

A New Technique for Identifying the Recurrent Laryngeal Nerve: Our Experience in 71 Patients

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To the Editor: Thyroid surgeries are the most frequently performed endocrine procedures worldwide. One of the most serious complications of thyroid surgery is injury to the recurrent laryngeal nerve (RLN), which varies from 0.5% to 14.0%, depending on the type of disease, the type of surgery, the extent of resection, and the surgical technique.^[1-3] Currently, there are three approaches used to identify the nerve: the superior, lateral, and inferior approaches.^[4] Each of these has advantages and disadvantages; however, the common component of all three techniques is that the RLN is identified from the lateral side of the thyroid. Yet, in some special cases when the lateral side of the thyroid is difficult to divide, it is not possible to use any of the three techniques to identify the RLN. Therefore, we introduce a new approach to help identify the RLN in special cases.

This study was conducted on 71 patients with thyroid cancer. The patients included 29 males and 42 females, and their ages ranged from 16 to 68 years, with a mean age of 42 years. The procedures were performed by one of the authors between March 2010 and November 2014 at the Fudan University Shanghai Cancer center. The medial approach was performed on patients who met the following criteria: (1) revision with the presence of a fibrous scar due to previous surgery; (2) multifocal thyroid cancer with local invasion (RLN, esophagus, and carotid sheath) and lymph nodes metastasis; and (3) other cases in which it was difficult to find the RLN using the standard approaches.

A collar incision was used, and subplatysmal flaps were elevated. The strap muscles were separated in the midline to expose the thyroid gland; the thyroid isthmus was clamped and transected at its attachment to the opposite lobe. The lobe was separated internally from the trachea until half of the lateral side of tracheal rings 2–4 was exposed from the thyroid lobe. Using the third tracheal ring as a landmark located 0.3 cm from the lateral surface of the tracheal ring, the surgeon employed a careful blunt dissection to expose the RLN through the layers of the fibers [Figure 1].

The preoperative workup included a clinical examination, neck and thyroid ultrasound scan, neck computer tomography, and an assay of thyroid-stimulating hormones and thyroid hormones. Fine-needle aspiration cytology was also performed before the surgeries. All patients then received a total thyroidectomy and central lymph nodes dissection (with or without lateral lymph nodes dissection). A postoperative laryngoscopy was performed on all patients. Patients were followed up every 6 months.

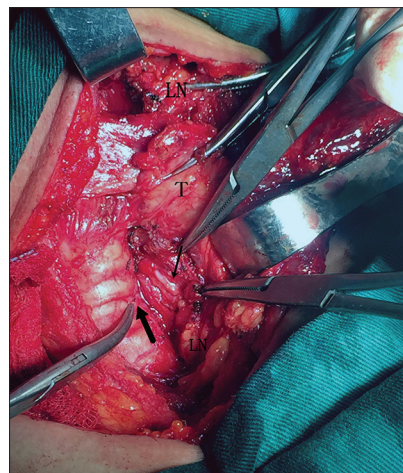


Figure 1: The thyroid lobe (T) was separated internally from the trachea. Using the third tracheal ring (thick narrow) as a landmark located 0.3 cm from the lateral surface of the tracheal ring, the surgeon employed a careful blunt dissection to expose the RLN (arrow). RLN: Recurrent laryngeal nerve; LN: Lymph node.

In all of the cases, RLNs were successfully identified by the medial approach. Of the 71 patients, 22 were revision surgeries. Among the remaining 49 patients, 81.6% (40 of 49) of the patients were T4 according to the 7th edition of the American Joint Committee on Cancer classification,^[5] which means that most of the patients in this study were in the late stage of thyroid cancer.

All of the patients were followed up for at least 12 months. The duration of the follow-up period ranged from 12 to 62 months, with a median of 28 months. Seven patients had clinical and biochemical hypocalcaemia, which was corrected using calcium supplementation. Two cases showed unilateral vocal cord paralysis;

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one fully recovered after 6 months, while the other showed lateral vocal paralysis and were treated with a tracheotomy.

RLN injury may lower the quality of life due to a variety of symptoms related to voice changes and subsequent limitations in physical, emotional, and social functioning. If the bilateral RLN was injured, it can be a life-threatening complication leading to airway obstruction.^[6] Thus, identification of the RLN is usually an initial and necessary step in thyroid surgery.

There are three approaches that are currently used to identify the nerve: the superior, lateral, and inferior approaches. The superior approach identifies the RLN at the laryngeal entry point, which is above the ligament of Berry. The advantage of this approach is that it is easy to perform because the RLN entry point is relatively constant; it is especially useful for large cervical or substernal goiters, where the nerve cannot be found using a lateral or inferior approach. The disadvantage is that dissection around the ligament of Berry is not easy because this region is fibrous and has a rich vasculature. The lateral approach identifies the RLN at the midpole of the thyroid lobe. This approach is usually used and applicable to most cases except those with a very large cervical or substernal goiter or the presence of a fibrous scar due to previous surgery. However, injury to the extralaryngeal branching of the RLN may occur with this approach. The inferior approach finds the RLN at the lower pole of the thyroid lobe around the tracheoesophageal groove. The main advantage is that extralaryngeal branching rarely occurs at this level. The disadvantage is that it involves the dissection of a long segment, and it may be difficult to find the RLN because of inferior thyroid artery bleeding.^[4]

In China, most thyroid procedures are performed by general surgeons even though most of them are not well trained for thyroid cancer surgeries. Thus, in our cancer center, reoperative thyroid procedures and those with severe thyroid cancers are very common. In the reoperative thyroid procedures, the lateral side of the thyroid was difficult to separate because of scarring and the loss of normal tissue planes; thus, the RLN could not be identified by regular approaches. Some huge, multifocal thyroid cancers with local invasion (RLN, esophagus, and carotid sheath) and lymph nodes metastasis also resulted in difficult cases in terms of finding the RLN with the three common approaches. Thyroid surgeons should have a number of different techniques available in the event that identification of the RLN proves troublesome. In this case series, we described a new backup approach for the identification of the RLN. This work represents the largest series of patients undergoing thyroid surgery using this method and provides valuable safety data for surgeons wishing to use it as a backup method for RLN identification in special cases.

A key to this new technique is to find the RLN from the internal side. As we discussed before, in cases where the lateral side of the thyroid was difficult to separate, identification of the RLN from the internal side seemed to be a very good backup method. In our hands, we found an entry point that can be navigated by its relative position to the trachea. The RLN is a branch of the vagus nerve and typically arises in the thorax. In general, the left RLN route is longer than the right, while the right nerve is more oblique than the left during its ascends. This article describes the exploration of the RLN from the medial approach. To avoid accidental bleeding of the inferior thyroid artery caused by injury, we try to identify the RLN above the level of the artery. In the author's observation, this level is about the third tracheal ring. The location of the RLN in the level of third tracheal ring is relatively stable by its anatomical characteristic, which is suitable for both sides. Hence, we use the third tracheal ring as a landmark, and careful blunt dissection was

employed to expose the RLN through the layers of the fibers 0.3 cm from the lateral surface of the tracheal ring. With this method, careful blunt dissection is also important in case of inferior thyroid artery bleeding interfering with the RLN identification. In addition, attention needs to be paid to the possible existence of a non-RLN, especially in the right side, and preoperative evaluation of an aberrant right subclavian artery with either a computed tomography scan or ultrasound is necessary.

Most patients in our study were in the late stages of thyroid cancer, which makes it difficult to identify the RLN. However, in all of the cases, the RLNs were successfully identified by the medial approach. The data also confirm that identifying the RLN with the medial approach does not increase the risk of operative complications, including vocal paralysis, hypocalcaemia, primary hemorrhage, or wound complications.

The patient cohort in this study seems to be small compared to other studies on thyroid surgery. However, the purpose of this study was to describe a backup of the RLN identification approach for special cases, not routine cases. In underdeveloped countries in particular, intraoperative neuromonitoring of the RLN is expensive and not available in most cases.^[7] However, an investigation in a larger population will certainly support our results and hypothesis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patients' guardians have given their consent for reporting their images and other clinical information in the journal. The patients' guardians understand that their names and initials will not be published and due efforts will be made to conceal their identity.

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Conflicts of interest

There are no conflicts of interest.

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