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Original Article

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Comparison of frequency of Hypoparathyroidism in Total Thyroidectomy (TT) versus Near-Total Thyroidectomy (NTT) patients

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ABSTRACT

BACKGROUND & OBJECTIVE: Hypoparathyroidism in total thyroidectomy and near-total thyroidectomy is debatable. This study will determine the procedure of choice. Our objective is to compare the frequency of hypoparathyroidism in total thyroidectomy versus near-total thyroidectomy patients.

METHODOLOGY: A prospective observational study was conducted at the Department of Surgery, Allied Hospital, Faisalabad. The study duration was six months. A total of 140 patients having multinodular goiter, 30-70 years of age, were selected. Patients were divided into two groups. In group A; patients underwent total thyroidectomy while in group B; patients were offered near-total thyroidectomy. All the parathyroid glands were preserved. In all patients, serum calcium levels and parathyroid hormone (PTH) levels were checked on 1st & the 2nd day after surgery.

RESULTS: Mean age in group A was 48.06±8.21 years & in group B was 48.83±7.0 years. The majority of patients, 88 (62.86%) were between 30 to 50 years of age. Out of these 140 patients, 37 (26.43%) were males & 103 (73.57%) were females, with the ratio of 1:2.8. Mean pre-operative serum Parathyroid hormone was 25.67±9.87 pg/mL. The mean post-operative serum Parathyroid hormone was 16.87±2.43 pg/mL. Mean pre-operative serum calcium levels were 11.32 ± 4.52 mg/dl and mean post-operative serum calcium levels were 9.4±0.45mg/dl. In this study, the frequency of Hypoparathyroidism in the total thyroidectomy group (28.57%) was significantly higher than near-total thyroidectomy (8.57%) (p=0.002).

CONCLUSION: Hypoparathyroidism is more common after total thyroidectomy as compared to near-total thyroidectomy.

KEYWORDS: Thyroidectomy, Hypoparathyroidism, Parathyroid glands.

INTRODUCTION

Iatrogenic damage to parathyroid glands usually results from total or near-total thyroidectomy [1]. Serum PTH immediately after surgery is an accurate way of knowing parathyroid gland function and the risk of hypocalcemia[2]. If, after surgery, PTH is less, then calcium & vitamin D administration reduces the incidence of hypocalcemia symptoms.

Patients are considered euparathyroid if PTH levels are 10 pg/ml in the absence of hypocalcemic symptoms. Low PTH presents with signs and symptoms of hypocalcemia, like perioral paresthesia, muscle cramps, carpopedal spasm, laryngospasm, bronchospasm, or tetany. Postoperative hypoparathyroidism is labelled as permanent at different time points. Some consider it to be permanent if recovery does not occur in 6 months, while others at one year post-operatively[3]. Post-operative hypocalcemia after thyroid surgery is well documented in the literature. The reported incidence ranged from (0.3%–66.2%) [4]. This variation is due to the fact that different thyroid procedures are offered. Some include total thyroidectomy, while others involve thyroid lobectomy (less chance of hypocalcemia). Such reporting underestimates hypocalcemia incidence and leads to misinterpretation.

The rationale of the research was to compare post-operative hypoparathyroidism incidence in patients undergoing total thyroidectomy with those who underwent near-total thyroidectomy. Low post-operative PTH levels lead to

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complications like hypocalcemia and hypoparathyroidism, which can increase the length of hospital stay, time of recovery, and associated morbidity. This study will also help in determining the type of surgery that is associated with less postoperative hypocalcemia and hypoparathyroidism.

We hypothesized that hypoparathyroidism is more frequent in patients who underwent total thyroidectomy as compared to near-total thyroidectomy.

METHODOLOGY

A simple observational study was conducted at the department of surgery, Allied hospital, Faisalabad. The study duration was six months (from 29-11-2019). The total number of patients calculated was 140 by using the WHO sample size calculator. Expected prevalence of hypoparathyriodism in total thyroidectomy is 26%, while in near-total thyroidectomy, the expected value is 9.8%. At the significance level of 5%, power of the test is 80%. The sampling technique was non-random, consecutive sampling. All patients of either gender having benign, diffuse or multinodular euthyroid goiter were included in the study. Patients with hypercalcemia/hypocalcemia or hypoparathyroidism/ hyperparathyroidism due to any other reason (pre-operatively), recurrent thyroid lesions, pre-operative suspicion of malignancy and patients with a history of neck exposure to radiations were excluded from the study.

After taking approval by the ethical review committee (ERC/955) and informed consent, patients fulfilling inclusion criteria were enrolled in the study and divided into two groups, A & B. Pre-operative Evaluation of patients was carried out by history, physical examination & investigations, which included serum PTH & calcium levels, thyroid function tests, and thyroid Ultrasonography. Patients were assessed by the anesthetist for the fitness. Euthyroid status was confirmed, and surgery was planned under general anesthesia. Group A: patients in this group underwent total thyroidectomy (TT). Group B: patients in this group were subjected to near-total thyroidectomy (NTT). Parathyroid glands were preserved in both groups. Post-operative blood serum calcium levels and PTH levels were checked on the 1st & the 2nd day after surgery. Data entered on Performa.

A. Total thyroidectomy (TT) is surgery of thyroid gland in which the whole of the thyroid gland is removed.

B. Near-total thyroidectomy (NTT) is an operation that involves the removal of both thyroid lobes except for a small amount of throid tissue (approximately 2gm) on each side.

C. Hypoparathyroidism: the normal parathyroid hormone level ranges from (10–72) pg/ml. Low PTH was defined as a PTH measurement <10pg/ml done within 24 hours after surgery.

D. Hypocalcemia: it is defined as low ionized serum calcium levels (less than 8.0 mg/dl). Normal range is 8.0 to 10.3 mg/dl.

The data was analyzed using SPSS version 20. Frequency & percentage were calculated for qualitative variables, including gender and the presence of hypoparathyroidism. For the quantitative variables like pre & post-operative serum parathyroid hormone, serum calcium level, and mean ± SD were calculated. Chi-square and Fisher's Exact test were applied to compare hypoparathyroidism in both groups ($p \leq 0.05$ was considered significant).

RESULTS

The age range of our patients was from 30-70 years, with a mean age of 48.44±7.63 years. The mean age in group A was 48.06±8.21 years & in group, B was 48.83±7.0 years. The majority, 88 (62.86%) were between 30-50 years of age, as shown in (table-I.) Out of these 140 patients, 37(26.43%) were males, and 103(73.57%) were females, with male to female ratio of 1:2.8.

Mean pre-operative serum Parathyroid hormone levels were 25.67±9.87 pg/mL. Mean post-operative serum Parathyroid hormone levels were 16.87±2.43 pg/mL. Mean serum calcium levels were 11.32±4.52 mg/dl (table-II).

Stratification of hypoparathyroidism with respect to age and gender is shown in table-III.

In this study, the frequency of hypoparathyroidism in the total thyroidectomy group (28.57%) was significantly higher than in near-total thyroidectomy (8.57%) ($p=0.002$), as shown in table-IV.

Table-I: Distribution of age.

Age	Group-A (n=70) n(%)	Group-B (n=70) n(%)	Total (n=140) n(%)
30-50	40(57.14%)	48(68.57)	88(62.86)
51-70	30(42.86)	22(31.43)	52(37.14)

Table-II: Pre-operative and postoperative levels of serum of PTH and Calcium.

Variables	Pre-operative (n=70)	Postoperative (n=70)
Parathyroid hormone pg/mL	25.67 ± 9.87	16.87±2.43
Calcium mg/dl	11.32 ± 4.52	9.4 ± 0.45

DISCUSSION

Surgical management of benign multinodular diseases remained under discussion over the years especially to decide whether total thyroidectomy or near-total thyroidectomy is a gold standard option. By leaving a wafer of tissue, the idea is to avoid injury to the parathyroid gland and its blood supply to avoid hypoparathyroidism.

Hypoparathyroidism presents with signs and symptoms of hypocalcemia. Hypocalcemia after thyroid surgery is common and frequently occurs after major thyroid surgery [5]. It might be due to iatrogenic damage of parathyroid glands and may result in temporary or permanent hypoparathyroidism [6]. When hypocalcemia is symptomatic, calcium and vitamin D supplements are helpful [7], but patients with worse symptoms may be needed, hospitalization which leads to an increase in the cost of health care [8].

In this study, the frequency of hypoparathyroidism in the total thyroidectomy group (28.57%) was significantly higher than in the near-total thyroidectomy (8.57%)

Table-III: Stratification of Hypoparathyroidism with respect to age and gender in study groups.

Variable		Group-A (n=70) Hypoparathyroidism		χ^2 p-value	Group-B (n=70) Hypoparathyroidism		Fisher Exact p-value
		Yes	No		Yes	No	
Age of patient (years)	30-50	14	26	0.169	05	43	0.657
	51-70	06	24		01	21	
Gender	Male	10	09	0.007	02	16	0.643
	Female	10	41		04	48	

p≤0.05 is considered statistically significant.

Table-IV: Comparison of frequency of hypoparathyroidism in study groups.

Age	Group-A (n=70) n(%)	Group-B (n=70) n(%)	Total (n=140) n(%)
30-50	40(57.14%)	48(68.57)	88(62.86)
51-70	30(42.86)	22(31.43)	52(37.14)

p≤0.05 is considered statistically significant.

(p=0.002). Another study reported the incidence of transient hypoparathyroidism in the TT group (26%) was significantly higher than in near-total thyroidectomy 9.8% (p<0.001) [9]. This is in accordance with the results of our study. Another study reported a lower incidence of hypoparathyroidism in near-total thyroidectomy in comparison with total thyroidectomy [10], again favouring the result of our study.

A study conducted in Pakistan reported that among the patients who underwent total thyroidectomy (47.5%) developed hypocalcemia due to hypoparathyroidism [11]. Another study described no significant disparity in PTH levels in patients during thyroidectomy procedures when compared to the early post-operative period [12]. This is in contrast to the results of our study.

In another study, hypocalcemia and hypoparathyroidism were assessed in patients (n=1071) who underwent total or subtotal thyroidectomy. They found (5.4%) post-operative hypocalcemia in total thyroidectomy patients (n=58). They found severe symptoms in 40 patients out of 58 having symptomatic hypocalcemia [13]. These results are in favour of our study.

In another prospective study [14], the incidence of hypoparathyroidism was found to be (28.8 %, 757 out of 2631 patients) in total thyroidectomy patients. In this study, transient hypocalcemia was more common (27.9)% compared to permanent (0.9 %). This again favours our study. In another study, significant hypocalcemia (23.6%) was found after total thyroidectomy [15]. Here surgery was performed for Graves'disease and Hashimoto'thyroiditis. Although the symptoms of hypocalcemia were delayed, the p-value was significant, 0.001 and 0.003, respectively. Here extensive dissection for fear of recurrence is a suspected reason for damage to parathyroid gland or its blood supply, resulting in hypoparathyroidism .

Sakouti et al, also described significant hypocalcemia after total thyroidectomy for malignancies of the thyroid, especially when combined with radical neck dissection [16]. This is in agreement with the results of our study. Another study favors our results where the author performed total thyroidectomy for benign conditions and found more hypoparathyroidism even in the management of benign diseases [17].

In another study where total thyroidectomy was done for benign conditions like toxic goiters, the incidence of hypocalcemia was found to be (26.8%) after total thyroidectomy. Again, extensive dissection to reduce disease recurrence was attributed to the development of hypoparathyroidism, leading to hypocalcemia [18]. Hypoparathyroidism was declared a major concern in the study by Baloch N et al. in total thyroidectomy patients, they observed (7%) hypocalcemia [19].

For malignant conditions where the radical procedure is mandatory, hypocalcemia is not considered inevitable. The best policy is to identify and save all four parathyroid glands along with their blood supply to avoid hypoparathyroidism and low calcium levels [20]. Nevertheless, if there is damage to the parathyroid gland, auto-transplant is advocated. In different studies for radical procedures involving thyroidectomy, auto-transplant is advised as a preventive measure to avoid hypocalcemia and hypoparathyroidism [21]. From our study and literature review, it is evident that more chances of developing hypoparathyroidism are related to more extensive surgery, including total thyroidectomy for benign, toxic conditions and radical thyroidectomy with or without neck dissection for malignant conditions. If the procedure is restricted to near-total thyroidectomy at least for the management of benign conditions, hypoparathyroidism can be avoided

CONCLUSION

The study concluded that hypoparathyroidism is more frequent in patients of total thyroidectomy (TT) group A, as compared to the patients of near-total thyroidectomy (NTT) in group B. So, our hypothesis of hypoparathyroidism is more frequent in patients who underwent total thyroidectomy as compared to near-total thyroidectomy stands true.

RECOMMENDATIONS: In light of the above discussion and keeping in view the morbidly and agony of hypoparathyroidism in addition to the burden of cost, it is recommended that near-total thyroidectomy be agreed upon in benign lesions.

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Author's Contribution:

Sajid Rehman Randhawa: Substantial contributions to the conception or design of the work.
Muhammad Saleem Iqbal: Acquisition, analysis, or interpretation of data for the work.
Tayyaba Fatima: Drafting the work or revising it critically for important intellectual content.
Iqra Khalid: Final approval of the version to be published.
Muhammad Sajid Sheikh: Analysis, and interpretation of data for the work.

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