Objective: To examine the feasibility of minimally invasive/focused parathyroidectomy in patients with primary hyperparathyroidism and negative results on preoperative sestamibi scanning.

Design: Retrospective review.

Setting: Hospital.

Patients: A total of 452 patients with primary hyperparathyroidism underwent parathyroidectomy between January 2005 and December 2009.

Main Outcome Measures: Preoperative sestamibi scans were reviewed, and their influence on the surgical outcome was examined. Records of the intraoperative and postoperative findings were also reviewed.

Results: Seventy-seven patients (17.0%) were found to have negative results on preoperative sestamibi scans, and these patients formed our cohort study group. In this group, neck ultrasonography performed as an adjunct was able to preoperatively localize an area that was suggestive of a single adenoma in 61 patients (79.2%), 53 of whom were confirmed to have a single adenoma intraoperatively (sensitivity, 80.3%; specificity, 27.3%; positive predictive value, 86.9%; and negative predictive value, 18.8%). In total, 66 of 77 patients (85.7%) were confirmed to have a single adenoma at the time of surgery.

Conclusions: Negative results on sestamibi scans should not be used as exclusion criteria for minimally invasive/focused parathyroidectomy in patients with primary hyperparathyroidism. In our study, 66 patients with negative results on preoperative scans were found to have a single adenoma and were surgically cured by minimally invasive/focused parathyroidectomy.


Primary hyperparathyroidism (PHPT) is the most common cause of hypercalcemia in the outpatient setting. Preoperative localization and the intraoperative parathyroid hormone (PTH) assay have revolutionized the surgical management of these cases. Over the years, minimally invasive/focused parathyroidectomy (MIFP) has rapidly gained popularity as the procedure of choice for patients with PHPT. It has been shown to have many advantages over traditional bilateral 4-gland parathyroid exploration to identify affected glands. Therefore, false-negative results on sestamibi scans may preclude patients from targeted minimally invasive parathyroidectomy, although a single-gland adenoma may still be discovered at the time of bilateral neck exploration. The objective of this study was to examine the feasibility of intraoperative PTH monitoring–guided MIFP in patients with PHPT and negative results on preoperative sestamibi scanning. Intraoperative PTH monitoring was used to evaluate the intraoperative success of the procedure. The intraoperative criterion for successful parathyroidectomy was defined as follows: intact PTH levels should decrease by more than 50% and fall into the normal range from the highest preincisional or preexisional hormone levels in a peripheral
Primary hyperparathyroidism has been recognized as a disease process since the 1920s, when it was discovered in both Europe and the United States. Since that time, the recognition, diagnosis, and treatment of PHPT have evolved because of improved laboratory testing, accurate preoperative localization, and less invasive surgical procedures. Once a diagnosis of PHPT is made and the patient is deemed an appropriate surgical candidate, preoperative localization of the involved gland(s) aids in the choice of operation (MIFP vs bilateral 4-gland exploration). Preoperative localization of the abnormal gland(s) has become even more important in the era of minimally invasive parathyroid surgery. The 2 most common imaging modalities are ultrasonography and technetium 99m sestamibi scintigraphy. The sensitivity of sestamibi–single-photon computed tomographic scanning in the present study was similar to that reported in the literature (range, 71% to 88%).

Ultrasoundography is particularly beneficial because it is inexpensive, can be performed by the surgeon in office settings, can be repeated easily, and does not involve ionizing radiation. A point of concern with preoperative imaging is the case involving PHPT and a negative sestamibi scan result. Such cases represent an important subset in which traditional 4-gland operative exploratory surgery is widely advocated at the expense of MIFP. However, MIFP is rapidly gaining popularity as the procedure of choice for patients with PHPT as well as the preferred treatment option in patients with PHPT and negative results on sestamibi scans. It has been shown to have many advantages over traditional bilateral 4-gland parathyroid exploration, including decreased pain, small incisions, improved cosmetic results, lower morbidity, and decreased length of hospital stay. In contrast, parathyroid exploratory surgery often and unpredictably requires more extensive neck exploration, including parapharyngeal resection, thyrohyoid resection, and partial thyroidectomy. Intraoperative PTH monitoring can help confirm a successful operation, leaving little to no suspicion of multiglandular disease and thereby avoiding bilateral neck exploration. We and others have shown that intraoperative PTH monitoring is of value not only in cases involving single-gland disease but also in cases involving multiglandular disease. Therefore, it has been our goal to consider more patients with PHPT as candidates for MIFP. However, it is important to emphasize that an experienced parathyroid surgeon should perform the operation after a comprehensive preoperative workup, either with an MIFP approach or with a conventional bilateral neck exploration. Treatment using the bilateral approach results in a greater than 95% cure, with a complication rate of less than 4%.

Our study aimed to assess the feasibility of MIFP in patients with PHPT who have negative results on preoperative sestamibi scanning. The results of our study emphasize several important points. First, in patients who had negative sestamibi scan results, we found a high incidence of single parathyroid gland disease. Most of these patients (85.7%) had a single adenoma. This finding contradicts the common perception that a negative sestamibi scan result indicates a diagnosis of parathyroid hyperplasia/multiglandular disease and thus requires 4-gland exploratory surgery. Second, further localization with comprehensive cervical ultrasonography will reveal a single adenoma in most cases, as in our study, in which cervical ultrasonography demonstrated a positive predictive value of 86.9% in the preoperative detection of a single adenoma when the results of sestamibi
scanning were negative. Comprehensive neck ultrasonography is beneficial because it allows more patients who were previously excluded to be candidates for MIFP. This concept was advocated in some previous studies, but little has been done to evaluate its efficacy in cases involving negative sestamibi scan results.18-21 Furthermore, we are able to achieve a success rate of 98.4% in resolving PHPT by starting with MIFP in this challenging patient subgroup. One of the limitations of our current study involved the difficulty in reporting an accurate cure rate in our study cohort. Therefore, we used intraoperative PTH testing as a predictor of cure. However, most surgeons agree that a decrease of more than 50% in PTH level is involved the difficulty in reporting an accurate cure rate in our study cohort. Therefore, we used intraoperative PTH testing as a predictor of cure. However, most surgeons agree that a decrease of more than 50% in PTH level from the highest preincision or preexcision level is associated with a predictive cure in 94% to 97% of cases.6,7,22 Future studies are needed to specifically address the cure rate in this interesting group of patients with negative preoperative sestamibi scan results.

We recently reported on independently evaluating both ultrasonography and sestamibi scanning as single-modality preoperative screening tools in cases of PHPT. We reported that the sensitivity for correct localization of a single parathyroid adenoma was 83% for sestamibi scanning vs 72% for ultrasonography.13 Therefore, when patients have negative results on a sestamibi scan, we recommend that they undergo comprehensive cervical ultrasonography before the option of MIFP is excluded. Using this approach, many more patients with PHPT will be considered for MIFP.

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REFERENCES