INSIGHTS-JOURNAL OF
HEALTH AND REHABILITATION

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

INCIDENCE OF RECURRENT LARYNGEAL NERVE INJURY IN HEMI THYROIDECTOMY AND TOTAL THYROIDECTOMY AT JPMC KARACHI

Original Research

Zulfiqar Ali[1]*, Zahid Mehmood[2], Muhammad Yasir Mengal[1], Kanwal[3], Muhammad Nabeel[1], Muhammad Parial Shahani[4]
[1]Postgraduate Trainee, Jinnah Postgraduate Medical Center Karachi, Pakistan.
[2]Associate Professor, Jinnah Postgraduate Medical Center Karachi, Pakistan.
[3]Senior Registrar, Jinnah Postgraduate Medical Center Karachi, Pakistan.
[4]Assistant Professor, SMBB Medical University Larkana, Pakistan.
Corresponding Author: Zulfiqar Ali, Postgraduate Trainee, Jinnah Postgraduate Medical Center Karachi, Pakistan, Zsoomro76@yahoo.com
Acknowledgment: We sincerely acknowledge the support of the surgical ward team at Jinnah Postgraduate Medical Center, Karachi, for their invaluable assistance in this study.

Conflict of Interest: None
Grant Support & Financial Support: None

ABSTRACT

Background: ARecurrent laryngeal nerve (RLN) injury is a significant complication of thyroid surgery, affecting essential functions like speech and breathing. Damage to the RLN can lead to hoarseness, speaking difficulties, and respiratory issues, impacting patients' quality of life. Total thyroidectomy and hemi-thyroidectomy are common surgical approaches for managing thyroid disorders, but their associated risks for RLN injury require careful evaluation to guide clinical decision-making.

Objective: To determine the incidence of recurrent laryngeal nerve injury and compare its frequency in hemi-thyroidectomy and total thyroidectomy.

Methods: A comparative cross-sectional study was conducted at the surgical ward of Jinnah Postgraduate Medical Center, Karachi. A total of 158 patients who met the inclusion criteria were divided into two groups: Group I (n=79) underwent hemi-thyroidectomy, and Group II (n=79) underwent total thyroidectomy. Data on sociodemographic details, presenting complaints, preoperative FNAC reports, comorbidities, indications for surgery, and operative procedures were collected from hospital records and recorded on a predesigned questionnaire. Surgical outcomes and the incidence of RLN injury were evaluated.

Results: In Group I, the mean age was 34.2 ± 4.89 years, mean BMI was 26.12 ± 2.74 kg/m², mean nodular size was 2.11 ± 0.85 cm, and mean surgery duration was 52.32 ± 12.21 minutes. In Group II, the mean age was 41.11 ± 6.34 years, mean BMI was 27.23 ± 2.88 kg/m², mean nodular size was 2.43 ± 0.94 cm, and mean surgery duration was 72.34 ± 19.75 minutes. Recurrent laryngeal nerve injury occurred in 6 patients (7.59%) in Group I and 9 patients (11.39%) in Group II.

Conclusion: Both hemi-thyroidectomy and total thyroidectomy are effective and safe surgical approaches for thyroid gland removal, with comparable risks of transient RLN injury when performed by experienced surgeons.

Keywords: Fine needle aspiration cytology (FNAC), hemi-thyroidectomy, incidence, recurrent laryngeal nerve injury, surgical outcomes, thyroidectomy, total thyroidectomy.

INTRODUCTION

Thyroid illnesses represent a significant global health concern, accounting for approximately 30–40% of the burden of endocrine diseases and ranking as the most prevalent endocrine disorder after diabetes mellitus (1). These conditions arise from a variety of causes, including thyroiditis, hypothyroidism, hyperthyroidism, and both benign and malignant thyroid tumors, such as diffuse or nodular goiters and neoplasms (1, 2). The management of thyroid disorders often involves a combination of medical and surgical interventions, with surgery being a cornerstone for conditions such as hyperthyroidism, goiters, and thyroid malignancies (3, 5). Indications for surgical intervention include cosmetic concerns related to anterior neck swelling, confirmed or suspected malignant changes, and the presence of pressure or toxic symptoms such as dysphagia, dyspnea, voice changes, palpitations, weight loss, heat intolerance, diarrhea, tremors, restlessness, and irritability (3, 4).

While thyroid surgery is considered a generally safe and effective therapeutic approach, complications remain a significant concern due to their potential impact on patient health and quality of life. Among these complications, recurrent laryngeal nerve injury is particularly noteworthy. The recurrent laryngeal nerve innervates the laryngeal muscles, which are critical for phonation and respiration. Damage to this nerve during thyroid surgery can result in hoarseness, speaking difficulties, or even respiratory compromise (7). Furthermore, inadvertent injury to the parathyroid glands, which are anatomically close to the thyroid gland, poses another challenge. These glands are responsible for producing hormones that regulate calcium homeostasis, and their damage may lead to hypocalcemia. This condition can manifest as muscle cramps, numbness, and tingling sensations in the extremities, significantly affecting patient well-being (8, 9).

Despite these risks, advancements in surgical techniques and postoperative care have contributed to favorable outcomes for the majority of patients undergoing thyroidectomy. However, recurrent laryngeal nerve injury remains a concern due to its potential to cause long-term morbidity. This study aims to evaluate the incidence of recurrent laryngeal nerve injury in patients undergoing thyroidectomy, specifically comparing its occurrence between hemi-thyroidectomy and total thyroidectomy. This objective seeks to provide evidence-based insights to optimize surgical strategies and improve patient outcomes.

METHODS

A comparative cross-sectional study was conducted in the surgical ward of Jinnah Postgraduate Medical Center (JPMC), Karachi, to evaluate the incidence and type of recurrent laryngeal nerve injury in patients undergoing hemi-thyroidectomy and total thyroidectomy. Participants were selected through a consecutive sampling technique, ensuring inclusivity of all male and female patients who met the study's inclusion criteria. Patient data were retrieved from hospital records, including sociodemographic information, presenting complaints, preoperative fine needle aspiration cytology (FNAC) reports, comorbidities, indications for surgery, and details of the operative procedure. All relevant information was systematically recorded using a predesigned questionnaire to maintain uniformity.

The sample size was calculated as 158 participants, using the "estimation of proportion in a single population" formula. This calculation was based on an assumed prevalence of hyperthyroidism post-thyroidectomy of 10%, with a 95% confidence interval and a 5% margin of error. Patients were divided into two groups: Group I included 79 patients undergoing hemi-thyroidectomy, and Group II comprised 79 patients undergoing total thyroidectomy. Patients with multinodular diffuse goiter or a history of previous neck or thyroid surgery were excluded from the study to minimize confounding factors.

Ethical approval was obtained from the Ethical Review Board of Jinnah Postgraduate Medical Center, ensuring that the study adhered to the principles of medical research ethics. All patients included in the study were informed about the potential risks and benefits of their surgical procedures, and verbal or written consent was obtained before enrollment.

RESULTS

A total of 158 patients who underwent thyroid surgery were evaluated, with 79 patients in each of the two groups. Group I consisted of patients undergoing hemi-thyroidectomy, and Group II included patients undergoing total thyroidectomy. In Group I, the mean age of participants was 34.2 ± 4.89 years, with a minimum and maximum age of 22.5 and 56 years, respectively. The mean BMI was 26.12 ±

2.74, while the mean nodular size measured 2.11 ± 0.85 cm. The mean duration of surgery for this group was recorded as 52.32 ± 12.21 minutes, ranging from 26.5 to 110 minutes. In contrast, Group II had a higher mean age of 41.11 ± 6.34 years, with a range of 20.5 to 63.5 years. The mean BMI in this group was 27.23 ± 2.88, and the mean nodular size was slightly larger at 2.43 ± 0.94 cm. The mean duration of surgery in Group II was significantly longer, at 72.34 ± 19.75 minutes, with a range of 45.5 to 156 minutes.

The incidence of recurrent laryngeal nerve injury was observed to differ between the two groups. In Group I, six patients (7.59%) experienced recurrent laryngeal nerve injury, while the majority, 73 patients (92.4%), did not report any nerve-related complications. In Group II, a slightly higher proportion of patients, nine individuals (11.39%), experienced recurrent laryngeal nerve injury, whereas 70 patients (88.6%) had no such injuries. These findings highlight a modestly increased risk of nerve injury in patients undergoing total thyroidectomy compared to hemi-thyroidectomy.

The results underscore the need for careful consideration of the surgical approach, as total thyroidectomy demonstrated a longer duration of surgery and a slightly higher incidence of nerve injury compared to hemi-thyroidectomy. However, additional data regarding postoperative recovery, severity of nerve injury, and its clinical impact remain missing, which would be essential to fully address the study's objective of evaluating the overall incidence and type of nerve injury.

The demographic comparison between the two groups revealed that Group II (total thyroidectomy) patients had a higher mean age of 41.11 ± 6.34 years compared to 34.2 ± 4.89 years in Group I (hemi-thyroidectomy). Similarly, the mean BMI was slightly higher in Group II at 27.23 ± 2.88 kg/m² compared to 26.12 ± 2.74 kg/m² in Group I. The mean nodular size was also larger in Group II, measuring 2.43 ± 0.94 cm versus 2.11 ± 0.85 cm in Group I. These differences suggest that patients undergoing total thyroidectomy were older, had a marginally higher BMI, and presented with larger nodules compared to those undergoing hemi-thyroidectomy.

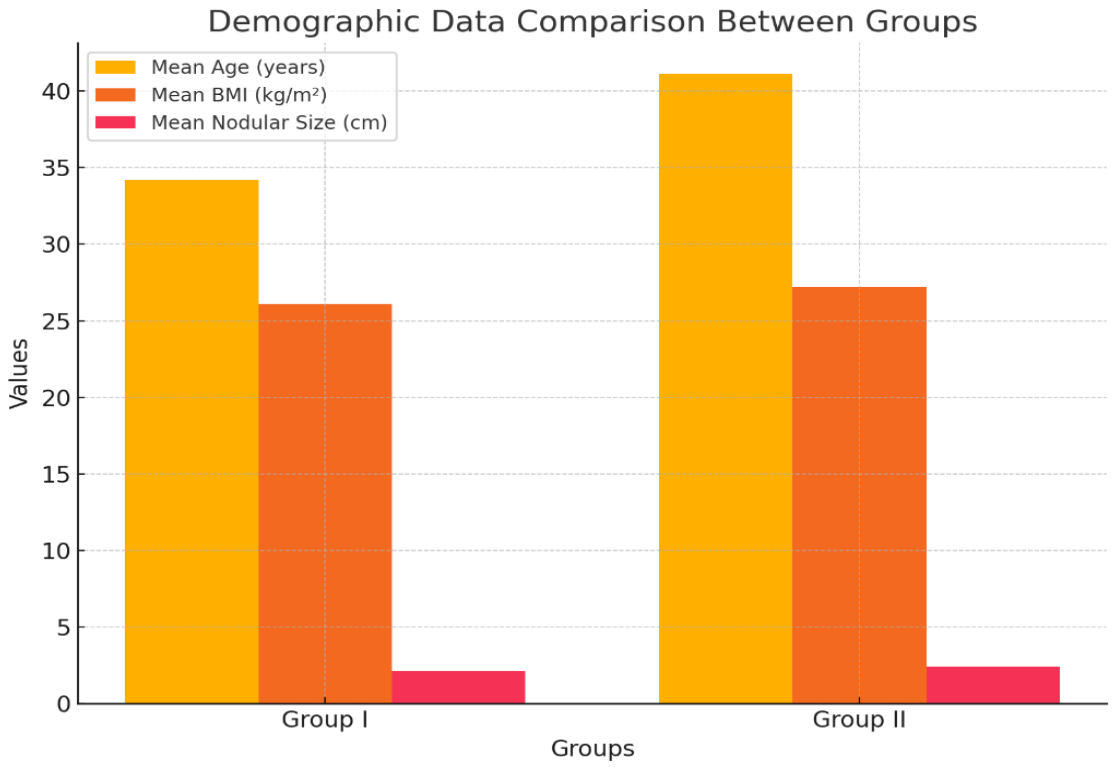

Figure 1 Demographic Data Comparison Between Groups

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

Table I Descriptive Statistics of the Study Participants

Group I				
	Min	**Max**	**Mean**	**SD**
Duration of the Surgery (min)	26.5	110	52.32	12.21
Group II				
Age	20.5	63.5	41.11	6.34
BMI	23.5	31.5	27.23	2.88
Nodular size (cm)	2.12	3.94	2.43	0.94
Duration of the Surgery	**45.5**	**156**	**72.34**	**19.75**

The descriptive statistics revealed that the duration of surgery was notably longer in Group II (total thyroidectomy), with a mean duration of 72.34 ± 19.75 minutes, ranging from 45.5 to 156 minutes, compared to Group I (hemi-thyroidectomy), where the mean duration was 52.32 ± 12.21 minutes, ranging from 26.5 to 110 minutes. Additionally, Group II demonstrated a wider age range (20.5–63.5 years), higher mean BMI (27.23 ± 2.88 kg/m²), and larger nodular size (2.43 ± 0.94 cm) compared to Group I. These results highlight significant differences in surgical and demographic parameters between the groups.

Table II Recurrent Laryngeal Nerve Injury among Study Participants

Group I (n=79)			**%**
Recurrent Laryngeal Nerve Injury	Yes	6	7.59
	No	73	92.4
Total		79	100
Group II (n=79)			
Recurrent Laryngeal Nerve Injury	Yes	9	11.39
	No	70	88.6
		79	100

The incidence of recurrent laryngeal nerve injury was higher in Group II (total thyroidectomy) at 11.39% (9 out of 79 patients) compared to 7.59% (6 out of 79 patients) in Group I (hemi-thyroidectomy). The majority of patients in both groups did not experience nerve injury, with 92.4% in Group I and 88.6% in Group II remaining unaffected. These findings indicate a slightly increased risk of recurrent laryngeal nerve injury in total thyroidectomy compared to hemi-thyroidectomy.

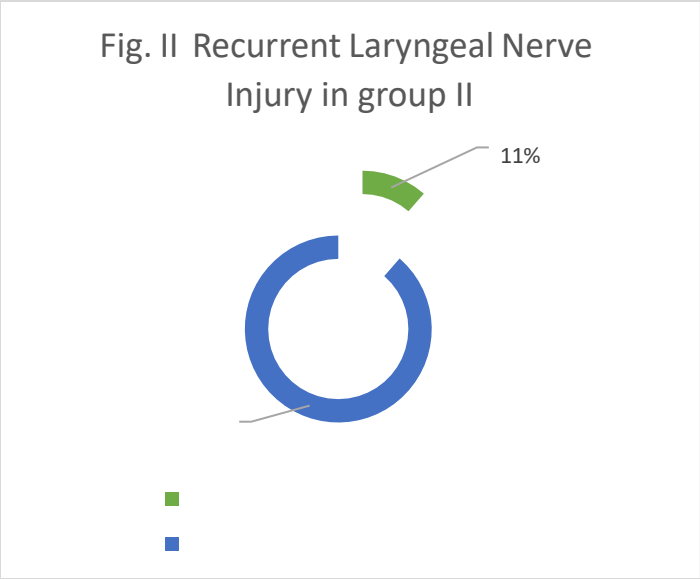

Figure 3 Recurrent Laryngeal Nerve Injury in group II

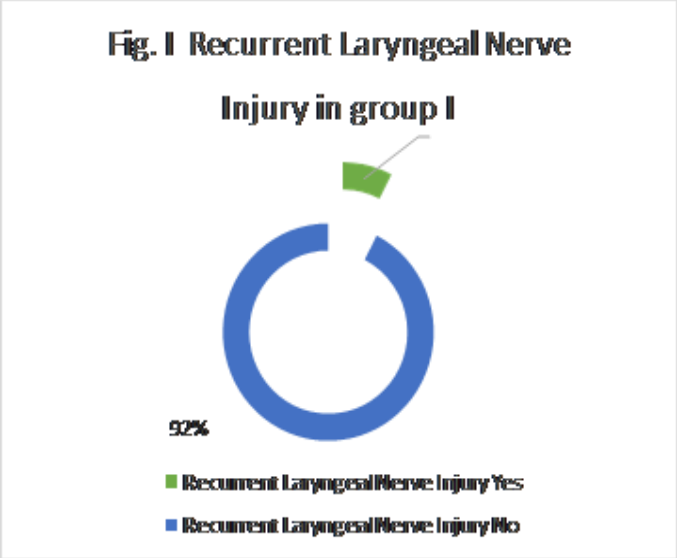

Figure 2 Recurrent Laryngeal Nerve Injury in group I

DISCUSSION

Recurrent laryngeal nerve palsy has been reported to occur in 1–20% of thyroid surgeries, depending on various factors including surgical technique and patient-related variables (10). Over the past 25 years, total thyroidectomy has become the preferred surgical approach for patients with Graves' disease, bilateral benign multinodular goiter, and most cases of thyroid cancer, replacing bilateral partial thyroidectomy. This shift is attributed to advancements in surgical techniques, notably the adoption of "capsular dissection" instead of the older "lateral dissection" technique, which has improved the precision of thyroid surgeries and reduced complications (11).

In the present study, the mean age of patients in Group I undergoing hemi-thyroidectomy was 34.2 ± 4.89 years, with a mean BMI of 26.12 ± 2.74, a mean nodular size of 2.11 ± 0.85 cm, and a mean surgery duration of 52.32 ± 12.21 minutes. In Group II, comprising patients who underwent total thyroidectomy, the mean age was higher at 41.11 ± 6.34 years, with a mean BMI of 27.23 ± 2.88, a mean nodular size of 2.43 ± 0.94 cm, and a longer mean surgery duration of 72.34 ± 19.75 minutes. The study identified recurrent laryngeal nerve injury in 6 patients (7.59%) in Group I and in 9 patients (11.39%) in Group II, consistent with findings from similar studies. The incidence aligns closely with the results of Mariam (13.62%) and Ritah (7.96%), but was significantly lower than the 25.2% reported by Chung et al. (15, 16). Variations in these rates could be attributed to differences in surgical expertise, patient populations, and the complexity of thyroid diseases managed across studies.

The study's strengths include an adequately sized sample and well-matched groups, which enhance the reliability of the observed trends. However, the lack of randomization is a significant limitation, as it may have introduced selection bias and reduced the statistical power to detect more nuanced differences. Additional factors such as substernal goiters, re-operative thyroid surgeries, and the surgeon's level of expertise are well-documented contributors to the risk of recurrent laryngeal nerve injury, with even skilled surgeons reporting inadvertent nerve damage in 1–2% of cases leading to permanent palsy (12, 13, 14).

Despite the alignment of findings with previous literature, the absence of randomization and more comprehensive data on postoperative outcomes limits the generalizability of these results. Further research with randomized controlled trials and longer follow-up periods is needed to better assess the factors influencing nerve injury and to refine surgical strategies that minimize complications.

A recent comparative study by Billah et al. (2022) investigated the incidence of recurrent laryngeal nerve (RLN) injury during thyroid surgeries, emphasizing the importance of visualizing the nerve to minimize complications. This study included 80 patients undergoing

INSIGHTS-JHR
INSIGHTS-JOURNAL OF HEALTH AND REHABILITATION

either total or hemi-thyroidectomy, with RLN injuries confirmed via fiber-optic laryngoscopy. The total incidence of RLN injuries was 3.8%, and all injuries were transient, with full recovery achieved through conservative management within six weeks. The authors concluded that surgical techniques prioritizing RLN visualization significantly reduce the risk of injury and highlighted the necessity of routine RLN identification during thyroid surgery to optimize outcomes (18).

CONCLUSION

Both total thyroidectomy and hemi-thyroidectomy are effective and safe surgical approaches for the management of thyroid disorders, with each procedure offering its own advantages depending on the clinical context. While variations in surgical techniques can influence the likelihood of transient nerve injuries, the overall risk of recurrent laryngeal nerve damage remains comparable between the two methods when performed with appropriate expertise. These findings highlight the importance of meticulous surgical planning and execution to ensure optimal patient outcomes while maintaining the safety and efficacy of these procedures.

AUTHOR CONTRIBUTIONS

Author	Contribution
Zulfiqar Ali	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Zahid Mehmood	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Muhammad Yasir Mengal	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Kanwal	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Nabeel	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Parial Shahani	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

REFERENCES

1. Toyib S, Kabeta T, Dendir G, Bariso M, Reta W. Prevalence, clinical presentation and patterns of thyroid disorders among anterior neck mass patients visiting Jimma Medical Center, Southwest Ethiopia. Biomed J Sci Tech Res. 2019;18(2):13431-5.

2. Suga Y, Abebe E. Paul Hospital Millennium medical Collage, Addis Ababa, Ethiopia. 2019.

3. Al-Hakami H, Al Garni M. Incidence and risk factors for recurrent laryngeal nerve injury after thyroid surgery. The Egyptian Journal of Otolaryngology. 2024 Aug 16;40(1):92.

4. El Shallaly GEHA, Ibrahim BA, Salih MM, Elhajahmed MM, Mohammed MF, Daffalla RO, et al. Histopathologic Pattern of Thyroid Disease in 1351 Thyroidectomy Patients. Sudan Journal of Medical Sciences. 2022;17(4):577–88-–88.

5. Alqahtani SM, Al-Sohabi HR, Rayzah MF, Alatawi AS, AlFattani AA, Alalawi YS. Recurrent laryngeal nerve injury after thyroidectomy: A national study from Saudi Arabia. Saudi medical journal. 2023 Jan;44(1):80.

6. Vacante M, Biondi A, Basile F, Ciuni R, Luca S, Di Saverio S, et al. Hypothyroidism as a Predictor of Surgical Outcomes in the Elderly. Frontiers in endocrinology. 2019;10:258.

7. Gunn A, Oyekunle T, Stang M, Kazaure H, Scheri R. Recurrent laryngeal nerve injury after thyroid surgery: an analysis of 11,370 patients. Journal of Surgical Research. 2020;255:42- 9.

8. Lukinović J, Bilić M. Overview of thyroid surgery complications. Acta Clinica Croatica. 2020;59(Supplement 1):81-6.

9. Del Rio P, Rossini M, Montana CM, Viani L, Pedrazzi G, Loderer T, et al. Postoperative hypocalcemia: analysis of factors influencing early hypocalcemia development following thyroid surgery. BMC surgery. 2019;18:1-8.

10. Cirocchi R, Arezzo A, D'Andrea V, Abraha I, Popivanov GI, Avenia N, Gerardi C, Henry BM, Randolph J, Barczyñski M. Intraoperative neuromonitoring versus visual nerve identification for prevention of recurrent laryngeal nerve injury in adults undergoing thyroid surgery. Cochrane Database of Systematic Reviews. 2019(1).

11. Kumar V. Retrospective Analysis of Recurrent Laryngeal Nerve Injury in Thyroid Surgery and its Risk Factors. Thyroid.9:18.36.

12. Mahoney RC, Vossler JD, Murayama KM, Woodruff SL. Predictors and consequences of recurrent laryngeal nerve injury during open thyroidectomy: An American College of Surgeons National Surgical Quality Improvement Project database analysis. The American Journal of Surgery. 2021 Jan 1;221(1):122-6.

13. Tabriz N, Muehlbeyer S, Weyhe D, Uslar V. Risk Factors for Recurrent Laryngeal Nerve Palsy in Thyroid Surgery: A Single Center Experience of 1147 Procedures with Intermittent Intraoperative Neuromonitoring. Journal of Personalized Medicine. 2024 Jul 2;14(7):714.

14. Vural V, Çomçalı B, Saylam B, Coşkun F. Identification of the recurrent laryngeal nerve during thyroidectomy can affect the complication rate. Annali italiani di chirurgia. 2021 May 1;92(3):217-26.

15. Gürleyik E, Gürleyik G. Recurrent laryngeal nerve injury in thyroid surgery with intraoperative nerve monitoring. Thyroid and Parathyroid Diseases: A Case-Based Guide. 2019:163-9.

16. Lv B, Zhang B, Zeng Q-D. Total endoscopic thyroidectomy with intraoperative laryngeal nerve monitoring. International Journal of Endocrinology. 2016;2016(1):7381792.

17. Chung YS, Choe J-H, Kang K-H, Kim SW, Chung K-W, Park KS, et al. Endoscopic thyroidectomy for thyroid malignancies: comparison with conventional open thyroidectomy. World journal of surgery. 2007;31:2302-6.

18. Billah M, Durrani SN, Baloch AH, Khan A, Nadeem M, Asghar F. Study of Paralysis of Recurrent Laryngeal Nerve after Thyroidectomy. Pakistan Journal of Medical & Health Sciences. 2022 Oct 9;16(07):985-.