

Improving Parathyroid Localisation on the ^{99m}Tc-Sestamibi Scan

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Background

- Primary hyperparathyroidism can only be cured by successful surgery
- High quality pre-operative localisation allows the surgeon to perform targeted exploration with economic and risk benefits.

Methods

- Retrospective audit of 431 patients undergoing parathyroid surgery.
- Correct localisation was determined by pathological specimen at surgery.

- 5-point scale was assigned to each report based on wording and lesion description.

- Blinded to surgical outcome

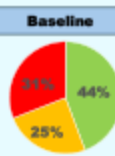
- Scale used to calculate ROC curves

1	No adenoma seen Unconvincing lesion seen on CT component only Unlikely location No tracer or contrast uptake
2	Unlikely adenoma Suspicious lesion seen on CT component only Likely location No tracer or contrast uptake
3	Possible adenoma Some tracer retention but no lesion on CT component Some tracer in lesion but not enhancing Intra-thyroid nodule with some tracer uptake Enhancing lesion but no tracer retention
4	Likely adenoma Any element of doubt in wording Enhancing lesion with some tracer uptake Good tracer uptake but only some enhancement
5	Adenoma identified No doubt in the report

Initial Results

0
Baseline

- Initial audit of 194 patients
- Sensitivity 69.8
- 31% failed to identify adenoma
- 44% confidently identified adenoma



Interventions

Goal was to improve sensitivity of adenoma localisation as well as confidence of the radiology report.

1
Upgrade
Scanner

- Upgraded SPECT/CT scanners
 - Siemens Symbia T to Siemens Intevo Bold

2
Optimise
Image
Acquisition

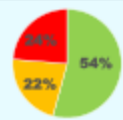
- Optimised image acquisition
 - Step and shoot acquisition over previous continuous acquisition
 - Increased administered activity from 750Mbq to 900Mbq ^{99m}Tc-Sestamibi
 - Changed SPECT reconstruction parameters (increased product of subsets and iterations)

3
Addition of
Iodinated
Contrast

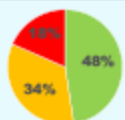
- Addition of arterial phase iodinated contrast
- Dropped the early phase of SPECT acquisition

Results

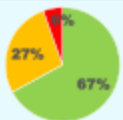
Intervention 1



Intervention 2

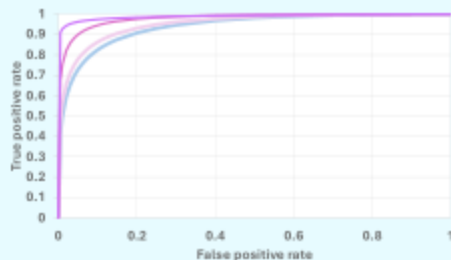


Intervention 3



Failed to identify
Possibly identified
Confidently identified

Pie charts showing proportions of adenomas which were successfully identified following each intervention



ROC curve following each intervention. Statistical analysis using DeLong test for 2 correlated ROC curves shown.

Conclusion

- We have demonstrated significant sequential improvement in adenoma localisation and radiologist report confidence.
- Improved adenoma localisation has resulted in fewer full neck exploration surgeries being performed with consequent improvement in patient safety, length of stay and reduced cost.