

Serendipitous Diagnosis of Tertiary Hyperparathyroidism in a Case Purportedly thought to have Skeletal Metastases

Abstract

Tertiary hyperparathyroidism (THPT) is characterized by over secretion of parathyroid hormone caused by long-standing secondary hyperparathyroidism. THPT can affect the bones as well as cause extraskeletal calcifications. The bony lesions often mimic multiple skeletal metastases or multiple myeloma. We report a case of a 48-year-old man with chronic kidney disease on dialysis, who presented with chief complaints of low back ache and swelling over the left clavicle. In view of clinical suspicion of malignancy with bony metastases, he underwent ^{18}F -fluorodeoxyglucose positron emission tomography/computed tomography and was subsequently found to have parathyroid adenomas, which were confirmed on $^{99\text{m}}\text{Tc}$ -methoxy-isobutyl-isonitrile scintigraphy.

Keywords: ^{18}F -fluorodeoxyglucose positron emission tomography/computed tomography, $^{99\text{m}}\text{Tc}$ -methoxy-isobutyl-isonitrile, parathyroid adenoma, tertiary hyperparathyroidism

Tertiary hyperparathyroidism (THPT) is characterized by excessive parathyroid hormone (PTH) secretion caused by long-standing secondary hyperparathyroidism. It is most commonly seen in patients with long-standing chronic kidney disease (CKD) that persists even after successful renal transplantation or in patients who have been undergoing dialysis for years. THPT can affect the bones, and the bony lesions often mimic multiple skeletal metastases or multiple myeloma.^[1-3] A 48-year-old man with CKD on dialysis for 2 years, presented with chief complaints of low back pain and swelling over the left clavicle. On clinical examination, there were ulcers, excoriations, postinflammatory pigmentation, and scars over the arms and legs (skin changes induced by repeated scratching, often seen in patients with CKD). In view of the clinical suspicion of malignancy with bony metastases, an ^{18}F -fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F -FDG PET/CT) study was requested, which revealed metabolically active soft tissue density lesions in the left superior, left inferior, right superior, and right inferior parathyroid locations, (likely parathyroid adenomas/hyperplasia). Metabolically active lytic skeletal lesions

were noted in the skull, medial end of the left clavicle, lateral end of the right clavicle, and bilateral pelvic bones with soft tissue components (likely osteitis fibrosa cystica). Furthermore, multiple calcific deposits were seen in the intermuscular plane and along the vessel wall in multiple medium- and small-sized arteries [Figure 1a-i]. Based on ^{18}F -FDG PET/CT findings, he was evaluated for CKD-associated metabolic bone disease, which is a systemic disorder of mineral and bone metabolism characterized by the abnormalities of calcium, phosphorus, PTH, or Vitamin D metabolism, bone turnover, and/or vascular or soft tissue calcification.^[4] His serum calcium was 11 mg/dL (8.5–10.5 mg/dL), phosphate 9.2 mg/dL (2.5–4.5 mg/dL), ALP 314 IU/L (40–129 IU/L), 25-OH Vitamin D 44.2 ng/mL (25–80 ng/mL), and iPTH 2167.5 pg/mL (15–65 pg/mL), suggesting THPT. $^{99\text{m}}\text{Tc}$ -methoxy-isobutyl-isonitrile ($^{99\text{m}}\text{Tc}$ -MIBI) scintigraphy with SPECT/CT was advised. The scan findings were consistent with four parathyroid lesions [Figure 1j-p]. Given the above clinical and scan findings, a revised diagnosis of THPT was made. The patient subsequently underwent subtotal parathyroidectomy; histopathological examination revealed polyglandular parathyroid hyperplasia. Thus, in this case,

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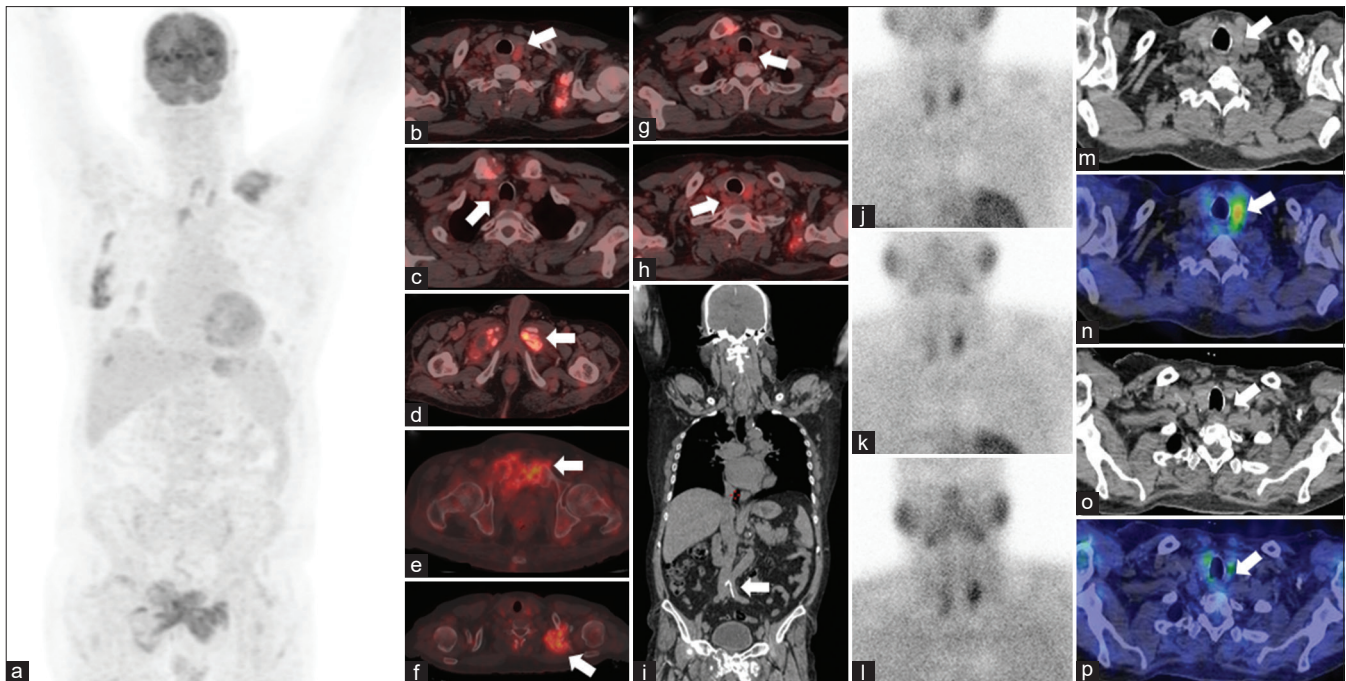


Figure 1: The maximum intensity projection (a) image of PET revealed metabolically active lesions in the left clavicular region and bilateral pelvic region. Axial fused PET/CT images (b, c, g and h) show metabolically active soft tissue density lesions in the left superior, left inferior, right superior, and right inferior parathyroid locations, respectively (white arrows). Axial fused PET/CT images (d-f) show calcific muscle deposits and metabolically active lesions in the medial end of the left clavicle and bilateral pelvic bones with soft tissue components (likely brown tumors) (white arrows). Coronal CT image (i) shows diffuse vascular calcification in multiple medium- and small-sized arteries (white arrow). Planar MIBI images (j-l) show bilateral parathyroid adenomas. Axial CT and fused SPECT/CT images (m-p) show left superior and inferior parathyroid adenomas (white arrows). PET/CT: Positron emission tomography/computed tomography, SPECT: Single-photon emission computed tomography, MIBI: Methoxy-isobutyl-isonitrile

¹⁸F-FDG PET/CT helped reach the correct diagnosis, leading to appropriate patient management. This case also highlights multiple imaging features of secondary and THPT, including extensive metastatic calcification, brown tumors, and multigland disease.^[5-7]

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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