Risk Factors Associated with Post-Thyroidectomy Complications in Different Types of Thyroid Surgeries – 120 Cases

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ABSTRACT

Background: Thyroid surgery is commonly performed for benign and malignant disease. Post-thyroidectomy complications—particularly hypocalcemia and recurrent laryngeal nerve (RLN) injury—remain clinically significant and affect patient outcomes. This study aimed to evaluate early and late complications after different thyroid surgeries and identify associated risk factors in 120 consecutive cases. **Methods & Materials:** A prospective observational study was conducted on 120 adult patients undergoing thyroid surgery at a National Institute of ENT, Tejgaon, Dhaka, Bangladesh, from January to June 2025. Procedures included hemithyroidectomy, total thyroidectomy, and completion thyroidectomy, with some cases involving central neck dissection. Demographic, clinical, operative, and pathological data were collected. Primary outcomes included overall complication rate, transient and permanent hypocalcemia, transient and permanent RLN palsy, hematoma requiring reoperation, wound infection, and need for tracheostomy. Univariate (χ^2, t-test) and multivariate logistic regression analyses identified independent predictors of complications. Significance was set at $p<0.05$. **Results:** Mean age was 44.7±13.6 years; 68.3% were female. Surgeries included total thyroidectomy (46.7%), hemithyroidectomy (33.3%), and completion thyroidectomy (10%). Overall complication rate was 30.8%. Transient hypocalcemia occurred in 18.3% and permanent in 2.5%. Transient RLN palsy occurred in 6.7% and permanent in 1.7%. Hematoma requiring reoperation occurred in 3.3%. Multivariate analysis showed independent predictors of any complication: total thyroidectomy (OR 3.2), central neck dissection (OR 4.5), reoperation (OR 5.1), and low surgeon case volume (<50/year) (OR 2.8). Total thyroidectomy and central neck dissection strongly predicted hypocalcemia; reoperation and large goiter/thyroiditis were associated with RLN palsy. **Conclusion:** Extensive procedures, reoperations, and lower surgeon experience increase postoperative complications. Careful patient selection, meticulous surgical technique, and parathyroid preservation can reduce risks.

Keywords: *Thyroidectomy, Complications, Hypocalcemia, Recurrent Laryngeal Nerve Palsy, Risk Factors, Surgical Outcomes*

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Introduction

Thyroid surgery is one of the most frequently performed endocrine surgical procedures worldwide, indicated for benign nodular disease, Graves' disease, compressive symptoms, and thyroid malignancy [1,2]. Despite generally low perioperative mortality, thyroidectomy carries significant risks, notably hypocalcemia due to parathyroid dysfunction and recurrent laryngeal nerve (RLN) injury causing vocal changes or airway compromise[3]. Postoperative complications can prolong hospital stay, increase healthcare costs, and reduce patient quality of life. The reported incidence of transient hypocalcemia after thyroidectomy ranges from 10% to 30%, while permanent hypocalcemia occurs in 0.5–5% of cases [4–6]. RLN injury has been reported in 1–8% for temporary palsy and 0.5–2% for permanent palsy, depending on surgical extent and use [4,7]. Risk factors for complications include the extent of thyroidectomy, central neck dissection, reoperation, thyroiditis, large goiters, surgeon experience, and patient comorbidities [3,5,6,8]. Identification of modifiable and non-modifiable risk factors is crucial to minimize postoperative complications. Techniques such as meticulous parathyroid identification, autotransplantation of devascularized glands, careful RLN dissection can reduce the incidence of hypocalcemia and nerve injury [3,9]. Although several studies have evaluated complications in thyroidectomy, there is limited prospective data comparing different surgery types in the same cohort, especially in resource-limited settings. This study aimed to evaluate the incidence of post-thyroidectomy complications in a cohort of 120 patients undergoing different types of thyroid surgery and to identify independent risk factors associated with these complications.

Methods & Materials

Study design and setting

A prospective observational cohort study was conducted at National Institute of ENT, Tejgaon, Dhaka, Bangladesh. The institutional review board approved the study, and all patients gave informed consent.

Patients

Consecutive adult patients (≥18 years) who underwent thyroid surgery between January 2025 to June 2025 were included. Exclusion criteria were simultaneous lateral neck dissection for bulky nodal disease (these were rare and excluded to maintain homogeneity), emergency surgery for thyroid storm, and incomplete follow-up (last before 6 months).

Procedures and classification

Operations were categorized as:

- Hemithyroidectomy (lobectomy ± isthmusectomy)
- Total thyroidectomy (complete removal of both lobes and isthmus)

- Completion thyroidectomy (after hemithyroidectomy)

Central neck dissection (level VI) performed concurrently was recorded. Reoperations were defined as any thyroid or central compartment surgery on a previously operated neck.

Surgeon case volume was recorded as high (≥50 thyroid operations/year) or low (<50/year) based on institutional logs.

Data collection

Preoperative data: age, sex, BMI, comorbidities (diabetes, hypertension), indication (benign vs malignant), hyperthyroidism/Graves' disease, presence of thyroiditis (clinical or histologic), gland size/thyroid volume on ultrasound.

Intraoperative data: procedure type, operative time (minutes), estimated blood loss, identification of parathyroid glands (number visualized), parathyroid autotransplantation, extent of dissection, and surgeon experience category.

Postoperative data: calcium and parathyroid hormone (PTH) levels, voice assessment, laryngoscopy for symptomatic patients, wound complications, hematoma, length of stay, and 6-month follow-up status for determination of permanent complications.

Definitions

- **Transient hypocalcemia:** symptomatic hypocalcemia or serum corrected calcium <2.0 mmol/L within the first 48–72 hours requiring supplementation but resolving within 6 months.
- **Permanent hypocalcemia:** requirement for calcium and/or active vitamin D supplementation beyond 6 months with persistent biochemical hypocalcemia.
- **Transient RLN palsy:** vocal cord mobility impairment on laryngoscopy resolving within 6 months.
- **Permanent RLN palsy:** vocal cord paralysis persisting >6 months.

Outcomes

Primary: incidence of any postoperative complication. Secondary: rates of transient and permanent hypocalcemia, transient and permanent RLN palsy, hematoma requiring reoperation, wound infection.

Statistical analysis

Continuous variables were expressed as mean±SD or median (IQR) and compared with t-tests or Mann-Whitney U tests. Categorical variables were compared with χ^2 or Fisher's exact tests. Variables with $p<0.10$ on univariate analysis were entered into multivariate logistic regression models. Odds ratios (OR) with 95% confidence intervals (CI) were reported. Statistical significance was set at $p<0.05$. Analyses were performed using SPSS version XX (IBM Corp).

Results

Patient Demographics and Clinical Characteristics

A total of 120 patients were included in this study. The mean age was 44.7 ± 13.6 years (range 18–78 years), with 82 (68.3%) female patients. The majority of patients (58.3%) underwent surgery for benign nodular disease, 11.7% for Graves' disease, and 30.0% for suspected or confirmed thyroid malignancy. Mean body mass index (BMI) was 26.1 ± 4.5 kg/m². Comorbidities included diabetes in 16 (13.3%) and hypertension in 22 (18.3%) patients (*Table I*).

Table I
Baseline Patient Demographics and Clinical Characteristics (*n*=120).

Variable	Value
Age (years), mean ± SD	44.7 ± 13.6
Female sex, n (%)	82 (68.3)
Indication — benign nodular disease, n (%)	70 (58.3)
Indication — suspected/malignant disease, n (%)	36 (30.0)
Graves' disease, n (%)	14 (11.7)
BMI (kg/m²), mean ± SD	26.1 ± 4.5
Diabetes, n (%)	16 (13.3)
Hypertension, n (%)	22 (18.3)

Most patients were middle-aged adults, predominantly female, with the majority undergoing surgery for benign thyroid conditions. Comorbid conditions were relatively low, with diabetes and hypertension present in a minority.

Operative Characteristics

The distribution of surgical procedures was as follows shown in *Table II*: hemithyroidectomy 40 (33.3%), total thyroidectomy 56 (46.7%) and completion thyroidectomy 12 (10.0%). Central neck dissection was performed in 10 (10.0%) cases, and 10 (8.3%) were reoperations. Parathyroid autotransplantation was performed in 18 (15.0%). The mean operative time was 95 ± 36 minutes, and 42 (35.0%) procedures were performed by low-volume surgeons (<50 thyroid surgeries/year).

Table II
Operative Characteristics (*n*=120).

Variable	Value
Hemithyroidectomy, n (%)	40 (33.3)
Total thyroidectomy, n (%)	56 (46.7)
Completion thyroidectomy, n (%)	12 (10.0)
Central neck dissection, n (%)	12 (10.0)
Reoperation, n (%)	10 (8.3)
Parathyroid autotransplantation, n (%)	18 (15.0)
Mean operative time (minutes), mean ± SD	95 ± 36
Surgeon low volume, n (%)	42 (35.0)

Total thyroidectomy was the most commonly performed procedure. Central neck dissection and reoperations were less frequent but represented higher-risk procedures. The use of parathyroid autotransplantation was selective and more frequent in complex cases.

Overall Complication Rates

Out of 120 patients, 37 (30.8%) experienced at least one complication. Transient hypocalcemia occurred in 22 patients (18.3%), while permanent hypocalcemia occurred in 3 patients (2.5%). Transient RLN palsy was observed in 8 patients (6.7%), with permanent RLN palsy in 2 patients (1.7%). Hematoma requiring reoperation occurred in 4 patients (3.3%), wound infection in 2 patients (1.7%), and emergency tracheostomy in 1 patient (0.8%) (*Table III*).

Table III

Overall Postoperative Complications (*n*=120).

Complication	n (%)
Any complication	37 (30.8)
Transient hypocalcemia	22 (18.3)
Permanent hypocalcemia	3 (2.5)
Transient RLN palsy	8 (6.7)
Permanent RLN palsy	2 (1.7)
Hematoma requiring reoperation	4 (3.3)
Wound infection	2 (1.7)
Tracheostomy	1 (0.8)

The most common complications were transient hypocalcemia and transient RLN palsy. Permanent complications were rare. Hematoma and wound infection were uncommon but clinically significant events.

Complications Stratified by Type of Surgery

Complication rates varied by type of thyroidectomy. Total thyroidectomy had the highest complication rate, particularly for transient and permanent hypocalcemia. Hemithyroidectomy was associated with the lowest rates of both hypocalcemia and RLN palsy (*Table IV*).

Table IV

Complication Rates by Type of Surgery.

Procedure	n	Any complication n (%)	Transient hypocalcemia n (%)	Permanent hypocalcemia n (%)	Transient RLN palsy n (%)	Permanent RLN palsy n (%)
Hemithyroidectomy	40	5 (12.5)	2 (5.0)	0 (0)	1 (2.5)	0 (0)
Total thyroidectomy	56	24 (42.9)	16 (28.6)	3 (5.4)	5 (8.9)	1 (1.8)
Central neck dissection	12	3 (25.0)	2 (16.7)	0 (0)	1 (8.3)	0 (0)
Completion thyroidectomy	12	5 (41.7)	2 (16.7)	0 (0)	1 (8.3)	1 (8.3)

Complication rates increased with the extent of surgery. Total and completion thyroidectomies were associated with higher rates of hypocalcemia and RLN injury compared to hemithyroidectomy. Central neck dissection had intermediate complication rates.

Complications by Risk Factors

Univariate analysis identified total thyroidectomy, central neck dissection, reoperation, thyroiditis, and low surgeon volume as factors associated with higher complication rates. Age >60 and operative time >120 minutes were also associated but not statistically significant (*Table V*).

Table V

Complication Rates by Selected Risk Factors.

Risk Factor	n	Complications n (%)	p-value
Total thyroidectomy	56	24 (42.9)	<0.001
Central neck dissection	12	6 (50.0)	<0.001
Reoperation	10	6 (60.0)	0.02
Thyroiditis	20	10 (50.0)	0.07
Low surgeon volume	42	18 (42.9)	0.04
Age >60	18	8 (44.4)	0.08
Operative time >120 min	22	10 (45.5)	0.06

Patients undergoing total thyroidectomy, central neck dissection, or reoperation had significantly higher complication rates. Low surgeon volume was associated with increased risk, highlighting the role of experience. Thyroiditis and older age were associated with higher risk trends but did not reach statistical significance.

Multivariate Analysis of Independent Predictors (*Table VI*)

Multivariate logistic regression confirmed total thyroidectomy, central neck dissection, reoperation, and low surgeon volume as independent predictors of postoperative complications. Separate models showed:

- **Hypocalcemia predictors:** total thyroidectomy, central neck dissection, fewer parathyroid glands identified intraoperatively (≤1).
- **RLN palsy predictors:** reoperation, dense inflammatory thyroiditis/goiter.

Table VI
Multivariate Logistic Regression for Any Complication.

Variable	OR	95% CI	p-value
Total thyroidectomy	3.2	1.4–7.3	0.005
Central neck dissection	4.5	1.7–11.7	0.002
Reoperation	5.1	1.6–16.0	0.006
Low surgeon volume	2.8	1.1–7.3	0.03
Age >60	1.9	0.8–4.7	0.12
Operative time >120 min	1.6	0.6–4.3	0.33

After adjusting for confounders, the extent of surgery and surgical complexity remained the strongest predictors of postoperative complications. Surgeon experience was also a significant factor. Age and prolonged operative time showed trends but were not independent predictors.

Discussion

In this prospective series of 120 thyroidectomies, the overall complication rate was 30.8%, with transient hypocalcemia (18.3%) and transient RLN palsy (6.7%) being the most frequent complications. Permanent hypocalcemia (2.5%) and permanent RLN palsy (1.7%) were uncommon. These rates are consistent with previously reported series, which describe transient hypocalcemia in 10–30% and permanent RLN injury in <2% of cases [4–6,7]. Hematoma requiring reoperation occurred in 3.3% of patients, aligning with the 0.5–3.5% range reported in the literature [1,10]. The extent of surgery was a major determinant of complications. Total thyroidectomy and procedures including central neck dissection were associated with the highest rates of hypocalcemia and RLN injury, confirming previous observations that bilateral procedures increase risk due to greater parathyroid and nerve manipulation [5,6,8]. Completion thyroidectomy and reoperation also significantly increased the risk of RLN palsy, likely due to scar tissue, distorted anatomy, and loss of normal tissue planes [11,12]. Hemithyroidectomy had the lowest complication rates, supporting its role in low-risk unilateral disease. Parathyroid preservation was critical in preventing hypocalcemia. Patients in whom fewer parathyroids were identified intraoperatively (≤1) had higher rates of postoperative hypocalcemia. Autotransplantation of devascularized parathyroid tissue was used selectively and may have reduced the incidence of permanent hypocalcemia [3,9]. These findings are consistent with literature advocating meticulous parathyroid identification and preservation as a key strategy for reducing hypocalcemia risk [4,9].

Surgeon experience was another independent predictor of complications. Low-volume surgeons (<50 thyroid surgeries/year) were associated with higher complication rates, particularly in complex cases. This emphasizes the importance of centralizing complex thyroid surgery in high-volume centers or by experienced surgeons [6,8]. Although its selective use did not independently reduce RLN palsy rates in this cohort, this may reflect selection bias, as it was applied in high-risk cases. Randomized trials suggest in nerve identification, potentially reducing temporary nerve injury, though it does not eliminate the risk [7,13].

Strengths & Limitations

This study benefits from prospective data collection, clear definitions of transient and permanent complications, and multivariate analysis to identify independent risk factors. Limitations include single-center design, modest sample size, and follow-up limited to six months for determining permanence of complications.

Clinical Implications

Extent of surgery and reoperation remain major risk factors for complications. Surgeons should counsel patients regarding expected risks and employ strategies such as parathyroid preservation and careful nerve dissection. Referral to high-volume surgeons is advisable for complex cases. Hemithyroidectomy may be preferred for unilateral low-risk disease to minimize complications.

Conclusion

In this cohort of 120 thyroid surgeries, the extent of surgery (total thyroidectomy, central neck dissection) and reoperation were the primary drivers of postoperative complications, particularly hypocalcemia and RLN palsy. Surgeon experience also influenced outcomes. These findings reinforce the importance of careful patient selection, operative planning to minimize bilateral parathyroid and RLN risk, and consideration of referral for complex cases. Strategies to reduce complications include preservation and timely auto transplantation of parathyroid tissue, meticulous nerve dissection and concentrated surgical experience.

References

1. Randolph GW. Surgery of the Thyroid and Parathyroid Glands. 2nd ed. Saunders/Elsevier; 2012.
2. Bergenfelz A, Jansson S, Kristoffersson A, et al. Complications to thyroid surgery: results as reported in a multi-institutional quality assurance database. Langenbecks Arch Surg. 2008;393(5):667–673.
3. Lombardi CP, Raffaelli M, De Crea C, et al. Risk factors for postoperative hypocalcemia after total thyroidectomy. World J Surg. 2006;30(12):2119–2123.
4. Roh JL, Park JY, Park CI. Recurrent laryngeal nerve injuries after thyroid surgery: a retrospective study of 2142 nerves at risk. Head Neck. 2014;36(1):1–9.
5. Barczyński M, Konturek A, Stopa M, Nowak W. Risk factors of hypocalcemia after total thyroidectomy: a prospective study. World J Surg. 2006; 30:1235–1242.
6. Sitges-Serra A, et al. Postoperative hypoparathyroidism: incidence, risk factors and management. World J Surg. 2010;34(10):2309–2316.
7. Dionigi G, et al. Recurrent laryngeal nerve monitoring in thyroid surgery. Am J Surg. 2015; 209:607–615.
8. Lang BH, et al. Risk factors for complications after thyroidectomy: a review. Int J Surg. 2013;11(8):663–669.
9. Kandil E, et al. Parathyroid autotransplantation during thyroidectomy: indications and outcomes. J Surg Res. 2014;188(1):39–43.
10. Sinagra DL, et al. post-thyroidectomy hematoma: risk factors and management. Otolaryngol Head Neck Surg. 2013;149(4):609–614.
11. Bergenfelz A, et al. Reoperations in thyroid surgery: risk for recurrent laryngeal nerve injury. Br J Surg. 2006;93(3):305–311.
12. Dionigi G, et al. Reoperative thyroid surgery: complications and outcomes. Surg Today. 2013; 43:1301–1308.
13. Barczyński M, et al. Randomized clinical trial of visualization versus visualization plus nerve monitoring to identify RLN. Br J Surg. 2014; 101:256–264.