Diagnostic accuracy of ultrasound and dual-isotope scintigraphy for parathyroid adenoma localisation

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Purpose

Methods and Materials

Results

- 112 patients had parathyroid scintigraphy in the above period.
  - 99 patients had surgery locally.
  - 23 patients had surgery elsewhere.

- Our parathyroid adenoma localisation protocol includes both parathyroid scintigraphy and ultrasound.
  - Parathyroid scintigraphy includes:
    - Dual-isotope planar subtraction imaging
    - SPECT-CT
    - Delayed (2 hours) planar MIBI imaging
  - Ultrasound imaging includes:
    - Colour Doppler
    - Grey-scale

- We assessed the diagnostic accuracy of these parathyroid localisation techniques.

The diagnostic accuracy for parathyroid adenoma was 82.6% for dual isotope scintigraphy, 63.6% for ultrasound and 87.0% when combining the tests.

Conclusion

Parathyroid scintigraphy is more accurate than ultrasound in the localisation of adenomas in this study population. However, there was one case where ultrasound detected an adenoma that was occult on scintigraphy. Given the low cost of ultrasound, we advocate the combination of these two modalities in pre-operative localisation.

This study has limitations in that not all patients who had localisation studies underwent parathyroid exploration. Particularly those with negative localisation studies. Therefore, the presence of false negatives was our main concern, as this would mean patients having an unnecessary anaesthesia for attempted minimally invasive resection. False negatives may lead to further investigations such as 4DCT.

Fig 1: 56 year old female with primary hyperparathyroidism
  - A) Pertechnetate scan shows normal distribution
  - B) Early MIBI shows a focus of increased uptake over the right thyroid lobe
  - C) Late MIBI shows retention of radiotracer in the lesion
  - D) Subtraction (Early MIBI minus pertechnetate) shows the lesion more clearly after subtraction of the thyroid activity.

Fig 2: Same patient as fig 1.
  - Greyscale ultrasound demonstrates a hypoechoic lesion posterior to the right lobe of thyroid increasing the diagnostic confidence of parathyroid adenoma.

Fig 3: Chart showing overall pre-op localisation findings

Combined Scintigraphy and Ultrasound Findings

- False positive
- False negative
- True positive
- True negative

References


Methods and Materials

- Retrospective review of all parathyroid scintigraphy performed in the period 01/12/15 to 30/06/16.
- Data were collected on demographics and scintigraphic findings, and where available ultrasound findings. Surgical and histological data were not available in all cases as our number of cases was limited.
- False negative findings were taken as gold standard.

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