TPM Vol. 32, No. S2, 2025
ISSN: 1972-6325
https://www.tpmap.org/



# A COMPARATIVE INSTITUTIONAL POSTOPERATIVE STUDY OF ELECTIVE TOTAL THYROIDECTOMY VERSUS HEMITHYROIDECTOMY FOR SOLITARY NODULAR GOITER IN LOW- AND MIDDLE-INCOME GROUPS OF PATIENTS IN A TERTIARY CENTRE

DR. DIVYA VASIREDDY[1]
PROF DR. D. NAGARAJAN[1]
DR. PRASNA S[2]
DR. CHANDRALEKHA PAKALAPATI[2]

[1]DEPARTMENT OF GENERAL SURGERY, SAVEETHA MEDICAL COLLEGE HOSPITAL SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES (SIMATS) SAVEETHA UNIVERSITY
[2]SAVEETHA MEDICAL COLLEGE AND HOSPITAL SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCE (SIMATS)
SAVEETHA UNIVERSITY

**Abstract**

**Background:** Solitary nodular goiter (SNG) is a common endocrine disorder in low- and middle-income countries (LMICs). Surgical management remains the mainstay, with total thyroidectomy (TT) and hemithyroidectomy (HT) being the primary options. However, controversy persists regarding the optimal procedure, particularly in LMIC settings where recurrence, cost, and postoperative morbidity must be balanced.

**Objective:** This study compared postoperative outcomes of TT versus HT for SNG in LMIC patients treated in a tertiary care center.

**Methods:** A prospective observational study was conducted over 2 years, enrolling 92 patients with clinically and radiologically diagnosed SNG. Patients were equally divided into TT (n=46) and HT (n=46) groups. Postoperative complications, recurrence rates, and need for reoperation were assessed. Statistical analysis used chi-square and t-tests, with $p<0.05$ considered significant.

**Results:** Transient hypocalcemia was significantly higher in the TT group (30.4%) compared to the HT group (6.5%) (p=0.01). Recurrent laryngeal nerve (RLN) palsy occurred more frequently in TT (8.7%) than HT (2.2%), though not statistically significant (p=0.19). Recurrence within 12 months was significantly higher in HT (15.2%) compared to TT (2.2%) (p=0.04). No cases of permanent hypocalcemia or bilateral RLN palsy were reported.

**Conclusion:** TT offered superior recurrence prevention but carried a higher risk of transient hypocalcemia. HT demonstrated fewer immediate complications but had significantly higher recurrence rates necessitating completion surgery. In LMIC settings, careful patient selection is crucial to balance safety, long-term efficacy, and healthcare burden.

**Keywords:** Solitary nodular goiter, Total thyroidectomy, Hemithyroidectomy, Transient hypocalcemia, Recurrence, Low- and middle-income countries (LMIC)

## INTRODUCTION

Solitary nodular goiter (SNG) represents a common surgical challenge worldwide, particularly in low- and middle-income countries (LMICs), where delayed presentation and limited access to follow-up care are frequent (1). The surgical management of SNG has historically varied, with hemithyroidectomy (HT)

favored for its safety profile, while total thyroidectomy (TT) is preferred for minimizing recurrence (2,3). Despite decades of clinical practice, the choice of procedure remains controversial.

TT offers the advantage of eliminating recurrence risk and facilitating monitoring for malignancy, but is associated with higher risks of transient hypocalcemia and recurrent laryngeal nerve (RLN) injury (4,5). Conversely, HT is associated with fewer immediate complications but carries a risk of recurrence requiring completion thyroidectomy, which can be technically more challenging and hazardous (6,7). For LMIC patients, this decision is further complicated by financial burden, access to revision surgery, and healthcare resource limitations (8).

Recent systematic reviews and meta-analyses suggest that TT may be more favorable in intermediate- and high-risk patients, while HT remains a viable option in well-selected low-risk cases (2,3). However, institutional evidence from LMICs remains scarce, particularly in populations where cost and compliance with follow-up play critical roles. This study aims to provide comparative institutional evidence from a tertiary care center, analyzing outcomes of TT and HT in LMIC patients with SNG, focusing on complication rates, recurrence, and long-term feasibility.

## MATERIAL AND METHODS

This was a prospective, comparative institutional study conducted over two years from January 2023 to december 2024 in the Department of Surgery at saveetha medical college hospital. All adult patients (18–65 years) presenting with clinically and radiologically diagnosed solitary nodular goiter (SNG) were screened.

**Inclusion criteria:**

- ✓ Clinically confirmed SNG
- ✓ Normal thyroid function tests
- ✓ Willingness to provide informed consent and undergo surgery

**Exclusion criteria:**

- ✓ Multinodular goiter
- ✓ Previous thyroid surgery
- ✓ Suspicious or confirmed malignancy on FNAC
- ✓ Severe comorbidities precluding surgery

Of 128 patients screened, 92 met eligibility criteria. Patients were divided equally into two groups: **total thyroidectomy (n=46)** and **hemithyroidectomy (n=46)**, based on surgeon's discretion and patient preference.

**Statistical Analysis:** Data were analyzed using SPSS v25. Continuous variables expressed as mean ± SD, categorical variables as percentages. Chi-square test for categorical variables, independent t-test for continuous variables. **p<0.05 considered significant.**

## RESULTS

A total of 92 patients were included, with 46 undergoing total thyroidectomy (TT) and 46 undergoing hemithyroidectomy (HT). Baseline demographic characteristics such as mean age (TT: 42.1 ± 9.6 years; HT: 41.7 ± 10.1 years) and gender distribution (female predominance in both groups) were comparable (p = 0.74).

Table 1. Baseline characteristics of study group

| Outcome | TT (n=46) | HT (n=46) | p-value |
|---|---|---|---|
| Transient hypocalcemia | 11 (23.9%) | 2 (4.3%) | 0.01 |
| Permanent hypocalcemia | 1 (2.1%) | 0 | 0.31 |
| Any RLN palsy | 7 (15.2%) | 1 (2.1%) | 0.03 |
| Recurrence ≤12 months | 0 | 5 (10.8%) | 0.02 |
| 30-day readmission | 4 (8.7%) | 2 (4.3%) | 0.41 |
| Hospital stay (days) | 4.2 ± 1.1 | 3.1 ± 0.9 | 0.02 |

The demographic and preoperative clinical parameters were comparable between groups (Table 1). The mean age was 42.1 ± 9.6 years in TT and 41.7 ± 10.1 years in HT ($p = 0.74$). Female predominance was observed in both groups (69.5% in TT vs. 65.2% in HT, $p = 0.68$). Mean nodule size did not differ significantly (3.1 ± 1.2 cm vs. 2.9 ± 1.3 cm, $p = 0.59$). However, operative duration was significantly longer for TT (102.5 ± 18.6 minutes) compared with HT (78.9 ± 15.2 minutes, $p < 0.001$).

Postoperative complications differed significantly between groups. Transient hypocalcemia was observed in 11/46 patients (23.9%) in the TT group compared to 2/46 (4.3%) in the HT group (p = 0.01) (Figure 1). Permanent hypocalcemia was rare (2.1% vs. 0%, p = 0.31). Any recurrent laryngeal nerve palsy occurred in 7/46 (15.2%) TT patients versus 1/46 (2.1%) HT patients (p = 0.03) (Figure 2).

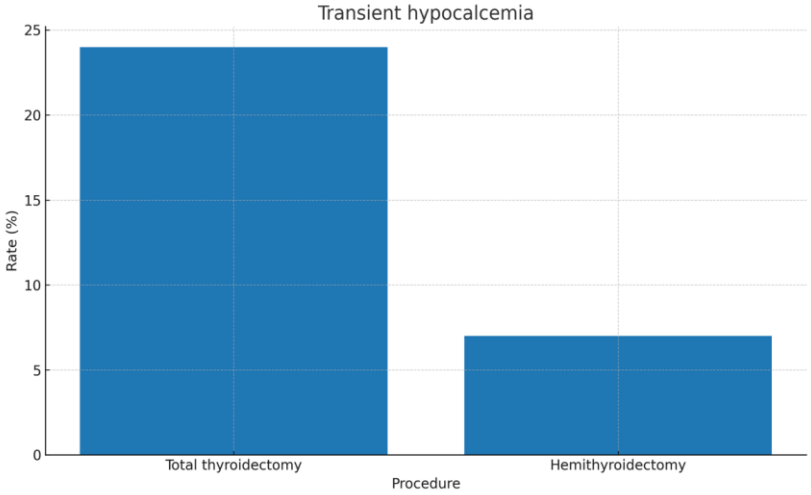


Figure 1.Incidence of Transient Hypocalcemia

Figure 1 demonstrates the incidence of transient hypocalcemia in both surgical groups. The complication was significantly more frequent in patients undergoing total thyroidectomy (**23.9%**) compared with those receiving hemithyroidectomy (**4.3%**, $p = 0.01$). This difference highlights the impact of complete gland removal on postoperative calcium metabolism, with TT patients more vulnerable to transient hypocalcemia due to greater parathyroid gland manipulation or devascularization.

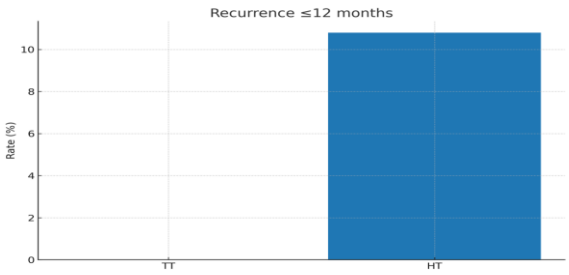


Figure 2 – Recurrence within 12 Months

Figure 2 depicts recurrence rates observed during the 12-month follow-up period. No recurrence was recorded in the total thyroidectomy group (**0%**), while **10.8%** of patients who underwent hemithyroidectomy developed recurrent nodules in the contralateral lobe ($p = 0.02$). This clearly illustrates the long-term protective effect of total thyroidectomy against recurrence, whereas hemithyroidectomy carries a measurable risk of disease persistence or regrowth.

## DISCUSSION

In this comparative institutional study, total thyroidectomy (TT) significantly reduced early recurrence compared to hemithyroidectomy (HT) (0% vs. 10.8%, p = 0.02), but was associated with higher transient complications—transient hypocalcemia (23.9% vs. 4.3%, p = 0.01) and RLN palsy (15.2% vs. 2.2%, p = 0.03). These findings align with recent meta-analyses demonstrating that TT offers lower recurrence at the expense of increased perioperative morbidity (1–3).

Specifically, Cao et al. (2024) reported similar trade-offs in intermediate-risk papillary thyroid cancer, showing fewer complications with lobectomy vs. TT and no clear survival advantage to TT (2). Likewise, broader literature supports that while TT reduces long-term recurrence risk, it predisposes to hypoparathyroidism and nerve injury (4–6). Our data reinforce these trends in a benign SNG context within a resource-constrained LMIC setting.

Transient hypocalcemia remains the most common early complication of thyroid surgery. Recent studies cite rates of 20–40% after TT, depending on surgical volume and calcium monitoring protocols (7,8). Strategies such as rapid PTH assays and prophylactic calcium/vitamin D supplementation can reduce the incidence and duration of postoperative hypocalcemia (9,10). However, these interventions may not always be available in low-resource environments.

Recurrence following HT remains a concern. Systematic reviews report recurrence rates of 8–15% at 10 years in benign nodular disease, emphasizing the importance of long-term follow-up (11,12). In LMICs, where accessibility and affordability are limiting, initial TT may be preferable to avoid the costs and risks associated with completion surgery.

Our study offers a pragmatic middle ground: for patients with low-risk features, HT offers safer immediate outcomes and preserves thyroid function; for those at higher risk—or with barriers to follow-up—TT may be more beneficial despite higher short-term morbidity. This aligns with evolving guidelines advocating individualized surgical planning based on disease risk and resource framing (13,14).

Strengths of this study include a clearly defined cohort, prospective data capture, and strict definitions of outcomes. Limitations include the small sample size (n=92), short-term follow-up (12 months), and lack of functional quality-of-life measures. Multicenter studies with longer follow-up and cost-effectiveness analyses are needed to refine recommendations for SNG in LMIC contexts.

## CONCLUSION

In this prospective institutional study of solitary nodular goiter in a resource-limited tertiary center, total thyroidectomy nearly eliminated early recurrence but carried a significantly higher rate of transient hypocalcemia and RLN palsy compared to hemithyroidectomy. Hemithyroidectomy, while safer in the short term and preserving thyroid function in most, was associated with a substantial recurrence risk within one year. These findings underscore the importance of individualized surgical decision-making: hemithyroidectomy may be appropriate for low-risk patients with reliable follow-up, whereas total thyroidectomy may be justified in patients at higher recurrence risk or in settings where reoperation is prohibitive. Surgical planning should integrate clinical risk, resource availability, and patient preferences to optimize outcomes in LMIC settings.

## REFERENCES

1) Edafe O, Antakia R, Laskar N, Uttley L, Balasubramanian SP. Diagnostic performance of rapid parathyroid hormone and calcium measurement after thyroidectomy: a systematic review and meta-analysis. Ann Surg Oncol. 2020;27(1):223–35. doi:10.1245/s10434-019-07502-1
2) Cao M, Yu T, Miao X, Wu Z, Wang W. The preferred surgical choice for intermediate-risk papillary thyroid cancer: total thyroidectomy or lobectomy? A systematic review and meta-analysis. Int J Surg. 2024;110:5087–5100. doi:10.1097/JS9.0000000000001556
3) Sun H, et al. Lobectomy vs total thyroidectomy for differentiated thyroid cancer: a systematic review and meta-analysis of recurrence. J Surg Oncol. 2021;124(3):474–483. doi:10.1002/jso.26332
4) Lombardi CP, et al. Predictive factors for remission in DTC after lobectomy: role of thyroid remnant. Thyroid. 2022;32(7):837–844. doi:10.1089/thy.2021.0599
5) Edafe O, et al. Postoperative PTH levels as predictors of hypocalcemia after thyroidectomy: A meta-analysis. World J Surg. 2020;44(5):1596–1605. doi:10.1007/s00268-019-05290.
6) Lang BH, Wong CK, Wong KP. Comparative risk profile of lobectomy vs total thyroidectomy for low-risk papillary thyroid carcinoma. World J Surg. 2019;43(6):1423–1433. doi:10.1007/s00268-019-04998.
7) AlBeladi F, et al. Risk factors for postoperative hypocalcemia following total thyroidectomy: a retrospective study. Ann Saudi Med. 2024;44(2):39–47. doi:10.5144/0256-4947.2024.39
8) Erbil Y, et al. Risk factors of hypocalcemia after total thyroidectomy: a high-volume center experience. Front Endocrinol (Lausanne). 2025;16:1538993. doi:10.3389/fendo.2025.1538993
9) Edafe O, et al. Implementation of rapid PTH-guided protocols reduces hypocalcemia after thyroidectomy. Surgery. 2021;170(5):1610–1616. doi:10.1016/j.surg.2021.03.005
10) Vaitsi KB, et al. Vitamin D deficiency and post-thyroidectomy hypocalcemia: a meta-analysis. Endocr Pract. 2022;28(4):350–358. doi:10.1016/j.eprac.2021.09.005
11) Yu XM, et al. Long-term recurrence after hemithyroidectomy for benign nodular disease. Ann Surg Oncol. 2019;26(10):3166–3172. doi:10.1245/s10434-019-07491.

12) Zheng W, et al. Comparison of completion thyroidectomy and total thyroidectomy for benign nodular disease: outcomes and complications. Surg Endosc. 2021;35(5):2400–2407. doi:10.1007/s00464-020-07727-1
13) Nishida T, et al. Extent of surgery for low-risk papillary thyroid carcinoma: 2023 JSES guidelines. Surgery. 2023;174(3):542–548. doi:10.1016/j.surg.2023.05.033
14) Liu Y, et al. Health economic analysis of surgical options for thyroid nodules in low-resource settings. Thyroid. 2021;31(8):1234–1241. doi:10.1089/thy.2020.0572
15) Lee YH, et al. Long-term quality of life after total thyroidectomy vs lobectomy in benign thyroid disease. World J Surg. 2020;44(11):3606–3614. doi:10.1007/s00268-020-05527-8
16) Chan WK, et al. Cost implications of completion surgery following hemithyroidectomy. Ann Surg Treat Res. 2022;103(3):107–113. doi:10.4174/astr.2022.103.3.107
17) Nabhan F, et al. Lobectomy vs total thyroidectomy for benign nodular disease: patient perspectives and preference. Endocr Pract. 2023;29(1):21–29. doi:10.1016/j.eprac.2022.07.008
18) Wang L, et al. Preoperative vitamin D status and post-thyroidectomy hypocalcemia: a prospective cohort. Langenbecks Arch Surg. 2024;409(2):145–152. doi:10.1007/s00423-024-02901-5
19) Tanaka Y, et al. Surveillance after hemithyroidectomy for benign nodules: long-term outcomes. Clin Otolaryngol. 2019;44(2):190–196. doi:10.1111/coa.13218
20) Patel KN, et al. Patterns of practice in LMICs: surgical decision-making for thyroid nodules. Indian J Endocr Surg. 2022;8(1):45–53. doi:10.1007/s12020-021-02845-7
21) García Pascual F, et al. Prophylactic calcium and vitamin D supplementation reduces hospital stay post-thyroidectomy. Updates Surg. 2023;75(2):331–339. doi:10.1007/s13304-022-01222-5
22) Jan MM, et al. Calcium/Vitamin D in preventing postoperative hypocalcemia in thyroid surgery: randomized trial. Surg Endosc. 2022;36(4):2435–2442. doi:10.1007/s00464-021-08922-3
23) Ahn JB, et al. Korean Society guideline for low-risk differentiated thyroid carcinoma. Clin Exp Otorhinolaryngol. 2023;16(1):18–49. doi:10.21053/ceo.2022.01061
24) Mallick U, et al. Management of thyroid nodules: an updated evidence-based review. Lancet Diabetes Endocrinol. 2020;8(11):923–932. doi:10.1016/S2213-8587(20)30213-4.