Case 15977

Eurorad

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

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Section: Head & neck imaging
Area of Interest: Head and neck
Procedure: Diagnostic procedure
Technique: Ultrasound-Colour Doppler
Technique: Nuclear medicine conventional
Special Focus: Endocrine disorders Case Type: Clinical Cases
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Patient: 43 years, female

Clinical History:

A 43-year-old female patient, clinically diagnosed with 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 localise 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 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 localisation of parathyroids was negative on two previousoccasions. She had three previous ultrasound neck reports with no localisation 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 localises and is retained in the region of mitochondria. The high cellularity and vascularity of parathyroid adenoma and a 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 shows hyperfunctioning 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 of 98% and specificity of 92% for the localisation 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 multiphase 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 detailed ultrasound evaluation of the neck must be performed to localise 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 the jaw and mandible and inferiorly up to the clavicles. In experienced hands, ultrasound is a highly sensitive modality, widely available and cost effective.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Parathyroid adenoma, Thyroid nodule, Lymph node

Final Diagnosis: Parathyroid adenoma

References:

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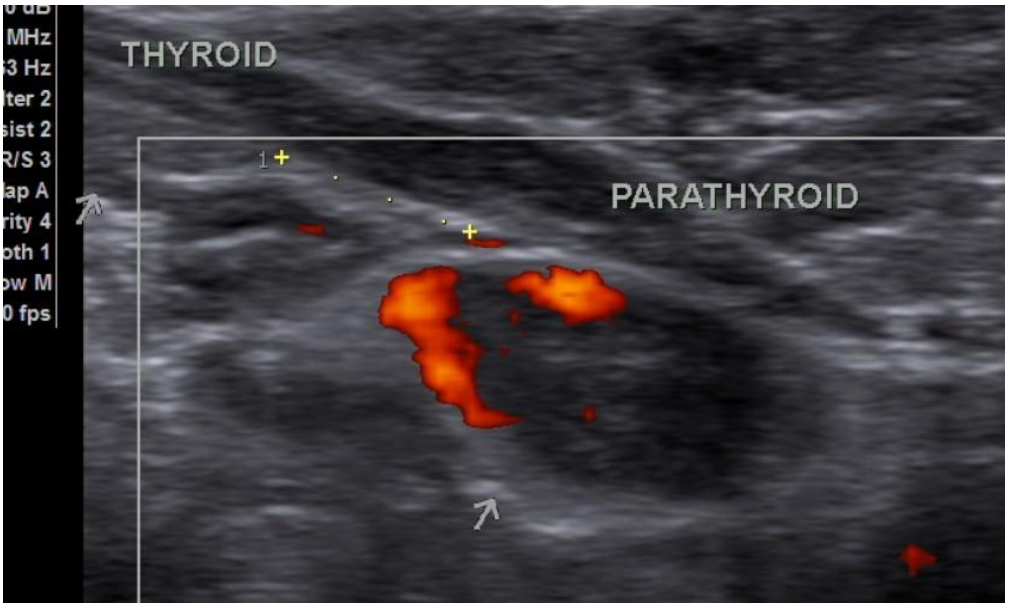
Figure 1

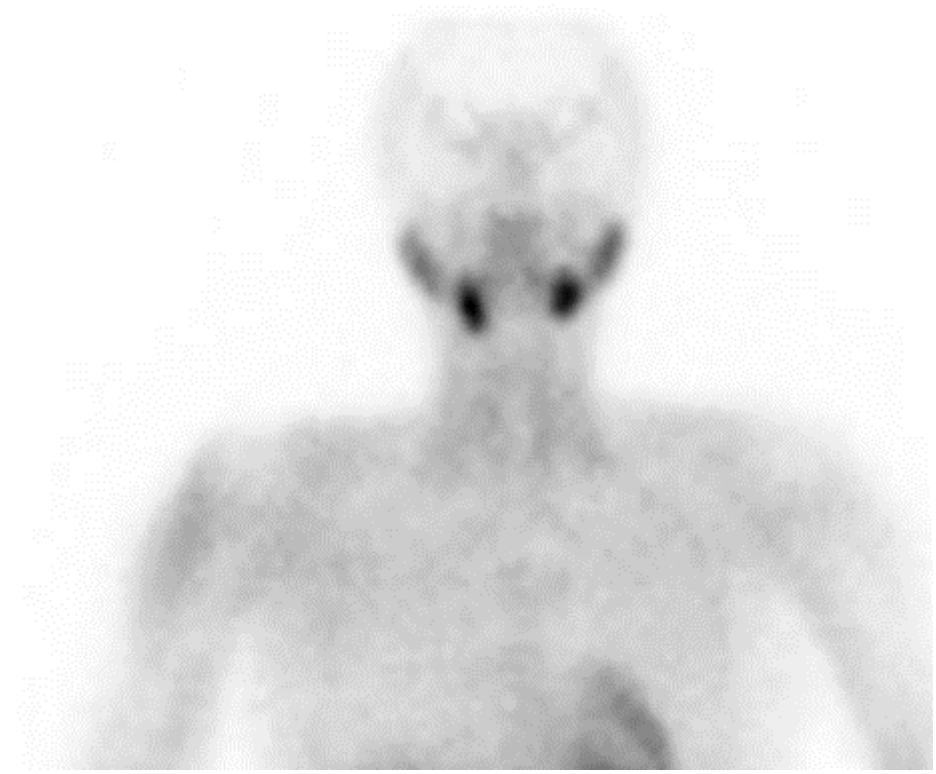
a



Description: Ultrasound neck showing a well defined hypoechoic nodule measuring 9 x 5 mm located one centimetre below the lower pole of left lobe thyroid. On colour Doppler characteristic polar feeding vessel with an arc rim is noted. **Origin:** Medanta Division of Radiology and Nuclear Medicine, Medanta The Medicity, Delhi, India

Figure 2

a



Description: 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. **Origin:** Medanta Division of Radiology and Nuclear Medicine, Medanta The Medicity, Delhi, India