



## A Houdini Act by Parathyroid Adenoma

Mohan M<sup>1</sup>, Anandkumar J<sup>2\*</sup>, Guruprasad R<sup>2</sup>, Vinod U<sup>3</sup>, Karunanithi S<sup>4</sup>, Janardhanan S<sup>5</sup> and Thavarool SB<sup>6</sup>

<sup>1</sup>Consultant, Department of Head and Neck Surgical Oncology, Aster Malabar Institute of Medical Sciences, India

<sup>2</sup>Fellow, Department of Head and Neck Surgical Oncology, Aster Malabar Institute of Medical Sciences, India

<sup>3</sup>Senior Specialist, Department of Endocrinology, Aster Malabar Institute of Medical Sciences, India

<sup>4</sup>Senior Consultant and HOD, Department of Nuclear Medicine, Aster Malabar Institute of Medical Sciences, India

<sup>5</sup>Senior Consultant, Department of Radiology, Aster Malabar Institute of Medical Sciences, India

<sup>6</sup>Senior Consultant & HOD, Department of Head and Neck Surgical Oncology, Aster Malabar Institute of Medical Sciences, India

**\*Corresponding author:** Janani Anandkumar, Fellow, Department of Head and Neck Surgical Oncology, Aster Malabar Institute of Medical Sciences, Kozhikode, Kerala, India, Tel: 8861267981; Email: jananni.28@gmail.com

**Received Date:** June 17, 2024; **Published Date:** August 24, 2024

### Abstract

Surgical parathyroidectomy is the only recommended treatment for primary hyperparathyroidism. Sestamibi scan is the most widely accepted and commonly used technique, for locating the parathyroid gland. The false positive rate of sestamibi scan is not widely reported. Here, we present the case of an ectopic parathyroid adenoma which was mislocated by the sestamibi scan.

**Keywords:** Parathyroid Adenoma; Sestamibi Scan; Hypercalcemia; SPECT CT

### Introduction

Hypercalcemia is a condition in which the serum calcium level in the body is higher than the normal range. The two most common causes of hypercalcemia are hyperparathyroidism and malignancy [1]. Hyperparathyroidism can be divided into primary, secondary and tertiary. It may have renal, gastrointestinal, cardiac, neuromuscular and psychological manifestations. The cause of primary hyperparathyroidism is abnormal functioning of the parathyroid glands. Surgical parathyroidectomy is the only recommended treatment for primary hyperparathyroidism. In recent past, minimally invasive parathyroidectomy has become possible due to the parathyroid localization techniques. Sestamibi scan is the most widely accepted and commonly used technique, which uses 99m Technetium-sestamibi, a lipophilic cationic compound, for locating the parathyroid gland. Though the sensitivity of this technique ranges from 54-100%, its false

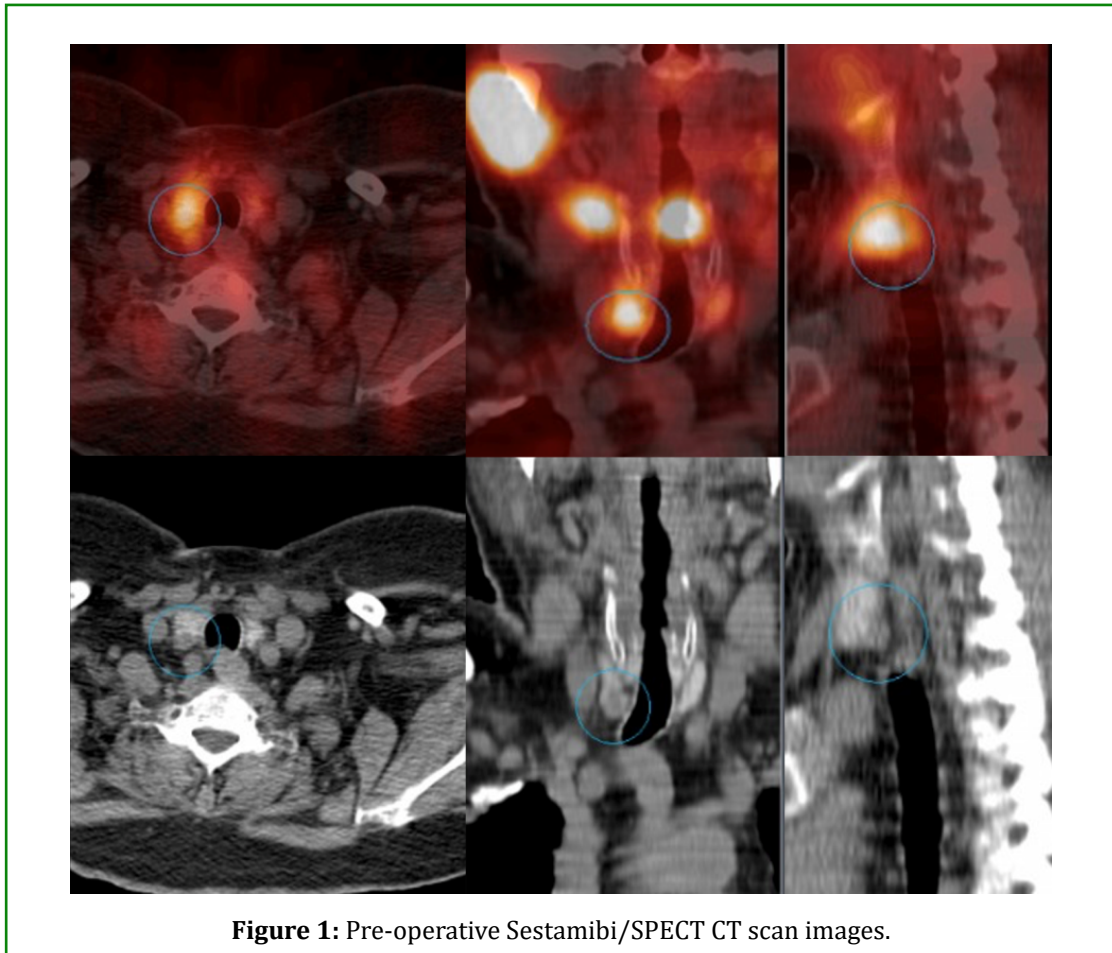
positivity cannot be excluded, which is less reported in the literature [2]. In this article, we present the case of an ectopic parathyroid adenoma which was mislocated by the sestamibi scan.

### Case History

A 61-year-old female, presented with complaints of bleeding per rectum for duration of six months and a history of chronic constipation. She has also been under evaluation for depression. Patient was not on any regular medication. She was diagnosed with haemorrhoids and was planned for haemorrhoidectomy. During routine pre-operative examination she was detected to have a raised parathyroid hormone levels (428.5 pg/mL) and ionised calcium levels (1.67mmol/L). All other blood parameters were within normal limits. Sestamibi scan was done, in which 99mTc-sestamibi was injected I.V. and early planar static image of

the neck & chest was acquired in the anterior projection, 15 minutes after the radiotracer injection. Tomographic images (early SPECT/CT) of the same region were acquired following the early static planar image. Delayed static planar image was acquired at 45 minutes after the tracer injection. There was a focalized area of increased tracer uptake with significant retention of tracer activity noticed in the inferior aspect lower pole of right lobe of thyroid region. Both the lobes of the thyroid showed uniform tracer activity showing washout with time. Physiological tracer uptake was also seen

in the salivary glands, myocardium and liver. There was no abnormal focus of tracer uptake noted in the mediastinum. SPECT-CT showed tracer avid hypodense nodular lesion (8mm) noted in inferior and posterior aspect lower pole of right lobe of thyroid region. USG neck showed a well-defined hypoechoic lesion of size 4.2 x 6.9 mm with small cystic area measuring 2.2 x 3.2 mm noted in posterior aspect of lower pole of right lobe (Figure 1). On clinical examination, there was no palpable swelling present.

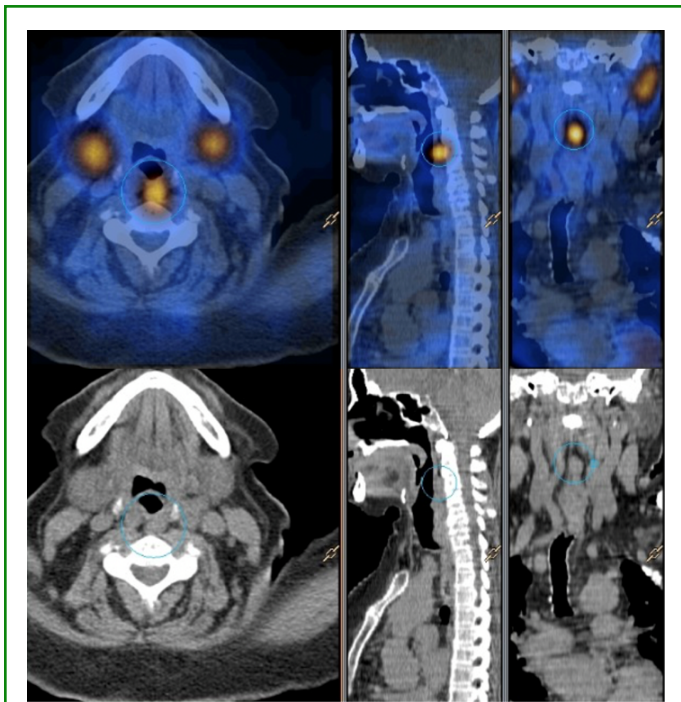


**Figure 1:** Pre-operative Sestamibi/SPECT CT scan images.

Based on these reports a neck exploration for parathyroid adenoma was planned. After obtaining due consent, under general anaesthesia with aseptic precautions, lower neck crease incision placed and flap was raised. A nodule was identified in poster inferior pole of right thyroid and was excised. The excised specimen sent for frozen study, which reported negative for parathyroid tissue. Significant intraoperative PTH drop was not achieved. Intra-operative USG was done, but no other lesions were identified. Right thyroid lobectomy and central compartment clearance was done and the wound was closed in layers. Since there were no significant drops in PTH and serum calcium post

thyroid lobectomy and central neck dissection, the case was discussed with endocrinology, nuclear medicine and radiology departments. The patient and by-stander were explained regarding the situation and was advised to undergo repeat Sestamibi scan to re-isolate the cause of hyperparathyroidism. Repeat scan showed that there was a focalized area of increased tracer uptake with retention of tracer activity noticed in a 10 mm nodular lesion in retropharyngeal region at the level of epiglottis. Left lobe of the thyroid showed uniform tracer activity showing washout with time. There was abnormal focus of tracer uptake noted in the mediastinum (Figure 2). An endoscopic USG and FNAC/

CECT correlation to rule out ectopic parathyroid adenoma in this clinical scenario was suggested but the patient has defaulted.



**Figure 2:** Post-operative repeat Sestamibi/SPECT CT scan images.

## Discussion

The parathyroid glands are commonly four in number and they develop during the sixth week of gestation. They migrate caudally during the eighth week of gestation, to lie behind the thyroid gland. The superior parathyroid glands originate from the dorsal wing of the fourth pharyngeal pouch, whereas, the dorsal wing of third pharyngeal pouch give rise to inferior parathyroid glands and the ventral wing give rise to the thymus. Ectopic parathyroid glands are those glands that are located in any position, apart from their normal anatomical position. They result from any abnormality in the embryological development or migration of the glands. Their actual incidence is unknown since they become evident only when they develop an adenoma. It is a common aetiology of hyperparathyroidism. The incidence of parathyroid adenoma is 15-20% in patients with primary hyperparathyroidism [3]. Due to their long course of descent, the inferior parathyroid glands are more commonly found ectopic. The common embryonic origin of the thymus and inferior parathyroid explains why the mediastinum and the thymus are the most common location of ectopic inferior parathyroid adenoma. The ectopic superior parathyroid gland is commonly found at the tracheoesophageal groove followed by retro-esophageal

area and posterior mediastinum [4].

Although false positive sestamibi scans are rare, few cases have been reported in the literature. The false positivity is attributed to uptake in thyroid adenomas, lymph nodes, brown adipose tissues and certain thyroid malignancy [5]. Rodriguez-Carranza S, et al. [6] showed that only 58.2% of the adenomas were found intra-operatively at the same location detected by the sestamibi scan. They also showed those upper neck lesions were more frequently missed as compared to the lower neck with a statistical significance [6]. This article emphasizes the significance of checking serum PTH value before and after parathyroidectomy intra-operatively, for validating the results of the sestamibi scan and also the importance of pre-operatively explaining the patients about the chances of false positivity and mislocation by the sestamibi scan and the need for repeat scan and re-exploration in such cases.

## Compliance with Ethical Standards

- The study does not involve any intervention in human/animal.
- Informed consent obtained from the patient to use their treatment related information.

## References

1. Walker MD, Shane E (2022) Hypercalcemia: A Review. *JAMA* 328(16): 1624-1636.
2. Khorasani N, Mohammadi A (2014) Effective factors on the sensitivity of preoperative sestamibi scanning for primary hyperparathyroidism. *Int J Clin Exp Med* 7(9): 2639-2644.
3. Noussios G, Anagnostis P, Natsis K (2012) Ectopic parathyroid glands and their anatomical, clinical and surgical implications. *Exp Clin Endocrinol Diabetes* 120(10): 604-610.
4. Phitayakorn R, McHenry CR (2006) Incidence and location of ectopic abnormal parathyroid glands. *Am J Surg* 191(3): 418-423.
5. Sundas Z, Dao H, Kumar S, Thomay AA, Haider A (2023) The Right Hand Must Know What the Left Hand is Doing: A False-Positive Hotspot on the Sestamibi Scan. *AACE Clin Case Rep* 10(1): 17-19.
6. Rodriguez-Carranza S, Caceres M, Aguilar-Salinas CA, Gomez-Perez FJ, Herrera MF, et al. (2004) Localization of parathyroid adenomas by (99m) Tc-sestamibi scanning: upper neck versus lower neck lesions. *Endocr Pract* 10(6): 472-477.