

HYPERPARATHYROIDISM DUE TO INTRATHYROIDAL PARATHYROID ADENOMA

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Abstract

Introduction: The intrathyroidal parathyroid adenoma (IPA) represents a rare anatomical variant where parathyroid tissue is located within the thyroid gland instead of its usual extrathyroidal position. This condition arises due to aberrant embryologic migration of the parathyroid glands and is identified in approximately 1.3% to 6.7% of all parathyroid lesions.

Case report: We present the case of a 56-year-old female diagnosed with a thyroid nodule, incidentally found on neck ultrasound. Fine-needle aspiration biopsy reported only microfollicular and macrofollicular arrangement of benign thyrocytes and lymphocytes. Due to continuous fatigue, loss of appetite, pain in bones, osteoporotic changes and constipation, hyperparathyroidism was suspected and laboratory revealed hyperparathyroidism with increased parathormone (1587 pg/mL), ionized calcium (2.25 mmol/L) and low phosphates. 99mTc-MIBI scintigraphy revealed a focal accumulation in the lower quadrant of the right thyroid lobe, indicative of intrathyroidal parathyroid adenoma, which was confirmed by histopathology report. After surgery, continuous decrease in PTH levels were reported, and after 7 months PTH levels were 66.73 pg/mL, ionized calcium 1.12 mmol/L and inorganic phosphate 1.15 (0.8-1.4 mmol/L). Follow-up of the patient revealed variations in the PTH levels, above the upper reference limit, along with hypoechogenic nodule in the posterior parts of the contralateral thyroid lobe. Further close follow-up is recommended due to the possibility of recurrence.

Keywords: intrathyroidal parathyroid adenoma, hyperparathyroidism, 99mTc-MIBI SPECT/CT

Introduction

The intrathyroidal parathyroid adenoma (IPA) represents a rare anatomical variant where parathyroid tissue is located within the thyroid gland instead of its usual extrathyroidal position. This condition arises due to aberrant embryologic migration of the parathyroid glands and is identified in approximately 1.3% to 6.7% of all parathyroid lesions^[1,2].

Clinically, intrathyroidal parathyroid lesions may present as adenomas or, more rarely, carcinomas, causing hypercalcemia and other symptoms related to excessive secretion of parathyroid hormone (PTH). Diagnosis is often challenging due to difficulties in localizing parathyroid tissue within the thyroid, necessitating a multidisciplinary approach utilizing ultrasound, scintigraphy, and PTH measurement in aspirates^[3].

Accurate identification and surgical excision of intrathyroidal parathyroid lesions are crucial for successful treatment and prevention of recurrence or complications.

Case report

We present the case of a 56-year-old female diagnosed with a thyroid nodule, incidentally found on neck ultrasound. The nodule was located in the posterior part of the lower quadrant of the right thyroid lobe, measuring 13 mm in diameter (Figure 1). Regular thyroid check-ups were performed over the course of one year, revealing euthyroid hormonal status. Ultrasound-guided fine-needle aspiration biopsy reported only microfollicular and macrofollicular arrangement of benign thyrocytes and lymphocytes.



Fig. 1. Ultrasound of intrathyroidal parathyroid adenoma presenting as hypoechoic nodule in the middle of the thyroid lobe

Due to continuous symptoms of fatigue, loss of appetite, pain in bones, osteoporotic changes and constipation, hyperparathyroidism was suspected and additional laboratory investigations were done, revealing increased parathormone (PTH) levels (1587 pg/mL), increased ionized calcium (2.25 mmol/L), and low phosphates.

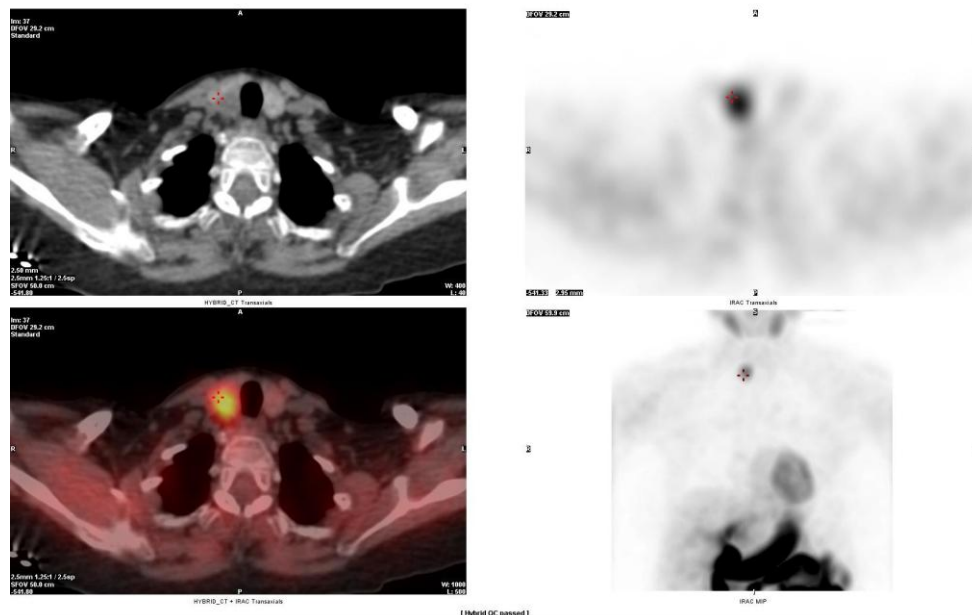


Fig. 2. 99mTc-MIBI SPECT/CT scan at 2 hours after intravenous administration of the radiopharmaceutical - Focal intensive accumulation of metabolic radiopharmaceutical in hypodense nodule in the right thyroid lobe

99mTc-MIBI scintigraphy at 10 min and SPECT/CT after two hours revealed focal accumulation in the lower quadrant of the right thyroid lobe indicative of intrathyroidal

parathyroid adenoma. Lobectomy of the right thyroid lobe was performed and the histopathology report revealed parathyroid adenoma in the previously described localization (Figure 2).

After surgery, continuous decrease in PTH levels were reported and after 7 months PTH levels were 66.73 pg/mL, ionized calcium 1.12 mmol/L and inorganic phosphate 1.15 (0.8-1.4 mmol/L). Follow-up of the patient revealed variations in the PTH levels, above the upper reference limit and hypoechogenous nodule in posterior parts of the contralateral thyroid lobe. Further close follow-up is recommended due to possibility of recurrence.

Discussion

Intrathyroidal parathyroid adenomas (IPA) are rare entities. Their intrathyroidal localization often complicates both diagnosis and surgical management. In this case, a 56-year-old female presented with a thyroid nodule that was initially interpreted as benign, based on ultrasound-guided fine-needle aspiration biopsy (FNAB). The absence of significant cytological atypia and the presence of typical follicular and lymphoid cells contributed to the misinterpretation as a benign thyroid lesion.

This case highlights the diagnostic challenge of distinguishing parathyroid from thyroid lesions based solely on cytology. FNAB often fails to differentiate between thyroid follicular neoplasms and parathyroid lesions due to overlapping features such as follicular structures, oxyphilic cytoplasm, naked nuclei, and colloid-like material^[4]. Additionally, FNAB samples are frequently non-diagnostic for parathyroid origin, unless parathyroid hormone (PTH) washout analysis is performed on the aspirate.

Some characteristic ultrasound features for intrathyroidal parathyroid adenoma include an oval to near-spherical shape, a lack of fatty appearance, and the presence of feeding vessels^[2].

Persistent symptoms including fatigue, bone pain, constipation, and biochemical findings such as hypercalcemia, hypophosphatemia, and markedly elevated serum PTH levels (1587 pg/mL), raised suspicion for primary hyperparathyroidism (PHPT) in this patient. The high PTH level indicated autonomous secretion by parathyroid tissue, while suppressed phosphate levels and elevated ionized calcium supported the diagnosis.

Imaging played a crucial role in localization. Although neck ultrasound revealed a nodule, it did not provide a definitive diagnosis. The 99mTc-MIBI scan with SPECT/CT was essential for detecting the metabolically active intrathyroidal parathyroid tissue, confirming the location in the posterior lower quadrant of the right thyroid lobe.

99mTc-MIBI remains a widely used and well-established method, being the gold standard for localizing parathyroid adenomas, as well as intrathyroidal ones^[5]. Despite its high sensitivity, false positive findings are not excluded, such as benign thyroid nodules and malignant thyroid lesions^[6].

According to Goodman's classification, IPA can be categorized into three types^[7]:

Type I: Subcapsular parathyroid tissue, not within the thyroid parenchyma.

Type II: Partially embedded in the thyroid tissue.

Type III: Completely intrathyroidal, as in the present case.

Complementary analysis of laboratory data, clinical presentation and both US and 99mTc-MIBI scan features is the most useful approach in confirming the diagnosis. Surgical removal is the therapy of choice, but different surgical techniques can be applied, such as lobectomy, thyroidectomy, and tumorectomy. The minimally invasive radio-guided parathyroidectomy using a gamma detector probe for intraoperative radiolocalization of parathyroid adenomas has many advantages over conventional neck exploration^[8]. The surgical treatment is considered successful if hypercalcemia has been corrected and normocalcemia is present 6 months postoperatively^[9]. Still, recent studies showed a significant recurrence rate of 14.3% in sporadic cases after 6.3 years of follow-up^[10].

The patient underwent surgical excision via right lobectomy, and histopathology confirmed the presence of a parathyroid adenoma. Postoperative PTH normalization and calcium-phosphate balance indicated successful resection. However, the patient showed fluctuating PTH levels and a hypoechoic lesion on the contralateral thyroid lobe during follow-up, raising suspicion for possible multiglandular disease or recurrence, which occurs in up to 10% of IPA cases^[6]. Long-term follow-up is crucial due to the potential for recurrent or missed multiglandular hyperplasia.

Conclusion

In conclusion, intrathyroidal parathyroid lesions often require a high index of suspicion, multimodal imaging, and a multidisciplinary approach for optimal outcomes, especially when hypercalcemia and elevated PTH are present.

Conflict of interest statement. None declared.

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