

Research Article

Clinical Profile, Surgical Outcomes, and Postoperative Complications Following Total Thyroidectomy: A Prospective Observational Study from a Tertiary Care Centre in Southern India

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ABSTRACT

Background: Total thyroidectomy has become an increasingly preferred procedure for a wide range of benign and malignant thyroid disorders, but hypocalcemia, recurrent laryngeal nerve (RLN) injury, and haemorrhage remain important sources of morbidity, and institution-specific prospective data from southern India are limited.

Aims: To evaluate the clinical profile, surgical outcomes, and postoperative complications in patients undergoing total thyroidectomy, and to identify risk factors associated with these complications.

Methods: A prospective observational cohort study was conducted in the Department of General Surgery of a tertiary care hospital in Kuppam, India, over 18 months. Eighty-six consecutive adult patients undergoing total thyroidectomy were enrolled after preoperative thyroid function testing, ultrasonography, and FNAC. Postoperative complications were systematically monitored, and data were analysed in SPSS v23.0 using the chi-square test, independent t-test, and binary logistic regression.

Results: The mean age was 38.41 ± 10.47 years with marked female predominance (83.7%). Colloid goitre (36.1%) and multinodular goitre (30.2%) were the commonest FNAC diagnoses. Mean operative time was 104.41 ± 14.85 minutes and mean blood loss 104.70 ± 21.08 ml. The overall postoperative complication rate was 24.4%, transient hypocalcemia being the commonest complication (10.5%), followed by permanent hypocalcemia (3.5%) and temporary RLN injury (4.7%); no permanent RLN injury, respiratory obstruction, or thyroid storm occurred. Central neck dissection was significantly associated with postoperative hypocalcemia (odds ratio 9.13, 95% CI 1.65-50.59, $p = 0.011$).

Conclusion: Total thyroidectomy is a safe procedure with an acceptable complication profile in a tertiary care setting. Central neck dissection is an independent risk factor for postoperative hypocalcemia, underscoring the need for meticulous parathyroid preservation and vigilant postoperative monitoring.

Keywords: Total Thyroidectomy, Thyroid Swellings, Postoperative Complications, Hypocalcemia, Recurrent Laryngeal Nerve Injury, Multinodular Goitre, Central Neck Dissection, Tertiary Care.

INTRODUCTION

Enlargement of the thyroid gland is among the most frequently encountered endocrine problems in surgical practice, encompassing a broad spectrum of benign and malignant conditions that range from diffuse enlargement and solitary nodules to multinodular goitre. Accurate evaluation combining clinical examination, fine-needle aspiration cytology (FNAC), ultrasonography, and thyroid function testing is essential to guide management¹, and surgical excision — increasingly by total

thyroidectomy — has become the treatment of choice for many of these disorders.

Population-based ultrasonographic surveys suggest that thyroid nodules may be detectable in nearly half of adults, although most remain clinically silent², and the global burden of thyroid disease continues to rise. In India, persistent regional iodine deficiency together with increasing detection of nodules has driven a corresponding rise in thyroid surgery, making systematic evaluation of surgical outcomes an ongoing priority³.

Total thyroidectomy offers complete disease clearance, reduces recurrence, and facilitates radioactive iodine therapy and postoperative surveillance; consensus statements support it as the preferred approach for differentiated carcinoma, toxic goitre, and selected benign multinodular disease⁴. The procedure nonetheless demands detailed anatomical knowledge and meticulous technique, since injury to the parathyroid glands or recurrent laryngeal nerves remains a well-documented source of morbidity across large multicentric series⁵. Surgeon experience and case volume have repeatedly emerged as determinants of outcome, with high-volume centres consistently reporting lower complication rates⁶, and professional bodies in India have accordingly emphasised structured evaluation and standardised perioperative protocols for thyroid nodule management⁷. Despite this, regionally focused prospective data describing the clinicopathological spectrum and surgical morbidity of thyroid swellings from rural and semi-urban tertiary centres in southern India remain comparatively limited⁸.

The present study was therefore undertaken to prospectively characterise the clinical profile and surgical outcomes of patients undergoing total thyroidectomy at a tertiary care hospital in Kuppam, Andhra Pradesh, and to identify factors associated with postoperative complications, with the intention of generating institution-specific evidence to inform local surgical practice.

Aims and Objectives

Aim: To evaluate the clinical profile, surgical outcomes, and postoperative complications of patients undergoing total thyroidectomy for thyroid swellings at a tertiary care centre.

Objectives:

1. To assess the indications and clinical outcomes of total thyroidectomy in patients presenting with thyroid swellings.
2. To determine the incidence and identify risk factors associated with postoperative complications following total thyroidectomy.

MATERIALS AND METHODS

Study design and setting: This was a prospective observational cohort study conducted in the Department of General Surgery of a tertiary care hospital in Kuppam, Andhra Pradesh, India, over a period of 18 months, after approval from the Institutional

Health Ethics Committee (IHEC) and written informed consent from all participants.

Study population: Adult patients (≥ 18 years) diagnosed with thyroid swellings and scheduled for total thyroidectomy at the study centre were enrolled by consecutive sampling.

Sample size: The minimum sample size was calculated as 62, based on a previously published study⁹; to allow for attrition and to improve statistical precision, 86 eligible patients were ultimately enrolled.

Inclusion criteria: Adult patients diagnosed with thyroid swellings and scheduled for total thyroidectomy who were willing and able to provide informed consent and to complete follow-up.

Exclusion criteria: Patients with contraindications or allergy to anaesthesia; coexisting thyroid disease that could confound diagnosis or management; pregnancy or lactation; participation in another clinical trial or receipt of experimental treatment within the preceding 30 days; and unwillingness to complete follow-up.

Preoperative evaluation included clinical examination, ultrasonography (USG) of the neck, FNAC, and thyroid function tests (TFTs). All patients underwent total thyroidectomy under general anaesthesia according to a standard institutional protocol, performed by trained surgeons; operative time, blood loss, and intraoperative details were recorded on a structured surgical checklist. Postoperatively, patients were monitored for hypocalcemia (serum calcium and parathyroid hormone assay), recurrent laryngeal nerve injury (laryngeal examination), and hypothyroidism (thyroid function tests), assessed before surgery, after surgery, and at follow-up visits.

Statistical analysis: Data were entered into a password-protected database and analysed using SPSS v23.0. Continuous variables were expressed as mean $\pm$ standard deviation and compared using the independent samples t-test; categorical variables were expressed as frequencies and percentages and compared using the chi-square test. Binary logistic regression (univariate and multivariate) was used to identify independent predictors of postoperative complications and of hypocalcemia specifically. A two-tailed p-value < 0.05 was considered statistically significant.

RESULTS

A total of 86 patients undergoing total thyroidectomy were included in the study, exceeding the calculated minimum sample size

of 62 and thereby improving statistical precision. The mean age of participants was 38.41 ± 10.47 years and the mean body mass index (BMI) was 24.13 ± 2.65 kg/m², with a mean duration of swelling of 26.08 ± 13.13 months prior to surgery, indicating that most patients presented with long-standing disease (Table 1). The study population showed marked female predominance (83.7%), and comorbid diabetes mellitus and hypertension were present in 16.3% and 24.4% of patients respectively, with only 3.5% having undergone previous thyroid surgery. On preoperative assessment, 69.8% of patients were biochemically euthyroid, 19.8% hyperthyroid, and 10.5% hypothyroid.

Age distribution showed that the majority of patients (63.9%) were below 40 years, with the 31–40-year group being the largest (37.2%). By Asian BMI classification, 72.1% of patients were overweight or obese (Table 2).

Fine-needle aspiration cytology identified colloid goitre as the commonest diagnosis (36.1%), followed by multinodular goitre (30.2%), thyroiditis/Graves' disease (14.0%), follicular neoplasm (11.6%), and papillary carcinoma (8.1%), confirming that benign disease predominated in this surgical cohort. The mean operative time was 104.41 ± 14.85 minutes and mean intraoperative blood loss was 104.70 ± 21.08 ml, with a mean hospital stay of 4.47 ± 1.14 days; central neck dissection was performed in 8.1% of patients, and a surgical drain was used in 90.7% (Table 3).

Overall, 21 of 86 patients (24.4%) developed at least one postoperative complication, while 65 (75.6%) had an uneventful course. Transient hypocalcemia was the most frequent complication (10.5%), followed by temporary RLN injury (4.7%), permanent hypocalcemia (3.5%), wound infection (3.5%), seroma (3.5%), postoperative haemorrhage (2.3%), and haematoma (1.2%); no cases of permanent RLN injury, respiratory obstruction, or thyroid storm were observed (Table 4).

On bivariate analysis, central neck dissection was significantly associated with the development of any postoperative complication (57.1% vs 21.5% without dissection; $\chi^2 = 4.42$, $p = 0.035$), whereas age group, BMI category, sex, diabetes, hypertension, drain use, and previous surgery showed no significant association. On univariate logistic regression, central neck dissection showed borderline significance for any complication (OR 4.86; 95% CI 0.99–23.85; $p = 0.051$), and this did not remain independently significant on multivariate analysis (adjusted OR 2.75; 95% CI 0.34–21.96; $p = 0.340$). However, when postoperative hypocalcemia was analysed specifically as the outcome, central neck dissection emerged as a strong and statistically significant independent predictor, with patients undergoing dissection having approximately nine-fold higher odds of developing hypocalcemia (OR 9.13; 95% CI 1.65–50.59; $p = 0.011$) (Table 5).

Table 1: Baseline Demographic and Clinical Characteristics (N = 86)

Variable	Value / N	%
Age (Years), Mean $\pm$ SD	38.41 ± 10.47	—
BMI (Kg/M ²), Mean $\pm$ SD	24.13 ± 2.65	—
Duration Of Swelling (Months), Mean $\pm$ SD	26.08 ± 13.13	—
Sex — Female	72	83.7
Sex — Male	14	16.3
Diabetes Mellitus	14	16.3
Hypertension	21	24.4
Previous Thyroid Surgery	3	3.5
Euthyroid	60	69.8
Hyperthyroid	17	19.8
Hypothyroid	9	10.5

Table 2: Age Group and BMI Category Distribution (N = 86)

Age Group (Years)	N	%
21–30	23	26.7
31–40	32	37.2
41–50	17	19.8
51–60	14	16.3

BMI Category	N	%	
Underweight	2	2.3	
Normal	22	25.6	
Overweight	24	27.9	
Obese	38	44.2	

Table 3: FNAC Diagnosis and Operative Characteristics (N = 86)

Fnac Diagnosis	N	%
Colloid Goitre	31	36.1
Multinodular Goitre	26	30.2
Thyroiditis / Graves' Disease	12	14.0
Follicular Neoplasm	10	11.6
Papillary Carcinoma	7	8.1
Operative Characteristics	Value	
Operative Time (Min), Mean $\pm$ Sd	104.41 $\pm$ 14.85	
Blood Loss (ML), Mean $\pm$ Sd	104.70 $\pm$ 21.08	
Hospital Stay (Days), Mean $\pm$ Sd	4.47 $\pm$ 1.14	
Central Neck Dissection Performed	7	8.1%
Surgical Drain Used	78	90.7%

Table 4: Postoperative Complications (N = 86)

Complication	N	%
Transient Hypocalcemia	9	10.5
Temporary RLN Injury	4	4.7
Permanent Hypocalcemia	3	3.5
Wound Infection	3	3.5
Seroma	3	3.5
Postoperative Haemorrhage	2	2.3
Haematoma	1	1.2
Permanent RLN Injury	0	0
Respiratory Obstruction	0	0
Thyroid Storm	0	0
No Complication	65	75.6
At Least 1 Complication	21	24.4

Table 5: Risk Factor Analysis for Postoperative Complications and Hypocalcemia

Variable / Model	Or / X ²	95% Ci	P-Value
Central Neck Dissection Vs Any Complication (X ²)	4.42	—	0.035
Central Neck Dissection — Univariate Or (Any Complication)	4.86	0.99–23.85	0.051
Central Neck Dissection — Adjusted Or (Any Complication)	2.75	0.34–21.96	0.340
Diabetes — Univariate Or (Any Complication)	2.85	0.86–9.48	0.088
Central Neck Dissection — Or (Postoperative Hypocalcemia)	9.13	1.65–50.59	0.011

DISCUSSION

The present study evaluated the clinical profile, surgical outcomes, and postoperative complications of 86 patients undergoing total thyroidectomy at a tertiary care hospital in Kuppam, India, exceeding the calculated minimum sample size and thereby improving

statistical precision. The cohort was characterised by a predominantly young to middle-aged population (mean age 38.41 $\pm$ 10.47 years), marked female preponderance (83.7%), and a high prevalence of overweight or obesity (72.1%), consistent with the recognised demographic pattern of thyroid

disease. Benign pathology, principally colloid and multinodular goitre, accounted for the majority of surgical indications, fulfilling the first study objective of characterising the clinical and pathological spectrum of thyroid swellings undergoing total thyroidectomy.

The overall postoperative complication rate of 24.4% observed in this study is broadly consistent with the wider literature on total thyroidectomy, though reported rates vary considerably depending on case mix, surgical extent, and definitions used.

Zambudio et al. reported an overall complication rate of 21% following total thyroidectomy for multinodular goitre¹⁰, closely comparable to our findings, although their permanent complication rate of 1% was somewhat lower than the 3.5% permanent hypocalcemia observed in the present cohort. In contrast, Chahardahmasumi et al. described a markedly higher hypocalcemia rate of 54.4%¹¹, substantially exceeding our transient hypocalcemia rate of 10.5%, a discrepancy likely attributable to broader biochemical definitions and inclusion of asymptomatic cases. Pavani et al., working in a comparable tertiary teaching-hospital setting, reported an 8.3% hypocalcemia rate¹², closely approximating our own, while Baral et al. documented a considerably higher overall complication rate of 39.6%¹³, which may reflect differences in sample size and postoperative calcium monitoring protocols. Pandey et al., by contrast, reported a 20% overall complication rate and 3.75% permanent hypocalcemia¹⁴, almost identical to the present findings, lending external validity to our complication profile within the Indian tertiary care context. Soni et al. observed hypocalcemia in 16.9% of patients and RLN injury in 5.7%¹⁵, marginally higher than our rates despite a greater proportion of lesser procedures in their cohort, again pointing to variation in biochemical thresholds across studies. Asari et al., using more sensitive albumin-adjusted calcium and intact parathyroid hormone assays, reported transient hypoparathyroidism in approximately 24% of patients¹⁶, higher than our clinically ascertained rate, and notably found no significant influence of central neck dissection on hypocalcemia — a contrast with the strong association demonstrated in the present study.

Larger administrative and multicentre datasets provide additional context. Javidi et al. reported RLN injury in 6.1% of cases and higher hypocalcemia rates with total compared with subtotal thyroidectomy¹⁷, supporting the

principle that extent of surgery drives morbidity, while Mulita et al. described hypoparathyroidism in 15.89% of patients following total thyroidectomy for differentiated carcinoma¹⁸, modestly higher than our figure. Fassas et al., analysing over 161,000 patients in a large administrative database, reported a considerably lower overall complication rate of 3.28%¹⁹, likely reflecting a focus on major systemic events rather than biochemical hypocalcemia. Gonçalves Filho and Kowalski reported transient hypocalcemia in 13.1% and permanent hypocalcemia in 2.5% of patients, figures closely mirroring our own, and similarly identified neck dissection as a significant risk factor for hypocalcemia²⁰, corroborating the central finding of the present study.

Taken together, central neck dissection emerged as the most consistent and clinically important risk factor identified in this cohort, showing a significant bivariate association with overall complications and, more importantly, an independent, nearly nine-fold increase in the odds of postoperative hypocalcemia on logistic regression. This is biologically plausible, since dissection of the central compartment increases the risk of inadvertent devascularisation or removal of the parathyroid glands. Other demographic, clinical, and operative variables — including age, BMI, sex, hypertension, drain use, and previous surgery — did not independently predict complications, suggesting that meticulous surgical technique and standardised perioperative care, rather than baseline patient characteristics, are the principal determinants of outcome in this setting. The favourable rates of permanent nerve injury (0%), respiratory obstruction (0%), and thyroid storm (0%) further support the overall safety of total thyroidectomy as practised at this centre.

Limitations

This study has certain limitations. It was conducted at a single tertiary care institution, which may limit generalisability to centres with different case mix or perioperative protocols. Although the final sample ($n = 86$) exceeded the calculated requirement, the cohort size may still have limited statistical power to detect smaller independent predictors on multivariate analysis. Early postoperative intact parathyroid hormone levels were not routinely measured, and detailed intraoperative parathyroid variables, such as the number of glands identified or inadvertently resected, were not quantitatively documented, both of which may

have refined risk stratification. Follow-up duration was also not perfectly uniform across all patients, which could have influenced the classification of permanent complications.

CONCLUSION

Total thyroidectomy in this prospective cohort was associated with an acceptable overall complication rate, with three-fourths of patients experiencing an uneventful postoperative course. Transient hypocalcemia was the most common complication, while permanent recurrent laryngeal nerve injury and mortality were not observed, reflecting favourable surgical safety in this tertiary care setting. Central neck dissection significantly increased the risk of postoperative hypocalcemia, emphasising that the extent of surgical dissection remains a key determinant of metabolic morbidity, whereas other demographic, clinical, and operative variables did not independently predict complications. These findings reaffirm that total thyroidectomy is a safe and effective procedure when performed with careful identification and preservation of the parathyroid glands and recurrent laryngeal nerves, and that early recognition of high-risk patients — particularly those undergoing central neck dissection — combined with vigilant postoperative monitoring can help optimise outcomes.

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