

# Surgical Delight: Nonrecurrent Laryngeal Nerve

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## ABSTRACT

**Introduction:** A nonrecurrent course is an unusual anatomic variation of the recurrent laryngeal nerve. It is seen usually on the right side, and it is very rare on the left side. Nonrecurrent laryngeal nerve if present is mostly associated with vascular anomalies.

**Case report:** A 55-year-old female was referred to us with thyrotoxic symptoms for a period of 6 months. She was rendered euthyroid with antithyroid medications. After complete evaluation, she was posted for total thyroidectomy. Intraoperatively, right recurrent nerve could not be identified in usual position. On careful dissection, a nonrecurrent laryngeal nerve was identified. The recurrent laryngeal nerve on the left side showed normal course. The intraoperative and postoperative period were uneventful. Postoperative vocal cord status was normal.

**Conclusion:** This case was presented for its rarity and to stress the need for orderly meticulous surgical dissection.

**Keywords:** Nonrecurrent laryngeal nerve, Recurrent laryngeal nerve, Inferior laryngeal nerve.

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## INTRODUCTION

The recurrent laryngeal nerve, a branch of vagus nerve, supplies the intrinsic muscles of larynx in the neck, but the branching of the nerves occurs in the thorax. The nerves during its course toward larynx, usually loops around the subclavian artery on the right side and around the arch of aorta on left side. A nonrecurrent course is an unusual anatomic variation of the recurrent laryngeal nerve. If seen, it is usually on the right side and is very rare on the left side. Nonrecurrent laryngeal nerve if present is mostly associated with vascular anomalies.

## CASE REPORT

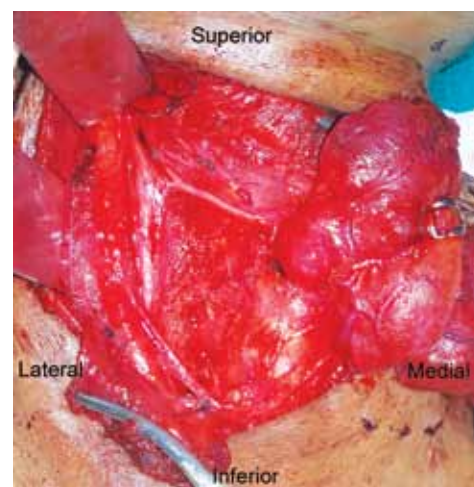
A 55-year-old female was referred to us with thyrotoxic symptoms for a period of 6 months. She had moderately

enlarged thyroid gland. Ultrasonogram of neck revealed a diffuse goiter with increased vascularity. She was rendered euthyroid with antithyroid medications. She was normoglycemic and normotensive. Her echocardiogram was normal. After complete evaluation, she was posted for total thyroidectomy.

Surgery was proceeded in usual manner. The left lobe was dissected first, after identifying the external branch of superior laryngeal nerve, the superior pedicle was ligated. The left recurrent laryngeal nerve was seen in the tracheoesophageal groove. Both the parathyroid gland on left side were identified and preserved. Left lobe was mobilized fully. On the right side, after ligating superior pedicles, the right recurrent laryngeal nerve could not be identified in usual position. On careful dissection, a nonrecurrent laryngeal nerve was identified (Figs 1 and 2), seen arising from the vagus at the level of superior thyroid artery (Figs 3 and 4). Classical total thyroidectomy was done. The intraoperative and postoperative period were uneventful. Patient had normal voice in the postoperative period. The normal vocal cord status was confirmed with video laryngoscope.

## DISCUSSION

The relatively long course of the recurrent laryngeal nerves places them at risk of iatrogenic injury in numerous procedures involving the cervical and upper thoracic regions. The first description of a nonrecurrent laryngeal nerve was given by GW Stedman in 1823, a 'right inferior laryngeal nerve in a nonrecurrent situation' arising

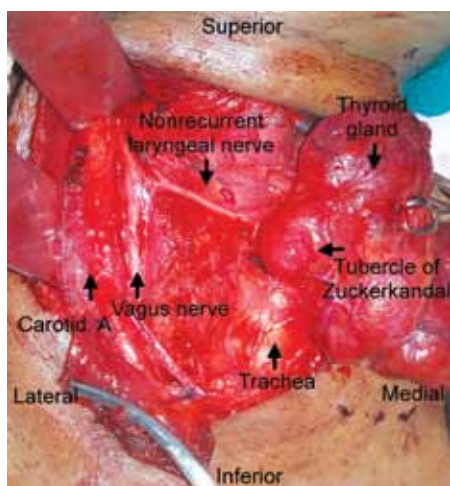


**Fig. 1:** Nonrecurrent laryngeal nerve originating from right vagus nerve. Right lobe of thyroid gland retracted medially

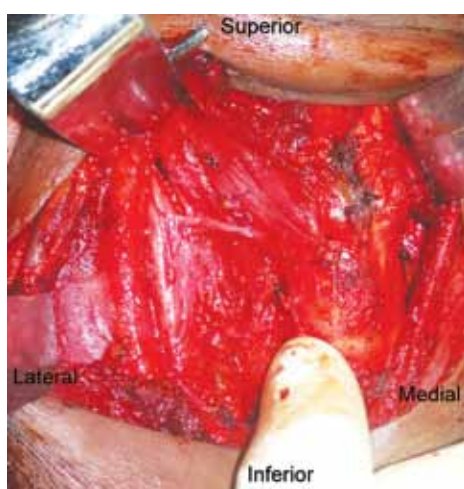
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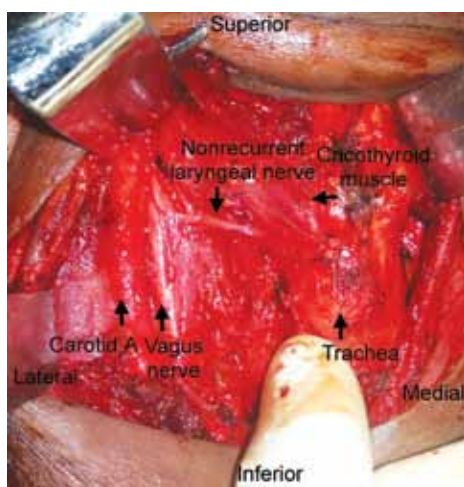
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**Fig. 2:** Nonrecurrent laryngeal nerve originating from right vagus nerve. Right lobe of thyroid gland retracted medially. A pointer is showed for tubercle of Zuckerkandl, which is a constant landmark for identification of recurrent laryngeal nerve



**Fig. 3:** Nonrecurrent laryngeal nerve originating from right vagus nerve. Thyroid gland was excised. The entry point of nonrecurrent laryngeal nerve is seen



**Fig. 4:** Nonrecurrent laryngeal nerve originating from right vagus nerve. Thyroid gland excised. The entry point of nonrecurrent laryngeal nerve is seen clearly. All structures marked by small arrow pointers

from the right vagus nerve and coursing directly into the larynx.<sup>1</sup> The incidence of this anomaly ranges from 0.54 to 1.6% for the right side and it is approximately 0.04% for the left side.<sup>2</sup>

The nonrecurrent laryngeal nerve is an unusual occurrence that should always be kept in mind, in order to prevent accidental injury during surgery. The absence of the recurrent laryngeal nerve in its usual site is due to an embryologic error. During fetal development, the recurrent laryngeal nerves are derived from the VI branchial arch. These originate from the vagus nerves under the VI aortic arch and have a horizontal course. The V and the distal portion of the VI aortic arches regress bilaterally and the two laryngeal nerves remain anchored to the structures that develop from the IV arch (the subclavian artery on the right and the aortic arch on the left). During their descent into the thorax, these arteries take with them the nerves, which therefore assume a recurrent course.<sup>3</sup>

A right-sided nonrecurrent laryngeal nerve should be suspected preoperatively in those patients with dysphagia due to an aberrant retroesophageal right subclavian artery (arteria lusoria), a 'bayonet' image is seen in barium swallow due to distortion of the esophagus.<sup>4</sup> A left nonrecurrent laryngeal nerve has been suspected in patients with proven situs inversus.<sup>5</sup>

Two types of nonrecurrent laryngeal nerve were defined. In type 1, the nonrecurrent laryngeal nerve runs together with the vessels of the superior thyroid pedicle. In type 2, the nonrecurrent laryngeal nerve follows a transverse course parallel to the inferior thyroid artery. In 2a, the nerve lies over the trunk of the inferior thyroid artery and in 2b the nerve lies under the trunk or between the branches of the inferior thyroid artery.<sup>3</sup>

Theoretically, the preoperative diagnosis of a nonrecurrent laryngeal could be attempted with imaging studies, such as USG, CT scan or magnetic resonance imaging (MRI), to visualize the arteria lusoria.<sup>6</sup> In ultrasonogram, the presence of the division of the brachiocephalic artery into the right common carotid artery and right subclavian artery can be visualized. When this division is not evident, the course of right common carotid artery should be traced to identify its possible origin directly from the aortic arch.<sup>7</sup>

Intraoperatively, if the recurrent laryngeal nerve is not evident in its usual course, the surgeon should make diligent dissection in an orderly fashion. The carotid sheath should be opened, carefully identify and mobilize the vagus nerve. The vagus nerve can be gently raised with elastic loops, enabling identification of the nonrecurrent laryngeal nerve and its course.<sup>8</sup>

Liu et al suggested that any transverse bond should not be cut between vascular and laryngeal except

middle thyroid vein, unless the recurrent laryngeal nerve is identified.<sup>9</sup>

According to Brauckhoff et al, neuromonitoring and selective neurostimulation of vagus is a very simple and reliable method to identify a nonrecurrent laryngeal nerve and to prevent nerve palsy.<sup>10</sup>

## CONCLUSION

The injury to the nonrecurrent laryngeal nerve is a major risk during thyroid surgeries. The best way to avoid damage to the nonrecurrent laryngeal nerve is awareness about the possibility of their existence. Care should be taken to identify the nerve with a systematic meticulous dissection based on the anatomical landmarks.

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