

## **<sup>99m</sup>Tc-MIBI accumulation in the parathyroid autograft in a patient with recurrent hyperparathyroidism**

Hitoya OHTA,\* Tomoo KOMIBUCHI,\* Masanori NISHIMURA,\*\* Kazuo NISHIMURA,\*\* Yoshiaki NAGAO,\*\*\*  
Hideo WATANABE,\*\*\* Shigeyoshi FUJIKAWA,\*\*\* Shigeo NAKAISHI\*\*\*\* and Shogo OKI\*\*\*\*

*Departments of \*Laboratories, \*\*Urology, \*\*\*Orthopedics and \*\*\*\*Internal Medicine,  
Osaka Red Cross Hospital*

A case with recurrent hyperparathyroidism secondary to chronic renal insufficiency is reported. The patient had undergone total parathyroidectomy and autotransplantation of parathyroid tissue five years ago. Bone scintigraphy clearly demonstrated skeletal involvement of secondary hyperparathyroidism and <sup>99m</sup>Tc-methoxyisobutylisonitrile scintigraphy clearly demonstrated a hyperfunctioning parathyroid autograft.

**Key words:** <sup>99m</sup>Tc-MIBI, hyperparathyroidism, autograft

### **INTRODUCTION**

<sup>99m</sup>Tc-METHOXYISOBUTYLISONITRILE (MIBI) has recently been introduced for myocardial perfusion imaging as an alternative to <sup>201</sup>Tl and also has been applied for parathyroid imaging.<sup>1-3</sup> We report a case of recurrent hyperparathyroidism (HP) which showed <sup>99m</sup>Tc-MIBI accumulation in a hyperfunctioning parathyroid autograft.

### **CASE REPORT**

A 45-year-old male on hemodialysis for twelve years was referred to our hospital because of swelling and pain of the left wrist. Five years ago the patient had undergone total parathyroidectomy and autotransplantation of parathyroid tissue into the right forearm for HP. Roentgenogram showed massive calcareous disposition, vascular calcification and osteitis fibrosa (Fig. 1). Bone scintigraphy revealed generalized increased osseous accumulation especially in the skull and no visualization of the urinary system (Fig. 2). The serum intact parathyroid hormone was very high (2,400 pg/ml with a normal range 10-60). Examination of serum electrolytes showed hyperphosphatemia (12.5 mg/dl) and normocalcemia (4.6 mEq/l).

These findings suggested renal osteodystrophy (ROD), due to secondary HP. Parathyroid scintigraphy with 740 MBq of <sup>99m</sup>Tc-MIBI was performed. An early image of the neck obtained at 15 min postinjection showed thyroid parenchyma (Fig. 3A). On a delayed image obtained 2 hr postinjection, the thyroid accumulation had decreased and no abnormal accumulation was recognized, suggesting no residual hyperfunctioning parathyroid gland in the neck (Fig. 3B). But both images of the right forearm demonstrated abnormal accumulation, suggesting a hyperfunctioning parathyroid autograft (Fig. 3C, D). Subsequently performed ultrasonography revealed a slightly low-echo level mass measuring 12 × 6 mm concordant with <sup>99m</sup>Tc-MIBI accumulation (Fig. 4). The patient was treated with dietary restriction of phosphorus, oral calcium supplements and 1 $\alpha$ -hydroxyvitamin D<sub>3</sub>, resulting in amelioration of the laboratory data.

### **DISCUSSION**

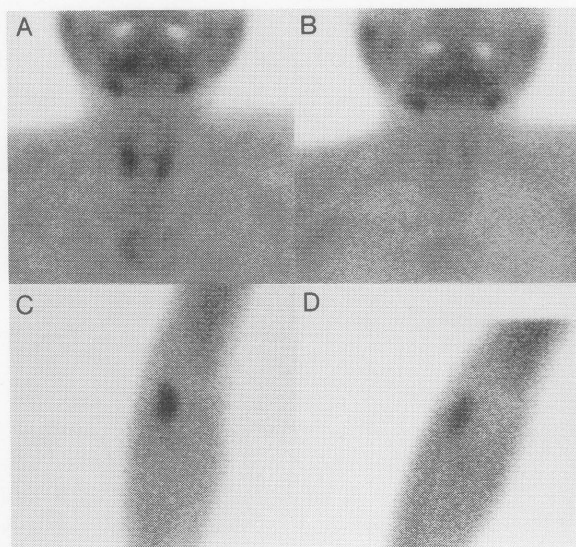
A chronic deterioration in renal function is associated with abnormalities of calcium, phosphorus, parathyroid hormone, and vitamin D metabolism. If not treated, hypocalcemia and hyperphosphatemia along with osteodystrophy (osteitis fibrosa due to secondary HP or osteomalacia) develop. Bone scintigraphy is a sensitive method for detecting skeletal involvement in ROD.<sup>4</sup> HP induces an increase in the rate of bone resorption and osteoblastic activity with a resultant increase in osseous tracer accumulation. In this case, bone scintigraphy was

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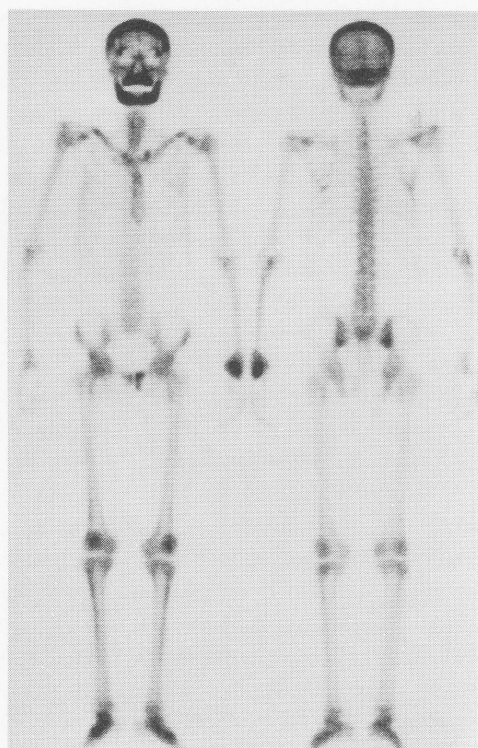
For reprint contact: Hitoya Ohta, M.D., Department of Laboratories, Osaka Red Cross Hospital, 5-53 Fudegasaki-cho Tennohji-ku, Osaka 543, JAPAN.



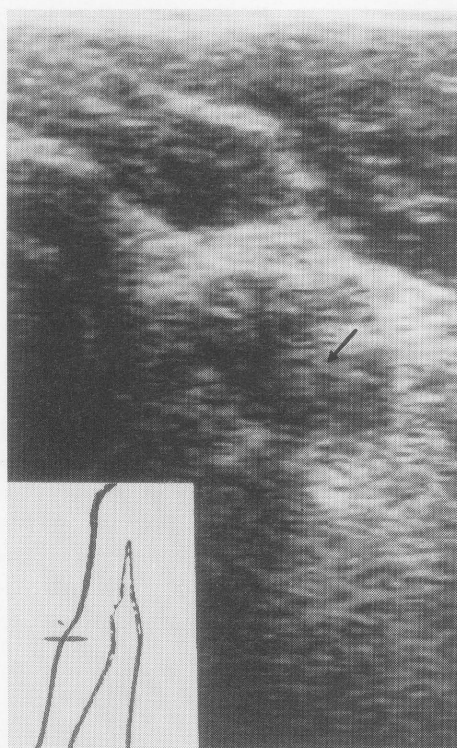
**Fig. 1** Roentgenogram showed massive calcareous disposition, vascular calcification and osteitis fibrosa.



**Fig. 3**  $^{99m}\text{Tc}$ -MIBI scintigraphy showed normal thyroid (A) and abnormal accumulation in the right forearm (C) on early imaging. On delayed imaging the thyroid accumulation decreased (B), but abnormal accumulation in the forearm was clearly seen (D).



**Fig. 2** Bone scintigraphy revealed generalized increased osseous uptake suggesting hyperparathyroidism.



**Fig. 4** Ultrasonography revealed a mass concordant with  $^{99m}\text{Tc}$ -MIBI accumulation.

useful in evaluating secondary HP.

Parathyroid autograft after total parathyroidectomy may sometimes cause recurrent HP (approximately 14%) and  $^{201}\text{Tl}$  has been used to localize such hyperfunctioning autografts.<sup>5</sup> Recently  $^{99\text{m}}\text{Tc}$ -MIBI has been applied for parathyroid imaging and promising results are reported.<sup>1-3</sup> A single radionuclide imaging procedure and the superior physical characteristics of  $^{99\text{m}}\text{Tc}$  are advantageous. In addition, a double-phase study (early and late study with differential washout analysis) is used to accentuate the parathyroid image relative to the thyroid background, and this procedure is effective.<sup>1</sup> There is not extensive literature on the  $^{99\text{m}}\text{Tc}$ -MIBI scintigraphy of a hyperfunctioning parathyroid autograft.<sup>6</sup> In this case, we could detect a hyperfunctioning parathyroid autograft with  $^{99\text{m}}\text{Tc}$ -MIBI on both early and late images. To the best of our knowledge, normally functioning parathyroid glands are not detected by  $^{99\text{m}}\text{Tc}$ -MIBI scintigraphy.<sup>3</sup> In conclusion, bone scintigraphy and  $^{99\text{m}}\text{Tc}$ -MIBI parathyroid scintigraphy were useful in evaluating a case of secondary HP caused by a hyperfunctioning parathyroid autograft.

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