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Interest of PET-scan in the management of severe hyperparathyroidism

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A 48-year-old woman on haemodialysis developed progressive and diffuse bone pain especially in the left thigh, with progressive halting. She was adequately dialysed, and her ideal body weight was stable. She had no signs of systemic infection. Her medical history included two renal transplantations for ESRD secondary to chronic interstitial nephritis. Haemodialysis had been resumed 2 years earlier due to chronic allograft nephropathy. ESRD was complicated by severe secondary hyperparathyroidism for more than 5 years with PTH values systematically above 2500 (normal <85) pg/ml and alkaline phosphatase level ranging between 400 and 1000 (normal <95) UI/l. The patient denied parathyroidectomy several times.

Hands and femoral (Figure 1) bone X-rays showed multiple lytic lesions, specific of hyperparathyroidism. A total body bone scintigraphy (Tc99m-diphosphonat hydroxyethylene) showed numerous tumoural lesions, mainly localized at the level of the long bones and the ribs (Figure 2). An 18-F-fluorodeoxyglucose (FDG) positron emission tomography (PET scan) demonstrated numerous bone lesions disseminated in the skeleton (Figures 3 and 4). Excellent concordance of the lesions was observed between X-rays and PET-FDG.

In hyperparathyroidism, bone micro-fractures, and subsequent bleedings, occur and cause localized osteoclast influx, osteolysis and subsequent reactional medullar fibrosis. This leads to the constitution of tumoural masses, called 'brown tumours' (because of the haemosiderin deposits) [1]. Their intense metabolic activity is likely to explain the high uptake of the glucose-analogue FDG. Reduction of PTH hypersecretion, either by cinacalcet prescription or parathyroidectomy, is the only therapeutic approach that may reduce appearance and development of 'brown tumours'. Cinacalcet was inefficient in the present case so subtotal parathyroidectomy was performed.

The present case illustrates the superiority value of PET imaging over conventional bone scintigraphy in the detection and localization of extensive bone lesions secondary to hyperparathyroidism.

Conflict of interest statement. None declared.

References

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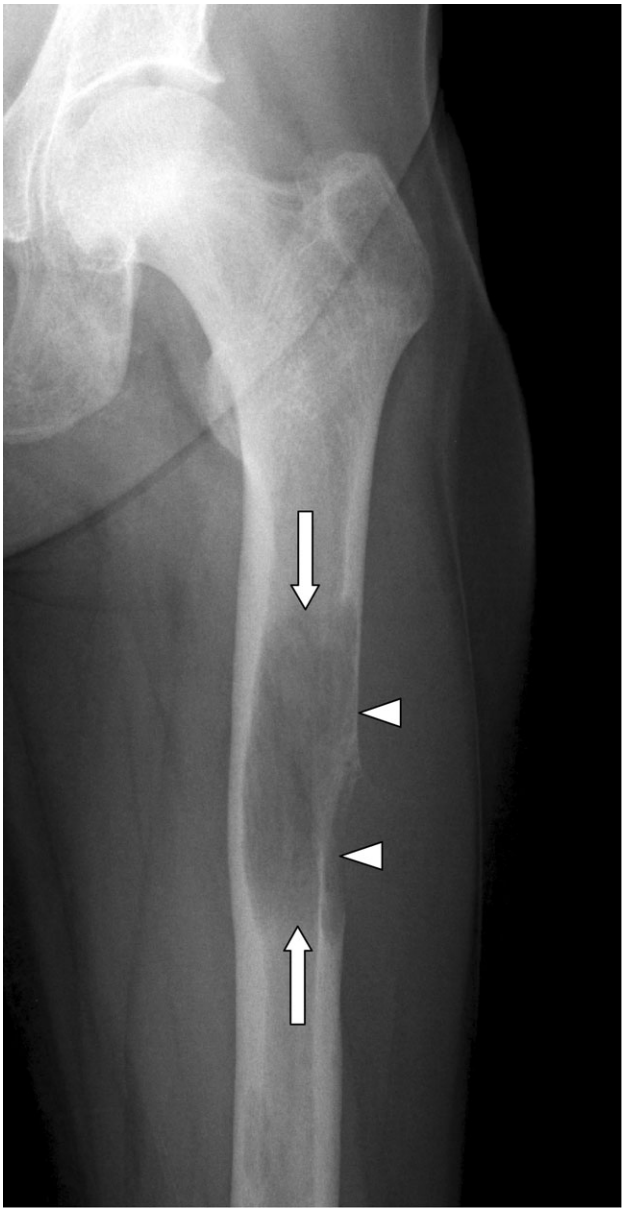

Fig. 1. Radiograph of the left femur shows extensive (8-cm height) and discretely expansive lytic lesion within the proximal diaphysis (arrows) with almost complete destruction of the lateral cortex (arrowheads).

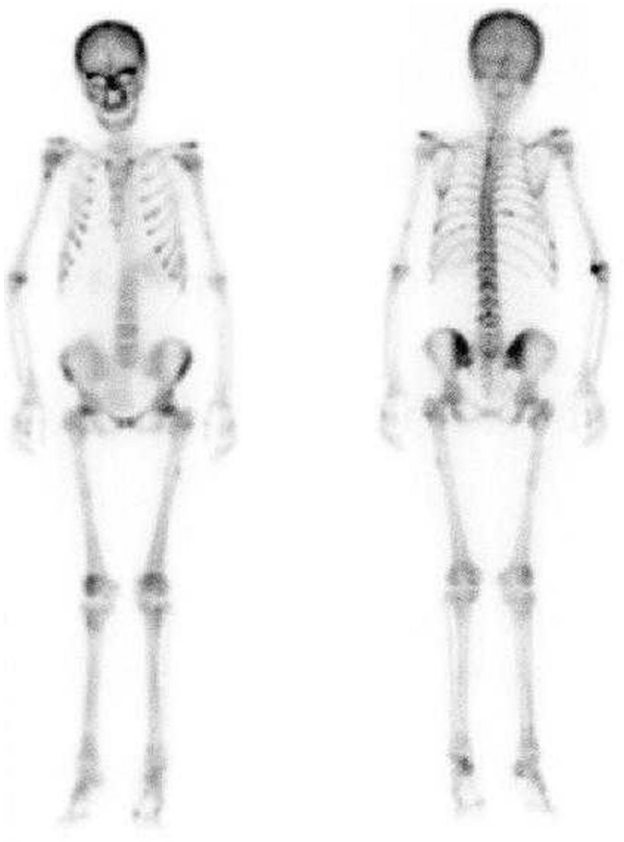

Fig. 2. Total body bone scintigraphy (Tc99m-HDP) showed numerous tumoural lesions mainly localized at the level of the long bones and the ribs.

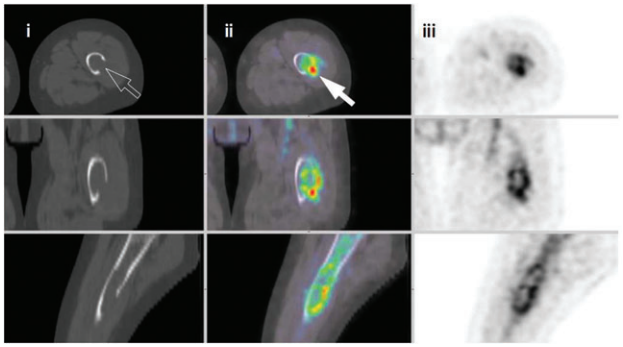

Fig. 3. CT (left, i), fused PET-CT (centre, ii) and PET-FDG (right, iii) images of the left femoral lesion. The highest uptake of FDG is noted in the mass developed in the bone (white arrow), with subsequent lysis of the cortex (open arrow).

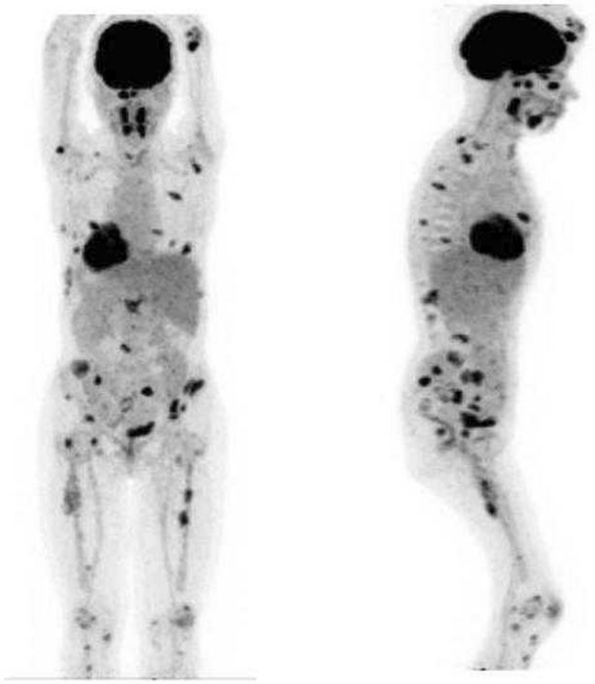

Fig. 4. Whole-body PET-FDG image showing multiple hot spots, all corresponding to osteolytic tumours. Note the physiological myocardial and brain uptake, as well as the uptake within the tonsils.