MINIMALLY INVASIVE DIRECTED PARATHYROIDECTOMY IS HIGHLY EFFECTIVE

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INTRODUCTION

Primary hyperparathyroidism (PHPT) is often diagnosed at a very early stage during which time, the great majority of patients are asymptomatic. In 2000, the National Institutes of Health (NIH) revised consensus recommendations and effectively broadening the indications for surgery in asymptomatic patients. As a result, there has been a dramatic rise in parathyroidectomy among asymptomatic patients, provided they meet surgical guidelines.

With early surgical exploration being offered for otherwise asymptomatic patients, highly successful, less invasive surgery, has become more desirable. Targeted, minimally invasive parathyroidectomy based on preoperative localization, using a combination of parathyroid sestamibi scanning, ultrasound, and rapid intraoperative PTH (IOPTH) assay has helped to achieve this goal.

While this approach is effective in the vast majority of cases, there are failures. In order to increase the safety and effectiveness of surgery, causes of failure during parathyroid exploration should be explored to minimize such outcomes. In this study, we aim to scrutinize our data with regard to the effectiveness of targeted exploration, in an attempt to improve quality of care and patient outcomes.

METHODS AND MATERIALS

A non-controlled prospective cohort of 208 patients, who had undergone surgery for primary hyperparathyroidism were included in this study. The cohort comprised of 145 females and 62 males. All patients underwent parathyroid sestamibi scan as well as ultrasound, and IOPTH assay was used. A more than 50% drop in the IOPTH value from the highest pre-excision value and the demonstration of a negative IOPTH slope over 3 post excision measurements were used as criteria for successful removal of hypersecreting glands.

Based on final post operative pathologic findings, patients were diagnosed as having either a single gland adenoma, double adenomas, or four gland hyperplasia. Patients were followed biochemically with serum calcium levels to assess for the long term success of exploration. Cases with failure of exploration or recurrence of hyperparathyroidism were identified. The rates of failure were calculated for targeted and bilateral explorations. The cases of failure were then scrutinized and determined if IOPTH dynamics were compared for single gland adenoma versus multiglandular disease (double adenoma or hyperplasia) as well.

RESULTS

Of the 208 patients with primary hyperparathyroidism, data were available for 202. One hundred seventy seven underwent unilateral exploration. Follow up serum calcium levels were used as criteria for success and extent of excision. Cases, there are failures. In order to increase the safety and effectiveness of surgery, causes of failure during parathyroid exploration should be explored to minimize such outcomes. In this study, we aim to scrutinize our data with regard to the effectiveness of targeted exploration, in an attempt to improve quality of care and patient outcomes.

Of the 202 patients, follow calcium data was available for 179 (88%). Among patients with negative or false positive imaging, bilateral exploration carried a failure rate of 25% (2/8). Of the 4 recurrences, 2 were in the targeted group and 2 in the bilateral exploration group. Targeted parathyroidectomy was successful in 155/181 (99%) for first time explorations. Following negative or false positive imaging, bilateral exploration carried a failure rate of 25% (2/8). IOPTH dynamics demonstrate a persistent down sloping pattern, following excision of adenoma. For multiple disease, while after the excision of the first abnormal gland there is a significant drop in IOPTH, it begins to plateau at 10 minutes, and increases again at 20 minutes.

FAILURES OF UNILATERAL EXPLORATION:

Case 1: Failed exploration, for imaging negative case and false-positive selective IV sampling for PTH. Patient had previous preoperative Ca of 11.9, and PTH of 46. The parathyroid gland was not identified preoperatively. Selective IV sampling for PTH and this was suggestive of an adenoma on the left side.

Case 2: Failed second exploration. Patient had a previous failed bilateral exploration at outside institution. Repeat investigation including a biopsy of an intrathyroidal nodule suggested a left sided lesion. Patient underwent left sided exploration and left hemithyroidectomy. A parathyroid adenoma could not be identified. The patient continued to demonstrate persistent disease on biochemical testing.

FAILURES OF BILATERAL EXPLORATION:

Case 1: Failed exploration for imaging negative case. Patient had non-localizing imaging on imaging and a preoperative Ca of 11.9, and PTH of 46. Three normal parathyroid glands were identified intraoperatively. The right inferior parathyroid could not be found. Despite right hemithyroidectomy, there was no drop in IOPTH. Postoperative Ca was 11.3 at 10 months.

Case 2: Failed exploration and false positive imaging. Imaging suggested a RI adenoma. Intra-operatively two normal glands on the right side and a left superior normal gland were identified. The left inferior gland was not identified despite bilateral thyroidectomy for multinodular goiter. Calcium remained elevated at 11.2.

DISCUSSION

In our experience minimally invasive directed parathyroid exploration is highly effective (99%) when the preoperative parathyroid imaging is localizing. Ultrasound is useful for corroborating suspicious findings and to assess for thyroidea interna, which can potentially cause false positive scans.

The targeted parathyroid exploration resulted in 95% cure rates. It is also possible to convert a 25% failure after unilateral exploration to a 0% failure after bilateral exploration. For these reasons, many surgeons choose to continue with extended bilateral exploration, even when preoperative imaging is localizing.

IOPTH measurements are useful, and correctly predict the removal of the adenoma when adenomas are fully encapsulated, the highest pre-excision levels. Dynamics of IOPTH levels can provide additional clues to correctly decide on bilateral exploration in cases of non-localization.

In our experience, minimally invasive directed parathyroidectomy using IOPTH is highly effective when the preoperative parathyroid imaging is localizing. Ultrasound is useful for corroborating suspicious findings and to assess for thyroidea interna, which can potentially cause false positive scans.

The targeted parathyroid exploration resulted in 95% cure rates. While this approach is effective in the vast majority of cases, there are failures. In order to increase the safety and effectiveness of surgery, causes of failure during parathyroid exploration should be explored to minimize such outcomes. In this study, we aim to scrutinize our data with regard to the effectiveness of targeted exploration, in an attempt to improve quality of care and patient outcomes.

In cases of non-localization on parathyroid imaging, a bilateral exploration still carries a high risk of failure. In our series this failure was 25%. Therefore, in such cases several strategies may be adopted to help avoid unsatisfactory exploration.

First, exploration for mist non-localizing disease should be reconsidered especially if it does not meet the NIH consensus guidelines. Expectant waiting may allow for localization in the future and increase the chance of successful surgical exploration. In these cases, the disease may advance, or it will increase the consensus guidelines for exploration.

Second, additional localization studies may be useful in these selected cases. These include non-invasive measures such as MI imaging or invasive measures such as selective IV sampling for IOPTH by interventional radiology. This is an expensive and time consuming test and should be used very selectively.

CONCLUSIONS

Targeted parathyroidectomy following preoperative localization studies with parathyroid sestamibi scan and ultrasound is highly effective for primary hyperparathyroidism with a success rate of 99%. The targeted parathyroid exploration resulted in 95% cure rates. IOPTH measurements are useful, and correctly predict the removal of the adenoma when adenomas are fully encapsulated, the highest pre-excision levels. Dynamics of IOPTH levels can provide additional clues to correctly decide on bilateral exploration in cases of non-localization.

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REFERENCES