Case 13715

Brown tumours (ECR 2016 Case of the Day)
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Section: Musculoskeletal system
Area of Interest: Musculoskeletal bone
Procedure: Comparative studies
Technique: Conventional radiography
Technique: CT
Technique: MR
Technique: PET-CT
Special Focus: Endocrine disorders Case Type: Clinical Cases
Authors: Ž. Snoj, J. Regvat, V. Salapura
Patient: 58 years, female

Clinical History:

A 58-year-old female patient felt a bulge on the right lingual side of her lower jaw interfering for the past 6 months with a dental prosthesis position. Shortly after, she noted a moderately painful lump at the distal part of her right lower leg. She was feeling unspecific diffuse bone pain.

Imaging Findings:

Radiograph of the hand shows pathognomonic finding of HPT with subperiosteal resorption along the radial aspects of middle phalanges of index and middle fingers (Fig. 1). Radiographs of the right lower limb showed multiple, expansile, osseous lytic lesions with cortical thinning, non-sclerotic margins, and without periosteal reaction in the diaphysis of the tibia and fibula (Fig. 2). CT showed osseous lesions with comparable characteristics (Fig. 3). MR of the right lower limb showed well-limited lesions with predominantly hyperintensive signal on T2W and hypointensive signal on T1W images with homogeneous contrast uptake on T1W post-contrast images (Fig. 4 and 5). Choline PET/CT verified numerous metabolically active bone lesions (SUVmax 7.7) (Fig. 6), and 1.5 cm adenoma in the lower pole of the right parathyroid gland (Fig. 7).

Discussion:

Hyperparathyroidism (HPT) may be primary, secondary or tertiary. The causes of primary HPT are pathologically divided into adenomas (85%), hyperplasia (15%) and carcinomas (<1%) [1]. Primary HPT is characterized by elevated calcium level and normal or low phosphate level [2, 3]. Bone resorption is a diagnostic feature of HPT, with subperiosteal resorption along radial aspects of middle phalanges of index and middle fingers being a pathognomonic finding (Fig. 1). Salt and pepper sign of the skull may be seen due to generalized bone resorption with focal areas of resorption, which may be conjoined with patchy sclerosis [4]. Brown tumours represent a component of metabolic bone disease recognized as osteitis fibrosa cystica, and are a late manifestation of severe HPT that affect mostly cortical bones [5]. Despite their name, brown tumours represent reparative bone process...
rather than true neoplasm [6]. They are usually found incidentally, however, they may compromise adjacent structures and present with pain, neuropathies and myelopathy [6]. Brown tumours can occur anywhere in the skeleton, however, the preferential locations are pelvis, ribs, clavicle, and the head bones (especially the mandible) [2, 7].

Mandibular bulging was the first manifestation in our patient. Orthopantomogram showed marble-like mandible, histological and microbiological analyses diagnosed a mandibular giant cell granuloma without osteomyelitis, but exceptionally elevated serum parathormone (1487pg/mL), hypercalcaemia, hypophosphataemia, and hypercalciuria confirmed primary HPT. After imaging was performed (described above) right parathyroid adenoma was subsequently surgically removed, and histologically verified. After the surgery the patient was successfully treated for the hungry bone syndrome.

Definitive treatment of primary HPT depends on surgical removal of the underlying cause [4, 7]. Treatment of brown tumours relies on management of hyperparathyroidism [6]. Osseous lesions usually shrink and ossify, however, rarely when the pain persists, surgical enucleation is needed [1, 6].

Although severe cases of primary HPT are exceptional, it should certainly be included in the differential diagnosis of multiple lytic osseous lesions, especially in patients without known underlying disease.

**Differential Diagnosis List:** Multiple brown tumours in primary hyperparathyroidism, Paget's disease, Metastatic disease, Multiple myeloma

**Final Diagnosis:** Multiple brown tumours in primary hyperparathyroidism

**References:**

(2012) Primary hyperparathyroidism with rare presentation as multiple brown tumours.
Figure 1

Description: Radiograph of the hand, PA Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
**Figure 2**

Description: Radiograph of the lower limb, AP and lateral. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
Description: CT, axial sections; A and B the lower limb, C and D the lower jaw. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
Description: MRI of the lower limb, coronal sections A. T2-weighted fat-saturated image; B. T1-weighted fat-saturated post contrast image. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
Description: MRI of the lower limb, axial sections; A. T1-weighted image, B. T1-weighted post-contrast image. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
Figure 6

Description: Choline PET/CT, axial sections of the pelvis. A. CT window. B. Fusion window. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.
Figure 7

Description: Choline PET/CT, coronal sections of the neck, PET window. Origin: V. Salapura, Clinical Institute of Radiology, University Medical Centre; Ljubljana, Slovenia.