

Case of coexisting, ipsilateral nonrecurrent and recurrent inferior laryngeal nerves

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Abstract

Objective: We report an extremely rare case of coexisting, ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve.

Method: We present a case report and a review of the world literature concerning ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve.

Results: The presence of a coexisting, ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve is a very rare embryological aberration which is associated with a right subclavian artery originating from the aortic arch. We report a case of coexisting, ipsilateral nonrecurrent and recurrent inferior laryngeal nerves associated with this vascular anomaly.

Conclusion: The surgeon must be aware of the possibility of coexisting, ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve, and thus must trace the nerve in its entirety. Occasionally, what appears to be a nonrecurrent inferior laryngeal nerve will actually be a communicating branch between the recurrent inferior laryngeal nerve and the oesophageal or sympathetic ganglia. If such a neurological variant is present, the consequences of careless dissection could include not only vocal fold paralysis but also dysphagia (if the pharyngeal and oesophageal branches of nonrecurrent or recurrent inferior laryngeal nerve are injured).

Key words: Recurrent Laryngeal Nerve; Anatomy; Congenital Abnormalities; Neck

Introduction

The nonrecurrent inferior laryngeal nerve enters the larynx directly from the main vagal trunk. When such an abnormality occurs, it is usually considered synonymous with the absence of a recurrent inferior laryngeal nerve on the same side.¹ A nonrecurrent inferior laryngeal nerve present together with an ipsilateral recurrent inferior laryngeal nerve is extremely rare. To our knowledge, only four such cases have previously been reported.¹⁻³

We report a case of nonrecurrent inferior laryngeal nerve in association with an ipsilateral recurrent inferior laryngeal nerve, which was also accompanied by an anomalous right subclavian artery. We also present a review of the relevant literature.

Case report

A 57-year-old woman presented with a nodule in her thyroid gland. She had no complaints of dysphagia or globus hystericus. She had no previous medical history or family history of thyroid disease or any other congenital disease.

Clinical examination revealed a 1.0 × 1.0 cm thyroid mass on the right side. There was no palpable lymph node enlargement in the neck. The rest of the examination was unremarkable, including fibre-optic nasopharyngoscopy and laryngoscopy.

Blood investigations and biochemical analysis results were within normal range, including tests for thyroid stimulating hormone, tri-iodothyronine and thyroxine. Fine

needle aspiration cytology of the thyroid mass revealed papillary carcinoma and Hashimoto's thyroiditis.

Pre-operative computed tomography (CT) scanning of the neck at the level of the upper mediastinum showed an anomalous right subclavian artery originating from the aortic arch and passing to the right side behind the oesophagus and trachea (Figure 1).

The patient was taken to the operating theatre for total thyroidectomy with central neck dissection. On the basis of pre-operative CT imaging, a nonrecurrent inferior laryngeal nerve was predicted. Intra-operatively, careful dissection in the region of the superior half of the right lobe of the thyroid gland did indeed reveal a nonrecurrent inferior laryngeal nerve (Figure 2). The nonrecurrent inferior laryngeal nerve arose directly from the vagus nerve and passed obliquely behind the common carotid artery. It was thinner than previously encountered nonrecurrent inferior laryngeal nerves. On further dissection, we discovered that this nonrecurrent inferior laryngeal nerve had merged with a separate, recurrent inferior laryngeal nerve of normal size and position. We carefully traced this latter nerve and confirmed that it disappeared into the thorax without branching, in the usual manner of the recurrent inferior laryngeal nerve (Figure 2).

The patient underwent a total thyroidectomy with central neck dissection.

The final pathological diagnosis was papillary carcinoma and Hashimoto's thyroiditis.

The patient's post-operative course was unremarkable. She had no hoarseness or dysphagia.

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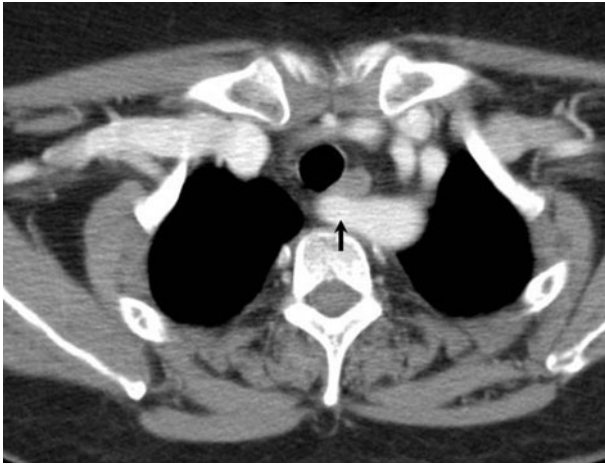


FIG. 1

Axial computed tomography scan showing an anomalous right subclavian artery (arrow) originating from the aortic arch and passing to the right side between the trachea and a vertebral body.

Discussion

Damage to the recurrent inferior laryngeal nerve during thyroid surgery is the most common iatrogenic cause of vocal fold paralysis. Identification of the recurrent inferior laryngeal nerve together with meticulous surgical technique can significantly decrease the incidence of this complication.⁴ In 1823, Stedman was the first to report a nerve that passed from the right vagus nerve directly into the larynx, in a cadaver in which the right subclavian artery arose from the aortic arch to the left of the left subclavian artery.⁵ The possibility of a nonrecurrent inferior laryngeal nerve is a known but rare (0.6 per cent) anatomical variant.¹ Very few cases of a nonrecurrent inferior laryngeal nerve in association with an ipsilateral recurrent inferior laryngeal nerve have been reported.¹⁻³ In these cases, the nonrecurrent inferior laryngeal nerve came off the right vagus nerve to join the recurrent inferior laryngeal nerve before entering the larynx. Either one of these nerves can be the larger branch. Proye *et al.* suggested

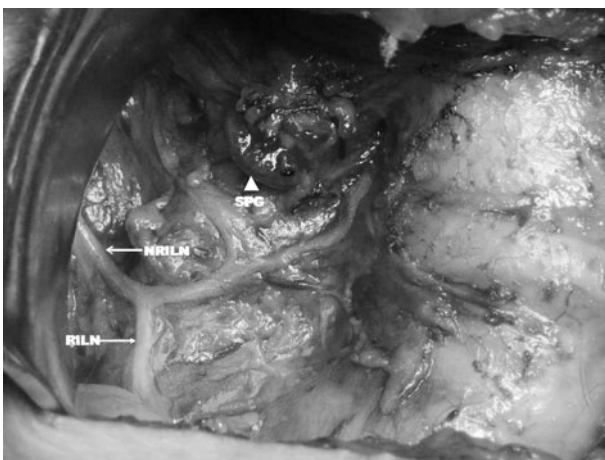


FIG. 2

Intra-operative photograph showing a nonrecurrent inferior laryngeal nerve (NRILN) together with a recurrent inferior laryngeal nerve (RILN). The superior parathyroid gland (SPG) is also indicated.

that, in the course of routine exposure of the recurrent inferior laryngeal nerve, if a nerve of diminished diameter is observed in the usual recurrent course, careful dissection cephalad should be continued to demonstrate a possible merger of ipsilateral nonrecurrent and recurrent nerves.¹ In our case, there was no difference between the widths of the nonrecurrent inferior laryngeal nerve and the recurrent inferior laryngeal nerve.

The presence of a communicating branch between the sympathetic trunk and the recurrent inferior laryngeal nerve, which could be mistaken for a nonrecurrent inferior laryngeal nerve during neck surgery, has twice been reported.^{6,7} The incidence of such a communicating branch has been variously reported as 0.8⁶ and 17.3 per cent.⁷ The large difference between these two incidence rates may be explained by the different sensitivities of the methods used (i.e. anatomical dissection versus surgical dissection); cadaveric dissection permits a more morphologically sensitive search for details far away from the surgical field. This communicating branch is usually thin but occasionally may have the same diameter as the inferior laryngeal nerve and may be confused with it.^{6,7} Such confusion may have serious consequences if surgeons omit to search posteriorly to identify the genuine recurrent inferior laryngeal nerve, leaving it susceptible to injury.^{6,7} The communicating branch arises from the superior, middle, inferior and stellate cervical sympathetic ganglia or from the sympathetic trunk itself.^{6,7}

The recurrent inferior laryngeal nerve seen in our patient may have been a communicating branch between the nonrecurrent inferior laryngeal nerve and the inferior sympathetic or stellate ganglion. However, we believe that our patient had a coexisting, ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve, because of her aberrant retroesophageal right subclavian artery and the lack of difference in width between the two nerve branches. Furthermore, our patient's nonrecurrent inferior laryngeal nerve was thinner than previously encountered nonrecurrent inferior laryngeal nerves. All cases of ipsilateral nonrecurrent inferior laryngeal nerve and recurrent laryngeal nerve were discovered during operation.¹⁻³ Thus, it was impossible to confirm whether these cases represented coexisting, ipsilateral nonrecurrent and recurrent inferior laryngeal nerves or a communicating branch between the sympathetic trunk and the recurrent inferior laryngeal nerve, due to the limitations of surgical exploration.

The right nonrecurrent inferior laryngeal nerve is strictly associated with an aberrant brachiocephalic artery, which is sometimes symptomatic (causing dysphagia). Pre-operative imaging, such as barium swallow, CT or magnetic resonance angiography, easily detects this rare anomaly.⁸ Our hospital used CT to evaluate all patients undergoing thyroid surgery. Through such pre-operative CT imaging, we could thus predict the presence of a nonrecurrent inferior laryngeal nerve, on the basis of an aberrant retroesophageal right subclavian artery.

Conclusion

Variations and anomalies of the recurrent inferior laryngeal nerve are very common. The surgeon must be aware of the rare possibility of a coexisting, ipsilateral nonrecurrent inferior laryngeal nerve and recurrent inferior laryngeal nerve, and must trace the nerve in its entirety. Occasionally, what appears to be a nonrecurrent inferior laryngeal nerve will actually be a communicating branch between the recurrent inferior laryngeal nerve and the oesophageal or sympathetic ganglia. The consequences of careless dissection include not only vocal fold paralysis but also dysphagia if

pharyngeal and oesophageal branches of nonrecurrent or recurrent inferior laryngeal nerve are injured.

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