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ORIGINAL ARTICLE

Early Bone Pain Relief a Reliable Indicator of Successful Para Thyroidectomy: A Comparative Prospective Study

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ABSTRACT

Aim: To evaluate early bone pain relief as anindicatorof successful Para thyroidectomy in hyperparathyroidism.
Methodology: A prospective, comparative study was conducted at the Department of Surgery, Jinnah Postgraduate Medical Center, between March 2022 and August 2022. All patients with symptoms of hyperparathyroidism, confirmed with increased intact parathyroid hormone and elevated levels of calcium onpresentation were included in the study. Patients were classified as primaryhyperparathyroidism when the MIBI scan detected an adenoma with clinical features ofhypercalcemia and increased PTH whereas, patients were diagnosed with secondaryhyperparathyroidism if patient presented with renal failure, persistently high levels of PTH, as well as hypocalcemia. All patients with primary hyperparathyroidism underwentexcision for adenoma while patients with secondary hyperparathyroidism underwenttotal Para thyroidectomy and auto transplantation. Visual analogue scale was used toassess bone pain at presentation and 12 to 24 hours after procedure, and then six-weeks atfollow-up. Change in symptomatology was observed and compared between the twosets of patients.
Results: A total of fourteen primary hyperparathyroidism cases were observed in ourcenter. 13 patients presented with bone pain and deformity, three of these patients were operated for renal stones, three patients had depressive symptoms. The calcium ranged from 12-15mg/dl with adenoma ranging from 1.0 cm to 4.0 cm.Three cases were diagnosed as secondary hyperparathyroidism, secondary to renal failure. Total Para thyroidectomy was done to remove all four parathyroid glands with subsequent auto transplant. All patients had hypo calcemic signs postoperative, which was relieved after calcium transfusion for two days followed by oral.
Conclusion: In all patients, irrespective of the cause of the hyperparathyroidism, early pain reliefwas correlated with successful parathyroid surgery.
Keywords: Parathyroid, hyperparathyroidism, primary, secondary, PTH, calcium, pain

INTRODUCTION

Hyperparathyroidism, a condition with elevated parathyroid hormone (PTH) levels canoccur as primary hyperparathyroidism, which is either caused by adenoma of one ormore parathyroid glands or hyperplasia of all four parathyroid glands. It can also occur as secondary hyperparathyroidism, which may be due to Vitamin D deficiencyoruremia[1]. Hyperparathyroidism is identified in 1 in every 500 women and 1 in every 2000 menolder than the age of 40[2].

Primary hyperparathyroidism is a clinical condition caused when the parathyroid glandsoverproduce parathyroid hormone.[3] Diagnosable by the presence of hypercalcemiawith an inappropriately normal or elevated level of parathyroid hormone. This clinicalentity is now considered the most common cause of hypercalcemia in the outpatientsetting[4]. Bone pain, fatigue, mood swings are some common symptoms ofhyperparathyroidism. However, more than 90% patients that have been labeled “asymptomatic” have presented with significant symptoms that are likely related tohyperthyroidism since many of its symptoms are nonspecific and cannot be quantified with ease[5].

Secondary hyperparathyroidism is a problem that has often been experienced duringthe management of patients with chronic kidney disease (CKD).

Traditionally, severe bone pain, general weakness, pruritus and extensive soft tissue calcification a resigns for Parathyroidectomy in secondary hyperparathyroidism[6]. An increase in the levels of Parathyroid hormone (PTH) are seen with the progression ofCKD when the eGFR falls to approximately 45 ml/min per 1.73m2. On transition to maintenance dialysis therapy, almost all the patients are seen to have secondary hyperparathyroidism[7].

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Cheng highlighted that the symptom burden of secondary hyperparathyroidism hasaffected patient quality of life negatively and Para thyroidectomy has been associatedwith a noticeable improvement in the symptoms and quality of life[8]. Despite the apparent advances in the field of endocrinology, the treatment of hyperparathyroidism remains a challenge for clinicians[9].

Chou et al revealed that Para thyroidectomy and auto transplantation improved the bonemineral density of secondary hyperparathyroidism. Authors commented that after 7 days of surgery, a decrease in calcium and parathyroid hormone was observed. Furthermore, after six months of operation, BMD increased significantly ($p<0.001$)[10].

Due to limited local research and the dire need of data on management and outcome of hyperparathyroidism post operatively, the current study was undertaken.

The study aimed to evaluate the cases of hyperparathyroidism, both primary and secondary, and assess pain relief as an indicator of recovery.

METHODS AND MATERIALS

A prospective, comparative study was conducted at the Department of Surgery, Jinnah Postgraduate Medical Center, between March 2022 and August 2022. After obtaining the ethical approval from the institutional review board, the data acquisition was initiated. All patients with increased intact parathyroid hormone and elevated levels of calcium onpresentation were included in the study. Patients were classified as primary hyperparathyroidism when the MIBI scan detected an adenoma with clinical features ofhypercalcemia and increased PTH whereas, patients were diagnosed with secondary hyperparathyroidism if patient presented with renal failure, persistently high levels ofPTH, as well as hypocalcemia. Secondary hyperparathyroidism was defined as persistently high PTH level (normal PTH =65 pg/ml)[11].

All patients with primary hyperparathyroidism underwent excision for adenoma while patients with secondary hyperparathyroidism underwent total parathyroidectomy andauto-

transplantation. Visual analogue scale was used to assess bone pain atpresentation and 1-day after procedure, and then six-weeks at follow-up. Change insymptomatology was observed and compared between the two sets of patients.

SPSS was used to analyze the data. All quantitative data were presented with mean and standard deviation including the mean calcium and PTh levels. All categoricalvariables were presented as frequency and proportions.

RESULTS

The mean calcium levels of patients with primary parathyroidectomy was 13.5mg/dL.

Parameter	Primary Hyperparathyroidism (n=14)	Hyperparathyroidism Secondary (n=4)
Calcium mg/dL	13.5	7.5
PTH pg/ml	2650	
Adenoma size (cm)	2.5(1-4)	-
Adenoma		
Yes	14 (100%)	1 (25%)
No	0 (0%)	3 (75%)
Bone pain		
Yes	13 (92.8%)	1 (25%)
No	1 (7.2%)	3 (75%)
Renal stone		
Yes	4 (28.6%)	4 (100%)
No	10 (71.4%)	0 (0%)
Depression		
Yes	4 (28.6%)	0 (0%)
No	10 (71.4%)	4 (100%)
Duration of Hypocalcemia (days)	-	9 (5-14)
Surgery		
Yes	14 (100%)	3 (75%)
No	0 (0%)	1 (25%)

A total of fourteen primary hyperparathyroidism cases were observed in our center. A 30 year old male patient presented with multiple fractures, a history of surgeries forrecurrent kidney stones, who was bedridden on admission. Baseline calcium and parathyroid levels were 13mg/dL and 2650pg/ml. The patient was eventuallydiagnosed as a case of adenoma, subsequently underwent surgical excision. Postoperative PTH levels reduced to 850pg/ml. After seven weeks, the patient was relieved of the bone pain. Thirteen patients presented with bone pain and deformity, three of these patients were operated for renal stones, three patients had depressive symptoms. The calcium ranged from 12-16 with adenoma ranging from 1.0cm to 4.0cm. In all these 13 patients, MIBI scan showed adenoma after which these patients underwent

Three cases were diagnosed as secondary hyperparathyroidism, secondary to renalfailure. Total parathyroidectomy was done to remove all four parathyroid glands with subsequent autotransplant. All patients had hypocalcemic signs, which was relievedaftersurgery.

One patient presented with renal failure, diagnosed with adenoma. However, the patient did not respond to surgery and underwent recurrent surgery for second enlargement of gland on the contralateral side that was missed on imaging. All four glands wereexcised.Bone pain was relievedafter surgery.

DISCUSSION

Silveirae et al. in their study found Para th secondary hyper-parathyroidism[11]. The authors also discussed that in patients diagnosed with renal hyperthyroidism who underwent Para thyroidectomy, using parathyroid hormone during the procedure helped to assume an earlier therapeutic outcome which was both specific and sensitive.

McDow et al in their review discussed hyperparathyroidism to lead to lower quality oflife and also to increase the risk of osteoporosis along with kidney stones and cardiovascular disease[12]. Silverberg et al. in a 10 year study foundhyperparathyroidism patients having high levels of bone mineral density of femoral neckand lumbar spine with improvements in 1 year after surgery.[13] Patients notundergoing surgery were however found by the authors tohave no improvement whatsoever in bone mineral density along with progression of disease (10%). Other studies such as Sekar et al. found that patients could be discharged without givingcalcium supplementation after thyroids as a calcium and PTH based protocol can beefficiently utilized in thesepatients.[14] Dahiya et al. discussed that focused surgeryshould be the main management plan in sporadic Para thyroidectomy even ifintraoperative parathormone is not available after the gland has been localized post surgery to avoid complications due to surgery leading to a low recurrence rate[15]. The authors also saw a decrease in the serum calcium (11.94±1.76mg% to 9.11±0.87mg%) and average PTH (608 ± 673.6 pg/ml to 32.05 pg/ml (IQR 15.71, 54.54) afterfocused Para thyroidectomy which was consistent with our study. Elhenfy et al however looked at early predicting factors of hypocalcemia post total thyroidectomy and while Calcium (9mg/dL to 8.4mg/dL) and Phosphate levels (40.5pg/ml to 25.3pg/ml 2hpostoperatively) were decreased ($p<0.001$), PTH levels were found to be more specificand sensitive to early detection of hypocalcemia[16]. This was similar to an earlier study by Asari et al where the authors found that measuring intact PTH levels alongwith serum Calcium levels within 24 hours of total thyroidectomy helps in predictinghypercalcemiaowing to higher specificity, sensitivity and positive predictive value of intact PTH[17]. However in a study conducted by Yadav et al. the authors could not prove the accuracy of intraoperative parathormone to have any significant effect on the outcome of surgery while comparing conventional surgery with focused surgery;conventional surgery (7.6%) was also seen with more complications as compared tofocused surgery (3.6%) ($p<0.001$)[18].

One limitation of our study is that since it is a rare disease we were not able to findenough cases to compare our study findings with. Further large scale studies arewarranted.

CONCLUSION

In all patients, irrespective of the cause of the hyperparathyroidism, pain relief wascorrelated with recovery from signs and symptoms of illness.

Conflict of interest: Nil

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