

Intraoperative Identification and Preservation of a Right Non-Recurrent Laryngeal Nerve during Thyroidectomy: A Case Report

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ABSTRACT

Introduction: Non-recurrent laryngeal nerve (NRLN) is an extremely rare variant of recurrent laryngeal nerve (RLN) or inferior laryngeal nerve. It occurs in about 0.3-0.8% on right-side and rarely on left-sided. Being unusual in its course, it is highly predisposed to unintentional intraoperative trauma during thyroid surgeries. The preoperative diagnosis could be suggested on ultrasound or contrast enhanced Computed Tomography (CT) scan by the presence of aberrant right subclavian artery; but usually the NRLN is identified in the operating room.

Discussion: This case presents a report of a 44 year-old patient, with symptomatic right sided multinodular goiter treated with right thyroid lobectomy and isthmusectomy. The patient underwent preoperative ultrasonographic and indirect laryngoscopic examination showing intact function of the vocal cords. During intra-operative dissection, the RLN was not identified in the usual tracheoesophageal groove. Further careful exploration revealed a right sided type 2A NRLN arising straight from Vagus nerve and moving towards larynx. The nerve was carefully identified, preserved and protected throughout the procedure. The patient had no post-operative complications, including no vocal cords dysfunction after the procedure.

Conclusion: This case highlights the necessity of keeping in mind the possibility of NRLN in the absence of RLN in its expected anatomical course. Anatomical identification of this variation of RLN is important to prevent iatrogenic nerve injury and improve postoperative outcomes.

Keywords: Non-recurrent laryngeal nerve; thyroid surgery; aberrant subclavian artery.

INTRODUCTION

Recurrent laryngeal nerve (RLN) is a branch of Vagus nerve that normally loops around the subclavian artery on right side and aortic arch on left side. Injury to the RLN is one of the most feared complications of thyroid surgery, occurring in around 3% of cases and causes hoarseness, dysphonia, or paralysis of vocal cords.¹⁻³ In spite of its well-described course and importance in literature, non-recurrent laryngeal nerve (NRLN) frequently remains an unforeseen intraoperative finding because its preoperative diagnosis in clinical practice is rare. Not being able to identify the RLN in its usual anatomical pathway raises the suspicion of NRLN and needs meticulous anatomical dissection during identification and ligation of adjacent blood vessels.⁴

NRLN is a very rare anatomical variation of the RLN, which is seen in 0.3–0.8% of patients on the right and 0.04% of patients on the left side of the neck.^{5,6} Three different variations in the course of NRLN have been described. These variations include the crossing of NRLN across the superior pedicle (superior thyroid vessels and vein) (Type 1), parallel and above the inferior thyroid artery (Type 2A) and parallel and below or between the branches of inferior thyroid artery (Type 2B).⁷ A thorough understanding of these anatomical variations is essential in order to identify the NRLN and preserve it in cases where it is encountered.

In this case, a right sided Type 2A NRLN was found during right thyroid lobectomy and isthmusectomy and was successfully managed without any post-operative complications. This case emphasizes the importance of having a high index of suspicion regarding NRLN in cases where the usual course of RLN is not observed.

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CASE SCENARIO

In August 2024, a 44-year-old female, presented to the OPD with progressively increasing painful swelling in front of her neck for the last twelve years. She had history of hair fall, dry skin, periorbital puffiness, striae, fatigue, constipation, amenorrhea, hoarseness of voice, and insomnia. Neck ultrasonography revealed multiple smooth marginal nodules in right lobe of thyroid with the largest measuring 3.8 × 2.2 cm. A computed tomography (CT) scan was done

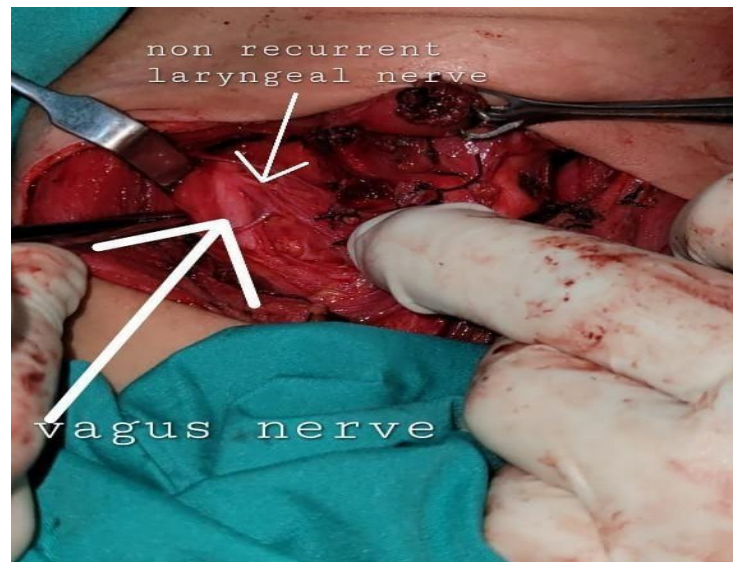


Figure 1: Intraoperative identification of the non-recurrent laryngeal nerve arising directly from the Vagus nerve

to look for the extent of disease and its effect on surrounding structures, which showed multinodular goiter involving right lobe of thyroid and isthmus that was exerting mass effect on trachea and surrounding structures. Biochemical profile of patient depicted euthyroid status (T3: 0.98, total T4: 10.0, and TSH: 0.79 mIU/L). Colloid goiter with cystic degeneration corresponding to Thy2C lesion was found on fine needle aspiration cytology (FNAC). Thyroid scan was done to assess whether the disease was truly diffuse/multinodular throughout both lobes or more localized towards a single lobe. It showed small goiter with early nodular changes in right lobe of thyroid which corresponded to TIRADS category 3. After assessing the extent of disease, the nature of nodules and functional status of the gland, a decision for right sided lobectomy with isthmusectomy was made.

This surgery was performed by surgical team comprising of authors IA, AA, SK, and MF on 5th of September, 2024, through a standard Kocher (collar) incision. Superior pole was ligated and mobilization of the thyroid gland was done medially in order to get access to its posterior aspect. Inferior thyroid vessels were ligated in the vicinity of the lower pole. Since RLN was not identified along its usual course in the tracheoesophageal groove, the presence of an anatomical variation was considered. Further unnecessary ligation and dissection were avoided and meticulous exploration was done. Transverse nerve coming from carotid sheath to the larynx was identified. Through careful dissection, it was found to be originating from the Vagus nerve (Figure 1). The nerve was running parallel and above the inferior thyroid artery, which is characteristic of type 2A NRLN. Parathyroid glands were identified and

preserved in situ. No extended incision and division of strap muscles was needed to identify the NRLN.

Post-operative course was unremarkable. Bilateral mobility of the vocal cords was normal on postoperative laryngoscopy, and there were no new findings of vocal change. Doppler Ultrasonography was performed to look for missed identification of associated aberrant subclavian artery which did not reveal any significant finding. Histopathological report of the resected specimen showed colloid goiter with cystic degeneration without any signs of malignancy. The skin sutures were removed on the tenth postoperative day and the patient was successfully discharged on 15th of September, 2024. Patient was followed up for 6 months to assess for any new symptoms of hypocalcemia. Informed consent was obtained from the patient for the publication of this report along with the relevant clinical images.

DISCUSSION

Ever since the first report of NRLN by Stedman in 1823,⁵ there have been cases where NRLN was found during thyroid operations. NRLN is predominantly found on the right side and is attributed to the embryological anomaly that occurs in the development of the fourth pharyngeal arch.⁸ The condition is often associated with vascular anomalies, especially the arteria lusoria, which is commonly seen in right-sided NRLN.⁹ Left-sided NRLN is very rare and has been found in conjunction with different vascular and visceral anomalies such as right aortic arch formations and situs inversus.^{4,10}

A systematic review and meta-analysis has established the incidence of right-sided NRLN to be approximately 0.7% and majority (~60%) of nerves were found to

be originating from the Vagus nerve above the laryngo-tracheal level, while the rest (~40%) originated below this level. Arteria lusoria was found in 86% of all the reported cases.¹¹ In this particular case, the nerve was found to be originating directly from the Vagus nerve and ran transversely alongside the inferior thyroid artery before crossing above it. This corresponds to the type 2A, which is a commonly reported pattern of NRLN.⁶

Identification of NRLN preoperatively may allow surgeons to predict this anatomical abnormality and avoid nerve injury. Multiple studies have assessed the contribution of imaging methods in the detection of NRLN. According to Zhang et al., preoperative CT scan can assist in the diagnosis of an anomalous right subclavian artery, which is highly associated with NRLN on the right side.¹² Certain vascular anatomical anomalies found on imaging, particularly those related to the brachiocephalic trunk, also suggest the presence of NRLN.¹³ The use of ultrasonography as a possible screening method was also examined, with the result of studies showing that the presence of an anomalous right subclavian artery can be used for preoperative prediction of NRLN.¹⁴ Barium swallow is another investigation method capable of providing indirect evidence of arteria lusoria, like the presence of esophageal indentation posteriorly.¹⁵ CT Angiography and MRI are imaging methods useful for evaluation of vascular anatomy and thus preoperative suspicion of NRLN; however, the use of these investigations routinely might be limited due to the cost and clinical situation.¹³ Intraoperative neuromonitoring (IONM) can provide an additional possibility of identifying nerve anomalies.^{7,16}

In this particular case, preoperative ultrasound and computed tomography (CT) scans were conducted. Nonetheless, no signs of aberrant subclavian artery or NRLN were found. Without nerve monitoring during the operation, it was possible to identify the NRLN only through a meticulous surgical approach and by taking into account the possibility of having an RLN variant. The NRLN is more prone to damage than a normally positioned RLN. It is confirmed by the results of recent metaanalysis, according to which the risk of damaging the nerve is approximately 3.8 times higher than in a normally placed one.¹⁷ Thus, recognizing this anatomical variation and identifying the nerve that is not in its expected anatomical place is crucial in the process of safe thyroid surgery.

Damage to RLN can result in postoperative voice changes in the form of dysphonia and hoarseness. These symptoms depend on the extent of the nerve damage. A bilateral RLN injury causes airway problems that may need urgent intervention.¹⁸ In this particular case, due to the timely discovery of the NRLN, it was possible to preserve the integrity of the nerve and prevent voice changes after surgery. The significance of this case comes from the fact

that the intraoperative recognition of the right Type 2A NRLN occurred despite an inability to predict any clues on preoperative radiological examinations. There is always a strong level of suspicion of NRLN in the absence of the RLN in its typical anatomic pathway.

CONCLUSION

The NRLN is a rare anatomic variant of RLN that is considered to be at risk for iatrogenic injury during thyroid surgery because of its unusual course. Preoperative imaging can give some indications regarding this type of anomaly since the presence of NRLN could be accompanied by vascular anomalies; nevertheless, NRLN may still be encountered unexpectedly during the operation. In case the surgeon fails to detect the RLN in its usual anatomic position, NRLN should be suspected in order to prevent injury to the nerve, should a NRLN be present.

Author Contributions

MF: Conception and design, analysis and interpretation of data, drafting the article, critical revision for important intellectual content, and final approval.

SA: Conception and design, analysis, and interpretation of data, drafting the article and critical revision and final approval.

AA: Conception and design, analysis and interpretation of data.

MR: Analysis and interpretation of data, drafting the article.

SK: Acquisition of data, conception and design, analysis and interpretation.

IA: Conception and design, analysis and interpretation of data.

REFERENCES

1. Doran H, Wiseman S, Palazzo F, Chadwick D, Aspinall S. Post-thyroidectomy bleeding: analysis of risk factors from a national registry. *Br J Surg.* 2021;108(5):567-574. doi:10.1093/bjs/zna015.
2. Mohammed AA, Arif SH. Two concomitant right nonrecurrent laryngeal nerves encountered during thyroidectomy (type 4 course): reported for the first time. *Ear Nose Throat J.* 2021;100(9):NP388-NP390.
3. Hong PK, Pathak A, Shirali AS. Predictors of postoperative complications following thyroidectomy: a systematic review. *Surg Pract Sci.* 2024;18:100252.
4. Furukawa T, Otsuki N, Tomotsu M, Tatehara S, Morita N, Kojima Y, et al. Left nonrecurrent inferior laryngeal nerve in a patient with right-sided aortic arch and aberrant left subclavian artery. *Auris Nasus Larynx.* 2021;48(2):317-321.
5. Stedman GW. A singular distribution of some of the nerves and arteries in the neck, and the top of the thorax. *Edinb Med Surg J.* 1823;19(77):564.
6. Tesso BA, Tola GG, Abadura MA. A case report of the rare non recurrent laryngeal nerve in a resource limited setting: the first Ethiopian documentation. *Int J Surg Case Rep.* 2023;110:108751.
7. Zheng V, Rajeev R, Pinto D, de Jong MC, Sreenivasan DK, Parameswaran R. Variant anatomy of non-recurrent laryngeal nerve: when and how should it be taught in surgical residency? *Langenbecks Arch Surg.* 2023;408(1):185.
8. Shomorony A, Fitzgerald C, Shaha AR. The nonrecurrent laryngeal nerve: anatomic and embryologic considerations, imaging findings, and intraoperative testing. *VideoEndocrinology.* 2022;9(2):32-34.

9. Mediouni A, Sayedi H, Chahed H, Besbes G. Non-recurrent laryngeal nerve and arteria lusoria: rare and little known association. *Clin Case Rep*. 2021;9(8):e04723.
10. Chen YY, Liao CY, Yao CC. Left nonrecurrent laryngeal nerve with situs inversus totalis. *Diagnostics (Basel)*. 2022;12(3):730.
11. Henry BM, Sanna S, Graves MJ, Vikse J, Sanna B, Tomaszewska IM, et al. The nonrecurrent laryngeal nerve: a meta-analysis and clinical considerations. *PeerJ*. 2017;5:e3012.
12. Zhang D, Fu Y, Zhou L, Wang T, Liang N, Zhong Y, et al. Prevention of non-recurrent laryngeal nerve injury in robotic thyroidectomy: imaging and technique. *Surg Endosc*. 2021;35:4865-4872.
13. Kuwazoe H, Enomoto K, Murakami D, Kumashiro N, Takeda S, Hotomi M. The role of anatomical imaging and intraoperative neuromonitoring (IONM) for successful prediction of a nonrecurrent laryngeal nerve. *Case Rep Surg*. 2022;2022:3147824.
14. Liang RX, Wang B, Zhao WX, Xue ES, Ye Q, Chen ZY, et al. Predictive value of ultrasound diagnosis of aberrant right subclavian artery with non-recurrent laryngeal nerve. *Arch Med Sci*. 2020;20(3):719-725. doi:10.5114/aoms.2020.98971.
15. Medhi R, Sarma N, Lynrah ZA, Chakraborty S, Deka A, Lynser D. Non-recurrent laryngeal nerve—a rare anatomical anomaly that increases the risk of nerve injury during thyroidectomy. *Indian J Otolaryngol Head Neck Surg*. 2024;76(5):4869-4872.
16. Lederer AK, Staubitz-Vernazza JI, Margies R, Wild F, Musholt TJ. Continuous intraoperative nerve monitoring of a non-recurrent laryngeal nerve: real-life data of a high-volume thyroid surgery center. *Cancers (Basel)*. 2024;16(5):1007.
17. So JTK, Thompson CSG. Non-recurrent laryngeal nerve: surgical risk of injury in comparison with the normal recurrent laryngeal nerve—a systematic review and meta-analysis. *Clin Otolaryngol*. 2025;50(4):654-663. doi:10.1111/coa.14312.
18. Tomoda C, Yoshioka K, Saito Y, Masaki C, Akaishi J, Hames K, et al. Clinical classification of recurrent laryngeal nerve palsy. *Gland Surg*. 2023;12:1203-1208. doi:10.21037/gs-23-149.