Calcium Normalization Among Patients Receiving Subtotal or Total versus Partial Parathyroidectomy for the Treatment of Tertiary Hyperparathyroidism

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Objectives

- To investigate the calcium normalization of different surgical approaches for tertiary hyperparathyroidism and renal allograft function

Introduction

Prompt management of patients with aberrant parathyroid hormone secretion after renal transplant is necessary to avoid allograft dysfunction and osteoporosis. Parathyroidectomy is typically curative but the extent of parathyroidectomy remains controversial. Practice patterns vary as avoiding persistent disease must be weighed against risks to the transplanted kidney and hypocalcemia.

While surgery for secondary hyperparathyroidism typically involves more aggressive parathyroidectomy, the primary endpoint of parathyroidectomy in tertiary hyperparathyroidism is a >50% drop in PTH level even if this is above the normal value. Additionally, some studies define ”success/cure” more liberally by a normalization of calcium levels regardless of PTH level.

Our study sought out to monitor calcium normalization in patients who underwent more aggressive parathyroidectomy (total/subtotal) vs. partial parathyroidectomy and the resultant effects on renal allograft function.

Methods and Materials

Retrospective chart review

- Patients undergoing parathyroidectomy for tertiary hyperparathyroidism by three fellowship-trained head and neck surgeons between January 1, 2011 through January 1, 2021.
- Exclusion Criteria: Patients younger than 18, patients without renal allograft, incomplete or unavailable records

Demographic data (age, gender, race), body mass index (BMI), procedure time, diagnosis, surgical technique (total parathyroidectomy, subtotal parathyroidectomy, partial parathyroidectomy,). Parathyroid hormone, calcium, GFR and Creatinine levels perioperatively and at 6 months. Readmission rates, ED visit rate, Recurrence of disease, success of parathyroidectomy.

Statistical Analysis

- Chi square tests were used for categorical variables that passed the Shapiro Wilk normality test.
- Wilcoxon Rank Sum Test for non-parametric data sets

Table 1. Surgical technique

	N (%)	Symptomatic hypercalcemia (%)	Pre-op PTH median(IQR)	PTH % reduction median(IQR)
Subtotal/Total	11 (55%)	4(36.3%)	228(500)	83(6.4%)
Partial	9 (45%)	5 (55.5%)	149(90)	67.7(14%)

Table 2. Calcium Normalization

	Three month post-op Serum Calcium median(IQR)	Six month post-op Serum Calcium median(IQR)	Eucalcemia at 6 months	P-value
Subtotal/Total	9.6(.7)	9.6 (.3)	8(82%)	
Partial	9.8(.25)	9.6(.3)	8(89%)	.58

Results

Demographics

- 20 patients; 14 Females (70%), 6 Males (30%)
- The majority, 12/20 (60%), were African-American, and 6/20 (30%) were Caucasian.
- The median age for patients undergoing total or subtotal parathyroidectomy was 49 years while the partial group had a median age of 68.

Indications for Surgery

- 12(60%) patients had documented failure of maximum dosage of sensipar.
- 9 (45%) of patients had symptomatic hypercalcemia prior to surgery

Surgery

- Baseline biochemical profile was similar between the two groups though patients undergoing total/subtotal PTX had a greater intraoperative reduction in PTH (83.11% vs. 65.12%, p=0.043).

Hospital Course

Hypocalcemia and Length of stay

- All episodes of post-op hypocalcemia (n=5) occurred in the total/subtotal PTX group (p=0.038).
- Patients who underwent total/subtotal PTX required a longer hospital stay(3.5 vs. 2, p=.044).

Calcium Normalization and Allograft Function

- The was no difference in rate of eucalcemia at 6 months (81.8%vs. 88.9%), p=0.579) between the groups.
- There was no difference in reduction in GFR at 6 months was 11.5% vs 9.3%, p=0.93).

Table 3. Renal Allograft function

	GFR reduction 3 months median (IQR)	GFR reduction 3 months median (IQR)	P-value
Subtotal/Total	6.8 (2.8%)	9.3 (3.5%)	
Partial	3.4 (2.1%)	11.5(2.2%)	.93

Discussion

Practice patterns for tertiary hyperparathyroidism vary widely. Several studies have shown that partial parathyroidectomy has been efficacious in treating tertiary hyperparathyroidism. In our study, surgical technique did not significantly impact normalization of calcium at three months or at six months. The difference in renal allograft function were minimal and not statistically significant. Interestingly, a dip in renal allograft function was noted in a majority of patients after surgery.

Undergoing more aggressive surgery prompted longer hospitalization stays for calcium repletion and patients were more likely to be symptomatic. Although the perioperative morbidity is higher, this study shows that over medium to long term there is not a significant benefit to partial parathyroidectomy. Overall, surgeon preference is important for the treatment for tertiary hyperparathyroidism as well as close communication with the patient’s renal transplant nephrologist.

Limitations of this study include those inherent to retrospective cohort studies. Our data is prone to selection, limitations from available data.

Conclusions

In patients with tertiary hyperparathyroidism, similar rates of eucalcemia are observed after different extents of parathyroidectomy. Patients undergoing subtotal /total PTX had longer hospital stays and more frequent clinical hypocalcemia. Although our study shows no significant differences to renal transplant function, this is limited by sample size and disease incidence. Larger, multi-institutional studies

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