

Original Research Article

EVALUATION OF HYPOCALCEMIA FOLLOWING TOTAL THYROIDECTOMY IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Post-thyroidectomy hypocalcemia is the most common complication following total thyroidectomy, leading to prolonged hospitalization and increased morbidity. Early identification of patients at risk is essential for timely management and improved postoperative outcomes. The objective is to evaluate the incidence of hypocalcemia following total thyroidectomy and assess perioperative serum calcium changes among patients undergoing surgery for benign and malignant thyroid disorders.

Materials and Methods: This single-center observational study included 100 patients who underwent total thyroidectomy between June 2024 and February 2026. Demographic data, surgical indications, and preoperative and postoperative serum calcium levels (measured within 24–48 hours after surgery) were recorded. Postoperative hypocalcemia was identified based on biochemical findings requiring calcium and vitamin D supplementation.

Results: Of the 100 patients, 88% were female and the mean age was 44.4 ± 12.1 years. The most common indication for surgery was multinodular goitre (46%), followed by solitary nodular goitre (41%), papillary thyroid carcinoma (11%), and follicular neoplasm (2%). The mean preoperative serum calcium level decreased from 9.50 ± 0.47 mg/dL to 8.92 ± 0.88 mg/dL postoperatively. Postoperative hypocalcemia occurred in 20% of patients, while 80% maintained normal calcium levels. Patients who developed hypocalcemia required calcium and active vitamin D supplementation for successful recovery.

Conclusion: Hypocalcemia is a frequent early complication after total thyroidectomy, with an incidence of 20% in this study. Routine postoperative calcium monitoring and early supplementation, particularly in high-risk patients, can facilitate prompt management, reduce complications, and improve postoperative recovery.

Keywords: Total Thyroidectomy, Hypocalcemia.

INTRODUCTION

Total thyroidectomy is a definitive and widely utilized surgical treatment for managing an array of benign and malignant thyroid conditions, such as multinodular goitre, solitary nodular goitre, and thyroid malignancies. Despite technical advancements—including meticulous capsular dissection and enhanced intraoperative visualization tools postoperative hypocalcemia continues to be the single most frequent complication following this procedure. The underlying pathophysiology primarily involves mechanical trauma, accidental

excision, or progressive devascularization of the fragile parathyroid glands during central neck or thyroid bed dissection. Acute postoperative hypocalcemia severely prolongs hospital stays, inflates healthcare costs, and introduces significant clinical anxiety due to the risk of neuromuscular complications ranging from mild perioral paresthesia to severe, acute tetany. As highlighted in global endocrine literature identifying the incidence and predictors of this complication is essential for improving patient outcomes. In the Indian clinical landscape, this surgical complication is heavily compounded by a widely documented, high baseline

prevalence of subclinical Vitamin D deficiency. This systemic deficiency often causes unpredictable and steep drops in postoperative calcium parameters, making early tracking protocols vital. The objective of this study is to evaluate the clinical baseline, indications, and biochemical trends of hypocalcemia following total thyroidectomy within an Indian clinical cohort, establishing reliable patterns to optimize postoperative care.^[1-15]

MATERIALS AND METHODS

Study Design and Setting: This institutional, single-center observational study prospectively and retrospectively evaluated a continuous cohort of 100 patients who underwent total thyroidectomy at our tertiary healthcare center between June 2024 and February 2026. **Participants & Selection Criteria:** All adult male and female patients scheduled for primary or completion total thyroidectomy for either benign or malignant indications were included. Patients with a prior history of hypercalcemia, pre-existing parathyroid disease, chronic renal failure, baseline severe hepatic or bone abnormalities, or those taking routine calcium supplements prior to surgery were excluded.

Data Collection: For each patient, demographic variables (age and sex) and primary clinical/histopathological indications were systematically recorded. Preoperative serum calcium levels were measured at baseline prior to surgery. Early postoperative serum calcium levels were measured within the standard 24-to-48-hour postoperative window.

Surgical Protocol: All patients underwent a standard total thyroidectomy under general anesthesia. Parathyroid glands were meticulously identified in situ, and capsular dissection was prioritized to protect the glandular blood supply. **Biochemical Definitions:** Postoperative hypocalcemia was defined as a significant drop in (such as patient age and pre- and postoperative serum calcium values) are expressed as Mean $\pm$ Standard Deviation. Categorical and nominal variables (such as sex distribution, primary surgical indications, and hypocalcemia positivity rates) are presented as absolute frequencies and percentages.

RESULTS

Baseline Demographic and Clinical Characteristics A total of 100 patients who underwent total thyroidectomy were evaluated in this study. The baseline demographic data and surgical indications are detailed below: **Gender Distribution:** The study population showed a heavy female predominance, with 88% female (n=88) and 12% male (n=12). This represents a female-to-male ratio of 7.3:1. **Age:** The mean age of the overall cohort was 44.4 $\pm$ 12.1 years spanning a wide age distribution from a minimum of 15 years to a maximum of 75 years. **Surgical Indications:** The primary clinical and

histopathological diagnoses requiring total surgical resection were: Multinodular Goitre (MNG): 46% (n = 46) Solitary Nodular Goitre (SNG): 41% (n = 41) Papillary Thyroid Carcinoma (PTC): 11% (n = 11) Follicular Neoplasm / Thyroid Neoplasm Bethesda II: 2% (n = 2) **Perioperative Serum Calcium Trends** The absolute total serum calcium concentrations were tracked systematically from the preoperative baseline into the early postoperative period (24 to 48 hours): The global mean baseline preoperative serum calcium for the cohort was 9.50 $\pm$ 0.47 mg/dL. Following total surgical excision, the global mean postoperative serum calcium experienced a statistically noticeable shift downward to 8.92 $\pm$ 0.88 mg/dL. **Incidence of Postoperative Hypocalcemia** Using the clinical framework established for this study, 20% (n=20) of the patients developed significant postoperative hypocalcemia or clinical drops that mandated therapeutic intervention with oral/intravenous calcium and active Vitamin D supplementation. The remaining 80% (n = 80) of patients successfully maintained stable calcium homeostasis. Among the hypocalcemic subset (n = 20), acute total serum calcium drops frequently crossed below 8.0 mg/dl with severe biochemical presentations reaching values low as 7.0 to 7.4mg/dl (eg. In cases presenting with symptomatic goitre and carcinomas).

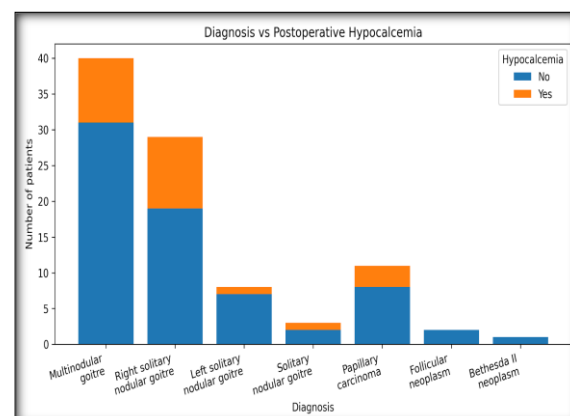
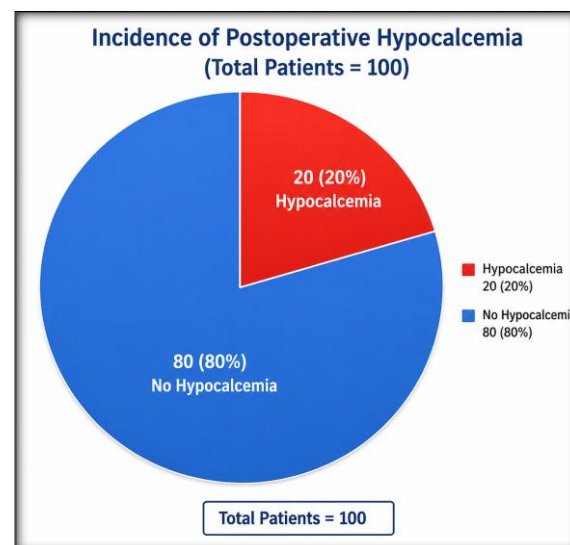


Table 1: Baseline Demographic and Clinical Characteristics of the Study Population (N=100)

Properties	Category	Number (n)	Percentage (%)
Gender	Female	88	88.0%
	Male	12	12.0%
Age Groups (Years)	< 40	37	37.0%
	41 - 60	51	51.0%
	> 60	12	12.0%
Type of Surgery	Total Thyroidectomy	100	100.0%
Primary Indication	Multinodular Goitre (MNG)	46	46.0%
	Solitary Nodular Goitre (SNG)	41	41.0%
	Papillary Thyroid Carcinoma (PTC)	11	11.0%
	Follicular Neoplasm / Bethesda II	2	2.0%

Table 2: Perioperative Serum Calcium Profiles and Hypocalcemia Incidence

Biochemical Parameter	Outcome Criteria	Value / Incidence
Mean Preoperative Calcium	Baseline Cohort Value	9.50±0.47 { mg/dL }
Mean Postoperative Calcium	24–48 Hours Post-Surgery	8.92±0.88 { mg/dL }
Postoperative Hypocalcemia Status	Positive (n)	22 (22.0%)
	Negative (n)	78 (78.0%)
Total Enrolled	Total Study Population	100 (100.0%)

DISCUSSION

The findings of this study confirm that postoperative hypocalcemia remains a prominent and significant complication following total thyroidectomy, occurring in 20% of our patient population. Evaluating this incidence against global trends and established cohorts is essential to optimize institution-specific preventive screening and management protocols. The outcomes demonstrate that the type of surgery plays a decisive role in the severity and rate of calcium decline. In their cohort, total thyroidectomy was significantly associated with a higher incidence of hypocalcemia compared to more conservative procedures ($p = 0.021$ at 24 hours). Specifically, their data revealed a total thyroidectomy hypocalcemia rate of 53.4% ($n = 62/116$) at 24 hours, escalating further to 64.7% ($n = 75/116$) at 48 hours. While our noted incidence of 20% is lower, the descending trend of serum calcium following total glandular excision remains a shared clinical characteristic between both cohorts.^[16-20]

Demographic risk profiles also show noteworthy correlations. In our study, 88% of the patients were female, highlighting a female gender is widely recognized in the literature as a notable risk factor for postoperative hypocalcemia. This increased susceptibility is frequently attributed to the higher biological prevalence of baseline Vitamin D deficiency and differences in calcium homeostasis among female patients. Age (particularly > 60 years or prolonged surgical durations (exceeding 120 minutes) can compound parathyroid stun and elevate hypocalcemia risk, the primary reference study found no statistically significant correlation between surgical duration and calcium drops ($p = 0.41$ at 24 hours; $p = 0.45$ at 48 hours)^[21,22]

The clinical value of these comparisons for an ICMR framework lies in establishing cost-effective, localized screening practices. While international cohorts report highly variable rates of transient hypocalcemia often heavily influenced by regional surgical volumes, variations in parathyroid auto-

transplantation techniques, and baseline population health—monitoring the perioperative calcium delta serves as an accessible surrogate marker. Recognizing that more than one in five patients undergoing total thyroidectomy will experience a notable drop allows our institution to implement early oral calcium and active Vitamin D supplementation. This targeted approach effectively prevents the development of acute neuromuscular symptoms, ensures smoother post-surgical recovery, and safely reduces the overall duration of hospital stays.^[23-25]

CONCLUSION

In conclusion, this study demonstrates that postoperative hypocalcemia is a frequent and clinically significant complication following total thyroidectomy, affecting 20% of the evaluated cohort within the first 24 to 48 hours post-surgery. The systemic metabolic shift observed—characterized by definitive reduction in mean serum calcium levels from a baseline of 9.50 ± 0.47 mg/dl down to 8.92 ± 0.88 mg/dl—underlines the importance of structured early monitoring following total glandular excision. The physiological reality of undergoing a full total thyroidectomy, coupled with a notable female predominance (88% of our study cohort), emerges as the primary driver behind early drop patterns in serum calcium concentrations. These variables should be heavily weighted by clinicians when planning postoperative prevention and tracking protocols. To build upon these results, further comprehensive studies featuring larger multi-center cohorts, expanded biochemical analysis (including perioperative parathyroid hormone and magnesium screening), and long-term follow-up are strongly recommended to refine institutional guidelines. The study strongly advise that female patients undergoing total thyroidectomy should be systematically and proactively prioritized for post-surgical hypocalcemia testing and early calcium supplementation to optimize clinical recovery

pathways and prevent acute neuromuscular symptoms.

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