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Case Report

Intra-operative discovery of nonrecurrent inferior laryngeal nerve: a report of 3 cases including one of left nonrecurrent inferior laryngeal nerve and literature review

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ABSTRACT

The nonrecurrent inferior laryngeal nerve (NRILN), a rare variant in the course of the inferior laryngeal nerve, passes transversely into larynx directly arising from the vagus nerve that increases the risk of damage to the nerve during thyroid and parathyroid surgery. We discussed clinical significance of non-recurrent laryngeal nerve during cervicotomy. Its importance was demonstrated in three clinical cases as well as the related literature reviews. All patients underwent bilateral thyroidectomy for a multinodular goiter. Two patients had identification of the NRILN on the right side. The third patient had the NRILN on the left side. The diagnosis of this anatomical variation was made per-operatively on all cases. The NRILN is an exceptional anomaly but overlooking its risk may lead to grave morbidity. This is a supplementary proof in favour of systematic dissection of the recurrent inferior laryngeal nerve (RILN) during all thyroid and parathyroid surgery.

Keywords: Anatomy, Thyroidectomy, NRILN, Vocal cord palsy, Clinical cases

INTRODUCTION

The NRILN emerges directly and transversely from the vagus nerve at the cervical region into the larynx behind the inferior thyroid cartilage notch. It is a rare anatomical variation without functional consequences. This anomaly has been described clinically in a cadaver by Stedman since 1823.[1]

During thyroid surgery, this aberrant nerve may become inadvertently injured, causing persistent ipsilateral vocal fold paralysis.[2] This article reported 3 cases of NRILN we had identified during the performance of 1511 thyroid operations between the years 2011 to 2021 emphasizing the intraoperative diagnostic accuracy.

CASE REPORT

Case 1

A 51-year-old woman, without a medical history or any prior neck radiation, presented with neck pain and dysphagia. On physical examination, the patient had an enlarged and irregular thyroid gland predominately on the left side with no palpable adenopathies. She was clinically euthyroid without anomalies of thyroid blood tests (TSH, FT3 and FT4). Ultrasound reported a multinodular goiter with a dominant nodule of 2.1 cm in the left thyroid lobe. The patient underwent a total thyroidectomy respecting the 4 parathyroid glands, the right RILN and the left NRILN (Figure 1). She presented

transitory hypocalcaemia in the post-operative period with no dysphonia. Histological analysis of specimen demonstrated the presence of multiple thyroid nodules without malignancy signs.

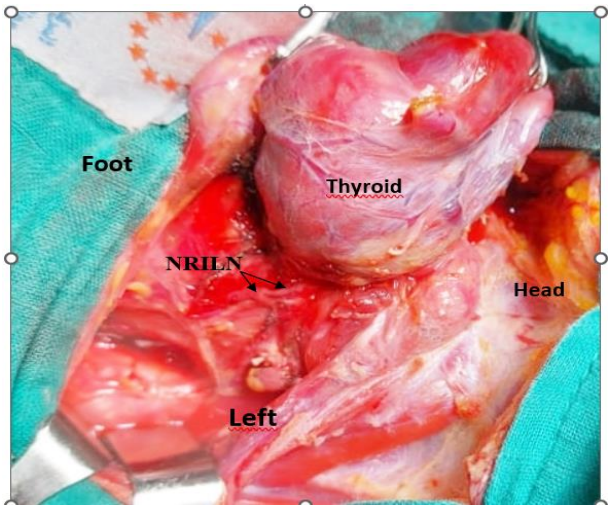

Figure 1: Intraoperative image of the left NRILN (case 1).

Case 2

A 39-year-old woman, with hypertension placed under treatment, presented with neck swelling. On physical examination, the patient had an enlarged thyroid gland with no palpable adenopathies. She was clinically euthyroid without anomalies of thyroid blood tests (TSH, FT3 and FT4). Ultrasound reported a multinodular goiter. The patient underwent a total thyroidectomy respecting the 4 parathyroid glands, the left RILN and the right NRILN (Figure 2). She presented neither hypo-calcaemia nor dysphonia in the post-operative period. Histological analysis of specimen demonstrated the presence of multiple thyroid nodules without malignancy signs.

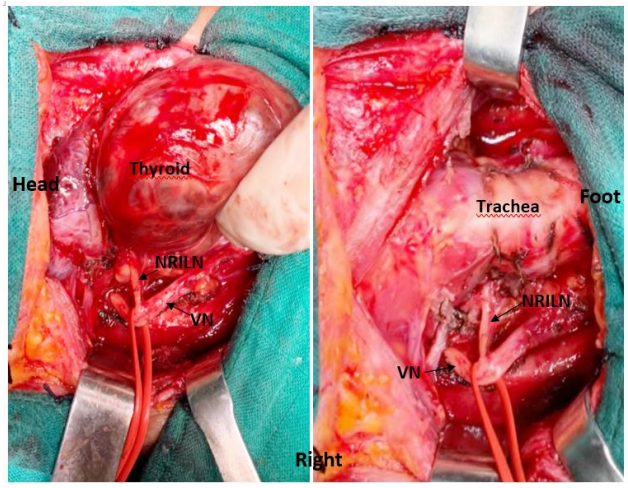

Figure 2: Intraoperative image of the right NRILN (case 2).

Case 3

A 49-year-old woman presented with neck swelling. Physical examination revealed an enlarged thyroid gland with no palpable adenopathy. Laboratory tests demonstrate a normal serum thyroid hormone concentration. A cervical ultrasound shows the presence of a thyroid nodule of 4.5 cm in the left lobe and multiple small nodules bilaterally. A total thyroidectomy was performed; a left RILN was noted with right NRILN that runs to the larynx (Figure 3). Post-operatively, she presented neither hypocalcaemia nor dysphonia. The pathologic analysis showed the presence of multiple thyroid nodules with no signs of malignancy.

All cases were not diagnosed NRILN preoperatively, and were found during the operation. Preoperative cytological analyses showed no signs of malignancy and preoperative and postoperative laryngoscopy reports were without anomalies. The lateral approach was used as dissection and exposure technique of the nerves and no vessel aberrance existed intraoperatively.

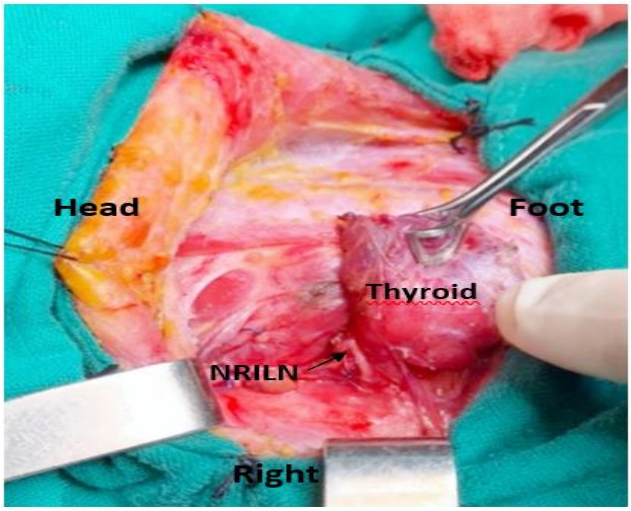

Figure 3: Intraoperative image of the right NRILN (case 3).

DISCUSSION

The eventuality of anatomical variants in the course of the RILN requires its systematic intraoperative identification. One of the possible variants is NRILN; it emerges from an atypical embryological origin of the subclavian artery.[3] Generally, the left NRLN is accompanied by situs inversus viscerum according to the study conducted by Weatherford.[1-4] However, Michael et al reported a left-sided NRLN unaccompanied by viscerum anomalies.[2-5]

The NRILN is relatively an exceptional anomaly which has been described only in 0.52 to 0.7% of cases.[2] Between the years 2011 to 2021 inclusive 1511 thyroid operations were performed at endocrine surgery

department of Rabat University Hospital Center. The RILNs were usually dissected and exposed. Of the nerves identified, 3 were nonrecurrent, arising from the cervical trunk of the vagus nerve, passing to the tracheo-oesophageal tract at the level of the inferior pole of gland. Two occurred on the right side and one on the left side.

As a consequence of its anatomical variation, the NRILN was at risk of being damaged during all surgical procedures requiring cervicotomy such as thyroidectomy, neck dissection, parathyroidectomy, oesophagectomy, and carotid endarterectomy.[6]

NRLN is usually asymptomatic. However, dysphagia can be suggestive, which is difficult to differentiate from the compression caused by thyroid nodule or hypertrophy, as in the case of our first patient.[7]

It was difficult to reveal the nervous anomaly by any type of pre-operative imaging.[8] The diagnosis may be made only if the corresponding vascular anomaly was suspected.[7,8] Esophagus barium swallow can be useful to find the right NRLN accompanied with retroesophageal right subclavian artery, which could take place in the disfigured esophagus showing bayonet sign on film.[9] Right side heart detected by X-ray examination can indicated the left NRLN according to situs inversus viscerum rule. An aberrant subclavian artery identified by angiography, CT-angoiography or magnetic resonance angiography, was often associated with the NRILN.[8-10]

The role of intraoperative nerve monitoring (IONM) for predicting the non RILN was not negligible. Donatini et al also revealed the greatly reduced incidence of nerve palsy, particularly in case of NRLN, by soliciting IONM for surgery. This technique had a clear advantage for precise prediction of non-RLN in the early period of surgery, before dissection and exposure of the RLN. Additionally, it could prove the presence and the function of the nerve.[11]

However, the majority of NRLNs were diagnosed during surgery.[12] Hence, its possible occurrence should be systematically and promptly anticipated by all thyroid surgeons by locating the RILN.[10-12] It can be found as low in the neck as possible next to the inferior thyroid artery and thyroid cartilage which were used as landmarks.[13] If the RILN was not observed at its anatomic position, it should be sought more or less transversally between the larynx and carotid artery and anything of cord shape should be carefully anatomized.[10-13] The absence of the innominate artery or perception of throbbing from the aberrant artery can help to identify the vascular underlying anomaly. In addition, when the RILN on the usual position is manifestly thin, a non-recurrent branch should be considered.[14]

CONCLUSION

The non-recurrence of the recurrent laryngeal nerve is uncommon. It can be suspected pre-operatively from signs correlated with the vascular anomalies such as dysphagia and thoracic imaging. Avoiding its intraoperative lesion is a key concern in every thyroidectomy because it can lead to vocal cord palsy. Indeed, recognizing the nerve is the best warranty against all possible damage.

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