

Ultrasonographic Sign of the Nonrecurrent Laryngeal Nerve

CME Credits

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Abstract

The nonrecurrent laryngeal nerve (NRLN) is a rare anomaly of the inferior laryngeal nerve and is associated with the aberrant subclavian artery (negative Y sign). Despite the low incidence, the risk of iatrogenic injury to the NRLN is high without awareness of this anomaly. Neck ultrasonography is an effective method for detecting vascular anomalies and lowering the risk of vocal cord paralysis. We reported a case of a 39-year-old female with a right thyroid nodule. Neck ultrasonography revealed one ill-defined and hypoechoic thyroid nodule with dimensions of 1.6 cm × 1.0 cm × 0.6 cm and a negative Y sign. The fine-needle aspiration cytology report showed suspicion of a follicular neoplasm, Hurthle cell type. After discussing with the patient, the right thyroid lobectomy was arranged. During the operation, the right NRLN was confirmed. No vocal cord paralysis was noted after the surgery. The patient was finally diagnosed with Hurthle cell adenoma.

Keywords: Aberrant subclavian artery, neck ultrasonography, nonrecurrent laryngeal nerve, thyroidectomy

INTRODUCTION

Knowing the anatomical structure is important to minimize complications during thyroid operations. One major complication of thyroidectomy is injury to the recurrent laryngeal nerve (RLN), which causes vocal cord paralysis. Normally, the right RLN recurs under the right subclavian artery (SCA), and the left RLN recurs under the aortic arch. On the right side, the vascular distribution of the SCA, the common carotid artery, and the brachiocephalic trunk (BCT) form a “Y sign” on the ultrasonography [Figure 1a]. In rare conditions, the RLN has no loop, which results in the non-RLN (NRLN). The right NRLN is usually accompanied by the right aberrant SCA, and a negative Y sign is noted on the ultrasonography [Figure 1b]. The left NRLN is accompanied by situs inversus (reversed visceral organs) and is more uncommon. Using neck ultrasonography, we can easily identify vascular anomalies and avoid nerve injury during surgery.

CASE REPORT

A 39-year-old female was referred to our outpatient department for the right thyroid incidentaloma, which was noted during her health examination. Neck ultrasonography revealed one ill-defined and hypoechoic thyroid nodule with dimensions of 1.6 cm × 1.0 cm × 0.6 cm. A negative Y sign was also noted [Figure 1b]. The report from the fine-needle aspiration cytology showed suspicion for follicular neoplasm, Hurthle cell type. After discussing with the patient, the right thyroid lobectomy was arranged for the pathology. During the operation, the right NRLN was identified crossing the tracheoesophageal groove toward the larynx [Figure 2]. The right thyroid lobectomy was performed under intraoperative nerve monitoring. The postoperative course was uneventful. No vocal cord paralysis was noted. The patient was finally diagnosed with Hurthle cell adenoma.

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Received: 09-07-2019 Revised: 02-08-2019 Accepted: 07-08-2019 Available Online: 16-12-2019

Access this article online

Quick Response Code:



Website:
www.jmuonline.org

DOI:
10.4103/JMU.JMU_69_19

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How to cite this article: Cheng PC, Cheng PW, Liao LJ. Ultrasonographic sign of the nonrecurrent laryngeal nerve. *J Med Ultrasound* 2020;28:48-9.

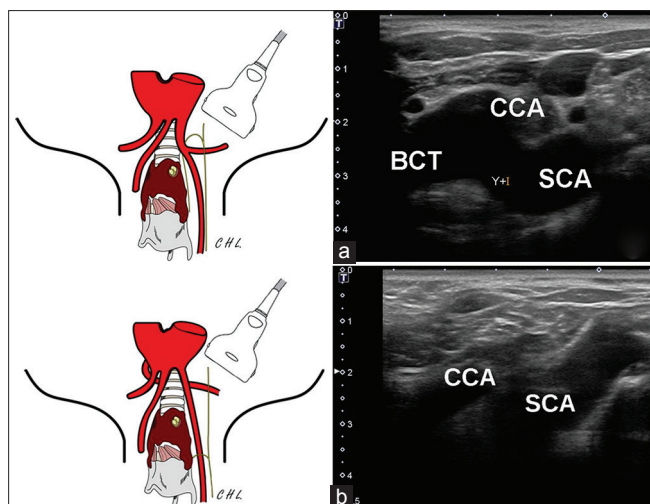


Figure 1: Ultrasonography of the right subclavian artery. (a) Longitudinal view of the normal right subclavian artery. The subclavian artery, CCA, and BCT form a “Y sign”. (b) Longitudinal view of the right aberrant subclavian artery. The subclavian artery and CCA arise from the aortic arch separately. There is no connection between the subclavian artery and CCA (negative Y sign). CCA: Common carotid artery, BCT: Brachiocephalic trunk, SCA: Subclavian artery

DISCUSSION

The NRLN is associated with vascular anomalies of primitive aortic arches and is mostly on the right side.^[1] Normally, the right RLN recurs around the 4th aortic arch, and the left RLN recurs around the arterial ligament. If the 4th aortic arch regresses, the right RLN migrates upward, resulting in the NRLN. The right NRLN is accompanied by the right aberrant SCA, and the incidence rate of the right NRLN is approximately 0.7%.^[1] The left NRLN is due to situs inversus (reversed visceral organs) and regression of the arterial ligament. The incidence rate of left NRLN is approximately 0.04%.^[2] This abnormal nerve route is associated with higher rates of nerve injury during operation if the physician is unaware of the condition. Iacobone *et al.* showed that the vocal cord paralysis rate is higher in NRLN cases than in RLN cases (14.3% vs. 1.75%, $P=0.007$).^[2]

Using ultrasonography, we can easily identify the orientation of the vessel. The normal right SCA arises from the BCT. The right SCA, the right common carotid artery, and the BCT form a “Y sign” on ultrasonography [Figure 1a]. The right aberrant SCA arises from the aortic arch toward the right side and crosses the right common carotid artery posteriorly. Thus, the Y sign was not present on ultrasonography [Figure 1b]. Several studies mentioned that preoperative ultrasonography can successfully predict the NRLN and significantly lower the vocal cord paralysis rate.^[1,2] However, there is one false-negative Y sign case in our experience. In this patient, the bifurcation of the right SCA and right common carotid artery was deeper in the upper chest cavity, which is beyond the depth that can be accessed by neck ultrasonography.

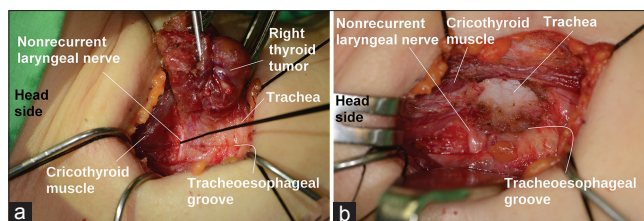


Figure 2: Right nonrecurrent laryngeal nerve during surgery. (a) Right nonrecurrent laryngeal nerve crossing the tracheoesophageal groove toward the larynx. (b) Right nonrecurrent laryngeal nerve preserved after the right thyroid lobectomy

A previous study also showed that false-negative Y signs may be present in patients with obesity or large mediastinal goiters.^[2] In our department, we routinely check for the Y sign during neck ultrasonography. If there is a negative Y sign, we arrange the neck computed tomography (CT) for the evaluation of RLN. If there is positive Y sign, we can reasonably assume that there is normal RLN and operation can be arranged directly. These can reduce the uses of neck CT and lower the associated costs.

We suggest that neck ultrasonography is necessary before operations for thyroid or parathyroid disease. In addition to examining the cervical lymph nodes, we should also assess vascular anomalies, including the Y sign.

CONCLUSION

Despite the low incidence rate, the risk of iatrogenic injury to the NRLN is high if there is no awareness about this anomaly. Neck ultrasonography is an effective method for detecting anomalies and lowering the risk of vocal cord paralysis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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