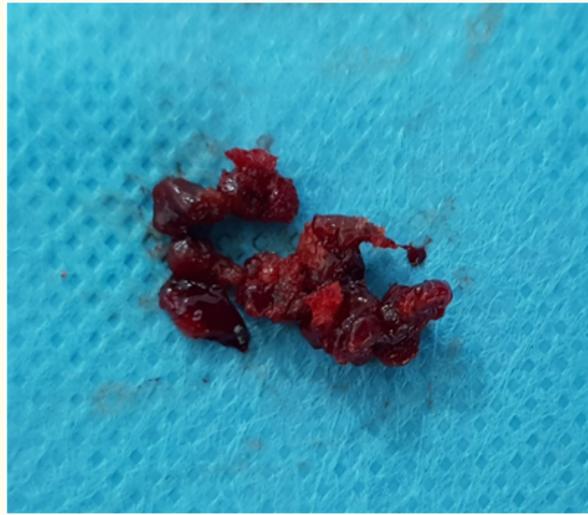


Figure 4: Surgical exploration.

The patient was referred to an endocrinologist. A vitamin D medical treatment in the form of cholecalciferol was initiated, because she estimated that hyperparathyroidism is related to hypovitaminosis D.

Discussion

Brown tumor (BT) of hyperparathyroidism (HPT) is a focal bone lesion caused by increased osteoclastic activity [6-8] and fibroblast proliferation encountered in primary and, more rarely, in secondary HPT [5-7,9]. However, it has also been described as a manifestation of calcium malabsorption and some forms of osteomalacia [6,7].

In 1891, Von Reckling Hausen studied the clinical impact of hyperparathyroidism and described osteitis fibrocystic as the pathognomonic bone lesion of this entity. Brown tumors are the main manifestation of this osteitis fibrocystic. In 1934, Albright made the first description of the BT in the facial skeleton [10].

The name of brown tumor comes from the color produced by deposit products like hemosiderin from micro-bleeding [11,12].

BT is not actual tumors but result from excessive osteoclastic activity. It can be seen in monostotic or polyostotic forms. Despite their benign characteristics, they can behave aggressively and can be destructive. The differential diagnosis between brown tumors and bone metastases may be challenging, especially in patients with an unknown primary tumor [13].

BT can occur in several body regions, affecting predominantly the hands, feet, skull, clavicle, ribs, pelvis, femur and facial bones [3,14]. It is more frequent in the mandible than in the maxilla, more prevalent in individuals aged 50 years or over and is three times more common in women than men [8,9,15,16]. In the present case, the patient is a 43-year-old male and the localization of the BT is maxillary

The etiology of brown tumors is hyperparathyroidism which can be primary, secondary or tertiary. In this case, the etiology is secondary hyperparathyroidism.

The incidence of brown tumors has been reported to be 3% in patients with primary HPT, in contrast to 1.5% - 1.7% in patients with secondary HPT [13].

The four parathyroid glands derive from the third and fourth pharyngeal pouches and descend caudally to the anterior neck. They are embedded in the posterior thymus, with ectopic locations occurring as well. These endocrine organs produce parathyroid hormone (PTH). PTH has well described and understood effects on bone, kidney and intestine which play a role in controlling serum calcium levels. Notably, PTH binds the osteoblast in bone and increases the production of receptor activator of nuclear factor kappa-B ligand (RANKL) while decreasing osteoprotegerin. RANKL stimulates osteoclast maturation, activity and resorption leading to increased levels of calcium in the serum. Overstimulation of PTH will cause pathological disorders as seen in primary, secondary, or tertiary hyperparathyroidism (HPT). In 1945, Weinmann described the first case of secondary hyperparathyroidism (SHPT) presenting in the mandible. Later, Nathan reported the first case in the maxilla and mandible occurring in primary hyperparathyroidism (PHPT) in 1966 [17].

Primary hyperparathyroidism is most commonly due to adenoma, parathyroid hyperplasia or rarely carcinoma. Secondary hyperparathyroidism is one of the most important complications of chronic renal failure. It appears also when parathyroid tissue is exposed to chronic hypocalcemia. And tertiary hyperparathyroidism is due to development of autonomic parathyroid hyperfunction, in a background of secondary hyperparathyroidism, may be considered as a less frequent etiology [18].

Brown tumor can occur as solitary or multiple lesions in any bone. These tumors are usually soft, painless, minimally tender and appear elastic on palpation. Symptoms result from the considerable dimensions of the tumor and its localization, but in most cases maxillary tumor is not painful. In the mandible, the cortical bone is expanded and thinned. Brown tumors of the jaws occasionally result in root resorption and loss of the lamina dura and may present as a space occupying mass in the sinus. When a BT involves the face and has progressive growth, it may cause severe deformities, discomfort, alteration of the masticatory apparatus and difficulty to breathe through [19]. In this case, BT was a solitary lesion in the maxilla. The lesion was soft, depressible and painful at the palpation.

Radiographically, BT shows a well-defined radiolucent lesion [3,5]. Lesions are osteolytic with undefined margins, frequently expand the cortical bone and determine a thin shell of reactive periosteal bone formation. Lytic lesions may be trabeculated, with a multiloculated appearance. By The computer tomography (CT), BT is a lytic lesion with irregular margins and soft tissue density. On the RMI, heterogeneous intensity signal and Hypointensity signal suggests the presence of hemosiderin deposits [18]. In the present case, BT showed a radiolucent lesion with a radio opaque image related to the sinus in the right maxillary region. The CT findings showed a hypodense lesion with an osteolytic, multilocular, expansive, progressive pattern piercing the cortical bone, extending from the right maxillary region to the sinus.

Histologically, it is composed of fibrous stroma associated with multinucleated giant cells, fibroblasts embedded in areas of hemorrhage and hemosiderin deposits [3,5,15,20].

The diagnosis of BT of HPT can be suggested by pathological examination. However, it may not provide conclusive evidence to distinguish it from similar lesions [16]. The differential diagnosis must be made between central giant cell granuloma, aneurysmal bone cyst, cherubism and Paget's disease [8,16].

The treatment of a brown tumor depends on several criteria: etiology, extent, location and symptomatology. It is important to emphasize that brown tumors are non-neoplastic lesions, with no malignant potential, compared with true giant cell tumors that have a potential for malignant transformation and expose to lung metastases, thus requiring radical surgical treatment [10].

The first step in the treatment of brown tumors of secondary hyperparathyroidism is the correction of HPT with the administration of vitamin D or PTx. In fact, intravenous calcitriol is often sufficient in high serum PTH level in case of hyperphosphatemia. Lesion regression and the normalization of PTH levels are expected to occur after this correction. Surgical resection and decompression of the brown tumor of the maxilla is urgently needed in anatomical site, because it may compromise the local area by continuous expansion, such as maxillary brown tumor [3]. In the present case, surgical exploration was performed following clinical and radiological signs. The histopathological and laboratory findings led to hyperthyroidism due to hypovitaminosis D. Therefore, the diagnosis of a BT of secondary HPT was confirmed. A vitamin D medical treatment in the form of cholecalciferol was prescribed.

Recurrences are possible especially with medical treatment [10].

Conclusion

A complete assessment of the medical history, blood test, clinical and radiological findings combined with biopsy results is necessary for a correct and complete diagnosis and for the correct treatment of the patient. [21].

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