Abstract

Objectives: In this study, we report a new, less invasive surgical technique in managing preserved parathyroid tissue in patients with secondary hyperparathyroidism who undergo bilateral parathyroid exploration and excision of all 4 parathyroid glands. We report this technique in 4 patients and evaluate their postoperative parathyroid hormone (PTH) levels as a marker to evaluate efficacy.

Methods: All 4 glands were first exposed. Superior glands are not possible to transpose and were excised while the inferior glands were mobilized on their pedicles. Once identified, the inferior glands were kept intact until it was determined which gland can be best preserved on its vascular pedicle with adequate length for transposition. This gland was then mobilized through an incision made in the strap muscles, placing it superficial and ventral to the muscles. The majority of the hyperplastic gland was then resected distal to its vascular pedicle. The portion of the gland that was preserved was secured over the strap muscle, making it easily accessible for future exploration and debulking if needed and avoiding a second operative site in the forearm.

Results: Rapid intraoperative PTH assay confirmed adequate removal of hypersecreting parathyroid glands and was indicative of a curative outcome. All patients exhibited a greater than 90% initial reduction in the PTH level from their baseline and a sustained decrease in postoperative PTH levels well below their preoperative baselines at one month. The percentage reduction in PTH at longest follow-up was 93.17% (range 83.22-98.27%). Importantly, none of the patients exhibited postoperative PTH levels indicative of hypoparathyroidism.

In this study, we report a new, less invasive, surgical technique to preserve parathyroid tissue in patients with secondary and tertiary hyperparathyroidism who undergo parathyroid exploration and excision of all 4 parathyroid glands. We report this technique in 4 patients and evaluate their postoperative iPTH levels as a marker to evaluate efficacy.

Methods

First, all four parathyroid glands are exposed. The dorsal position of the superior parathyroid glands prevents an adequate length for a vascular pedicle to proceed with transposition. Therefore the superior parathyroid glands are excised while the inferior glands can be mobilized on their pedicles. Once identified, the inferior parathyroid glands are kept intact until it is determined which gland can be best preserved on its vascular pedicle with an adequate length of the vascular pedicle for transposition. (Figure 1A) This gland is then mobilized and passed through an incision made in the strap muscles, placing it superficial and ventral to the muscles. (Figure 1B) The majority of the hyperplastic gland is then resected distal to its vascular pedicle. (Figure 1C & Figure 1D) The portion of the preserved parathyroid gland is secured over the strap muscles, by suture opening the muscle partially closed around the pedicle. The site is then marked with both a metal clip and non- absorbable prolene stitch. This allows for access to the preserved parathyroid in the event of future exploration and avoids a second operative site in the patient’s forearm.

Results

In the 4 reported cases illustrating the technique, intraoperative rapid PTH (t-PTH) assay confirmed adequate removal of hypersecreting parathyroid glands and was indicative of a curative outcome. Three of the four patients exhibited a greater than 90% initial reduction in the PTH level from their baseline. They experienced hung bone syndrome after parathyroidectomy which was managed with calcium and active vitamin D supplementation. Subjects exhibited a sustained decrease in postoperative iPTH levels at one month, well below their preoperative baselines (Table 1). None of the patients exhibited postoperative PTH levels indicative of hypoparathyroidism (less than 15 pg/ml). However, iPTH levels were low for a patient with ESRD. Patients who were followed for a longer time interval continued to have a stable decrease in iPTH and normalized serum calcium levels. The mean reduction in iPTH at the longest follow up period was 93.17% (range 83.22-98.27%). The one follow-up iPTH levels remain at or below the lower limit of normal for ESRD.

Discussion

The debate over whether subtotal or total parathyroidectomy is more suitable for multiglandular parathyroid disease has been longstanding. Both approaches involve thorough exploration of the neck. Each has unique advantages and disadvantages. Our modified approach towards subtotal parathyroidectomy with autotransplantation of parathyroid tissue ventral and hence superficial to the strap muscles combines certain aspects of both techniques. The parathyroid gland, after mobilization and transposition into an opening made in the strap muscles, is subsequently placed superficial and ventral to these muscles. The majority of the hyperplastic gland is resected distal to the vascular pedicle. Then the preserved portion of the gland is secured to overlie the strap muscle in a superficial location. Hence, this makes the parathyroid gland potentially easily accessible for future exploration while reducing any risk of injury to surrounding nerves and complications due to hypoparathyroidism with significant hypocalcemia. Patients encounter ‘hungry bone’ syndrome post-operatively and admission to a monitored setting provides the best care. A prior administration of active vitamin D increases gastrointestinal calcium absorption and enhances bone calcification, while calcium prevents severe hypocalcemia. Checking ionized or total serum calcium levels several times a day (every 4 to 6 hours) allows for timely calcium supplementation to treat hypocalcemia. Using a higher calcium dialysate concentration during dialysis also provides another source for calcium.

Conclusions

Parathyroid autotransplantation is a viable method used in conjunction with subtotal parathyroidectomy for surgical management of secondary or tertiary hyperparathyroidism. This technique is a viable alternative to parathyroid autotransplantation to allow effective reduction in iPTH levels, while avoiding potential profound hypoparathyroidism and hypocalcemia associated with total parathyroidectomy. It places the residual vascularized parathyroid in an easily accessible area ventral to the strap muscles, and avoids a second surgical site.

Table 1: iPTH levels in subjects undergoing parathyroidectomy with autotransposition UI = left inferior, RI = right inferior

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<th>Patient</th>
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References