





# Double Recurrent Laryngeal Nerve with Thyroid Carcinoma

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The most important and serious complication of thyroid surgery is recurrent laryngeal nerve (RLN) injury, and it has been noted that this risk increases considerably in the presence of anatomical variations. Double recurrent laryngeal nerve (DRLN) is very rare among RLN anatomical variations. There are only a few case reports on DRLN in the literature. It is crucial to possess surgical expertise and ensure complete visualization of the nerve to minimize the likelihood of RLN injury. Intraoperative nerve monitoring (IONM) is particularly useful in identifying anatomical variations. In a 54-year-old woman undergoing diagnostic left lobectomy+isthmectomy, a left DRLN was identified during intraoperative exploration and meticulous nerve exploration with the assistance of IONM monitoring verified that the impulse conduction in both branches was identical. The surgical procedure was successfully performed without causing any harm to the nerve. Based on the case reports in the literature and our experience with this patient, we believe that surgical expertise and the utilization of IONM can decrease RLN nerve damage and reveal its anatomical variations during thyroid surgery.

**Keywords:** double recurrent laryngeal nerve; thyroid; carcinoma; nerve; intraoperative nerve monitoring

## Introduction

Thyroidectomy is frequently performed for diffuse toxic goiter (Graves' disease), toxic multinodular goiter (Plummer disease); for benign thyroid diseases with symptoms like dysphagia, dyspnea, voice change, neck discomfort, and also for thyroid malignancies [1, 2, 3]. One of the most important and serious complications of thyroid surgery is recurrent laryngeal nerve (RLN) injury. The RLN normally arises from the vagus nerve in the upper mediastinum. It traverses the tracheoesophageal sulcus and enters the larynx lateral to the Berry ligament. It innervates all intrinsic laryngeal muscles except the cricothyroid muscle. The key steps in thyroid surgery are the identification and conservation of the RLN [4, 5]. The RLN has many anatomical variations, more frequently on the right side than on the left [4]. Hence, good dissection and thorough visualization during surgery are crucial for protecting nerves and ensuring surgical safety [6]. Double recurrent laryngeal nerve (DRLN) is very rare among RLN anatomical variations. There are only a few case reports in the literature [4, 6, 7]. RLN damage causes various problems, from voice changes to respiratory failure. Identifying variations such as DRLN is important to reduce the risk of intraoperative RLN damage [4]. Intraoperative nerve monitoring (IONM) is used by most thyroid surgeons. IONM contributes to the recognition of RLN injury, identification of its anatomical variations and reduc-

tion of the risk of damage [8]. We report a case of DRLN identified in a female patient during diagnostic left lobectomy+isthmectomy.

## Case Report

Written informed consent for scientific study was obtained from the patient. The patient was a 54-year-old woman who complained of swelling in the neck for one year. During the neck examination, a well-defined and mobile nodule measuring approximately 30 × 20 mm was detected in the left lobe of the thyroid gland. Ultrasound examination of the patient's neck revealed the presence of several hypoechoic solid nodules, with the largest measuring 40 × 25 mm, in the left lobe. The patient's thyroid function tests were within the normal limits. The ultrasound-guided fine needle aspiration cytology performed on the 40 × 25 mm nodule in the left lobe revealed a typical follicular cytology of unknown significance. Informed consent was obtained from the patient and she underwent diagnostic left lobectomy+isthmectomy due to the 40 mm size of the left lobe nodule and Bethesda 3 cytology. During intraoperative exploration, the left DRLN was identified (Fig. 1) and IONM verified that the impulse conduction in both branches was identical.

There were no complications and the patient was discharged on the first postoperative day. Based on the pathology results, the patient was diagnosed with four focal papillary carcinoma oncocytic variants, measuring 35 mm, 10 mm, 4 mm, and 4 mm. Therefore, it was decided to administer radioactive iodine (RAI) treatment. The patient underwent completion thyroidectomy in a second proce-

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**Fig. 1. Intraoperative view of the left DRLN.** DRLN, double recurrent laryngeal nerve. The two blue lines in the figure indicate the First trunk of RLN (top) and the Second trunk of RLN (bottom).

dure (first surgery: left lobectomy+isthmectomy; second surgery: right lobectomy). Central lymph node dissection was not performed on the patient because no pathological lymph nodes were detected in the preoperative radiological examination and intraoperative exploration. The right lobectomy pathology report revealed classical variant papillary carcinoma measuring 7 mm and 4 mm. No complications were observed during the postoperative period. The patient received a dose of 150 millicuries of RAI after the surgery and was subsequently monitored while taking levothyroxine to suppress thyroid activity.

## Discussion

RLN damage is one of the most important complications of thyroid surgery and negatively affects patient's quality of life. Additionally, it subjects surgeons to medicolegal is-

sues. The likelihood of RLN injury is dependent upon factors such as preoperative diagnosis, surgical procedure, and the surgeon's level of expertise [9]. It is reported that there is a risk of damage of up to 2% due to the many anatomical variations of the RLN [6]. DRLN is relatively uncommon among these anatomical variations. There are a few case reports of DRLN in the literature by Kilic [4], Manoğlu *et al.* [6] and Mishra and Dhall [7]. Some authors report that the second branch of the DRLN may be thinner and that surgeons should investigate the thicker, real branch of the RLN [10]. However, as in the case reports cited above, we found that both branches were the same thickness. Complete visualization of the RLN is mandatory to reduce the risk of damage and to identify any anatomical variations during thyroid surgery [4]. In our case, the RLN was completely explored during the diagnostic left lobectomy, revealing a double branch on the left side. IONM confirmed that signal

transmission was equal in both branches. IONM is widely used to identify and assess both the function and anatomical variations of the RLN [11]. Our patient underwent a thorough dissection of the left DRLN. According to the literature, anatomical variations of the RLN cannot be predicted before surgery and may be linked to an increased likelihood of RLN injury. IONM contributes to the detection of RLN anatomical variations, may contribute to reducing the risk of injury [12].

## Conclusions

DRLN was identified and the surgical procedure was successfully performed without causing any harm to the nerve. Based on the case reports in the literature and our own experience with this patient, it is our opinion that IONM is particularly useful in identifying anatomical variations of the RLN and IONM can decrease RLN nerve damage during thyroid surgery.

## Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

## Author Contributions

UK: Study design, analysis, interpretation, writing the article, critical revision of the article, and literature review. MGD: Literature review, English editing, critical revision. AFM: Data collections, literature review. LDE: Literature review, English editing. All authors: Analysis and interpretation of data. All authors revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

## Ethics Approval and Consent to Participate

Signed informed consent was obtained from the patient included in this case report and is available upon request. The Declaration of Ethics, which requires only the patient's informed consent because it is retrospective and complies with CARE rules, has been exempted by Sultan II. Abdulhamid Han Training and Research Hospital. The study was conducted in accordance with the Declaration of Helsinki.

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## Conflict of Interest

The authors declare no conflict of interest.

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