



Parathyroidectomy as a Daycase Surgery: Retrospective Study

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Received 22 Mar, 2017; Accepted 31 Mar, 2017 © The author(s) 2017. Published with open access at www.questjournals.org

ABSTRACT: The parathyroid glands are involved in calcium homeostasis. Primary hyperparathyroidism (PHPT) is the most common cause of elevated parathyroid hormone (PTH) and calcium levels. Parathyroidectomy is excision of one or more parathyroid glands. This is a surgical management for hyperparathyroidism.

Objective: Retrospective study of 68 cases over 2 years and literature review to assess if Parathyroidectomy can be safely performed as a daycase surgery.

Method: Retrospective study of postoperative outcome over 2 years, of 68 cases who had parathyroidectomy procedure. Postoperative complications, duration of hospital stay and indication for parathyroidectomy was analysed. Effects of change in parathyroid hormone levels in blood postoperatively, importance of imaging to localise the parathyroid lesion in order to achieve minimally invasive surgery and safe postoperative outcome is discussed.

Result: 59 patients out of 68 had PHPT. 53 of them were discharged on the same day, that is 89.8%. Remaining 6 patients were admitted overnight to confirm their postoperative normal calcium levels. None of them developed any postoperative complication. 40.7% of these PHPT patients were prescribed calcium supplement prophylactically. 33.3% of secondary and tertiary hyperparathyroidism (HPT) patients were discharged on the same day. All of them were followed up by endocrinologists or renal team postoperatively to regulate plasma calcium levels.

Conclusion: Parathyroidectomy for Primary hyperparathyroidism can be performed safely as day case surgery, if the adenoma is accurately localised by dual modality imaging.

Keywords: Primary hyperparathyroidism, Parathyroidectomy, day case surgery, dual modality imaging.

I. INTRODUCTION

Parathyroid glands play an essential role in regulating calcium metabolism. Parathyroid adenoma or hyperplasia, in Primary, secondary and tertiary hyperparathyroidism disturbs plasma calcium concentration and bone calcium. Parathyroidectomy is the surgical treatment for these hyperparathyroidism conditions.

II. METHOD

Data was collected regarding parathyroidectomy surgeries carried out over 2 years. There were 68 patients who had parathyroidectomy surgery; their postoperative complications, duration of hospital stay and indication for parathyroidectomy was analysed. Retrospective study was carried out to assess the postoperative complications. The analysis was made whether it is safe to carry out parathyroidectomy as a day case surgery. Literature was studied via pubmed and NHS Athens regarding the same.

III. Result:

Amongst 68 cases; majority 59 were with primary HPT, 7 with secondary HPT and 2 with tertiary HPT. Patients with secondary and tertiary HPT needed very close monitoring of plasma calcium levels postoperatively. Only 33.3% of these patients who had minimal surgical intervention were discharged as day case. All of the patients with secondary or tertiary HPT were followed up by endocrinologists or renal team postoperatively to regulate plasma calcium levels. Patients with primary HPT had dual modality imaging done to localise site of parathyroid adenoma accurately. 89.8% of these patients were discharged home on the same day of surgery safely without any postoperative complications like bleeding, infection, haematoma or laryngeal nerve palsy; 40.7% of them were prescribed calcium supplement prophylactically.

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None of the patients develop hypocalcemia postoperatively. In this study the patients' age varied from 21years to 67 years, with average age of 43years. Female patients were more, female: male ratio being 4.66.

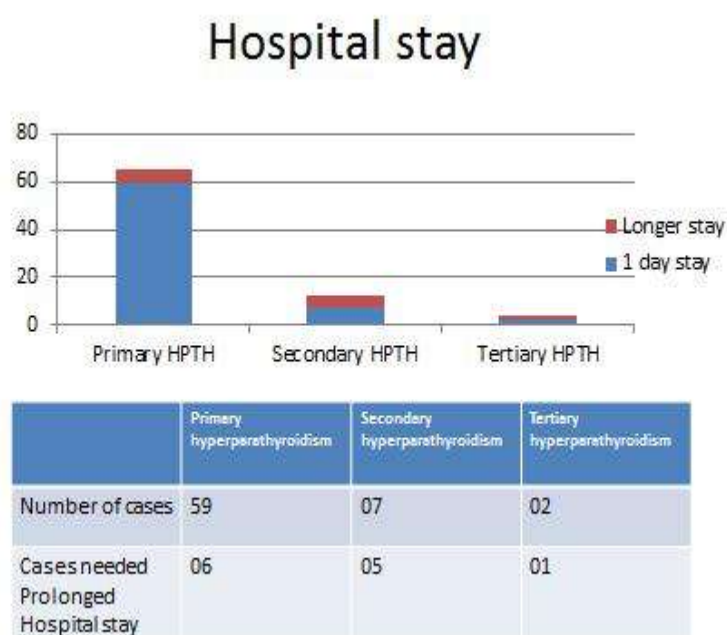


Fig.1 Hospital stay of the patients

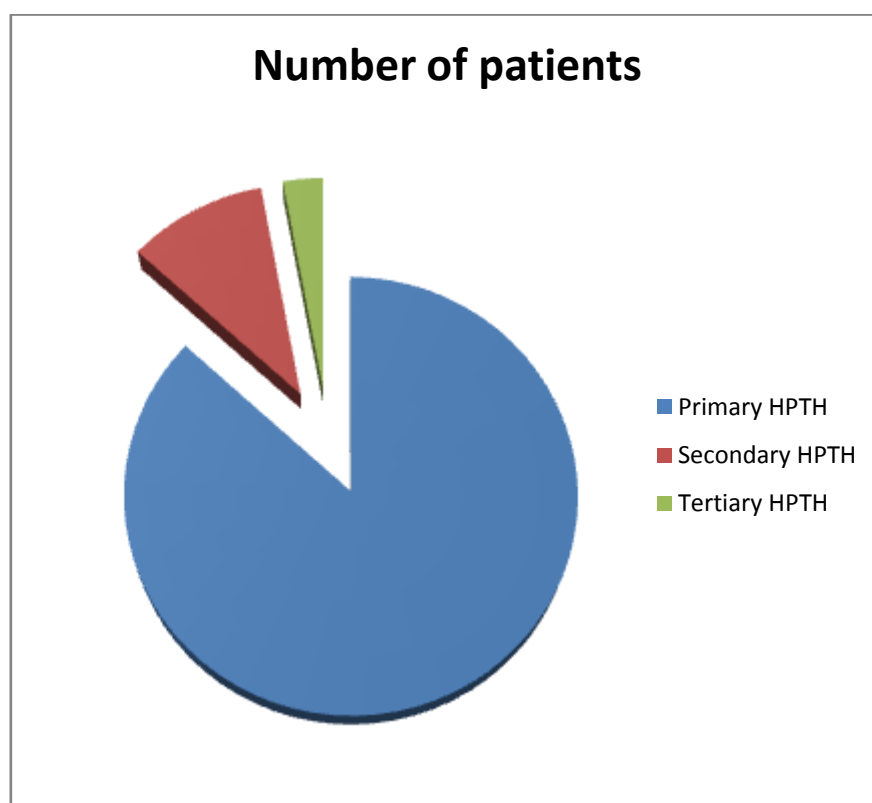


Fig.2 Distribution of patients as per indication of surgery

IV. DISCUSSION

The parathyroid glands are involved in calcium homeostasis. They release parathyroid hormone (PTH) in response to low serum concentrations of ionized calcium, and the release of the hormone is inhibited by an increase in serum ionized calcium. PTH causes the kidneys to increase the tubular resorption of calcium and decrease the resorption of phosphorus.[1] PTH also acts on bone and the intestine to increase serum calcium levels.

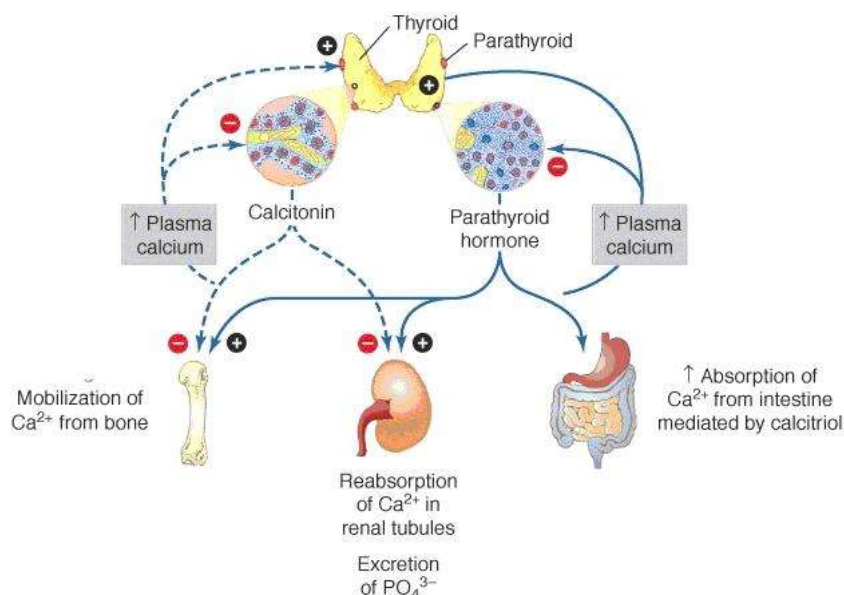


Fig.3 Calcium metabolism

IV.I Hyperparathyroidism- Primary hyperparathyroidism (PHPT) is defined as abnormal hypersecretion of parathyroid hormone (PTH), producing hypercalcemia and hypophosphatemia, even high normal parathyroid hormone levels are considered pathologic in patients with chronic hypercalcemia.

Primary hyperparathyroidism (PHPT) is the most common cause of elevated parathyroid hormone (PTH) and calcium levels. Approximately 85% of cases are found to be caused by an isolated parathyroid adenoma, 15% by diffuse parathyroid hyperplasia, and less than 1% by parathyroid carcinoma. Other causes include neck or mediastinal parathyroid cysts, which are also uncommon. Rarely, primary hyperparathyroidism (PHPT) may be related to multiple endocrine neoplasia (MEN); family history or other endocrine tumor warrants screening for MEN.[2] Localising adenoma: Parathyroid adenomas greater than 3g are called as giant parathyroid adenomas, preferably they are removed via a large collar incision.[3] If present in the superior mediastinum may require a sternotomy.[4] 1-3% of parathyroid glands are found in ectopic locations. The most common ectopic site is in the mediastinum, as many as 25%.[5] The embryological descent of the inferior parathyroid glands accompany the thymus from the third pharyngeal pouch to the lower neck and superior mediastinum. Therefore, ectopic parathyroid gland can be seen from the angle of the jaw to the pericardium.[4] One case study has demonstrated minimally invasive surgery for giant mediastinal parathyroid adenoma, which was performed as a day case surgery.[6]

A prospective cohort study by Vaidya indicated that a connection exists between low physical activity and the development of primary hyperparathyroidism. The study, which included 69,621 females, found that the age-adjusted relative risk of developing primary hyperparathyroidism was reduced by 50% in women in the highest physical activity quintile, compared with women in the lowest quintile. The investigators also found that, compared with participants with high physical activity and high calcium intake, the adjusted relative risk of developing the condition was 2.37-fold greater in women with a combination of low physical activity and low calcium intake.[7]

Secondary hyperparathyroidism (HPT) is a compensatory hyperfunctioning of the parathyroid glands caused by hypocalcemia or peripheral resistance to parathyroid hormone. As opposed to primary hyperparathyroidism (PHPT), treating the underlying cause can reverse secondary hyperparathyroidism (HPT). The most common setting is in a patient with end-organ failure from chronic renal insufficiency, with hypocalcemia and hyperphosphatemia. Advanced age and malnutrition are risk factors for developing secondary hyperparathyroidism in patients with chronic kidney disease. Less commonly, secondary hyperparathyroidism may be caused by calcium malabsorption, osteomalacia, vitamin D deficiency, or deranged

vitamin D metabolism. Tertiary hyperparathyroidism (HPT) occurs in a setting of previous secondary hyperparathyroidism (HPT) in which the glandular hyperfunction and hypersecretion continue despite correction of the underlying abnormality, as in renal transplantation.

Indications for parathyroidectomy-

1. Primary Hyperparathyroidism who are symptomatic
2. Refractory secondary hyperparathyroidism
3. Asymptomatic primary hyperparathyroidism with following:
 - Serum calcium level more than 1.0 mg/dL above the upper limit of normal
 - Marked hypercalciuria (> 400 mg/day) or renal stones
 - Creatinine clearance less than 30% of normal
 - Marked bone density reduction with a T-score lower than 2.5 at any site
 - Age less than 50 years (if the problem is left untreated, many of these younger patients eventually develop complications of primary hyperparathyroidism)
 - A patient who requests surgery or a patient for whom surveillance and follow-up are difficult or impossible.

Surgical procedure involves smaller incision over neck anteriorly. Dissection continues along the thyroid capsule, and the thyroid gland is rotated anteriorly and medially. If a preoperative localization study suggested either a superior or inferior gland, the corresponding area is examined first. The location of the superior parathyroid gland is sought on the posterior and lateral aspect of the thyroid gland. The middle thyroid veins are ligated, and the gland is rotated. The superior gland should be located deep to the plane of the recurrent laryngeal nerve and superior to the intersection of the recurrent laryngeal nerve and the inferior thyroid artery. The superior gland is often within 1 cm of the cricothyroid cartilage articulation. Care should be taken to maintain excellent hemostasis. Preoperative imaging plays a major role to increase surgical success via a minimally invasive approach, a significant reduction in operating time and complications. The imaging used are ultrasonography and Sestamibi scan as first line imaging; computerised tomography(CT) scans, Four dimensional computed tomography(4DCT), Magnetic Resonance Imaging(MRI) and Positron emission tomography and computed tomography(PET-CT) for revision surgeries. USS is a non-invasive, inexpensive outpatient procedure without radiation to the patient, which helps to localise the adenomatous gland in relation to adjacent structures with precision. Technetium99m methoxyisobutylisonitrile(Sestamibi)scan picks up the hyperfunctioning gland, which retains the Technetium longer than the other parathyroids and thyroid gland due to its increased mitochondrial activity.[8] Sestamibi-single photon emission computed tomography(SPECT-MIBI) provides a multi-dimensional higher resolution images with a 92-98% sensitivity compared to 71-79% of using MIBI alone.[9,10]

Complications of Procedure- With parathyroidectomy, as with all surgical procedures, bleeding and infection are potential complications. Because parathyroidectomy is a clean operation and because meticulous homeostasis is crucial to its performance, both of these complications should be rare. There is a risk of injury to the recurrent and superior laryngeal nerves. In difficult cases, where the abnormal gland is not easily found easily, it is important to identify the recurrent laryngeal nerve, both to protect it from injury and to have it available as a landmark during the dissection. Failure to cure the hyperparathyroidism, persistent or recurrent hypercalcemia, and postoperative hypocalcemia are also potential adverse results of parathyroidectomy.

Hungry bone syndrome: Transient hypoparathyroidism after resecting significant amounts of parathyroid glands, which were secreting excess PTH, due to hyperplasia or an adenoma; resulting in high alkaline phosphatase and significant bone demineralisation and rapid rebound recalcification of bones after prolonged hypocalcaemia. Bone hunger is exacerbated by pre-existing renal dysfunction.[11]

V. CONCLUSION

None of the patients had other surgical postoperative complications than hypocalcaemia. Patients with secondary and tertiary HPT needed monitoring of plasma calcium levels postoperatively. Patients with primary HPT did not present with any postoperative complication. Parathyroidectomy can be performed as a day-case surgery, if the adenoma is accurately localised by dual modality imaging. The anatomical findings are reinforced by performing the Sestamibi (MIBI) scan, which is a functional scan. The location of the adenoma was determined anatomically via ultrasonography and functionally via sestamibi scan.[12] There was a 96% concordance between intra-operative location of the adenoma with the pre-operative imaging.

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