Successful minimally invasive parathyroidectomy for primary hyperparathyroidism depends on accuracy of pre-operative localisation studies.

Ultrasound (US) and sestimibi (SM) scanning remain the imaging modalities of choice, reserving MRI, CT and PET for patients who have not been cured by previous explorations or for whom other localization techniques are uninformative or discordant.

The aim of this study was to review the accuracy of US and SM in the pre-operative localisation of parathyroid adenomas.

**Introduction**

Ultrasound and sestamibi scanning show good concordance with histology following parathyroid surgery and when combined provide accurate pre-operative localisation. They should remain the first line to guide minimally invasive parathyroidectomy while other techniques, such as CT and MRI, should be reserved for when results are discordant or for those who need re-exploration following failed surgery.

**Methods**

We performed retrospective review of patients with a biochemical diagnosis of primary hyperparathyroidism and who subsequently had undergone parathyroidectomy from January 2011 to December 2011. We compared pre-operative imaging (ultrasound and $^{99m}$Tc-sestamibi scintigraphy) to surgical and post op histological findings to look for any correlation.

Other data recorded included patient demographics, pre-operative serum calcium and parathyroid hormone (PTH) concentrations, immediate post-operative calcium and 6 month follow up post op calcium.

Sensitivity, specificity and positive predictive values were calculated from the above results.

**Results**

Complete data was available for 47 (of 51 reviewed) patients. Baseline characteristics shown in Table 1.

| Male: Female | 12:35 |
| Age (years) | 64 (15-81) |
| Pre-op calcium (mmol/L) | 2.85±0.17 |
| Pre-op PTH (pg/ml) | 126.0±113.0 |
| Post-op calcium (mmol/L) | 2.43±0.18 |
| 6 month post op calcium (mmol/L) | 2.39±0.14 |

**Table 1: Patient characteristics**

US and SM scans were performed by the same radiologist. Each patient was discussed at Multidisciplinary Team Meeting. Parathyroid surgery was undertaken by one of two experienced Endocrine Surgeons.

Thirty six patients had a solitary parathyroid adenoma, six had parathyroid hyperplasia, one had multiple adenomas and four had inconclusive histological findings.

Ultrasound was positive in 29 of 36 (80.6%) adenomas with precise anatomical position found in 22 of the 29 giving a sensitivity, specificity and positive predictive value of 81, 64 and 88%, respectively (Figure 1; Table 2). Pre-operative $^{99m}$Tc-sestamibi scintigraphy correctly identified 21 of 36 (58.3%) adenomas with 58.3% sensitivity, 81.8% specificity and 91.3% positive predictive value. US findings correlated with SM in 20 patients and were 85% accurate giving sensitivity 81.2%, specificity 100% and positive predictive value 100% (Figure 2; Table 2).

**Discussion**

Ultrasound and sestimibi scanning show good concordance with histology following parathyroid surgery and when combined provide accurate pre-operative localisation.

They should remain the first line to guide minimally invasive parathyroidectomy while other techniques, such as CT and MRI, should be reserved for when results are discordant or for those who need re-exploration following failed surgery.