Tc-99m sestamibi scintigraphy and primary hyperparathyroidism: uptake beyond parathyroid glands

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DESCRIPTION

Brown tumours (BTs) are one of the complications of long-standing hyperparathyroidism, being rare in developed countries. Tc-99m sestamibi scintigraphy (MIBI) is currently the gold standard for eutopic/ectopic parathyroid tissue localisation in primary hyperparathyroidism (PH). There are only a few reports showing BT uptake in whole-body MIBI.^{1–3}

Figure 1 Panel A corresponds to patient 1 and shows a neck-chest CT scan revealing a brown tumour of the left clavicle and a whole-body view of MIBI scan showing uptake in the inferior left pole of the thyroid, in the right thyroid lobe and in multiple bone lesions. Panel B corresponds to patient 2 and depicts a whole-body MIBI with uptake in the inferior pole of the right thyroid lobe, right maxilla, ribs and epigastric area (arrows). Swelling on the right side of the zygomatic bone is evident on the photo of the patient. MIBI, Tc-99m sestamibi scintigraphy.

The first case is a 72-year-old caucasian woman, with a history of right nephrectomy for renal lithiasis at the age of 49 and a left clavicle fracture at the age of 70, who presented with an enlarging mass in the fracture site (~6 cm). Laboratory data showed an elevated serum level of calcium (sCa) of 12.8 mg/dL [normal range (NR): 8.4–10.2], alkaline phosphatase (ALP) of 264 UI/L (NR: 9–36) and parathyroid hormone (PTH) of 1056 pg/mL (NR: 12–65), and decreased serum phosphorus (sPi) of 2.1 mg/dL (NR: 2.3–4.7) with 25-OH vitamin D of 33 ng/mL (NR 9–45), consistent with PH. MIBI showed uptake in the inferior pole of the left thyroid lobe, in the right thyroid lobe and in multiple bone lesions (figure 1A). A neck and chest CT scan revealed multiple lytic lesions of the skeleton, including the left clavicle (figure 1A), and a pathological right mandibular fracture. The patient underwent a left inferior parathyroidectomy and total thyroidectomy.

The second case is a 50-year-old black woman, without remarkable medical history, who presented with an enlarging right zygomatic mass in the last 6 months (figure 1B). Blood tests revealed an elevated sCa of 16.5 mg/dL, ALP of 593 UI/L and PTH of 1204 pg/mL, and decreased sPi 1.9 mg/dL and normal 25-OH vitamin D (33 ng/mL). MIBI showed uptake in the inferior pole of the right thyroid lobe, right maxilla and epigastric area (figure 1B). This latter uptake was interpreted as a haemangioma on the abdominal ultrasound (US) and CT scan. Neck US demonstrated a 36 mm cystic nodule inferior to the right lobe and a 26 mm spongiform nodule on the right lobe. A right hemithyroidectomy and a right inferior parathyroidectomy were performed. Genetic analysis in this patient revealed a heterozygous pathogenic germline mutation, c. 306G>A in exon 3 of the *HRPT2* gene.

These two patients developed hungry bone syndrome immediately after surgery. Histology revealed parathyroid adenomas in both cases (25×15×6 mm in patient 1 and 32×26×20 mm in patient 2), a right lobe papillary thyroid carcinoma in the first patient and nodular hyperplasia in the second patient. A decrease in the size of BTs was later noticed in both patients.

The presence of extraparathyroid lesions on MIBI scan may lead to diagnostic pitfalls, as shown in these two cases. In patient 1, MIBI uptake was present in BTs and in a thyroid nodule, which persisted after washout, suggesting thyroid

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Learning points

- Brown tumours are an uncommon manifestation of primary hyperparathyroidism.
- The presence of extraparathyroid lesions in Tc-99m sestamibi scintigraphy may lead to diagnostic pitfalls.
- In a patient with a long-standing hyperparathyroidism, the uptake of brown tumours in Tc-99m sestamibi scintigraphy can mimic a parathyroid carcinoma with bone metastasis.

malignancy; in patient 2, a liver haemangioma was revealed by the MIBI scan. In both cases, markedly increased PTH levels, together with MIBI uptake in multiple bones, required differential diagnosis with a parathyroid carcinoma with bone metastases. The benign nature of the bone lesions with MIBI uptake was demonstrated by its decrease in size following surgery. The underlying mechanisms for the increased uptake of MIBI in BT are not fully understood and may be related to increased local inflammation/vascularisation.³

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