

Case Report

Non-recurrent inferior laryngeal nerve (NRILN); Report of a case

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Recurrent nerve (inferior laryngeal nerve) injury in thyroid surgery is a very severe and serious complication that impairs patient's quality of life and it is one of the major complications in thyroid surgery. If the recurrent nerve can be detected during the surgery, injury can be prevented. We report a case of a woman with right non-recurrent inferior laryngeal nerve (NRILN) branching from the vagus nerve directly at the level of the right thyroid upper lobe in thyroid surgery.

NRILN is a very rare anatomic variation and is associated with aberrant right subclavian artery (ARSA). In such cases, preoperative contrast-enhanced computed tomography should be monitored closely to avoid injuring this nerve.

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Introduction

Recurrent nerve (inferior laryngeal nerve) injury in thyroid surgery is a very severe and serious complication that impairs patient's quality of life and it is one of the major complications in thyroid surgery. Non-recurrent inferior laryngeal nerve (NRILN), a malformation of the inferior laryngeal nerve, is well known to be always associated with aberrant right subclavian artery (ARSA); however, it is hard to detect during the surgery, and this nerve is injured frequently in usual operation¹⁾²⁾. Herein, we report the case of a woman with NRILN branching from the vagus nerve directly at the upper level of the right thyroid lobe that was detected during this thyroid surgery.

Case presentation

A 32-year-old woman complained of a large mass on the right side of her neck, which she has been noticed 5 years previously, but she had not received medical examination. She took her friends' advice and presented to our department. Physical examination revealed a 2-cm, elastic hard tumor without tenderness on her right neck. Tumor in the right thyroid lobe was suspected.

Neck ultrasonography revealed a hypo-echoic area and hyper-echoic spots with calcifications on the right thyroid lobe. Several surrounding lymph nodes around the right lobe were swollen. The left thyroid lobe had small a hypo-echoic area with calcifications.

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Neck computed tomography (CT) revealed a low-density area in both thyroid lobes.

Ultrasound-guided fine-needle aspiration cytology of the lesions of both thyroid lobes revealed class V papillary carcinoma.

Total thyroidectomy and bilateral D1 area dissection were performed. During operation, both lobes were separated smoothly and the left inferior laryngeal nerve (left recurrent nerve) was easily identified. However, we could not find the right recurrent nerve in its normal position. Hence, we considered the possibility of NRILN. After careful dissection, we found that the right laryngeal nerve was not recurrent, and it originated directly from the right vagus nerve (Figure 1; intraoperative findings, big arrow indicated NRILN). The right NRILN directly arose under at the level of cricoid cartilage from the vagus nerve, and total thyroidectomy was performed without injuring this nerve. Pathological examination revealed papillary carcinoma on both lobes, and two lymph node metastases were found in the right paratracheal area.

After this operation, we recognized that ARSA was rising

from the posterior part of the aorta, and passed through the dorsal side of the esophagus by preoperative chest contrast-enhanced CT in this case (Figure 2).

However, temporary right vocal cord palsy occurred after surgery, but it subsequently improved. There was no evidence of recurrence 8 years after surgery.

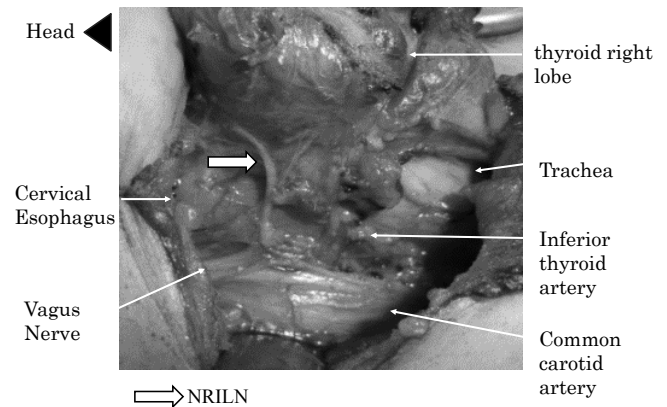


Figure 1. Intraoperative findings, arrow indicated NRILN.

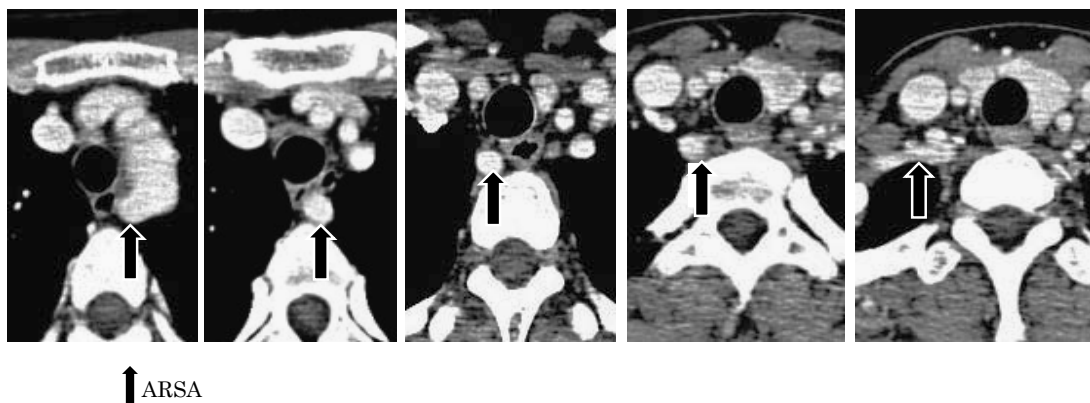


Figure 2. Chest enhanced computed tomography; arrow indicated ARSA.

Discussion

The prevalence rate of NRILN ranges from 0.25% to 0.99%²⁾³⁾. It usually occurs on the right side and very rarely occurs on the left side²⁾. This is caused by a right subclavian artery malformation, in other words, ARSA⁴⁾.

Generally, the inferior laryngeal nerve is rotated by the fourth brachial arch arteries. Later, the right fourth brachial arch artery becomes the subclavian artery on the right side. But, if the right fourth brachial arch disappears early, the right subclavian artery originates from the dorsal part of the aorta²⁾⁵⁾. Because the right subclavian artery was not located at its normal position, the right inferior laryngeal nerve could not rotate ARSA, as well. Therefore, NRILN always

arose from the vagus nerve, directly. Figure 3 shows the origin of ARSA and right NRILN. The existence of ARSA always predicts the existence of NRILN⁴⁾.

NRILN is classified into two types⁶⁾⁷⁾. In type 1, NRILN branches at the level of the inferior thyroid artery and ascends along the trachea. In type 2, NRILN branches at the level of the superior pole of thyroid and directly runs into the larynx. Figure 4-1 (quoted from reference 7) shows type 1 NRILN, and Figure 4-2 (quoted from reference 7) shows type 2 NRILN.

This case was diagnosed as type 2 NRILN based on the intraoperative findings. We did not notice ARSA before surgery and could not identify the right inferior laryngeal nerve in its ordinary position in the half time of the surgery.

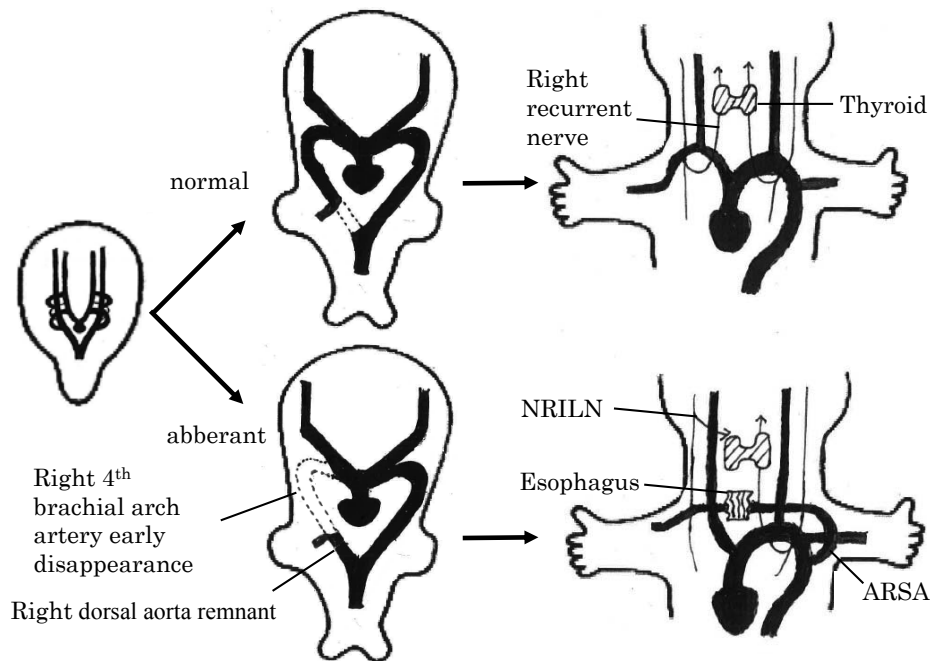


Figure 3. The origin of ARSA and right NRILN.

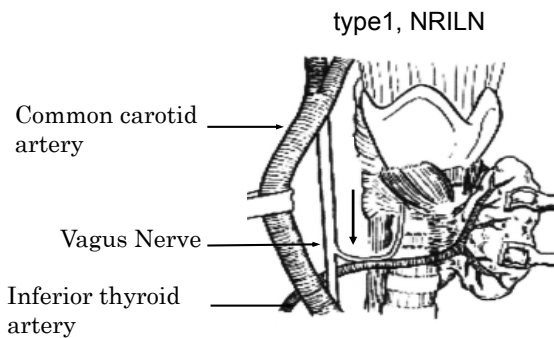


Figure 4. NRILN has two types
Figure 4-1. shows type 1 NRILN.

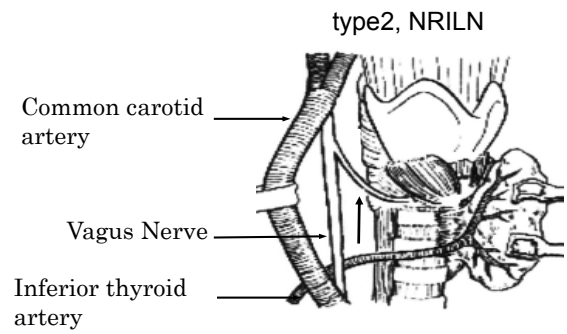


Figure 4-2. shows type 2 NRILN.

We should have predicted this nerve malformation, looked for this nerve along the vagus nerve, and confirmed that the nerve directly branched from the vagus nerve using a nerve stimulator. A nerve stimulator is very useful for the detection of NRILN during surgery⁸⁻¹⁰.

Awareness of the presence of NRILN during neck surgery is important, especially, in performing right thyroid lobe surgery. If ARSA is confirmed by contrast-enhanced CT before surgery, NRILN can be detected easily. Preoperative diagnosis of ARSA and prediction of NRILN are reportedly very effective for avoiding vocal cord palsy⁸⁾¹¹.

However, because we cannot predict its branching level (type 1 or type 2) before surgery, it is necessary to consider NRILN branching from the vagus nerve. If we predict NRILN, we should approach the vagus nerve first before

dissecting the paratracheal region to discover the separation point of the NRILN from the vagus nerve¹².

Conclusions

Predicting NRILN before thyroid surgery is important to avoid inferior laryngeal nerve injury. ARSA induces NRILN; hence, we have to check for the presence of ARSA by contrast-enhanced CT before surgery.

Conflicts of interest

The authors declare that they have no conflict of interest

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