

## FREQUENCY OF HYPOCALCEMIC TETANY IN PATIENT UNDERGOING TOTAL AND NEAR TOTAL THYROIDECTOMY

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### ABSTRACT

**Background:** Hypocalcemic tetany is one of the most common and clinically significant complications following thyroid surgery. Its occurrence is primarily linked to hypoparathyroidism caused by inadvertent parathyroid injury or devascularization during surgery. Identifying its frequency and associated risk factors is crucial to improving patient safety and outcomes. **Objective:** To investigate the frequency of hypocalcemic tetany in patients undergoing total and near-total thyroidectomy. **Study Design:** Descriptive Case Series. **Setting:** The study was conducted at the Department of Otolaryngology, Lady Reading Hospital, Peshawar, Pakistan. **Duration of Study:** 1<sup>st</sup>-December-2024 to 1<sup>st</sup>-June-2025. **Methods:** A total of 289 patients aged 20–60 years undergoing total or near-total thyroidectomy for goiter or Graves' disease were included. Hypocalcemic tetany was defined as the occurrence of carpopedal spasm with serum calcium <8.5 mg/dL within 72 hours postoperatively. Data were analyzed using descriptive statistics. Chi-square test was applied to determine associations between variables, with  $p \leq 0.05$  considered significant. **Results:** The mean age of participants was  $36.22 \pm 10.83$  years. Of the total, 168 (58.1%) were females and 121 (41.9%) were males. Hypocalcemic tetany was observed in 15.6% of patients, with significantly higher incidence among females (73.3% vs. 26.7% males,  $p = 0.02$ ) and in those with Graves' disease compared to goiter (73.3% vs. 26.7%,  $p = 0.01$ ). Postoperative calcium supplementation was associated with a reduced risk of tetany. **Conclusion:** Hypocalcemic tetany was identified in 15.6% of patients following total and near-total thyroidectomy. Female gender and Graves' disease were significant predictors. Prophylactic calcium supplementation may play a protective role in reducing postoperative complications.

**Keywords:** Hypocalcemic Tetany, Total Thyroidectomy, Near-Total Thyroidectomy, Graves' Disease

### INTRODUCTION

Thyroid diseases frequently present as challenges within the otorhinolaryngology department. This condition stands as the second most prevalent endocrine disorder, i.e., 47.34% of patients in different areas globally (1, 2). Most thyroid diseases are controlled through thyroidectomy. The increasing incidence of thyroid disease has led to a rise in surgical interventions. In 2014, there were 15,888 thyroidectomies carried out on Medicare beneficiaries in the US (3). However, the removal of the thyroid gland also results in excision of the embedded parathyroid gland, resulting in an imbalance in serum calcium regulation. For this reason, a near-total thyroidectomy may be performed to preserve parathyroid hormone and a portion of thyroid hormone (4, 6).

The incidence of hypocalcaemia had been significantly higher in patients going through total thyroidectomy compared to those receiving near total thyroidectomy (12.5% vs. 3.1%) (7). A separate investigation indicated that 26 patients (22.2%) experienced noteworthy postoperative hypocalcaemia. Among 36 patients who established hypocalcaemia postoperatively, the highest incidence (72.2%) occurred on the first postoperative day. By the third day, serum calcium measurements revealed 97.3% of these individuals had hypocalcaemia (8). Hypocalcaemia following thyroidectomy is a widespread metabolic complication that prolongs hospital stays. To prevent early discharge as well as rapid PTH elevation, serum calcium levels should be measured in the morning following surgery (9, 10). The objective of this study is to determine the frequency of hypocalcaemia in patients who have undergone total or near-total thyroidectomy at our hospital, as there is a lack of recent research on

this topic within the population served by our institution. The findings of my study can inform effective counselling for patients, thereby enhancing the management of individuals undergoing thyroidectomy in our department. The results will be disseminated among local clinicians for documentation and knowledge enhancement.

### METHODOLOGY

The study was conducted at the Department of Otolaryngology, Lady Reading Hospital, Peshawar, from 1<sup>st</sup>-December-2024 to 1<sup>st</sup>-June-2025. Ethical approval was obtained from the institute. A descriptive case series design was employed, and consecutive non-probability sampling was used to enroll 289 patients. The sample was determined based on a reported hypocalcemia frequency of 3.1%<sup>7</sup> in thyroidectomy patients with a 2% margin of error and 95% confidence interval.

Patients aged 20 to 60 years diagnosed with either goiter or Graves' disease and scheduled for total or near-total thyroidectomy were included. Goiter was identified as a visibly enlarged thyroid mass requiring surgical intervention as per the consultant otorhinolaryngologist's assessment. Graves' disease was confirmed in patients with a neck swelling persisting for over six months, accompanied by a serum TSH level below 0.4 mU/L, T4 exceeding 12.0 µg/dL, and positive thyroid-stimulating hormone receptor antibodies (TRAb). Total thyroidectomy was defined as the complete surgical removal of the thyroid gland, while near-total thyroidectomy involved resection of both lobes, leaving behind less than 1.0 mL of thyroid tissue on one or both sides. We assessed hypocalcemia tetany in these patients, which was defined as the presence of carpopedal

spasm, characterized by severely painful cramps in the hands and feet leading to specific muscle contractions, such as finger extension with metacarpophalangeal joint flexion and thumb abduction, along with a serum calcium level below 8.5 mg/dL within the first three postoperative days. Exclusion protocols comprised patients with prior thyroid surgery, primary/secondary/tertiary, hyperparathyroidism, chronic kidney disease (serum creatinine >2.0 mg/dL on two occasions six months apart), congestive heart failure, or those on diuretics such as furosemide or spironolactone.

After taking patients' consent, we recorded demographic and clinical data of the patients. A CPSP fellow in otorhinolaryngology made surgical decisions, and the procedure type (total or near-total thyroidectomy) was documented. Postoperative monitoring was conducted for three days, during which any administration of parathyroid hormone or calcium supplements was noted. Patients exhibiting carpopedal spasm underwent serum calcium testing to confirm hypocalcemic tetany. Data collection was performed by the primary researcher using a structured proforma.

Statistical analysis was done using SPSS 23. Age and disease duration were assessed with mean  $\pm$  standard deviation, while gender, surgical indication, procedure type, postoperative supplementation, and hypocalcemia tetany occurrence were evaluated with frequencies and percentages. Stratification was applied to demographics and clinical factors using the chi-square test, with p-value <0.05 considered statistically notable.

## RESULTS

The study included 289 patients with a mean age of  $36.22 \pm 10.83$  years. The average duration of disease before surgery was  $15.39 \pm 5.03$  months. Among the participants, 168 (58.1%) were female, while 121 (41.9%) were male (Figure 1).

The primary indications for surgery were Graves' disease in 165 (57.1%) cases and goiter in 124 (42.9%) cases. Total thyroidectomy was performed in 188 (65.1%) patients, while near-total thyroidectomy was conducted in 101 (34.9%) patients. Postoperative parathyroid hormone and calcium supplementation were administered to 174 (60.2%) patients, whereas 115 (39.8%) did not receive such supplementation. (Table 1)

Hypocalcemic tetany was observed in 45 (15.6%) patients, while the remaining 244 (84.4%) did not develop this complication. (Table 2) Analysis of demographic and clinical factors revealed that

hypocalcemic tetany was considerably more common in females, occurring in 33 (73.3%) cases compared to 12 (26.7%) in males ( $p = 0.02$ ). Additionally, patients with Graves' disease had a higher incidence of tetany, with 33 (73.3%) affected compared to 12 (26.7%) in those with goiter ( $p = 0.01$ ). We also observed that patients who had taken postop parathyroid hormone and calcium supplementation exhibited a lower incidence of hypocalcemic tetany 17 (37.8%) than those who had not 28 (62.2%) ( $p = 0.001$ ) (Table 3)

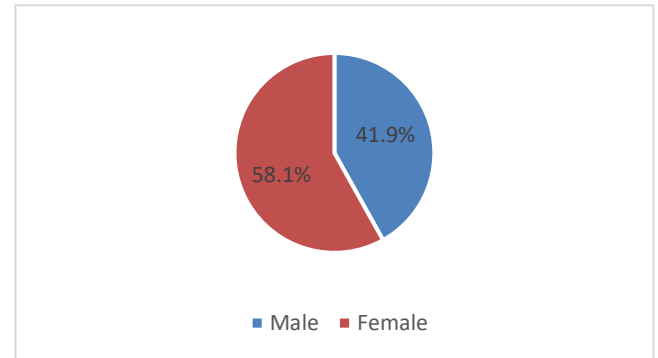


Figure 1: Gender distribution of the patients

Table 1: Clinical profile of the patients

Clinical profile		n	%
Indication of surgery	Goiter	124	42.9%
	Graves	165	57.1%
Type of surgery	Total thyroidectomy	188	65.1%
	Near total thyroidectomy	101	34.9%
Postop parathyroid hormone and calcium supplements	Yes	174	60.2%
	No	115	39.8%

Table 2: Frequency of hypocalcemic tetany

Hypocalcemic tetany	n	%
Yes	45	15.6%
No	244	84.4%

Table 3: Association of Hypocalcemic tetany with demographics and clinical profile

Demographics and clinical profile		Hypocalcemic tetany				P value
		Yes		No		
		n	%	n	%	
Age distribution (years)	20 to 40	32	71.1%	166	68.0%	0.58
	> 40	13	28.9%	78	32.0%	
Gender	Male	12	26.7%	109	44.7%	0.02
	Female	33	73.3%	135	55.3%	
Indication of surgery	Goiter	12	26.7%	112	45.9%	0.01
	Graves	33	73.3%	132	54.1%	
Type of surgery	Total thyroidectomy	28	62.2%	160	65.6%	0.66
	Near total thyroidectomy	17	37.8%	84	34.4%	
Postop parathyroid hormone and calcium supplements	Yes	17	37.8%	157	64.3%	0.001
	No	28	62.2%	87	35.7%	

## DISCUSSION

The overall tetany rate of 15.6% in our study aligns with Thottath et al., who documented symptomatic hypocalcemia in 14.3% of cases, around 5.1% patients had asymptomatic hypocalcemia, and 18.4% had a temporary condition (11). Ali et al. noted that 43.3% patients

had developed hypocalcemia (12). Iqbal et al. documented the condition in around 21.6% patients who underwent total thyroidectomy (13). Another study by Nair et al. reported a 23.6% incidence of the condition in their cohort (14). Arman et al. found that 21.4% patients developed the condition after thyroidectomy (15). One of the key observations in our study was the higher incidence of

hypocalcemic tetany in females (73.3%) compared to males (26.7%), a finding which is consistent with multiple previous studies. For instance, Iqbal et al. reported a female majority of 22.2% hypocalcemia cases while males had none, suggesting that gender may influence postoperative calcium metabolism (13). Similarly, Arman et al. noted that 83.1% of their cohort were female, reinforcing the trend that women are disproportionately affected by post-thyroidectomy complications (15). The reasons for this disparity remain unclear but may involve hormonal differences, smaller glandular anatomy, or variations in parathyroid susceptibility during dissection.

Graves' disease emerged as a notable risk factor for hypocalcemic tetany in our study, with 73.3% of tetany cases occurring in these patients. This aligns with Thottath et al., who observed that 75% of their Graves' disease patients experienced hypocalcemia, further supporting the association between autoimmune thyroid disease and postoperative tetany (11). Additionally, Nair et al. found that 42.85% of Graves' disease patients developed hypocalcemia, a rate substantially higher than in other thyroid conditions (14). The hypervascularity and inflammatory changes associated with Graves' disease may increase the risk of parathyroid gland trauma or devascularization during surgery.

Interestingly, the type of surgery, total versus near-total thyroidectomy, did not notably influence the occurrence of tetany in this study ( $p = 0.66$ ); however, we observed that 62.2% patients who underwent total thyroidectomy had hypocalcemia compared to 37.8% in near-total. Iqbal et al. documented that total thyroidectomy was linked to a 25% hypocalcemia rate in carcinoma cases due to extensive dissection (11). However, other studies like Arman et al. also found no notable difference between surgical types, suggesting that surgeon experience and technique may play a more critical role than the extent of resection alone (15).

Postoperative calcium and parathyroid hormone supplementation were administered to 60.2% patients in this study, and we found a substantial association between lower hypocalcemia tetany rates in these patients (37.8%). This corroborates with Arman et al., where 94.9% of patients received prophylactic supplements, correlating with lower hypocalcemia rates (21.4%). Sanabria et al. emphasized that routine calcium and vitamin D supplementation can reduce symptomatic hypocalcemia (16).

## CONCLUSION

From our study, we conclude that hypocalcemia tetany was found in 15.6% patients who underwent total and near total thyroidectomy, female gender, and Graves' disease are key risk factors for post-thyroidectomy hypocalcemia tetany. Post-op calcium, parathyroid hormone, and calcium supplements can help lower the aforesaid condition in these patients.

## DECLARATIONS

### Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

### Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

### Consent for publication

Approved

### Funding

Not applicable

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTION

### ARIF AHMAD (Registrar ENT)

Contributed to study design, patient recruitment, and drafting of the manuscript

### ZAHID ALI (Registrar ENT)

Assisted in data collection, clinical evaluation, and manuscript editing

### ANUM GUL (Trainee Medical Officer)

Helped in data acquisition, literature review, and preparation of tables

### UMAIR HAFEEZ

Assisted in statistical analysis, interpretation of results, and formatting of the manuscript

### SUHAIL AHMAD (Assistant Professor)

Supervised the overall study, provided critical review, and revised the manuscript for intellectual content

### HAMAD UR REHMAN (Senior Registrar)

Contributed to methodology, patient management, and final proofreading of the manuscript.

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