

Case Report

Non-recurrent inferior laryngeal nerve: a case report

Shah Urvin Manish*, Boopathi Subbarayan, Saravanakumar Subbaraj,
Tirou Aroul Tirougnanassambandamourty, S. Robinson Smile

Department of General Surgery, Mahatma Gandhi Medical College and Research Institute, Pondicherry, India

Received: 06 June 2020

Revised: 07 July 2020

Accepted: 14 August 2020

***Correspondence:**

Dr. Shah Urvin Manish,
E-mail: urvins93@gmail.com

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ABSTRACT

The incidence of Non-recurrent laryngeal nerve (NRLN) is reported to be 0.6%-0.8% on the right side and in 0.004% on the left side. Damage to this nerve during thyroidectomy may lead to vocal cord complications and should therefore be prevented. A middle-aged woman with a nodular goiter who underwent subtotal thyroidectomy for multinodular colloid goiter. We encountered a non-recurrent laryngeal nerve on the right side in a patient during surgery. We were not able to find the inferior laryngeal nerve in its usual position using the customary anatomical landmarks. Instead, it was emerging directly from the right vagus nerve at a right angle and entering the larynx as a unique non-bifurcating nerve. Nonrecurrent inferior laryngeal nerve incidence is very rare, but when present, increases the risk of damage during thyroidectomy. Hence, it is very important to be aware of the anatomical variations of the inguinal lymph node (ILN) and the use of safe meticulous dissection while looking for the nerve during thyroidectomy. The use of Intra-operative neuro-monitoring (IONM) if available in thyroid surgery allows the surgeon to recognize and differentiate branches of the inferior laryngeal nerve (ILN) from sympathetic anastomoses, as well as NRLN during surgery.

Keywords: Intra-operative neuro-monitoring, Non-recurrent inferior laryngeal nerve

INTRODUCTION

The inferior laryngeal nerve is traditionally named recurrent due to the fact that it loops around the subclavian artery on the right side and the arch of aorta on the left side.¹ The inferior laryngeal nerve (ILN) innervates the intrinsic muscles of the larynx except the cricothyroid. It also innervates the mucosa of the laryngeal region inferior to the vocal cords. Being an essential structure to laryngeal functions, injury to this nerve may thus result in paralysis of the vocal cord on the same side leading to permanent hoarseness.² If the lesion is bilateral aphonia and life-threatening dyspnea may ensue as a result of medial placement of the paralytic vocal cords, which can obstruct the airway.² Given the intimate relation with the thyroid gland, ILN identification and preservation are vital steps

in thyroid surgery. The non-recurrent laryngeal nerve (NRLN) is an anatomic variation and its intraoperative identification and preservation can be a challenge even for the most experienced surgeon. The non-recurrent ILN is related to the absence of brachiocephalic trunk and the presence of an anomaly called arteria lusoria on the right side.³ It only appears on the left side only if associated with situs inversus.⁴

CASE REPORT

A middle-aged woman presented with a nodule on the left lobe of thyroid to the department of general surgery. She was in euthyroid state and had no pressure symptoms. Clinical examination revealed a firm smooth nodule with size of 3 cm in diameter on the left lobe of thyroid.

Ultrasonography of neck showed multiple nodules involving both lobes of thyroid gland largest measuring 30×24×10 mm on the left lobe. Indirect laryngoscopy showed normal vocal cord movements. Fine needle aspiration cytology (FNAC) showed colloid goitre and she was posted for thyroidectomy. During surgery, the right recurrent laryngeal nerve (RLN) was not noted in the normal position. On further dissecting upwards it was seen emanating from the right vagus nerve almost at a right angle, entering the larynx 3 cm after its origin (Figure 1). The nerve did not show a recurrent course. The nerve on the left side had a normal configuration coming upwards in the tracheoesophageal groove in a recurrent fashion from the left vagus nerve. Patient had type 2A NRILN. Peri-operative period was uneventful and postoperative IDL was normal.



Figure 1: Intra-operative findings: R. NRILN originating at right angle from the vagus.

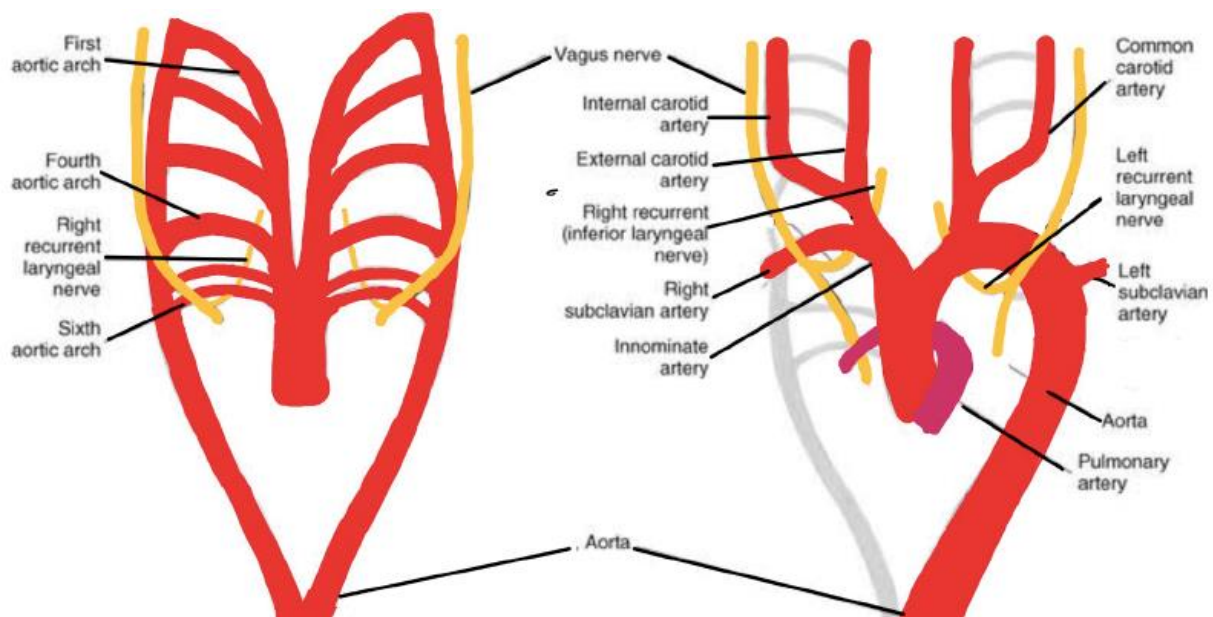


Figure 2: The normal embryological arterial and ILN development.

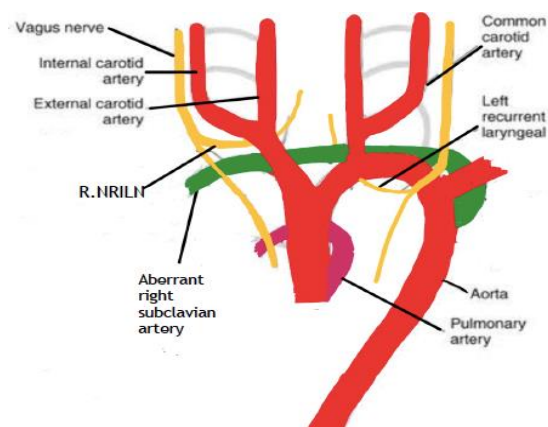


Figure 3: Abnormal disappearance of the right 4th aortic arch and formation of aberrant right subclavian artery from the arch of aorta distal to the origin of left subclavian artery, ILN arising from vagus in a non-recurrent fashion.

DISCUSSION

The reported incidence of NRLN on the right side is 0.6 to 0.8% and on the left side is 0.004%.⁵ ILN is the nerve of the 6th branchial arch which, with the descent of the heart loops around 6th aortic arch and ascends to the larynx in the tracheoesophageal groove.¹ On the right side, normally the distal portion of the 6th and 5th aortic arches disappears and the nerve moves up beneath the 4th aortic arch (Figure 2), which becomes the future right subclavian artery. Occasionally, the 4th arch disappears, and the subclavian artery arises directly from the aorta distal to the origin of the left subclavian artery (aberrant subclavian artery or arteria lusoria), Figure 2 and 3.

In these cases, the nerve moves cranially and originates directly from the vagus and enters the larynx without forming a loop.⁶ Even though this vascular change is usually asymptomatic, about 5% of these patients report

dysphagia (dysphagia lusoria). On the left side the ILN can be non-recurrent only with association of Situs Inversus.⁷

NRILN are classified as: type 1: arises directly from vagus and runs together with superior thyroid vessels; type 2A: parallel transverse path, over the trunk of inferior thyroid artery; and type 2B, parallel transverse path, under the trunk or between the inferior thyroid artery branches.⁸

Computed tomography (CT) diagnosis of arteria lusoria is based on the identification of an aberrant vessel that passes behind the esophagus. It is possible to predict the presence of a nonrecurrent inferior laryngeal nerve by identifying the presence of an arteria lusoria and the absence of the brachiocephalic artery on a preoperative CT scan.⁹ Rarely there will be NRILN along with RLN with normal vascular anatomy.

A NRLN may be suspected preoperatively if there was a barium swallow done for a patient experiencing dysphagia which might show indentation of the esophagus by an anomalous vessel (bayonet sign), or by an ab-normal chest X-ray with superior mediastinal widening or vascular anomalies detected on digital subtraction angiography.¹ In the majority of cases, these test are not done routinely, and so the surgeon will have to identify the NRLN at the time of surgery. Forde R et al has reported a similar case report of a 49-year old woman with solitary thyroid nodule who underwent left hemithyroidectomy revealed right RLN was not found as expected in or near the tracheoesophageal groove. However, careful exploration revealed a transverse nerve running medially to the cricothyroid joint.¹

Toniato A et al have reported a case series of 20 cases with non-recurrent laryngeal nerve and revealed high percentage of damage is due to the fact that it is unusual to suspect the presence of this anatomic anomaly preoperatively.⁷ In fact, the nonrecurrent nerve was identified in these four patients after the injury.⁷ The recurrent nerve, when not suspected, could be mistaken for fibrous tissue or for the inferior thyroid artery branch. Adequate surgical technique is of great importance.⁴ Most surgeons agree about the need to investigate the re-current nerve routinely. In fact, recognizing the nerve is the best guarantee against damage.⁷

Donatini G et al have reported Intraoperative neurophysical monitoring (IONM) allows the surgeon to eliminate confounding anatomy that sometimes may become apparent during ILN dissection, such as the “false” NRLN, a communication between the ILN and the middle cervical sympathetic ganglion.¹⁰ Neurophysiology allows the surgeon to understand the anatomy and function of the nervous system, eliminating confounding features as “false branches” and truly identifying the motor branch of the ILN in order to avoid lesions. Intraoperative neuromonitoring in a small cluster of patients revealed an increased incidence of NRLN.¹⁰

CONCLUSION

Nonrecurrent inferior laryngeal nerve incidence is very rare, but when present, increases the risk of damage during thyroidectomy. Hence, it is very important to be aware of the anatomical variations of the ILN and the use of diligent dissection while looking for the nerve during thyroidectomy. Preoperative radiological diagnosis of arteria lusoria or dysphagia lusoria may suggest its presence. The use of Intra-operative neuro-monitoring (IONM) if available in thyroid surgery allows the surgeon to recognize and differentiate branches of the ILN from sympathetic anastomoses, as well as NRLN during surgery.

ACKNOWLEDGEMENTS

I would like to thank my Emeritus Professor Robinson Smile for always supporting me and teaching me from the enormous experience he has in the field of General Surgery. I would like to thank Professor Tirou Aroul for always supporting me and motivating me to follow his practical path of approach to patient I would like to thank my guide, Associate Professor Saravanakumar Subbaraj for his constant support and teaching.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Manish SU, Subbarayan B, Subbaraj S, Tirou AT, Smile SR. Non-recurrent inferior laryngeal nerve: a case report. *Int Surg J* 2020;7:3469-72.