Diagnosis of Non-recurrent Laryngeal Nerve by CT Angiography

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ABSTRACT

Objective: Non-recurrent Laryngeal Nerve(NRLN) is found between 0.5-1.0% of entire populations. NRLN mostly develops on the right, and it's due to an anomaly of the subclavian artery. Through 3 cases, we report a simple method to diagnose an anomaly of the right subclavian artery with NRLN.
Method: Case 1. A 52 year-old woman was admitted with the thyroid mass. After a neck CT and fine needle aspiration biopsy, she got an operation from thyroid papillary carcinoma. Intraoperatively, we found NRLN and preserved it. Case 2. A 33 year-old woman visited us with the cervical mass. She was diagnosed as thyroid follicular carcinoma. Intraoperatively, we found NRLN cut. Case 3.A 68 year-old woman complained of the re-occuring thyroid mass. Preoperatively, we predicted NRLN through CT angiography. Intraoperatively, we identified the right NRLN.
Results: In case 3, NRNL was expected through neck CT angiography. Intraoperatively we could find NRLN more easily than case 1 and 2.
Conclusion: If we can predict NRLN preoperatively, it'll be possible to preserve NRLN easily. We can differentiate arteria lusoria from normal findings more precisely with neck CT angiography as compared with neck CT. We could diagnose NRLN preoperatively with neck CT angiography, and this was helpful for us to preserve RLN intraoperatively. We herein report the case that we identified and preserved NRLN more easily by predicting NRLN with neck CT angiography.

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INTRODUCTION

The preservation of a recurrent laryngeal nerve(RLN) is the most important and the most difficult procedure in a thyroid or parathyroid surgery. Normally, the RLN runs in the tracheoesophageal groove, but the chance of injury during operation is increased if the normal position of the RLN changes. In 1823, a non-recurrent laryngeal nerve(NRLN), first reported by Stedman, is known to be found in 1% of people and much related with abnormality of a major vessel. Our objective is to report the diagnostic methods of the NRLN with abnormality of the right subclavian artery through CT angiography(CTA).

CASE 1

A 52 year old woman was admitted for incidentaloma in the right thyroid, and thyroid papillary cancer was diagnosed by neck CT and NAB. Preoperative vocal cord mobility was intact. Intraoperatively, Rt. inferior thyroid artery was ligated and we found the NRLN running into the thyroid just beneath it. We dissected the nerve carefully from around soft tissue with much time passed and preserved it. On POD #1 and #4, normal vocal cord mobility was examined, and no vocal cord palsy was found after discharge.

CASE 2

A 33 year old woman visited for Rt. neck mass for 3 months. 3x2cm sized Rt. thyroid papillary cancer was diagnosed with neck CT and NAB. She complained of hoarseness for 1 year, but preoperative vocal cord mobility was normal and Lt. hemorrhagic polyp on Lt. vocal fold was found. After vocal polyp was excised with LASER, we found the diffusely enlarged Rt. thyroid lobe. After inferior thyroid artery was found and ligated with meticulous method, we found the horizontally crossing nerve beneath the artery, but didn't preserve it. We couldn't find the normal RLN anywhere. We traced the cut nerve course, confirmed that the nerve was the NRLN, and performed the neurorraphy. Postoperatively, paramedian fixation of Rt. vocal fold was noted.

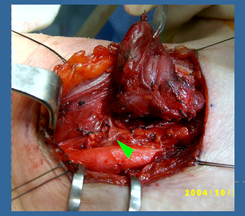

Figure 1. Non-recurrent laryngeal nerve (preserved)

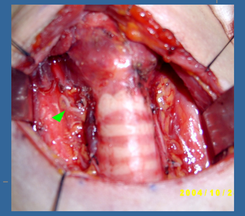

Figure 2. Non-recurrent laryngeal nerve runs downward and transversely.

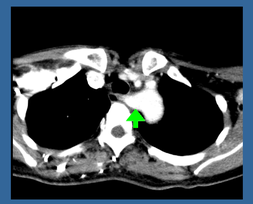

Figure 3. Arteria lusoria(arrow) on CT scan

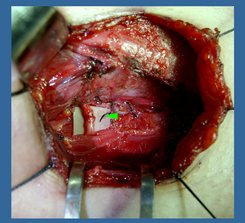

Figure 4. Cut non-recurrent laryngeal nerve on the piece of rubber glove

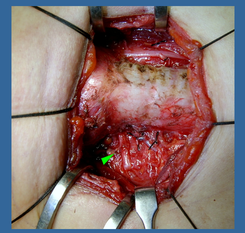

Figure 5. Neurorraphy of the damaged nerve

Figure 6. Arteria lusoria(arrow) on CT scan

CASE 3

A 68 year old woman got Rt. thyroid lobectomy at another hospital, and thyroid anaplastic carcinoma was reported. She visited our hospital for re-growing thyroid mass and had Lt. vocal cord palsy. Through CTA, we found 3x3cm sized Rt. thyroid mass, pathologic lymph nodes and arteria lusoria. Intraoperatively, NRLN was found just beneath the inferior thyroid artery and dissected smoothly from around tissue. Postoperatively, normal Rt. vocal fold movement was noted.

RESULT & DISCUSSION

We preserved the RLN in case 1, sacrificed it not predicting its presence in case 2, and preserved it as knowing its presence by CTA. We can avoid the damage of the NRLN that happened in case 2, if we can predict enough possibility of it preoperatively. And we can classify aa aberrant subclavian artery, or arteria lusoria(Fig.7, Fig.8) and normal subclavian artery(Fig.12) more correctly and more easily by CTA, even though we can do by only CT(Fig.3, Fig.6). When there is the anomaly that an aberrant subclavian artery originates directly from the aortic arch, the Rt. RLN runs directly into the larynx from the vagus nerve without turning the brachiocephalic artery. Because the arteria lusoria is the most common aortic arch anomaly. But as every anomaly of an artery originating from the aorta is not the arteria lusoria, we must diagnose the arteria lusoria differentially by CTA from other anomalies such as a double aortic arch similar to the arteria lusoria on CT(Fig.9, Fig.10). A double aortic arch has the RLN running in the normal nerve course(Fig.11). If we don't differentiate between the two varieties, we'll spend much more time finding the nerve than usual because of an incorrect prediction by CT. So, we can say that we should use CTA when we predict the NRLN. The preservation of the RLN in the thyroidectomy is key for postoperative voice, respiration and swallowing. The accurate prediction of the NRLN by preoperative CTA was very helpful for preserving the RLN and saving the operation time. So, we report that we could lessen the possibility of damage of the RLN during thyroidectomy and preserve it completely by preoperative CTA.

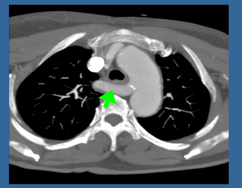

Figure 7. Arteria lusoria(arrow) on CT angiography

Figure 8. Arteria lusoria(arrowhead) on CT angiography-reconstruction (posteriro view)

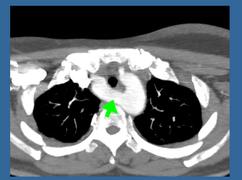

Figure 9. Double aortic arch(arrow) on CT angiography

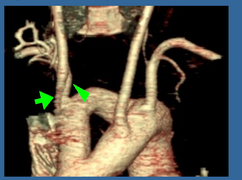

Figure 10. Rt. CCA(arrow) and subclavian artery(arrowhead) originating from the right aorta

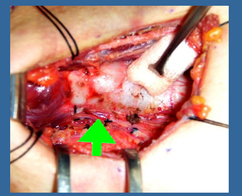

Figure 11. Rt. RLN(arrow) running in the normal nerve course

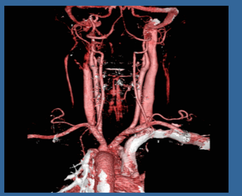

Figure 12. Normal finding on CT angiography-reconstruction (posterior view)

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