

## Single Photon Emission Computed Tomography/Computed Tomography Detects a Second Ignored Intrathyroidal Parathyroid Adenoma

### Abstract

The primary hyperparathyroidism (PHPT) is a result of high levels of parathyroid hormone and serum calcium, the most frequent cause is a solitary parathyroid adenoma. Double parathyroid adenoma is <5% of the PHPT. Intrathyroidal parathyroid adenoma (IPA) occurs <3.2%. We present a case of 58-year-old female with persistent primary hyperparathyroidism due to a second undetected IPA, suspected by ultrasound and confirmed by <sup>99m</sup>Tc sestamibi single-photon emission computed tomography/computed tomography.

**Keywords:** Hypercalcemia, hyperparathyroidism, parathyroidectomy, reoperation, single-photon emission computed tomography-computed tomography

A 58-year-old female initially required resection of inferior right parathyroid; its histopathology reported a parathyroid adenoma of 1.5 cm × 0.8 cm. At 3 months Postoperative control, presented decrease of calcium from 11 mg/dL to 10.46 mg/dL (RV: 8.8–10.2), and reduction of intact parathyroid hormone (iPTH) from 159 pg/mL to 112 pg/mL (RV: 16–87). The patient had no follow-up for 10 years and did not complain of any symptoms related to hyperparathyroidism. After that, she consults for serum calcium of 11 mg/dL (RV: 8.8–10.2), iPTH of 159 pg/mL (RV: 16–87) and left inferior thyroid nodule compatible with follicular neoplasia, which was diagnostic by neck ultrasonography and fine-needle aspiration biopsy (FNAB). The <sup>99m</sup>Tc sestamibi SPECT (single-photon emission computed tomography) parathyroid scintigraphy revealed a possible left inferior parathyroid adenoma [Figure 1a-c].

Suspecting an intrathyroidal parathyroid adenoma (IPA), it was decided to perform a <sup>99m</sup>Tc sestamibi single-photon emission computed tomography/computed tomography (SPECT/CT), which confirmed an inferior left intrathyroid adenoma [Figure 2a-f].

Therefore, according to the findings of the ultrasonography [Figure 3a], the

patient underwent left hemithyroidectomy. Histopathology revealed an intrathyroidal parathyroid adenoma of 1,2x1,1 cm [Figure 3b-d]. The <sup>99m</sup>Tc sestamibi parathyroid scintigraphy previous first surgery showed unclear uptake of the left inferior parathyroid gland [Figure 4a-b]. Two years postoperative last surgery, serum calcium was 9.66 mg/dL (RV: 8.8–10.2), ionized calcium was 1.0 mmol/L (RV: 1.12–1.37), and iPTH had a normal level of 50.70 pg/mL (RV: 15–65).

In 89% of cases, primary hyperparathyroidism is due to single-gland disease and 9.84% is a multiglandular disease. From this last group, 5.74% is for hyperplasia and 4.14% is for double adenomas.<sup>[1]</sup> The incidence of IPA is 1.4%–3.2%.<sup>[2]</sup> For these cases, neck ultrasonography sensitivity and scintigraphy sensitivity are <50%, showing only the second gland in a quarter of cases of double adenoma.<sup>[1]</sup> In our patient, an inferior right parathyroid adenoma was identified in the first surgery, but the left adenoma was not observed because it was hidden within the inferior pole of the thyroid. <sup>99m</sup>Tc sestamibi SPECT/CT provides an exact anatomical location of the abnormal glands, especially when they are ectopic.<sup>[3,4]</sup> García-Talavera *et al.* demonstrated that the SPECT/CT has better sensitivity compared with planar

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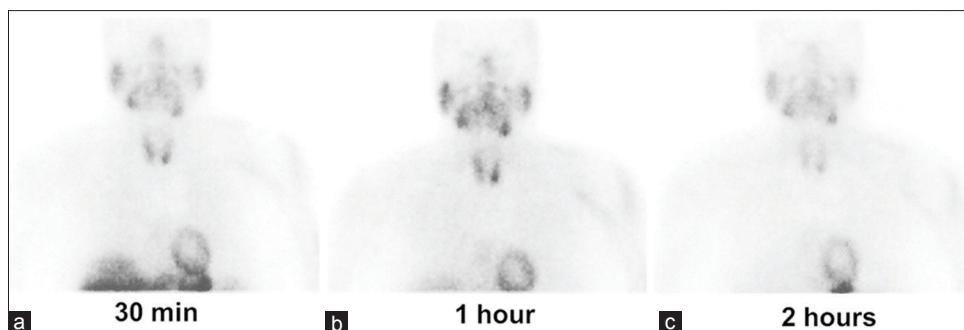


Figure 1: (a-c)  $^{99m}\text{Tc}$  sestamibi single-photon emission computed tomography/computed tomography parathyroid scintigraphy showed a left inferior parathyroid adenoma

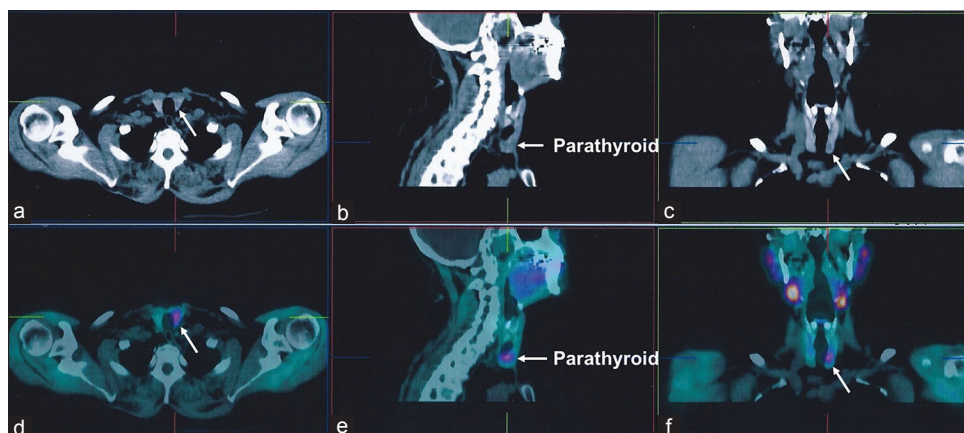


Figure 2: (a-f)  $^{99m}\text{Tc}$  sestamibi single-photon emission computed tomography/computed tomography confirmed an intrathyroid parathyroid adenoma

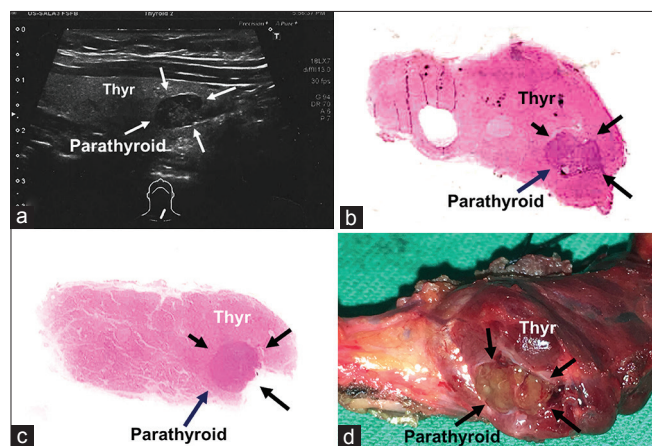


Figure 3: (a) Neck ultrasonography reported an intrathyroid nodule (white arrows), (b) (H and E, panoramic view) Final histopathology confirmed an intrathyroidal parathyroid adenoma, (c) (H and E, panoramic view) Capsule thyroid sectioned. (d) Surgical specimen sectioned, revealed intrathyroid nodular lesion of 1.2 cm × 1.1 cm (black arrows). Thy: thyroid

imaging (90% vs. 72.5%).<sup>[3]</sup> We were able to confirm this assertion, once images of  $^{99m}\text{Tc}$  sestamibi SPECT/CT accurately located the IPA.

Finally, FNAB of the parathyroid adenoma was reported as a follicular nodule of the thyroid, since follicular cells, such as the parathyroid cells in general, tend to be very similar in morphology to cytological evaluation.<sup>[5]</sup> A finding

that could differentiate them is that the parathyroid cells are generally smaller than the thyroid cells and have less cytoplasm and more chromatin; however, this is not a specific sign.<sup>[5,6]</sup>

**Learning points:**

- The treatment of persistent or recurrent primary hyperparathyroidism requires exact preoperative localization of pathologic gland
- To localize a parathyroid adenoma, neck ultrasonography and  $^{99m}\text{Tc}$  sestamibi SPECT/CT parathyroid scintigraphy should be performed before surgery.

**Declaration of patient consent**

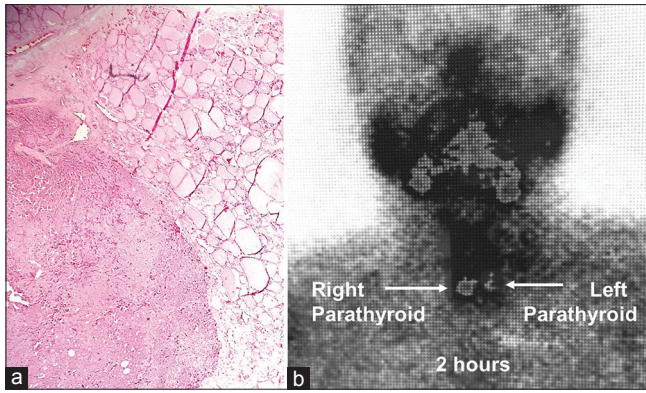
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that names and initials will not be published and due efforts will be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

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Nil.

**Conflicts of interest**

There are no conflicts of interest.



**Figure 4: (a) (H and E 10x) Intrathyroidal parathyroid adenoma: encapsulated neoplasms that are composed of chief cell, (b) The  $^{99m}\text{Tc}$  sestamibi parathyroid scintigraphy previous first surgery, showed unclear uptake of the left inferior parathyroid gland (planar image)**

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