INTRODUCTION

Solitary parathyroid adenoma is a common cause of primary hyperparathyroidism and up to 20% of parathyroid adenomata can be located in ectopic sites.1–4 The traditional treatment for primary hyperparathyroidism usually involves exploratory surgery. But morbidity is quite high and the surgery takes a long time. Prior localization of the adenoma or detection of hyperplasia may reduce the operation period and limit the extent of the surgery. In this study the efficacy of preoperative Tc-99m MIBI scintigraphy and intraoperative gamma probe was evaluated. Materials and Methods: Six patients with PHPT had preoperative Tc-99m MIBI parathyroid scintigraphy and intraoperative gamma probe (IGP) was used in surgical neck exploration. Results: Parathyroid adenoma was observed in 2/6 patients on scintigraphy in the right retroclavicular region and the left lobe of the thyroid. Both of them were clearly detected by IGP during the surgery and easily removed by the surgeon in a short time (35 min) with a small incision. Pathologic examination confirmed the parathyroid adenoma. No abnormal MIBI uptake was not observed in scintigraphy in 4/6 patients. Subtotal parathyroidectomy was performed in these patients. Conclusion: Preoperative Tc-99m MIBI scintigraphy and the use of IGP may limit the exploration and also the operation time and reduce surgical complications.

Key words: Tc-99m MIBI, parathyroid adenoma, intraoperative gamma probe
evaluated as a “parathyroid adenoma” and histopathological examination of this tissue was made in frozen sections.

RESULTS

Parathyroid adenomas were observed in scintigraphy in 2/6 patients.

Case I: A 29-year-old man. A parathyroid adenoma was observed in the retroclavicular region preoperatively with Tc-99m MIBI scintigraphy planar and SPECT study and neck ultrasonography (USG: GE RT-X200, 7.5 MHz transducer). The adenoma was clearly detected with the IGP during the surgery and excised with a small collar incision. The duration of the operation was 35 minutes (Fig. 1A, B).

Case II: A 57-year-old woman. She had multiple recurrent urinary stones. Parathyroid adenoma was observed in the area of the left lower parathyroid with high resolution neck USG (GE RT-X200, 7.5 MHz transducer) and Tc-99m MIBI scintigraphy. The adenoma was not found in surgical exploration. A high count was detected with the IGP in the left thyroid lobe. Left thyroid lobectomy was performed and parathyroid adenoma was confirmed in a frozen section of this lobe (Fig. 2).

Four out of six patients had a normal Tc-99m MIBI scintigraphy result. Subtotal parathyroidectomy was performed in these patients. The counts of parathyroid tissue and thyroid were not different with the IGP. All parathy-

<table>
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<th>patients</th>
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<th>PTH 2 (pg/ml)</th>
<th>Ca 1 (mg/dl)</th>
<th>Ca 2 (mg/dl)</th>
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<td>10</td>
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<td>6</td>
<td>154</td>
<td>26</td>
<td>13.6</td>
<td>9.2</td>
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PTH 1: Parathormone levels before the operation.
PTH 2: Parathormone levels after the operation.
Ca 1: Calcium levels before the operation.
Ca 2: Calcium levels after the operation.

Fig. 1 A: Retroclavicular adenoma was observed in parathyroid scintigraphy in planar images at 60 minutes. B: Retroclavicular adenoma was observed in parathyroid scintigraphy in 120 minute tomographic section.

Fig. 2 Parathyroid adenoma was clearly identified with Tc-99m MIBI in the left lobe of the thyroid.

Table 1 The parathormone and calcium levels before and after surgery
roid tissues were explored and “parathyroid hyperplasia” was observed on pathological examination.

The PTH values were 60–200 pg/ml (normal range 14.2–60.8 measured by radioimmunoassay) before the operation and were within normal limits 48 hours after surgery. The calcium levels were slightly higher than normal (10–15 mg/dl) and fell to the normal range after the operation (8.1–10.5 mg/dl determined by photometric color test) (Table 1).

The weight of each resected adenoma was about 1.5 grams and the hyperplasic parathyroid glands were 0.3 grams or less.

DISCUSSION

Accurate preoperative localization of parathyroid adenoma results not only in improving the outcome of these patients but also in shortening the duration of the operation and lowering the morbidity. Localization studies are particularly valuable in these patients. Tc-99m MIBI is commonly used to detect parathyroid adenoma especially when it is located in ectopic sites. But there are some limitations when it is coexisting with nodularly goiter and/or located in the thyroid lobe. For these limitations the use of IGP is also debated. Recent studies have shown that the rates of success in the detection of parathyroid adenoma preoperatively with scintigraphy and during the operation with all IGP are quite high and helpful in performing minimal excision. Casara et al. evaluated 21 patients with parathyroid adenoma and they could detect adenomas with scintigraphy and neck USG preoperatively and with an IGP during the operation in 20/21 (95.2%) and limited neck exploration was enough for these patients. The same workers also evaluated one hundred and forty three patients with primary hyperparathyroidism and concluded that parathyroid scintigraphy and neck USG might guide minimal invasive surgery and SPECT could enable the surgeon to detect the ectopic parathyroid adenoma easily when it was located in the mediastinum or deep in the neck.

Rubello et al. also investigated ectopic parathyroid adenoma with preoperative scintigraphy and with an IGP during the operation. The ectopic parathyroid adenomas were located at the carotid bifurcation and easily excised with minimal incision using an IGP during the operation.

In this study we observed parathyroid adenomas located in retroclavicular regions and in the thyroid lobe. They were clearly detected preoperatively with Tc-99m MIBI scintigraphy. The parathyroid adenoma located in the retroclavicular region was excised with minimal incision and in a short time using an IGP. But a parathyroid adenoma located in the thyroid lobe was not easily discriminated from nodularly goiter. Intrathyroidal parathyroid gland is found in 2–5% of ectopic parathyroid adenomata usually within the lower third part of the thyroid. In our patient the adenoma was located with scintigraphy but it could not be seen by the surgeon. But a high count was obtained in the left lower lobe of the thyroid with an IGP. A frozen section and histopathological examination of this excised tissue confirmed “parathyroid adenoma.”

Casara et al. reported that the mean counts of parathyroid adenomas were as high as 2.5 times the background. Others had similar findings. In our study the counts were either too close to the background (1–1.2 times) or too high (at least three times). We have therefore chosen a cut off level three times higher than the background.

Radioguided surgical techniques facilitate parathyroidectomy by discriminating parathyroid adenoma from thyroid nodules, lymph nodes and other normal neck structure.

As a conclusion, preoperative Tc-99m MIBI scintigraphy and the use of an IGP may limit the extent of surgery and shorten the operation time. Surgical complications may also be minimized.

REFERENCES

10. Rubello D, Piotto A, Pagetta C, Pelizzo M, Casara D. Ectopic parathyroid adenomas located at the carotid bifurcation. The role of preoperative Tc-99m MIBI scintigraphy

