



A Study on the Surgical Outcomes in different Thyroid Lesions in Sub Himalayan Rural Tertiary Care Hospital

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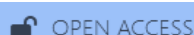
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ABSTRACT

Background; Thyroid lesions constitute a significant clinical burden in the sub-Himalayan region, where iodine deficiency contributes to a high prevalence of benign and malignant thyroid disorders. Surgery remains the primary mode of management, though the extent of resection influences complication rates. This study assessed clinical profiles, histopathological characteristics, surgical interventions, and postoperative outcomes among patients undergoing thyroid surgery in a tertiary care hospital in North Bengal.

Methods; An institution-based descriptive longitudinal study was conducted over 18 months (January 2023–July 2024) at North Bengal Medical College and Hospital. All patients above five years presenting with clinically diagnosed thyroid lesions and undergoing surgery were included (n=48). Data on demographics, clinical presentation, diagnostics, surgical type, and complications were collected using structured questionnaires and operative records. Statistical analyses were performed using MS Excel and SPSS version 22, with $p < 0.05$ considered significant.

Results; Most participants were young adults, with 50% aged 31–40 years, and a marked female predominance (81.3%). Solitary thyroid nodules constituted the most common presentation (70.8%). Histopathology revealed 70.8% benign and 29.2% malignant lesions. Hemithyroidectomy was the most frequently performed surgery (68.7%), followed by total thyroidectomy (23%) and total thyroidectomy with central neck dissection (8.3%). Complications were significantly higher after total thyroidectomy (54.5%) than hemithyroidectomy (30.3%) ($p = 0.042$). Common postoperative complications included asymptomatic unilateral recurrent laryngeal nerve palsy (22.9%) and hypocalcaemia (20.8%). Malignant lesions were associated with higher complication rates (50%) compared to benign lesions (32.3%) ($p = 0.251$). The mean hospital stay was 6.7 ± 3.2 days.

Conclusion; The study demonstrates a predominance of benign thyroid lesions and highlights hemithyroidectomy as a safer operative approach with fewer complications. Total thyroidectomy, though necessary for malignant disease, carries a substantially higher risk of postoperative morbidity. Careful surgical selection and meticulous operative technique are essential to reducing complication rates in thyroid surgery.

Keywords: Thyroidectomy; Thyroid Neoplasms; Postoperative Complications; Recurrent Laryngeal Nerve Injuries; Goiter.

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INTRODUCTION

The thyroid gland, derived from the Greek terms *thyreos* meaning shield and *eidos* meaning form, is a butterfly-shaped endocrine organ situated in the anteroinferior aspect of the neck.¹ Structurally, it consists of two lateral lobes connected by a central isthmus, forming the largest endocrine gland in the human body. Its superficial location renders any

enlargement or pathological alteration readily visible or palpable.² The thyroid is susceptible to a broad spectrum of pathological processes, including developmental abnormalities, inflammatory conditions, hyperplastic changes, and neoplastic transformations. Disturbances in thyroid hormone production may further complicate these lesions by producing distinct clinical manifestations that often necessitate careful evaluation and timely management.³ Thyroid swellings are commonly encountered in clinical practice and have been reported to occur in 4–7% of adults, with the majority being benign; malignancies constitute approximately 5% of all thyroid lesions.⁴ Most patients present with diffuse glandular enlargement or solitary/multiple nodules, although the overlapping nature of symptoms makes clinical differentiation challenging and underscores the importance of accurate diagnosis, particularly for distinguishing benign from malignant pathology, as this determines the appropriate therapeutic approach.⁵

Surgery remains the cornerstone of thyroid lesion management and may involve either hemithyroidectomy or total thyroidectomy, depending on the extent of the disease. When performed by skilled surgeons, thyroidectomy is considered a safe procedure with minimal mortality; nevertheless, it carries potential complications, ranging from mild postoperative flap edema to life-threatening hemorrhage or airway obstruction. Optimal preoperative preparation, including ensuring a euthyroid state, reduces the risk of perioperative complications.⁶

Hyperthyroid patients, for instance, are predisposed to postoperative laryngeal edema leading to airway compromise. Intraoperative technical errors may result in severe hemorrhage, recurrent laryngeal nerve injury, hypocalcaemia due to parathyroid devascularization, or inadequate resection resulting in persistent disease or recurrent hyperthyroidism.⁷ These risks highlight the need for meticulous technique and surgeon experience during thyroid surgery.

The sub-Himalayan belt, including the northern region of West Bengal, reports a particularly high prevalence of thyroid disorders, largely attributed to iodine deficiency in local soil and water. Patients commonly present with neck swelling, compressive symptoms, or features of thyrotoxicosis.⁸ Owing to the high burden of thyroid disease in this region, thyroid surgeries are frequently performed, emphasizing the importance of periodic evaluation of surgical outcomes and complication trends to improve patient care.⁹

Given the significant regional prevalence of thyroid lesions and varied postoperative outcomes, the present study was undertaken to assess the clinical presentations, pathological characteristics, surgical outcomes, and complication rates associated with different thyroid surgeries performed in a tertiary care teaching hospital of North Bengal. This study aims to contribute localized epidemiological data and provide insights into optimizing surgical management in populations residing in the sub-Himalayan region of India.

MATERIALS AND METHODS

This institution-based descriptive longitudinal study was conducted in the Department of Otorhinolaryngology at North Bengal Medical College and Hospital, a major tertiary care teaching center in Darjeeling, India. The study spanned 18 months, from January 2023 to July 2024, and involved patients older than five years who presented with clinically diagnosed thyroid lesions and were scheduled for surgical management. Individuals were included only after providing informed consent. Patients with congenital neck masses, recurrent lesions previously treated surgically, those unwilling to undergo surgical management, and children below five years of age were excluded from participation. A complete enumeration sampling technique was employed, whereby all eligible patients presenting during the study period were enrolled.

Ethical approval for the study was obtained from the Institutional Ethics Committee of North Bengal Medical College and Hospital. Participants were informed in their own language about the study objectives, procedures, and voluntary nature of participation, confidentiality safeguards, and their right to withdraw at any stage.

Data collection utilized pre-designed, pre-tested structured questionnaires administered directly to the participants. Information regarding sociodemographic characteristics, clinical presentation, and relevant medical history was recorded. Each patient subsequently underwent diagnostic investigations—including ultrasonography, CT scan of the neck, and fine-needle aspiration cytology—to establish the nature of the thyroid lesion and determine malignancy status. Following diagnostic confirmation, patients were evaluated by the anesthesiology department for preoperative fitness and were later taken to the operating theatre for hemithyroidectomy, total thyroidectomy, or total thyroidectomy with central neck dissection, as appropriate. Intraoperative observations, surgical findings, and complications were meticulously documented in individual case records. Essential instruments for pre- and postoperative assessment included indirect laryngoscopy mirrors, tongue depressors, a 70-degree endoscope, lignocaine spray, gauze, and antiseptic solutions. After data collection, all information was anonymized and securely stored in a password-protected electronic database.

Data analysis was performed using Microsoft Excel and IBM SPSS version 22. Descriptive and inferential statistical methods were applied, with categorical variables expressed as proportions and continuous variables summarized as mean \pm standard deviation. Graphical presentations included tables, bar charts, and pie diagrams. A p-value of <0.05 was considered statistically significant for analytical comparisons.

RESULTS

A total of 48 patients who underwent surgical management for thyroid lesions were included in the present study. The age distribution revealed that the majority of participants belonged to the 31–40-year age group, accounting for 50% of all cases, while only 2.1% were aged above 60 years. The mean age of the cohort was 32.6 ± 12.1 years, indicating that thyroid lesions requiring surgery were most frequently encountered among younger adults.

Pictures-



Table 1. Sociodemographic and clinical characteristics of the study participants (n=48)

1 a- Age

Parameters (years)	Frequencies	Percentage
11-20	3	6.3
21-30	12	25
31-40	24	50
41-50	6	12.5
51-60	2	4.1
>60	1	2.1

1 b- Sex

Parameters	Frequencies	Percentage
Female	39	81.3
Male	9	18.7

1 c- Residence

Parameters	Frequencies	Percentage
Hills	18	37.5
Plains	30	62.5

1 d- Presentation

Parameters	Frequencies	Percentage
Solitary thyroid nodule	34	70.8
Solitary nodule with lymphadenopathy	1	2.1
Multinodular	5	10.4
Multinodular with lymphadenopathy	2	4.2
Bilateral swelling with hoarseness of voice	1	2.1
Bilateral swelling with stridor	3	6.2
Bilateral swelling with fixation to deeper structure	2	4.2

1 e- Type

Parameters	Frequencies	Percentage
Benign	34	70.8
Malignant	14	29.2

Table 2. Distribution of study participants according to their surgery performed as per their histopathological diagnosis (n=48)

Diagnosis	surgery		
	Hemithyroidectomy	Total thyroidectomy	Total thyroidectomy with central neck dissection
Colloid goiter (30)	24 (80%)	6 (20%)	-
Papillary carcinoma (10)	3 (30%)	5 (50%)	2 (20%)
Follicular adenoma (4)	4 (100%)	-	-
Hurthle cell carcinoma (2)	2 (100%)	-	-
Medullary carcinoma (2)	-	-	2 (100%)

Table 3. Distribution of study participants according to incidence of complications according to the type of surgery performed (n=48)

Surgery	Complications		p-value
	Present	absent	
Hemithyroidectomy (33)	10 (30.3%)	23 (69.7%)	0.307*
Total thyroidectomy (11)	6(54.5%)	5 (45.5%)	
Total thyroidectomy with central neck dissection (4)	2 (50%)	2 (50%)	

Table 4. Distribution of study participants according to the type of complications (n=48)

Complications	Frequency	Percentage
Unilateral recurrent laryngeal nerve palsy (asymptomatic)	11	22.9
Unilateral recurrent laryngeal nerve palsy with change in voice	3	6.2
Unilateral superior laryngeal nerve along with recurrent laryngeal nerve palsy	4	8.3
Hypocalcaemia	10	20.8
Hypertrophic scar	1	2.1
Hematoma	1	2.1
Tracheostomy needed	1	2.1

Women constituted a substantial majority of the study population, with 81.3% being female and only 18.7% male, demonstrating a clear female preponderance in the occurrence of thyroid lesions (Table 1). In terms of geographical distribution, 62.5% of patients were residents of the plains, whereas 37.5% resided in the hilly regions of North Bengal. Analysis of clinical presentations showed that solitary thyroid nodules were the most common presenting complaint, observed in 70.8% of patients. A smaller proportion presented with multinodular goiter (10.4%), while 6.2% reported bilateral swelling associated with stridor, reflecting significant airway compromise in a subset of cases. Additionally, 4.2% of patients presented with bilateral swelling fixed to deeper structures, indicating possible malignant infiltration, and 2.1% presented with unilateral nodules accompanied by lymphadenopathy.

Based on histopathological evaluation, benign lesions accounted for 70.8% of cases, whereas malignant lesions comprised the remaining 29.2%, demonstrating that nearly one-third of surgically managed thyroid lesions in this cohort were cancerous.

With regard to the type of surgery performed, hemithyroidectomy was the most frequently conducted procedure, performed in 68.7% of the patients. Total thyroidectomy was carried out in 23% of cases, while 8.3% underwent total thyroidectomy with central neck dissection due to confirmed malignant involvement.

A more detailed analysis of surgical procedures based on diagnosis revealed that 80% of colloid goiter patients underwent hemithyroidectomy, whereas all patients with follicular adenoma and Hurthle cell carcinoma also underwent hemithyroidectomy. Among malignant conditions, 50% of patients with papillary carcinoma underwent total thyroidectomy, and 20% required total thyroidectomy with central neck dissection. All cases of medullary carcinoma required total thyroidectomy with neck dissection due to their aggressive nature.

Postoperative complications were assessed in relation to the type of surgery. Complications occurred significantly more often following total thyroidectomy (54.5%) compared to hemithyroidectomy (30.3%) ($p = 0.042$), highlighting a higher risk profile associated with more extensive surgical interventions. Total thyroidectomy with central neck dissection demonstrated a 50% complication rate.

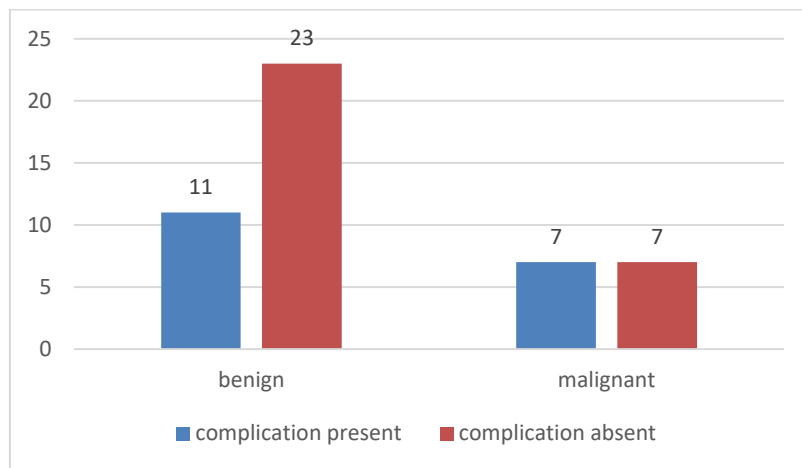


Figure 1. Distribution of study participants according to incidence of complications according to the type of lesion (n=48)

Evaluation of individual complications showed that the most common postoperative issue was asymptomatic unilateral recurrent laryngeal nerve (RLN) palsy, affecting 22.9% of patients. Symptomatic RLN palsy leading to voice change occurred in 6.2% of cases, while another 8.3% experienced combined superior and recurrent laryngeal nerve palsy. Hypocalcaemia—likely due to inadvertent parathyroid injury or injury to the blood vessels which supply parathyroid gland, was observed in 20.8% of patients. Less frequent complications included hypertrophic scarring (2.1%), hematoma formation (2.1%), and need for tracheostomy (2.1%). No case of unilateral superior laryngeal nerve palsy was found in our study.

The incidence of complications was also significantly associated with the nature of the thyroid lesion. Malignant lesions demonstrated a complication rate of 50%, notably higher than the 32.3% complication rate observed in benign lesions ($p = 0.251$), suggesting that more aggressive disease pathology and extensive surgical requirements contributed to increased postoperative risks.

Finally, the mean duration of hospital stay for the study cohort was 6.7 ± 3.2 days, reflecting the postoperative monitoring requirements typical of thyroid surgeries, especially in cases with complications or extensive resections.

DISCUSSION

The present study evaluated the surgical outcomes and complication patterns associated with the management of various thyroid lesions in a tertiary care teaching hospital in North Bengal, a region characterized by iodine deficiency and a high burden of thyroid disorders. The demographic pattern of the study cohort revealed that thyroid lesions were most common in younger and middle-aged adults, with half of the cases occurring in individuals aged 31–40 years. This observation is consistent with the findings of Geron et al., who reported that most patients undergoing hemithyroidectomy for papillary thyroid microcarcinoma were in their third and fourth decades of life.¹⁰ Similarly, Ji et al. demonstrated a comparable age distribution among clinically node-negative papillary thyroid carcinoma patients, aligning with the trend seen in the current study.¹¹ The younger age profile may also reflect better access to healthcare and earlier detection in endemic goiter regions like the sub-Himalayan belt.

An overwhelming female predominance was observed, with women constituting more than four-fifths of the study population. This is in line with global epidemiological trends that consistently show a higher incidence of thyroid disorders among females. Hauch et al. documented similar female predominance in their nationwide analysis of thyroidectomy outcomes.¹² Grover et al. also reported that the majority of their surgical cohort were women, and Kandil et al. associated this gender pattern with higher rates of autoimmune thyroiditis observed in females.^{13,14} The higher susceptibility of women to thyroid disease has been linked to hormonal and immunological factors, and this biological predisposition likely explains the sex distribution in the present study. Furthermore, iodine deficiency—prevalent in the sub-Himalayan region—has been shown to disproportionately affect women, potentially contributing to the high female representation in this population.

In terms of clinical presentation, solitary thyroid nodules were the most common finding, representing over 70% of cases. This mirrors observations from global data, where solitary nodules represent the predominant clinical manifestation of benign and malignant thyroid disorders. A substantial proportion of multinodular goiter cases and cases with pressure symptoms were also seen, reflecting the endemic nature of goitrous enlargement in the region. The histopathological spectrum showed that benign lesions, particularly colloid goiter, constituted the majority, while papillary carcinoma was the most frequent malignancy. This distribution is consistent with that reported by Son et al., Geron et al., and Ji et al., whose studies on papillary thyroid carcinoma also found papillary cancer to be the dominant malignant subtype.¹⁵

Hemithyroidectomy was the most commonly performed surgical procedure in the present study. A significant body of literature supports hemithyroidectomy as an effective and safe treatment option for benign thyroid lesions and selected low-risk papillary thyroid cancers. Geron et al. demonstrated favourable long-term oncologic outcomes following hemithyroidectomy in carefully selected papillary carcinoma patients.^{Error! Bookmark not defined.} Ji et al. also concluded that hemithyroidectomy is oncologically adequate for tumours ≤ 2 cm with minimal extra thyroidal extension.^{Error! Bookmark not defined.} Moreover, Schapp et al. and Hsiao et al. showed that hemithyroidectomy is associated with fewer postoperative complications—including lower risk of recurrent laryngeal nerve injury and hypoparathyroidism—compared with total thyroidectomy.^{16,17} These findings support the predominance of hemithyroidectomy in the current study and validate its role in minimizing surgical morbidity.

Complications were significantly more common after total thyroidectomy than hemithyroidectomy, in agreement with multiple studies. In the present cohort, 54.5% of total thyroidectomy patients developed complications, compared with 30.3% after hemithyroidectomy. This finding aligns with Kandil et al., who reported higher rates of hypocalcaemia, bleeding, and recurrent laryngeal nerve injury after total thyroidectomy.^{Error! Bookmark not defined.} Jensen et al. also documented substantial postoperative hypocalcaemia following total thyroidectomy, similar to the 20.8% hypocalcaemia rate seen in this study.⁸

Voice-related complications, such as unilateral recurrent laryngeal nerve palsy were the most common complications observed, reflecting the trends noted by Grover et al., who reported moderate to severe postoperative voice and swallowing impairment in many of their patients.^{Error! Bookmark not defined.}

The study further found that patients with malignant lesions experienced significantly higher complication rates than those with benign conditions. This observation is supported by Beka et al., who reported higher rates of permanent recurrent laryngeal nerve paresis in surgeries performed for compressive or malignant indications compared with diagnostic hemithyroidectomy.¹⁹

The greater surgical complexity and need for extensive dissection in malignant cases likely contribute to this increased risk.

CONCLUSION

The present study highlights the predominance of benign thyroid lesions, particularly colloid goiter, and confirms that hemithyroidectomy remains a safe and effective surgical option for most patients. Total thyroidectomy, while necessary for malignant disease, was associated with significantly higher complication rates, especially hypocalcaemia and recurrent laryngeal nerve injury. Malignant lesions demonstrated greater postoperative morbidity, reflecting the complexity of their management.

Declaration:

Conflicts of interests: The authors declare no conflicts of interest.

Author contribution: All authors have contributed in the manuscript.

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