



Fusion of a cervical sympathetic ganglion with the recurrent inferior laryngeal nerve: a case of false positive non-recurrent inferior laryngeal nerve

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An anastomosis between the recurrent inferior laryngeal nerve (RILN) and the cervical sympathetic ganglion is seen rarely and might be confused with non-recurrent inferior laryngeal nerve (NRILN) in patients undergoing thyroidectomy and parathyroidectomy. In spite of the fact that NRILN is rarely seen and is an important anatomical structure, when damaged, the quality of life of the patient is negatively affected. This case report describes a connection between the RILN and the sympathetic nerve ganglion encountered during nerve dissection in a 43 year old female patient undergoing thyroidectomy and central zone dissection. Key points in the differential diagnosis are discussed.

Key Words: Sympathetic nerve, recurrent laryngeal nerve, thyroid, non-recurrent laryngeal nerve

INTRODUCTION

The most important step during thyroidectomy, parathyroidectomy and neck surgeries involving the 6th level is the dissection and preservation of RILN. The variability in the trajectory of this nerve and its rare fusion with other nerves can make the dissection difficult and it can be mistaken for different nerves. Injury to RILN results in serious complications like hoarseness and respiratory distress. Minimizing the risk of injury to the nerve in patients undergoing thyroid and parathyroid surgery is essential for the quality of life. The fusion of sympathetic nerve with RILN (false NRILN) and NRILN are rare abnormalities, which can be confused with each other (1).

This case report emphasizes the properties that differentiate the fusion of sympathetic nerve with RILN and NRILN.

CASE PRESENTATION

A forty-three year old female presented with a lump in her neck. She had noticed mass a long time ago however it started to grow lately. On her physical examination bilateral, multiple nodules were palpated in the thyroid gland. The thyroid ultrasound showed multiple nodules reaching up to the size of 3x2 cm in the right lobe and 2x2 cm in the left lobe. The sintigraphy revealed that the large nodule on the right side was a cold nodule and a fine needle aspiration biopsy was taken. The result was suspicious. Operation was planned together with frozen section evaluation. During the operation after the inferior thyroid artery was hanged with a vessel loop, the right recurrent laryngeal nerve was dissected and it was seen that it unites with another nerve. Keeping in mind that this nerve might be a non recurrent laryngeal nerve, the pulse of the aberrant subclavian artery (arteria lusoria) was searched behind the oesophagus but was not found. The dissection was carried out in the lateral direction. Upon completion of the dissection it was clear that this nerve was not a NRLN, by seeing the nerve ganglion and the thickening-thinning of the nerve. It was found out that this nerve was the sympathetic ganglion and that it fuses with RILN (Figure 1). The frozen section evaluation revealed papillary carcinoma. A total thyroidectomy and central zone dissection was done after dissection of the left RILN, with preservation of the parathyroid glands. Vocal cords were mobile in indirect laryngoscopy and the patient did not experience any complications. The right common carotid artery was visualized in the neck with a postoperative 3.5 MHz ultrasound (Mindray-D8). It was observed that the artery unites with the right subclavian artery forming a Y shaped brachiocephalic artery before entering the aortic arch (Figure 2). The finding that there was no abnormality of the right subclavian artery (arteria lusoria) confirmed that the nerve was not a right NRILN (2). The sympathetic nerve seen in this case carries nearly all of the properties of a false NRILN listed in the table, although it was very thick (Table 1).

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Received: 16.01.2012
Accepted: 27.02.2012
Online Available Date: 28.05.2013

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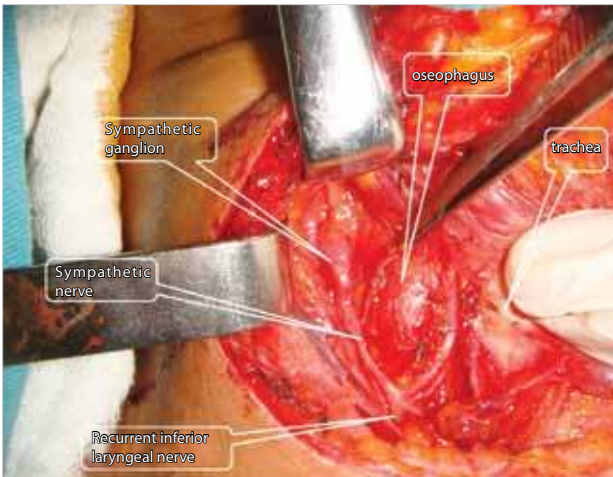


Figure 1. The fusion of RILN and sympathetic nerve together with its clearly visualized ganglia and progression of RILN in the trachea-oesophageal sulcus and its insertion to trachea

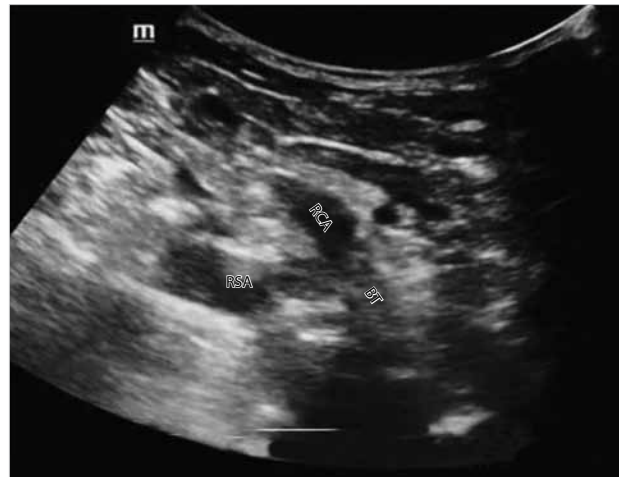


Figure 2. The right carotid artery combines with right subclavian artery forming the brachiocephalic trunk to reach the aortic arch. Ultrasonography clearly depicts the Y sign

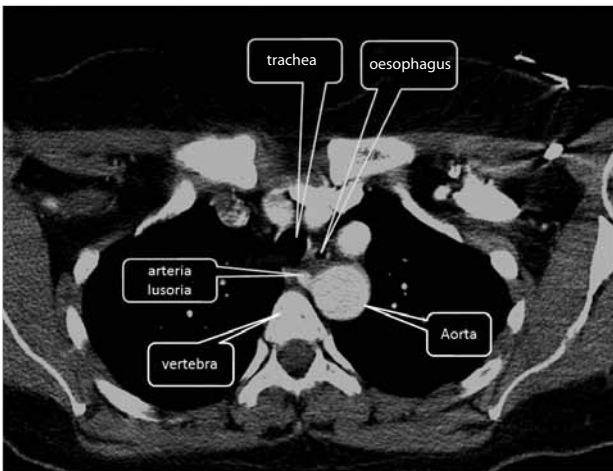


Figure 3. The trajectory of the right subclavian artery anomaly (arteria lusoria) accompanying NRILN in the posterior of the oesophagus and trachea

DISCUSSION

An anastomosis between the recurrent inferior laryngeal nerve (RILN) and the sympathetic ganglion might be mistaken for a non-recurrent inferior laryngeal nerve (NRILN) in patients undergoing thyroidectomy, parathyroidectomy or neck surgeries involving the 6th level.

Nonrecurrent inferior laryngeal nerve is a rare anatomic variation that should be taken into consideration during thyroidectomy or parathyroidectomy to prevent nerve injury (3). It is usually seen in the right. The incidence is 0.3-1.6% (4). Due to embryologic development abnormality of the aortic arch, direct origin of the carotid artery from the posterior aspect of aorta, the absence of brachiocephalic artery and presence of aberrant subclavian artery (arteria lusoria) are also diagnostic. NRILN can be recognized preoperatively by identification of the previously mentioned vascular abnormalities or during nerve dissection. Tomography is effective in showing the aberrant subclavian artery (arteria lusoria) during its co-

Table 1. Key points in differentiating NRILN from sympathetic nerve and RILN fusion

	NRILN	Sympathetic nerve and RILN fusion
Pulsation behind oesophagus	+	-
Y sign	-	+
Aberrant right subclavian artery (arteria lusoria)	+	-
Fusiform structure of the nerve (ganglion structure)	-	+
Branching to adjacent tissue and other nerves	rare	more frequent
Thinning and thickening of the nerve	rarely seen	usually present
Originating from vagus	+	-
Nerve thickness	usually equal to RILN width	usually thinner, very rarely thick
Nerve trajectory	usually horizontal	any direction
Nerve direction	towards carotid sheath	towards the posterior of the carotid sheath
Complications in case of injury to the nerve	hoarseness and respiratory distress	sympathetic nerve injury effects

urse from the posterior of the membranous wall of trachea (Figure 3) (2, 5, 6). On ultrasonography, visualization of bifurcation of the brachiocephalic trunk into common carotid artery and right subclavian artery (Y sign) indicates presence of RILN (7). Cervical 3.5 MHz ultrasonography was shown to be 100% predictive for the presence of right NRILN in a study done on 2330 thyroidectomy patients (8, 9). In this case we have seen the Y sign with 3.5 MHz ultrasonography, therefore proving this nerve not to be a true NRILN.

It is known that communicating branches exist between the cervical sympathetic system and RILN (10). These communicating branches usually arise from the middle sympathetic ganglion, less frequently from the superior cervical ganglion or directly from the sympathetic trunk. Table 1 summarizes points to differentiate sympathetic nerve and NRILN. If the sympathetic nerve-RILN anastomosis is as large as RILN it can be mistaken for a NRILN. Recognition of this anatomic variation during cervical dissection might avoid injury to RILN in its normal course. When a structure coursing transversely between the carotid sheath and thyroid is seen, it should be dissected and found out if it originates from the sympathetic ganglion or the vagal nerve (11).

Another structure that can also be confused for NRILN during level VI dissection is the Galen nerve (12). This anastomosis between the RILN and external branch of superior laryngeal nerve courses vertical when compared to NRILN.

CONCLUSION

Knowledge of the anatomy of the recurrent inferior laryngeal nerve and anatomic structures that can be mistaken for RILN and NRILN is essential to perform a safe surgery.

Conflict of Interest: No conflict of interest was declared by the authors.

Peer-review: Externally peer-reviewed.

Author Contributions: Study concept and design - F.Y., A.E.S.; Acquisition of data - F.Y., A.B.Ö., S.M.A., M.K.; Analysis and interpretation of data - F.Y., A.E.S., M.K.; Preparation of the manuscript - F.Y., A.E.S.

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