

Case 15977

Parathyroid adenoma diagnosed on ultrasound in a sestamibi negative patient of primary hyperparathyroidism

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Section: Head & Neck Imaging

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Patient: 43 year(s), female

Clinical History

A 43-year-old female patient, clinically diagnosed as primary hyperparathyroidism had been suffering with vague symptoms of backache, fatigue and depression for the past 5 years. Laboratory investigations showed serum calcium raised to 10.9 mg/dL and serum PTH (parathyroid hormone) levels elevated to 173 pg/ml.

Imaging Findings

Tc-99m-sestamibi scan was performed to localize the parathyroid glands. Normal tracer uptake of the thyroid and salivary glands, with no abnormal focus of retention on delayed films to suggest any enlarged parathyroid gland.

Ultrasound of the neck showed a well-defined homogeneously hypoechoic nodule measuring 9 mm x 5 mm located approximately one cm below the lower tip of the left thyroid gland. On colour Doppler a characteristic feeding vessel was seen to enter at one of the poles and a faint arc rim vascularity could be identified. Findings were suggestive of a left inferior parathyroid adenoma. The nodule was clearly extrathyroidal excluding the differential of a thyroid nodule. The characteristic vascular pattern helped to differentiate the lesion from an inflammatory lymph node, which would have had an echogenic hilum and hilar vascularity.

Discussion

Localization of parathyroid nodules is the key role of imaging in cases of hyperparathyroidism[1, 2], so that a focussed parathyroidectomy can be performed to treat the patient instead of bilateral neck exploration.

In this patient, Tc-99m-sestamibi scan done for localization of parathyroids was negative on two previous occasions. She had three previous ultrasound neck reports with no localization of any enlarged parathyroids. At our institute, based on the ultrasound features and clinical background, a diagnosis of left inferior parathyroid adenoma was made. Patient underwent focussed left inferior parathyroidectomy. Histopathology confirmed parathyroid adenoma.

The routine imaging modalities utilized are Tc-99m-sestamibi scan, ultrasound and a contrast CT Neck. Tc-99m-sestamibi, the radiotracer localizes and is retained in the region of mitochondria. Parathyroid adenoma's high cellularity & vascularity and large number of mitochondria in oxyphil cells are responsible for its avid uptake and slow release. After IV injection of Tc-99m-sestamibi, initial images are obtained 10 to 15 minutes after injection which typically show prominent thyroid uptake and a second set of images is obtained at 2 to 3 hours which showing hyper functioning parathyroid gland as a focus of residual activity after much of the thyroid uptake has washed out. The most common cause for a false negative study is small size, as was in this case. Tc-99m-sestamibi scan for parathyroids have a sensitivity of 93% and specificity of 75%[3].

Ultrasound with colour Doppler has a very high sensitivity 98% and specificity of 92% for the localization of parathyroid nodules in hyperparathyroidism. Knowledge of the anatomy and embryology of the parathyroid along with their ectopic locations is essential[4, 5]. High resolution ultrasound transducers with small foot print probes may be used when needed.

More advanced and more expensive imaging methods like Multi phase CT and PET imaging are being investigated[6, 7]. However, in our opinion currently these imaging techniques should only be used when conventional imaging including ultrasound and Tc-99m-sestamibi scanning fails to detect a parathyroid adenoma.

TAKE HOME MESSAGE

A meticulous and a detailed ultrasound evaluation of neck must be performed to localize the parathyroids in all cases of hyperparathyroidism. The anatomical variability of the location of the parathyroids makes it important for the neck ultrasound scan to extend superiorly from the angle of jaw and mandible and inferiorly up to the clavicles. In experienced hands, ultrasound is a highly sensitive modality, widely available and is cost effective.

'Written informed patient consent for publication has been obtained.'

Final Diagnosis

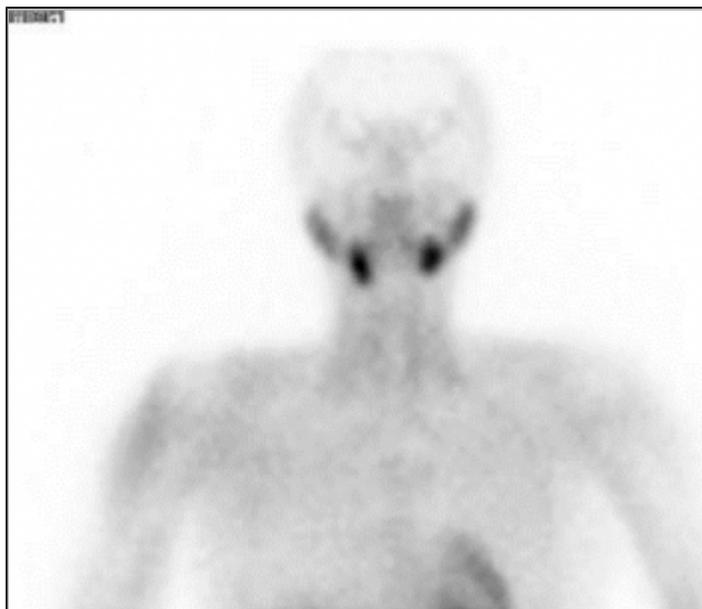
Parathyroid Adenoma

Differential Diagnosis List

Thyroid nodule, Lymph node

Figures

Figure 1 Tc 99m Sestamibi scan for the parathyroid



Tc 99m Sestamibi scan for the parathyroid: 2 hour delayed film showing no abnormal retention of the tracer in the neck area to suggest any parathyroid lesion

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Area of Interest: Head and neck;
Imaging Technique: Nuclear medicine conventional;
Procedure: Diagnostic procedure;
Special Focus: Endocrine disorders;

Figure 2 Ultrasound neck with colour doppler



Ultrasound Neck showing a well defined hypoechoic nodule measuring 9x5mm located one centimetre below the lower pole of left lobe thyroid. On colour Doppler characteristic polar feeding vessel with an arc rim is noted.

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Imaging Technique: Ultrasound-Colour Doppler;
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Special Focus: Endocrine disorders;

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Citation

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