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Bilateral Trifurcation of the Recurrent Laryngeal Nerve: A Case Report

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Abstract **Case Report**

***Introduction*:** Thyroidectomy is a common surgical procedure performed for a variety of thyroid disorders. NLR injury is a dreaded complication during thyroidectomy and is considered a challenge even by the most experienced surgeons. ***Case Report*:** A thirty-two-year-old female patient with no significant pathological history was admitted for management GMNH. Cervical ultrasonography revealed a multiheteronodular goitre classified as TIRADS 4, the largest nodule measuring four centimetres on the left, with no cervical adenopathy. Thyroid workup was normal. Thyroid cytology of nodule number 1 was consistent with follicular neoplasm (Bethesda stage four). A total thyroidectomy was performed, and a bilateral trifurcation of the two recurrent laryngeal nerves in the tracheoesophageal groove was found. ***Conclusion*:** Damage to the NLR is the most serious complication of thyroid surgery. Anatomical variations in the NLR increase the risk of iatrogenic nerve damage. Bilateral trifurcation of the recurrent laryngeal nerve is a relatively rare anatomical variation that should not be overlooked when locating this nerve for surgery.

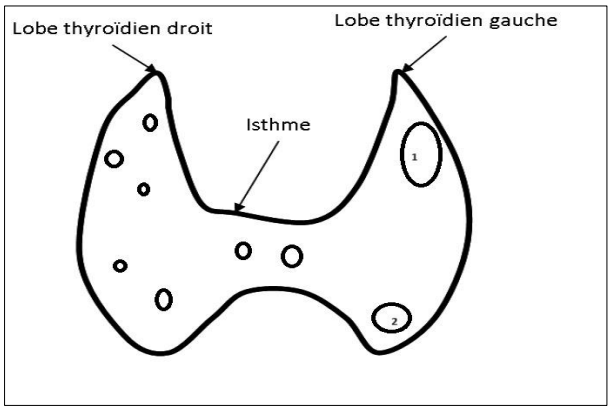
Keywords: Rare, NLR, Trifurcation.

INTRODUCTION

Thyroidectomy is a common surgical procedure performed for a variety of thyroid disorders. Potential complications include hemorrhage, hypoparathyroidism, hypothyroidism, infection and damage to the laryngeal recurrent nerve (NLR). NLR injury is a dreaded complication during thyroidectomy and is considered a challenge even by the most experienced surgeons. This is due to the multiple anatomical variations encountered intraoperatively. Proper identification of the NLR with consideration of potential anatomical variations can prevent or minimize iatrogenic damage to this nerve.

CASE REPORT

A thirty-two-year-old female patient with no significant pathological history was admitted for management of a median cervical swelling that had been evolving for four years. Clinical examination revealed a median cervical mass that ascended on swallowing, with no palpable cervical adenopathy. Nasofibroscopy revealed normal laryngeal mobility and morphology. Cervical ultrasonography revealed a multiheteronodular goitre classified as TIRADS 4, the largest nodule measuring four centimetres on the left, with no cervical adenopathy. Thyroid tests was normal. Thyroid cytology of nodule number 1 was consistent with follicular neoplasm (Bethesda stage four).



A total thyroidectomy was performed, and a bilateral trifurcation of the two recurrent laryngeal nerves in the tracheoesophageal groove was found. Pathological examination was consistent with benign thyroid hyperplasia. Post-operative follow-up was unremarkable, with no dysphonia or dyspnea.

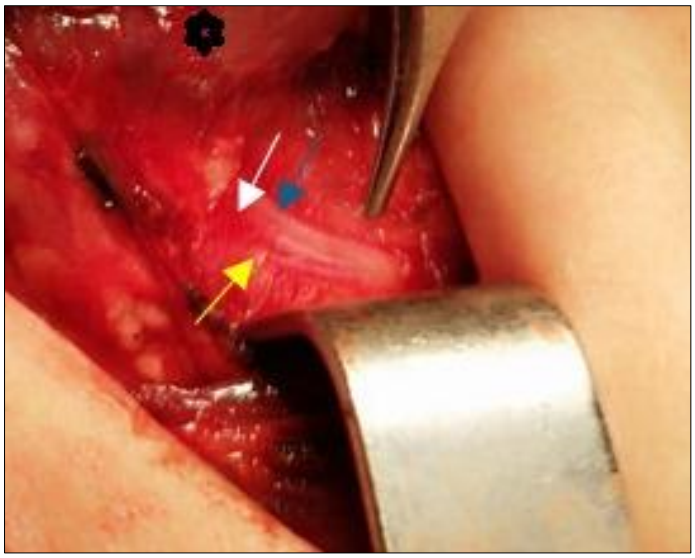


Figure 1: Trifurcation of the right recurrent laryngeal nerve in the tracheoesophageal sulcus as it enters the larynx. Blue branch: upper branch. White branch: middle branch. Yellow branch: lower baranhe. * :thyroid gland

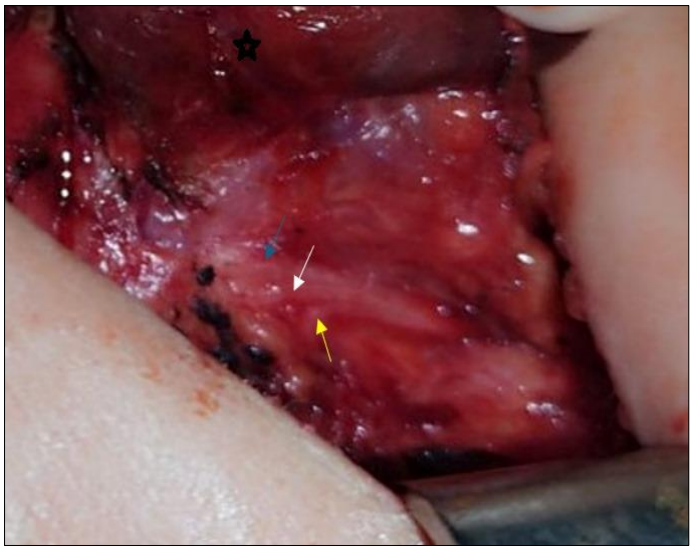


Figure 2: Trifurcation of the left recurrent laryngeal nerve in the tracheoesophageal sulcus as it enters the larynx. Blue nerve: upper branch. white nerve: middle branch. yellow nerve: lower branch.*: thyroid gland

DISCUSSION

The recurrent laryngeal nerve is a branch of the vagus nerve. It is the main motor nerve of the larynx. It innervates all intrinsic laryngeal muscles, with the exception of the cricothyroid muscle, which is innervated by the superior laryngeal nerve. It has a different course on the right and left sides [1].

On the right, the NLR originates from the vagus nerve as it crosses the subclavian artery anteriorly. It passes below and then behind the right subclavian artery, and ascends in a position lateral to the trachea along the tracheoesophageal groove. On the left side, the NLR separates from the vagus nerve as the latter passes in front of the aortic arch. The left NLR passes below and behind the aorta at the level of the ligamentum arteriosum, and ascends towards the larynx. It enters the tracheoesophageal sulcus, ascending to the level of the lower pole of the thyroid. The terminal portion of the NLR enters the larynx behind the cricothyroid muscle [1-4]. The right NLR can have a variable course, with more frequent anatomical variations than the left NLR, which lies more predictably on the tracheoesophageal sulcus [1, 2].

These anatomical variations include distortion of the NLR, extra-laryngeal branches, branches intertwined with the inferior thyroid artery and the presence of the non-recurrent laryngeal nerve [1-3]. The incidence of non-recurrent NLR is approximately 0.5-1.5% [1-4]. Distortion of the NLR involves abnormal orientation of its course, and is seen in patients with bulky goiter [1-5].

Extra-laryngeal branches of the NLR are characterized by bifurcations or trifurcations that occur before the nerve enters the larynx [1-5]. Around 25% of all nerves have bifurcations [4, 5].

Trifurcation of the recurrent laryngeal nerve is a relatively rare anatomical variation. Krishna .B *et al*., reported a single case of bilateral trifurcation of the recurrent nerve during thyroid surgery [1]. Whereas Guglielmo. A *et al*., [6], out of 2,626 NLR observed, only 23 cases (0.8%) of trifurcation of the recurrent nerve were found; fourteen on the left side and nine on the right.

Misidentification of these branches can potentially lead to iatrogenic lesions. The nerve with all its branches must be identified and followed through its entire course, until it enters the larynx [6]. Identification is based on the use of numerous reliable anatomical landmarks [2, 3]. Many authors consider the "classic position" of the NLR to be anterior to the ATI on the right and posterior on the left [6]. However, there are many variations on this neurovascular relationship. Nerves pass either anteriorly, posteriorly or between branches of the inferior thyroid artery [1-3]. Great care must therefore be taken when ligating branches of the ATI, and the NLR must first be found and identified before any vascular ligation [6, 7]. The nerve can also be identified at the inferior border of Zuckerkandl's tubercle, an important landmark during thyroid surgery [8, 9]. Finally, the NLR generally passes posterolaterally to Gruber's ligament, but in 12% of cases it passes through the ligament itself [8, 9].

CONCLUSION

Damage to the NLR is the most serious complication of thyroid surgery. Anatomical variations in the NLR increase the risk of iatrogenic nerve damage. The right-sided NLR shows greater anatomical variability than the left. Bilateral variations of the NLR in the same patient are also possible, increasing the vulnerability of this nerve. A lack of knowledge about the NLR's anatomical variations, course and branching pattern compromises the safety of cervical surgery. Bilateral trifurcation of the recurrent laryngeal nerve is a relatively rare anatomical variation that should not be overlooked when locating this nerve for surgery.

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