"The diagnosis and management of multiple Brown Tumours of the Jaws"

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October 6, 2020

Abstract

A 56-year-old male presented to an emergency dental service with multiple intra-oral swellings.The intraoral swellings were seen radiographically as punched out radiolucencies in the upper right first molar region and the lower left second molar region. These were indicative of browns tumours.

Six Keywords: hyperparathyroidism, browns tumour, surgical excision, Radiolucency

Key clinical message:

The key messages of this article is to allow dental practitioners to understand the features of browns tumours. From this article the readers will get an insight into the diagnosis, dental and medical management of this case.

Introduction

Hyperparathyroidism can present with a variety of oral manifestations. Many of which are only evident on radiographs, such as generalised reduction in bone density, ground glass changes to the trabecular bone pattern and loss of lamina dura around teeth. Brown Tumours can occur in the jaws of patients with hyperparathyroidism(1) and are evident on imaging as well demarcated, radiolucent, often expansile lesions (2). Histologically they are identical to giant cell granulomas which are seen in younger patients who do not have hyperparathyroidism(3) Brown tumours are not frequently seen in developed countries as hyperparathyroidism is usually quickly diagnosed and treated(4).

Hyperparathyroidism occurs when one or more of the four parathyroid glands in the neck, located at the deep surface of the thyroid gland, produce increased levels of parathyroid hormone. Parathyroid hormone regulates calcium metabolism.Hyperparathyroidism can be classified as primary, secondary and tertiary. Primary hyperparathyroidism is associated with elevated serum calcium levels. It is caused by overproduction of parathyroid hormone from either a parathyroid adenoma or hyperplasia of the parathyroid glands. Parathyroid carcinoma also exists but is very rare. Secondary hyperparathyroidism is caused by low serum calcium levels which is often associated with chronic renal failure. This drives a negative feedback mechanism to cause hyperparathyroidism.In this article, a case of tertiary hyperparathyroidism is discussed. Tertiary hyperparathyroidism occurs in cases where longstandingsecondary hyperparathyroidism leads to autonomously functioning parathyroid glands. Therefore, these patients may also have parathyroid adenomas or hyperplastic parathyroid glands(1, 12).Multiple, complimentary imaging modalities are utilised prior to considering a surgical approach to correct a diagnosis of primary or tertiary hyperparathyroidism (3).

Presentation of case

A 56-year-old West African male patient was admitted into an acute medical hospital following a hypertensive crisis. A Computed Tomography (CT) scan of the head and body was conducted, with a report highlighting a thickened aorta and small bilateral kidneys. This prompted a Fluoro-Deoxy-Glucose Positron Emission Tomography (FDG PET) scan to exclude vasculitis as the cause. No evidence of vasculitis was present. An incidental finding was focal metabolic activity in the right lobe of the thyroid gland (Fig 1). An FDG PET avidnodule in the thyroid gland is an indication for malignancy in 30%of cases(5).Further investigation in the form of an ultrasound and fine needle aspiration cytology (FNAC)was arranged to exclude a thyroid malignancy.

The ultrasound scan showed a suspicious nodule in the right lobe of the thyroid. It also showed an extra-thyroid nodule at the deepsurface of the gland (Fig 2). This extra-thyroid nodule was suspicious for a parathyroid adenoma, but the possibility of lymph node metastasis was also considered. A Fine Needle Aspiration was conducted of both nodules providing a coupled diagnosis of a papillary thyroid carcinoma and parathyroid adenoma. Further imaging in the form of a SestamibiSingle Photon Emission Computed Tomography (SPECT CT) scan supported this diagnosis (Fig 3) and excluded the possibility of any ectopically positioned parathyroid tissue in the neck or mediastinum.The patient was scheduled for total thyroidectomy and surgical removal of the parathyroid adenoma.

Prior to undergoing surgery, the patient presented as an outpatient to a dental hospital with the principle complaint of multiple intraoral swellings. These swellings were of fleshy consistency with an exophytic growth-like appearance. There was no evidence of discharge present (figures 4 and 5). Apanoramic radiograph was obtained (figure 6) showing two radiolucencies in the bone, a retained root in the right maxilla, periodontal bone loss and a dense bone island in the right mandible. The two radiolucencies had well-defined but non-corticatedmargins. They had the appearance of 'scooped out' defects. The bony defect in the lower left second molar region caused the tooth to have a 'floating appearance' with loss of virtually all bony support. Previous imaging was reviewed, the FDG PET CTshowed areas of focal uptake at sites corresponding to those seen on the panoramic radiograph. The CT component showed a soft tissue mass in the right maxilla and bony expansion in the left mandible, with intact corticated margins (Fig 7). As this patient had a known diagnosis of papillary thyroid carcinoma jaw metastasis was considered. However, the well-defined outline and lack of aggressive, permeative features suggested a benign pathology was more likely. Browns tumours seemed most likely given that there was also a known diagnosis of hyperparathyroidism.

Biopsy was arranged to allow for a definitive diagnosis.A local anaesthetic excisional biopsy of the upper right quadrant was obtained at the dental hospital.A bosselated, rubbery tumour-like mass was excised (Fig 8). A histology report followed describing "mononuclear cells with vesicular nuclei/small nucleoli, which are mixed with erythrocytes and singly arranged osteoclast-like multinuclear giant cells." The features were consistent with a "Brown Tumour of hyperparathyroidism". A decision was made to monitor the radiolucent lesion in the lower left quadrant.

As planned the patient had a total thyroidectomy as surgical management for the papillary thyroid carcinoma and adjuvant radio-iodine ablation was also prescribed.The parathyroid adenoma was also surgically removed in order to manage the hyperparathyroidism. Following the correction of the hyperparathyroidism, the patient was reviewed in the dental hospital. A further panoramic radiograph (figure 9) was obtained showing complete healing in the lower left quadrant at the site of previous radiolucency. The area had filled in with bone, with a somewhat sclerotic appearance. This was of stark contrast to the previous panoramic radiographobtained 1 year earlier when there wascomplete vertical bone loss at the distal aspect of the lower left second molar. There was also evidence of bony infill at the right maxillary site.

No further dental surgical intervention was necessary. The patient did exhibit periodontal disease and his general dental practitioner was contacted to address this issue. The patient was kept on review at the dental hospital. Appearances remained stable at two years follow up.

Discussion

The earliest reported case of hyperparathyroidism was documented in 1930 (2) and since then the fur-

ther classification into primary, secondary and tertiary forms has helped to directappropriate treatment.In the United Kingdom, it is suggested approximately one to four people per thousand have a diagnosis of hyperparathyroidism (8). Brown tumoursoccur more commonly in cases of primary than secondary hyperparathyroidism. However, most cases clinicians see are with secondary hyperparathyroidism as it is more prevalent in the general population (7).

The clinical manifestations of hyperparathyroidism are bone pain, insufficiency fractures and renal colic. Dental clinical findings can include drifting teeth and delayed dental development (1). There are also associated radiographic changes. An increased production of parathyroid hormone results in increased osteoclastic activity and bone resorption. On radiographs there is often cortical thinning and generalised bony changes which can range from osteopenia to a granular or ground glass appearance to the bone of the skeleton and jaws (10).Loss of lamina dura in patients with hyperparathyroid disease is a well-recognised consequence but it isactually only evident in about 10% of cases (8). There are also a range of other characteristic bony changes that can occur such as a 'pepper –pot' skull (10).Brown tumours can arise when the hyperparathyroid status is prolonged and the most common sites are the mandible, clavicles, ribs, pelvis and femur. Brown tumours can be single or multiple.Osteitis fibrosa cystica describes a more severe skeletal manifestationwith multiple cyst-like Brown tumours affecting the bone (10,11). Soft tissue calcifications may also be evident on imaging.

The panoramic radiograph identified multiple radiolucent lesions in the jaws. A range of differential diagnoses were considered to explain the multiple radiolucent lesions:

- Metastatic bone tumours are the most common malignant tumours of the jaw. Carcinomas of the thyroid are known to metastasize to the mandible (10). Metastasis would be expected to have poorly defined, permeative margins and would destroy bone rather than allow it to expand and remodel.
- Lymphoreticular tumours of the bone such Myeloma and Langerhans Cell Histiocytosis can both present as multiple jaw radiolucencies.
- Myeloma presenting as multiple proliferations of plasma cells in the bone marrow. The usual radiographic appearance includes multi-focal lesions of punched out radiolucent appearances. These lesions have well defined but not corticated borders.
- Langerhans cell histiocytosis is the increased proliferation of langerhans cells and eosinophilic leucocytes. It can manifest as a solitary eosinophilic granuloma, multiple lesions (Hand-Schüller-Christian disease) or disseminated disease (Letterer-Siwe disease). The bone lesions in all three circumstances are radiographically similar, also well defined, non-corticated and without expansion. Often the periodontal bone support is destroyed, leading to teeth appearing to "float" or appear to be "standing in space"(10). Langerhans cell histiocytosis only tends to affect children, adolescents and young adults.
- Giant cell lesions also known as 'granulomas'can present as single or multiple jaw radiolucencies. Radiographically and histologically Brown tumours are indistinguishable from giant cell lesions but they occur in patients that do not have hyperparathyroidism. These patients are usually younger and any patient with a giant lesion over thirty years hyperparathyroidism should be excluded with blood tests (10,11).

Conclusion

Brown tumours are not commonly encountered by the dentist or oral surgeon. However, they should be considered if an adult patient presents with multiple radiolucent lesions in the jaws. Correlation with the medical history is needed to make the diagnosis. It is possible that hyperparathyroidism could be an undiagnosed condition; a situation where the oral cavity acts as a "window" into the patients overall systemic wellbeing. In this case blood tests and liaison with a physician would be needed. Once the hyperparathyroidism is corrected the Brown Tumours would be expected to resolve and fill in with bone without any oral surgery intervention. This was nicely demonstrated in this case.

Consent

All appropriate patient consent forms. The patient is aware the case is of an interesting nature and could

be published.

Author contributions:

ML provided the idea for the article and involved in researching relevant literature and references wrote the Manuscript. LF and PN edited the manuscript. PN involved in review of manuscript and approved the final draft.

Conflict of Interest Statement

No Conflicts of interest to note.

Ethical Approval

Not applicable

Funding information

Edge Hill University

Acknowledgements

Mr T Thayer for reviewing the case

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Figure legends

Figure 1 - FDG PET CT showing avid nodule in the right lobe of the thyroid gland.

Figure 2 – Transverse greyscale ultrasound image of the right thyroid lobe. The papillary thyroid carcinoma, carotid artery and parathyroid adenoma are labelled.

Figure 3 – Sestamibi SPECT CT showing uptake in the parathyroid adenoma.

Figure 4. Fleshy, swelling in the upper right quadrant with an ulcerated surface.

Figure 5. Bony swelling in the lower left quadrant with normal overlying mucosa

Figure 6. Panoramic radiograph on initial presentation to the Dental Hospital showing the multiple radiolucent lesions as highlighted.

Figure 7 – Axial FDG PET CT images. From right to left: Fused image of right maxilla, CT image of right maxilla, fused image of left mandible, CT image of left mandible.

Figure 8. The mass in the upper right quadrant excised and sent for histological analysis

Figure 9. OPT obtained following parathyroidectomy and bony infiltration apparent