

Impact of Parathyroidectomy on Quality of Life and Symptom Relief in Primary Hyperparathyroidism Patients

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Abstract:

Background: Primary hyperparathyroidism is a frequent endocrine disorder with variable clinical manifestation and outcome. This study aimed to evaluate the impact of parathyroidectomy on quality of life and symptom relief in primary hyperparathyroidism patients.

Materials and Methods: A Cross sectional study was conducted in the Head and Neck Surgery Division of the Department of Otolaryngology-Head & Neck Surgery, BSMMU, Shahbag, Dhaka from August 2022 to January 2023. 25 patients undergone parathyroidectomy. Parathyroid function was measured as parathyroid hormone (PTH) level. Baseline levels of PTH, and total calcium (Ca) were evaluated preoperatively and their postoperative levels were measured before skin incision, 10 minutes after parathyroidectomy, 24 hours and 7 days accordingly. The data was calculated in an Excel spreadsheet which was then exported to SPSS 26.0 (Statistical Package for the Social Science) for analysis. The statistical significance was set to $p < 0.05$.

Results: In this series, 3(8.5%), 6 (17.1%) and 2(5.7%) patients presented with osteitis fibrosacystica, nephrolithiasis and neuropsychiatric syndrome respectively. Moreover, 14 (40.0%) patients had muscle weakness, and 18 (51.0%) subjects presented with fatigue. It was observed that preoperative PTH and calcium levels and postoperative calcium levels in SPHPT and ASPHPT were statistically significant. A notable improvement in health-related quality of life was observed with the VAS score rising from 70 (IQR: 50-80) to 80 (IQR: 70-90).

Conclusion: This study provides evidence supporting the enduring advantages of parathyroidectomy in individuals with primary hyperparathyroidism (PHPT). The observed reduction in pre-operative symptoms seems to be a significant factor contributing to the enhanced quality of life (QOL) experienced by these patients over the long term.

Introduction:

Primary hyperparathyroidism (PHPT) is a frequently encountered endocrine disorder characterized by a prevalence ranging from 0.1% to 1%. It exhibits a notable inclination toward affecting females and is strongly associated with the aging process¹. In its milder manifestation, PHPT is often categorized as

asymptomatic, distinguishing it from more severe cases that present with classical bone, renal and neuropsychiatric manifestations. Despite being labeled as asymptomatic, many individuals with relatively mild hypercalcemia may still experience symptoms potentially linked to PHPT. However, the extent to which these symptoms align with

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biochemical markers of severity and their reversibility with surgical intervention remains uncertain². A study suggests that a substantial portion of primary hyperparathyroidism (PHPT) cases may go undiagnosed. The study indicates that only 31% of hypercalcemic patients had their parathyroid hormone (PTH) levels measured, highlighting a potential under-recognition of PHPT in clinical assessments³. In recent times, there has been a growing acknowledgment of the normo-calcemic variant of primary hyperparathyroidism (PHPT). However it is important to note that this aspect falls outside the scope of our current investigation⁴. Elevated levels of parathyroid hormone in primary hyperparathyroidism contribute to bone demineralization, heightening the risk of fractures⁵. Moreover, this condition is characterized by elevated levels of calcium in the urine, indeed escalating the risk of developing kidney and urinary tract stones. The clinical presentation of primary hyperparathyroidism (PHPT) encompasses three distinct phenotypes. These include target organ involvement affecting the renal and skeletal systems, mild asymptomatic hypercalcemia, and more recent recognition of high parathyroid hormone (PTH) levels within consistently normal albumin-corrected and ionized serum calcium values. The prevalence of these phenotypes in a given country can be influenced by several factors. The extent to which biochemical screening is employed, the prevalence of vitamin D deficiency and the routine measurement of PTH levels in the evaluation of low bone density or osteoporosis by medical centers or practitioners can all contribute to the predominance of a particular clinical presentation in a population. Understanding these factors is crucial for tailoring diagnostic and therapeutic approaches to the specific characteristics and needs of individuals with primary hyperparathyroidism⁶. In recent times, surgery has become a more prevalent treatment approach for primary hyperparathyroidism. The advantages of surgical intervention for individuals with symptomatic primary hyperparathyroidism (PHPT) are widely acknowledged. There is a consensus that parathyroidectomy is warranted in patients exhibiting the classic symptoms associated with hyperparathyroidism. However, when individuals do not present with the typical manifestations such as nephrolithiasis (kidney stones) and bone disease, they are often labeled as having “asymptomatic

hyperparathyroidism.” Despite the term “asymptomatic,” there is ongoing debate among authors regarding the appropriate management for these patients, as some argue that intervention may still be beneficial in preventing potential complications and improving overall health outcomes⁷. This study aimed to evaluate the impact of parathyroidectomy on quality of life and symptom relief in primary hyperparathyroidism patients.

Materials and Methods:

This cross-sectional study was carried out in the Head and Neck Surgery division of the Department of Otolaryngology-Head & Neck Surgery and Endocrine Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Shahbag, Dhaka, from July 2022 to June 2023. All cases of primary hyperparathyroidism admitted to the Department of Otolaryngology & Head-Neck Surgery and Endocrine Surgery were considered as the study population. A total of 35 patients were included in this study by purposive sampling technique. A structured data collection sheet was prepared, encompassing all variables of interest. Hyperparathyroidism is defined as any elevated serum PTH above the normal limit (normal range, 15 to 65 pg/mL), regardless of hypercalcemic symptoms. The analysis of different variables was done according to standard statistical analysis. Data was expressed as mean and standard deviation. For statistical analysis, repetitive measure analysis was done. The data was calculated in an Excel spreadsheet which was then exported to SPSS 26.0 (Statistical Package for the Social Science) for analysis. The statistical significance was set to $p < 0.05$. The analyzed data were presented clearly and concisely using tables and charts. Ethical clearance for the study was taken from the Institutional Review Board and the concerned authority, BSMMU. Informed written consent was taken from the participants.

Inclusion criteria:

- All patients having primary hyperparathyroidism
- persistent and recurrent hyperparathyroidism.

Exclusion criteria:

- Patients with secondary hyperparathyroidism
- Patients of tertiary hyperparathyroidism
- Patients of familial hyperparathyroidism

Results:

Table I <i>Age distribution of the study subjects (N=35)</i>		
Age (years)	n	%
25-35	1	2.85
36-46	1	2.85
47-57	3	8.57
58-68	19	54.29
≥69	11	31.42
Mean ±SD	63.10± 15.50	

In this series, the majority of the patients (19, 54.29%) were in the 58 to 68 years age group followed by (11, 31.42%) were in ≥69 years age group. [Table I].

It was observed that the majority (71.0%) of the patients were female. [Figure 4.1]

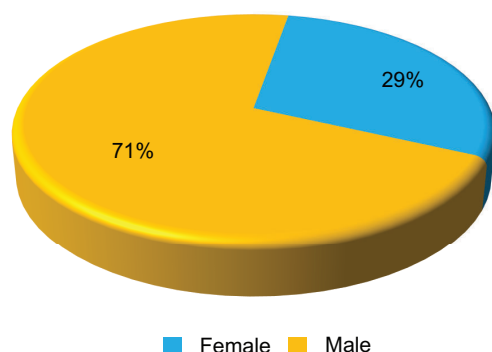


Figure 4.1: Sex distribution of the respondents

Table III <i>Preoperative and postoperative levels of serum calcium and PTH (N=35)</i>			
Levels	SPHPT	ASPHPT	p-value
Preoperative PTH (uIU/ml) ±SD	1110.70± 1058.10	435.98 ± 396.14	< 0.01
Postoperative PTH(uIU/ml) ±SD	31.94 ± 47.55	63.48 ± 192.00	0.031
Preoperative Ca (mmol/L) ±SD	3.12 ± 0.51	2.80 ± 0.38	< 0.01
Postoperative Ca (mmol/L) ±SD	2.42 ± 0.39	2.31 ± 0.23	< 0.01

SPHPT; Symptomatic Primary Hyperparathyroidism, ASPHPT; Asymptomatic Primary Hyperparathyroidism

Table IV <i>Health-related quality of life in patients with PHPT before and after surgery (N=35)</i>			
Parathyroidectomy	VAS score		p-value
	Asymptomatic patients	Symptomatic patients	
Before parathyroidectomy	77	70	<0.01 ^s
After parathyroidectomy	85	72	

S= significant

Table II <i>Distribution of patients according to classical and non-classical manifestations of PHPT (N=35)</i>		
Symptoms	n	%
Classical		
Osteitisfibrosacystica	3	8.5
Nephrolithiasis	6	17.1
Neuropsychiatric syndrome	2	5.7
Non-classical		
Muscle weakness	14	40.0
Fatigue	18	51.0

In this series, 3 (8.5%), 6 (17.1%) and 2 (5.7%) patients presented with osteitis fibrosacystica, nephrolithiasis, and neuropsychiatric syndrome respectively. Moreover, 14 (40.0%) patients had muscle weakness, and 18 (51.0%) subjects presented with fatigue. [Table II]

It was observed that preoperative PTH and calcium levels, and postoperative calcium levels in SPHPT and ASPHPT were statistically significant. [Table III]

A positive shift in health-related quality of life was noted globally as evidenced by a statistically significant increase in the Visual Analog Scale (VAS) score from 70 (interquartile range (IQR): 50-80) to 80 (IQR: 70-90) ($P < 0.001$). Specifically, asymptomatic patients experienced a noteworthy improvement in VAS scores, rising from 77 to 85. This improvement extended across all five domains of quality of life. Furthermore, even the symptomatic group demonstrated a significant enhancement in their VAS scores, suggesting an overall positive impact on their health-related quality of life. [Table IV]

Discussion:

Primary hyperparathyroidism (PHPT) is a prevalent endocrine disorder characterized by elevated blood calcium levels (hypercalcemia) and increased or inappropriately normal parathyroid hormone (PTH) levels. Regular monitoring of calcium and PTH levels along with bone density assessments may be part of the ongoing management plan for individuals with PHPT⁴. Parathyroidectomy (PTX) is the treatment of choice for symptomatic primary hyperparathyroidism (PHPT). This study intended to assess the surgical outcome of parathyroidectomy in PHPT⁸. In this series, the majority of the patients (19, 54.29%) were in the 58 to 68 years age group, followed by (11, 31.42%) ≥ 69 years age group. It was observed that the majority (71.0%) of the patients were female. In a study by Miller, B.S. et al. peak incidence was at age 56–60 years with 61–65 in females and age 56–60 in males⁹. However, the mean age was 41 ± 14 years with a female: male ratio of 2.4:1 according to another study¹⁰. Shah, V.N. et al. also showed a female preponderance in their study which was similar to the present study¹¹. It was observed that the majority (54%) of the study subjects were symptomatic. 46% of the patients did not show clinical symptoms. In the study of Arya, A.K., et al., of the 554 patients, 54 (10%) patients had asymptomatic PHPT¹². Regarding the clinical features, 3 (8.5%), 6 (17.1%), and 2 (5.7%) patients presented with osteitis fibrosa cystica, nephrolithiasis, and neuropsychiatric syndrome respectively. Moreover, 14 (40.0%) patients had muscle weakness, and 18 (51.0%) subjects presented with fatigue. These features were found similar to multiple studies^{12–14}. It was observed that preoperative PTH and calcium levels, and postoperative calcium levels in SPHPT and ASPHPT were statistically significant in the present study. The preoperative and postoperative biochemical values were similar to the study of Yu, Q. et al.¹⁵. The cure rate of PHPT was 96.63% in the study of Yu Q et al. Moreover, they also observed that the recurrence rate of PHPT was 1.12%, and the incidence of temporary hypocalcemia was 13.48%, which was somewhat similar to the current study (Yu, Q. et al. 2019). A positive shift in health-related quality of life was noted globally, as evidenced by a statistically significant increase in the Visual Analog Scale (VAS) score from 70 (interquartile range (IQR): 50–80) to 80 (IQR: 70–90) ($P < 0.001$). Specifically, asymptomatic patients experienced a noteworthy improvement in VAS scores, rising from 77 to 85. This

improvement extended across all five domains of quality of life. Furthermore, even the symptomatic group demonstrated a significant enhancement in their VAS scores, suggesting an overall positive impact on their health-related quality of life and coincides with the findings of Vadhwan, B. et al¹⁶. These findings underscore the effectiveness of the intervention or treatment in promoting a substantial and widespread improvement in subjective assessments of well-being, both for those initially asymptomatic and those presenting with symptoms.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion:

This study provides evidence supporting the advantages of parathyroidectomy in individuals with primary hyperparathyroidism (PHPT). The observed reduction in pre-operative symptoms seems to be a significant factor contributing to the increased quality of life (QOL) experienced by these patients over the long term.

Recommendation:

Favorable outcomes can be attained by relocating parathyroid surgery cases from low-volume settings. Complex procedures, such as those involving primary hyperparathyroidism without clear preoperative localization, hereditary variants, pediatric patients, and reoperations, are recommended to perform in high-volume settings.

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