

# From Detection to Localization: Whole body Scan and SPECT/CT in Parathyroid Sestamibi Scan

Areej Aijaz, Namra Asghar, Sana Munir Gill, Aamna Hassan  
Nuclear Medicine Department,  
Shaukat Khanum Memorial Cancer Hospital and Research Centre.

### INTRODUCTION

Excessive PTH production by parathyroid gland is the most common cause of hyperparathyroidism known as primary hyperparathyroidism.

The etiology of primary hyperparathyroidism is the solitary functioning adenoma (90%). Accurate localization aids the surgeons for successful surgical resection and better outcomes.

99mTc-sestamibi is imaging of choice for diagnosis of adenomas combined with whole body planar images and SPECT/CT also help in identification of ectopic parathyroid gland with a diagnostic accuracy of 90% for primary hyperparathyroidism.

Further the addition of whole body scan increases the likelihood of brown tumor detection in parathyroid scan.

### OBJECTIVE

To evaluate the significance of parathyroid sestamibi scan in localization of parathyroid adenoma and identification of brown tumors on whole body scan.

### METHODS

A retrospective analysis was conducted of 144 parathyroid sestamibi scans performed between January 2020 and August 2025.

Scans were reviewed using Hospital Information system.

Whole body scan acquired 20mins after intravenous administration of 800MBq Tcm99-Sestamibi followed by SPECT/CT at 1hour.

Serial imaging was carried out up to 4 hours to evaluate any focal tracer retention.

### RESULTS

A total of **144 parathyroid scans** were analyzed, with **47 males (32.6%)** and **97 females (67.4%)**; the **average age was 50 years**.

Average age of population was 50 year.

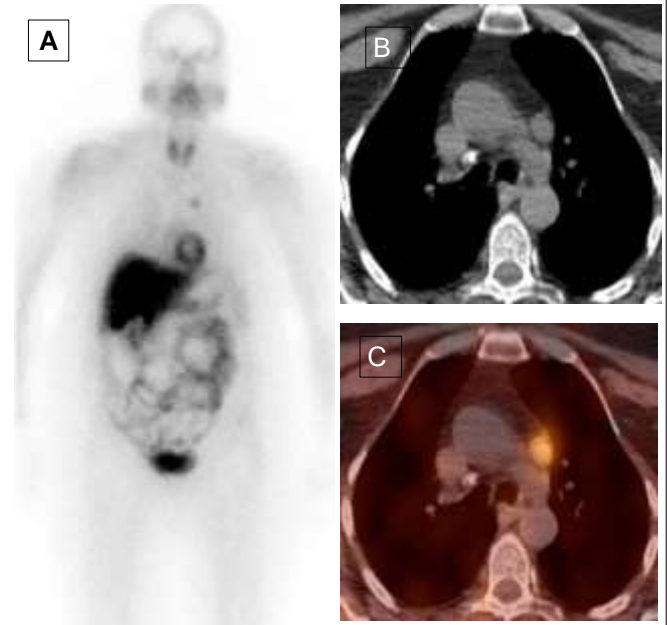
**79 patients (54.9%)** showed scintigraphic evidence of hyper functioning parathyroid glands.

**15 patients (10.8%)** were diagnosed with **Brown tumors**, representing **18.9%** of those with positive Sestamibi scans; all had **PTH levels >300 pg/mL**, indicating **metabolic bone disease**.

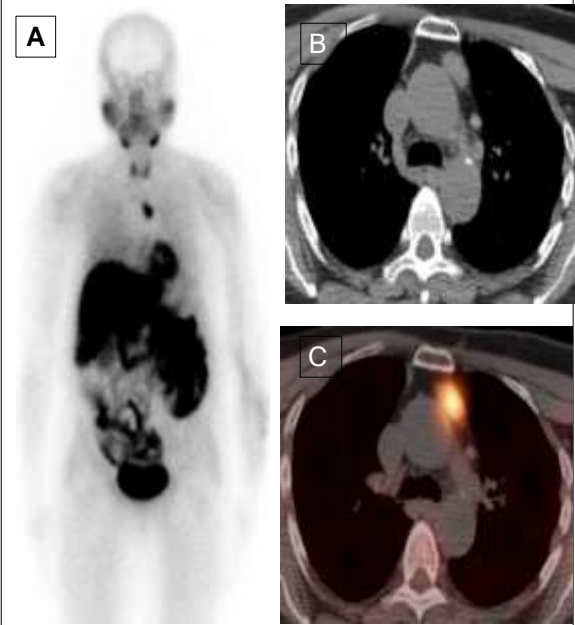
Ectopic parathyroid tissue in the mediastinum was found in 6 patients (4.2%), detected via **SPECT/CT imaging**.

**Intrathyroidal parathyroid glands** were identified in **2 patients (1.4%)**, posing a **diagnostic challenge** due to overlap with thyroid nodules.

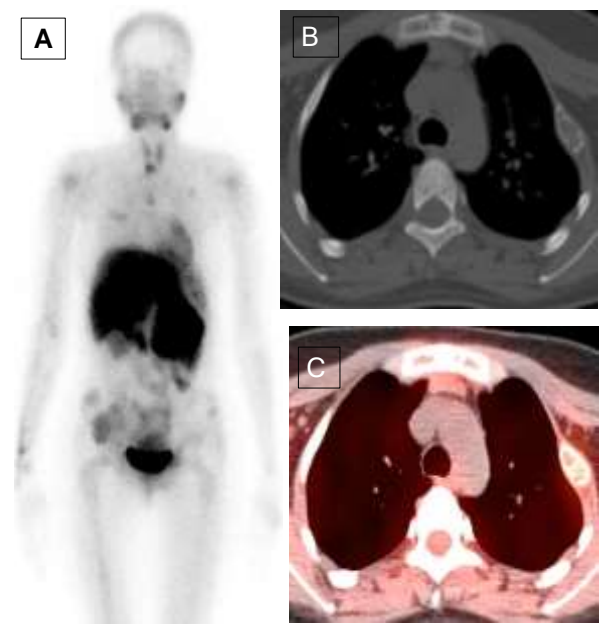
### CASES




**Case 1:** 62-year-old female clinically asymptomatic with hypercalcemia and serum PTH 226ng/ml on routine blood test. Her whole body planar images at 20 minutes showed focal avidity in left hemithorax (A) that persisted on delayed images acquired at 2 hours. This correlated with soft tissue density nodule on SPECT/CT in the mediastinum suggestive of hyper functioning parathyroid adenoma (B-C; Axial CT only and fused images).



**Case 2:** 60 years, female clinically asymptomatic with elevated PTH 299ng/ml. Whole body images acquired at 20 minutes showed focal increased uptake in the thorax (A). Tracer activity persisted in the chest on planar images acquired at 60 minutes and corresponded to avid soft tissue in the mediastinum on SPECT/CT suggestive of ectopic parathyroid adenoma (B-C; Axial CT only and fused images).



**Case 3:** 16-years-old female with nephrocalcinosis and serum PTH 735ng/ml. Whole body planar images show multiple sites of tracer uptake at 20 minutes image (A). These uptakes correspond to expansile ground glass bony lesions on SPECT/CT acquired at 1 hour (B-C; Axial CT only and fused images).



**Case 4:** 48-years-old male with known chronic kidney disease and raised PTH. Whole body planar images showed abnormal tracer uptake in the right knee region (A). SPECT/CT acquired at 1 hour showed avid lucency in the right distal femur consistent with brown tumor (B-C; Axial CT only and fused images).

### CONCLUSION

Addition of whole-body parathyroid scan to the standard protocol effectively identified hyper functioning glands and revealed brown tumors in patients with severe metabolic bone disease. The addition of SPECT/CT imaging to the standard protocol enhanced localization of ectopic and intrathyroidal parathyroid tissue, providing a more comprehensive evaluation and improving diagnostic accuracy in hyperparathyroidism.

### REFERENCE

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