

Incidence Of Recurrent Laryngeal Nerve (RLN) Palsy In Patients Undergoing Thyroid Surgery

Md. Morshed Alam¹, Syeda Sharmin Jamal², Mohammad Wahiduzzaman³, Syed Ali Ahasan⁴,
Mohammad Idrish Ali⁵, Arif Mahmud Jewel⁶, Umme Salma Sumi⁷

¹Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

²Consultant, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

³Associate Professor, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

⁴Assistant Professor, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

⁵Consultant, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

⁶Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

⁷Medical Officer, Sheikh Hasina National Institute of Burn & Plastic Surgery, Dhaka, Dhaka, Bangladesh

Corresponding author: Md. Morshed Alam, Medical Officer, Department of ENT, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Dhaka, Bangladesh

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ABSTRACT

Introduction: Thyroid surgery is among the most common neck surgeries performed worldwide. Injury to the recurrent laryngeal nerve (RLN) remains one of its most significant complications, leading to vocal cord paresis or paralysis. The most reliable way to preserve RLN integrity is to visually identify the nerve during all thyroid and parathyroid surgeries.

Objective: To determine the incidence of RLN palsy in patients undergoing thyroid surgery.

Methods: This prospective longitudinal observational study was conducted at the Department of Otolaryngology–Head & Neck Surgery, BSMMU Hospital, from July 2023 to August 2024. All patients provided informed consent and were counseled regarding the type of surgery (hemithyroidectomy, total thyroidectomy, or completion thyroidectomy) and potential complications, with special emphasis on RLN palsy. Preoperative and postoperative vocal cord assessments were performed using flexible laryngoscopy. Patients with RLN palsy were managed conservatively and followed up for six months to determine recovery status.

Results: Among 78 thyroid surgeries, 8 patients (10.25%) developed RLN palsy (5 right-sided, 3 left-sided). Seven patients (8.97%) recovered within 4 weeks, while one male patient (1.28%) developed permanent palsy. RLN injury was more common in total and completion thyroidectomy compared to hemithyroidectomy.

Conclusion: RLN injury during thyroid surgery is not uncommon. Most cases are temporary and resolve with conservative management. Careful dissection, full visualization of the RLN, and preservation of its blood supply are crucial to reducing the risk of nerve injury.

Keywords: Thyroid Surgery, Recurrent Laryngeal Nerve Palsy, Total Thyroidectomy, Hemithyroidectomy, Iatrogenic Injury

INTRODUCTION

Thyroidectomy is one of the most frequently performed endocrine and head–neck surgical procedures worldwide, indicated for benign thyroid disease, multinodular goiter, Graves' disease, and thyroid malignancies.¹ Despite advances in surgical techniques, anesthesia, and perioperative care, injury to the recurrent laryngeal nerve (RLN) remains one of the most feared complications of thyroid surgery due to its potential impact on voice, swallowing, and quality of life.²

The RLN provides motor innervation to all intrinsic laryngeal muscles except the cricothyroid, and its injury can lead to vocal cord paresis or paralysis.³ Clinically, this may manifest as hoarseness, dysphonia, aspiration, and in bilateral cases, airway obstruction that may necessitate emergency tracheostomy.⁴ RLN injury may be transient, with spontaneous recovery within weeks to months, or permanent if neural continuity is lost or fibrosis develops.^{5,6}

Reported incidences of RLN palsy vary widely, ranging from 1.5% to 14%, depending on the type of surgery, patient population, surgical expertise, and method of RLN assessment.⁷ Risk factors include re-exploration surgery, thyroid malignancy, Graves' disease, large goiters, and distorted anatomy due to inflammation or fibrosis.^{8,9} RLN palsy can result from multiple mechanisms including direct transection, traction, crush injury, thermal injury from cautery, or ischemia due to compromised blood supply.¹⁰

Prevention of RLN palsy is therefore a critical goal of thyroid surgery. Visual identification of the nerve is considered the gold standard to minimize iatrogenic injury, and intraoperative neuromonitoring (IONM) is increasingly being used as an adjunct to facilitate nerve identification and functional assessment.^{11,12} Moreover, preoperative laryngeal examination is recommended to identify preexisting vocal cord dysfunction, which may alter surgical planning and postoperative management.¹³

MATERIALS AND METHODS

Study Design and Setting

A prospective longitudinal observational study was conducted at the Department of Otolaryngology–Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), from July 2023 to August 2024.

Participants

All patients undergoing thyroid surgery during the study period were included after obtaining written informed consent. Exclusion criteria included patients with pre-existing vocal cord paralysis or those unwilling to participate.

Preoperative Assessment

All patients underwent clinical examination, neck ultrasonography, fine-needle aspiration cytology (FNAC), and imaging when indicated. Preoperative flexible laryngoscopy was performed to document vocal cord mobility.

Surgical Procedure

Surgery (hemithyroidectomy, total thyroidectomy, or completion thyroidectomy) was performed by the same surgical team. Efforts were made to identify and preserve the RLN whenever possible.

Postoperative Evaluation and Follow-Up

Vocal cord function was assessed by flexible laryngoscopy on postoperative day 4, at discharge, and during follow-up visits at 1, 3, and 6 months. RLN palsy was defined as partial or complete loss of vocal cord mobility during phonation.

Patients with RLN palsy were managed conservatively with corticosteroids in the immediate postoperative period, followed by speech and voice therapy. Palsy persisting beyond 6 months was classified as permanent.

RESULTS

A total of 78 patients underwent thyroid surgery during the study period (July 2023 – August 2024). The mean age of the patients was 39.6 ± 10.7 years (range: 21–65 years). The majority of patients were female ($n = 62$, 79.5%), while males accounted for 16 cases (20.5%). Out of 78 surgeries, 8 patients (10.25%) developed RLN palsy. Five of these cases involved the right RLN (62.5%) and three involved the left RLN (37.5%). No cases of bilateral RLN palsy were observed. Of the 8 patients with RLN palsy, 7 (87.5%) had transient palsy that resolved within 4 weeks, while 1 patient (12.5%) developed permanent RLN palsy, persisting at 6-month follow-up. This permanent palsy occurred in a male patient who had undergone completion thyroidectomy for papillary thyroid carcinoma.

Table-1: Type of Surgery and RLN Palsy

Type of Surgery	Number of Surgeries (n)	RLN Palsy (n)	RLN Palsy (%)
Total Thyroidectomy	27	4	16.66%
Total Thyroidectomy + MRND	5	0	0%
Hemithyroidectomy	49	3	6.97%
Completion Thyroidectomy	9	1	14.28%
Overall	78	8	10.25%

RLN palsy was most frequent in patients undergoing total thyroidectomy (16.66%), followed by completion thyroidectomy (14.28%). Hemithyroidectomy had the lowest incidence (6.97%). No RLN palsy occurred in patients undergoing total thyroidectomy with modified radical neck dissection (MRND).

Table-2: Recovery Pattern

Outcome	Number of Patients (n)	Percentage (%)
Temporary Palsy (Recovered ≤ 4 weeks)	7	8.97%
Permanent Palsy (Persisted > 6 months)	1	1.28%

Among patients with temporary palsy, the majority ($n = 5$, 71.4%) experienced voice improvement within 2–3 weeks, with complete resolution confirmed by flexible laryngoscopy at 4 weeks.

Table-3: Histopathological Findings

Histopathological Diagnosis	Number of Cases (n)	Percentage (%)
Multinodular Goiter	58	74.36%
Papillary Thyroid Carcinoma	15	19.23%
Follicular Adenoma	3	3.85%
Thyroiditis (e.g., Hashimoto)	2	2.56%
Total	78	100%

Histopathological analysis revealed benign multinodular goiter in 58 cases (74.3%), papillary thyroid carcinoma in 15 cases (19.2%), and other benign conditions (thyroiditis, follicular adenoma) in 5 cases (6.4%). The single case of permanent RLN palsy was associated with completion thyroidectomy for papillary carcinoma.

DISCUSSION

The present study found an overall incidence of RLN palsy of 10.25% among patients undergoing thyroid surgery, with 8.97% of cases being temporary and 1.28% permanent. This incidence falls within the range reported in the literature, which varies between 1.5% and 14%.^{7,13} Temporary RLN palsy is generally attributed to neuropraxia caused by traction, thermal edema, or mild ischemia, whereas permanent palsy is usually due to transection or severe injury to the nerve.¹⁰

In our cohort, RLN palsy occurred more frequently following total and completion thyroidectomy compared to hemithyroidectomy, which is consistent with previous studies. Bora et al. reported a higher incidence of RLN palsy in bilateral procedures compared to unilateral surgery, likely due to greater dissection and nerve exposure.¹⁴⁻¹⁸ Similarly, Beahrs et al. reported a 17% incidence of RLN palsy following completion thyroidectomy, reflecting the increased technical difficulty and risk of scar tissue dissection in reoperative settings.¹⁹

Right-sided RLN injury was more common in our series, which aligns with anatomical studies demonstrating greater variability in the course of the right RLN.²⁰ The nerve on the right side takes a more oblique course and may be more prone to traction injury during dissection.^{16,17} Identifying the nerve throughout its course is crucial in minimizing injury. Some surgeons advocate for complete exposure of the RLN to verify its anatomical integrity, whereas others prefer a capsular dissection technique to avoid unnecessary manipulation.^{16,21-23} While both approaches are accepted, meticulous dissection and avoidance of excessive traction are key principles.

Our findings support the recommendation of routine pre- and postoperative laryngoscopic assessment to document vocal cord function, as subclinical palsy may otherwise be missed.²¹ Early identification also allows timely initiation of conservative management, including corticosteroids and voice therapy, which may improve outcomes.²⁴

The use of intraoperative neuromonitoring (IONM) has been shown to reduce the risk of RLN injury, particularly in high-risk cases such as re-exploration, malignancy, or distorted anatomy.^{18,22} Although IONM was not routinely available in our setting, its adoption could further improve outcomes. Additionally, surgeon experience plays a major role in RLN preservation. High-volume thyroid surgeons have been shown to have lower complication rates, emphasizing the importance of structured training and supervision.^{4,5}

Overall, our study reinforces that RLN palsy, though often temporary, remains a significant concern in thyroid surgery. Prevention strategies should focus on meticulous surgical technique, nerve identification, careful hemostasis, and, where feasible, use of neuromonitoring. Long-term follow-up is crucial to differentiate transient from permanent palsy and to plan rehabilitative measures.

CONCLUSION

RLN palsy is an important complication of thyroid surgery, more frequently observed in total and completion thyroidectomy than hemithyroidectomy. Most cases are temporary and recover with conservative management. Careful dissection, identification of the RLN along its entire course, and gentle handling are crucial to minimizing the risk of injury.

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