ECRONICON OPEN ACCESS

EC PAEDIATRICS
Research Article

The Benefit of Identification and Preservation of Recurrent Laryngeal Nerve during Thyroid Surgery

Mohamed Mahmoud El-Sawy, Hatem Salah El Din EL Habashy, Tareq Abd El Kareem El Dahshan and Mahmoud Ahmed Abd El Fattah Amir*

Departments of Otorhinolaryngology, Al-Sayed Galal University Hospital, Al-Azhar Faculty of Medicine, Egypt

***Corresponding Author**: Mahmoud Ahmed Abd El Fattah Amir, Departments of Otorhinolaryngology, Al-Sayed Galal University Hospital, Al-Azhar Faculty of Medicine, Egypt.

Received: January 11, 2024; **Published:** January 22, 2024

Abstract

Background: Recurrent laryngeal nerve (RLN) iatrogenic injury is one of the most serious complications in thyroid surgery. Paralysis of vocal cords can represent a serious complication inducing, when bilateral, serious functional sequelae such as phonatory, respiratory and psychological problems that limit working capacities and social relationships of patients.

Objective: To study the importance of searching, identification and exposure of the RLN during thyroid surgery.

Patients and Methods: 20 patients who underwent thyroidectomy were reviewed for RLN paralysis between December of 2016 to July of 2017. Intraoperative identification of RLN at RLN triangle. Postoperative, assessment of RLN integrity was determined by using flexible nasolaryngoscopy 7 days after the procedure to visualize the vocal cord mobility.

Results: RLNs were identified intraoperatively in all patients. Concerning the postoperative results, flexible nasolaryngoscopy was utilized in all patients one week after the procedure. All patients had bilateral mobile vocal cords after the first week postoperatively.

Conclusion: Iatrogenic injury to the RLN or to its branches could be avoided by searching, identifying, and exposing the nerve itself and by following its course with care.

Keywords: *Recurrent Laryngeal Nerve (RLN); Thyroid Surgery; Iatrogenic Injury; Vocal Cord; Nasolaryngoscopy*

Introduction

Operations on the thyroid gland are the most frequently performed endocrine procedures worldwide. Improvements in technique have decreased the risk of injury to adjacent structures to minimal levels [1].

Apart from hypoparathyroidism [2] and hematoma [3], recurrent laryngeal nerve palsy is the most common and serious complication after thyroid surgery [2] and it is surgical technique (Zheng., *et al*. 2013), abnormal anatomy, bulky disease and surgeon inexperience are additional risk factors of recurrent laryngeal nerve injury [4].

Recurrent laryngeal nerve injury can diminish quality of life due to a variety of symptoms related to voice changes and subsequent limitations in physical, emotional and social functioning, while bilateral injury can be a life-threatening complication leading to airway obstruction [5].

Intraoperative identification of the recurrent laryngeal nerve has been demonstrated to decrease the incidence of postoperative nerve palsy [6]. But even in the most experienced hands recurrent laryngeal nerve palsy occurs occasionally, with permanent palsy rate of 1 - 2% and temporary palsy rate of up to 5 - 6%, owing to variability in nerve anatomy and difficulties in nerve identification [7].

The causes of recurrent laryngeal nerve injury could result from transaction, clamping, stretching, electro-thermal injury, ligature entrapment, or ischemia [8].

Earlier, surgeons suggested that the RLN is so vulnerable that it should not be touched or visualized. However, nowadays, the recommended procedure for avoiding injury to the RLN is localization during surgical dissection. Most surgeons advise RLN identifying rather than avoiding when performing thyroid surgery. Identification of RLN is associated with a significantly lower rate of temporary and permanent paralysis. Reports showed that the incidence of RLN paralysis is 3 - 4 times greater in cases where the nerve is not exposed than in cases where it is routinely exposed [9].

Several studies have reported that anatomical variations of the recurrent laryngeal nerve, such as extralaryngeal branches, distorted recurrent laryngeal nerve, intertwining between branches of the recurrent laryngeal nerve and inferior thyroid artery and non-recurrent laryngeal nerve, play an important role in the occurrence of nerve injury that can be caused by visual misidentification [2].

In recent years, increasing attention has been paid to the use of neuromonitoring devices to reduce the risk of nerve injury during thyroid surgery [10].

Visual identification of recurrent laryngeal nerve during thyroid operations has been associated with lower rates of permanent recurrent laryngeal nerve palsy and is considered the gold standard of recurrent laryngeal nerve treatment by many studies [11].

Patients and Methods

Twenty patients were selectively collected according to inclusion and exclusion criteria from the out-patient E.N.T clinic at Bab El She'reya (Sayed Galal) hospital from December of 2016 to July of 2017. The patients include 4 men represents 20% and 16 women represents 80% with a mean age of 35 years (range 14 to 67).

Inclusion criteria

20 patients with thyroid swelling without recurrent laryngeal nerve affection.

Exclusion criteria

It includes one or more of the following:

1. Patients with recurrent laryngeal nerve affection as previous thyroid surgery, thyroid malignancy, mediastinal mass.
2. Patients unfit for surgery as bad general condition, old age.
3. Uncontrolled thyroid deficit.

Diagnosis and preoperative evaluation

Careful history, complete ENT and head and neck examination was performed in all cases to establish the diagnosis.

All patients were subjected to the following protocol:

1. Full laboratory investigation include (CBC, thyroid function tests (T3, T4, TSH) liver and kidney functions, PT, PC, INR, FBS).
2. Neck ultrasound.
3. FNAB.
4. Preoperative laryngeal examinations to assess the condition of the vocal folds. All patients had normal vocal cord's function documented by flexible endoscopy in their files.

Surgical technique

All patients underwent the surgery under general anesthesia. Surgery is initiated with a Kocher collar skin incision, and flaps are elevated deep to the plane of the platysma. Strap muscles are retracted or transected for better exposure of the thyroid gland. Inferior thyroid veins are recognized and ligated. After exposure of the thyroid gland, the middle thyroid veins are identified and ligated. This will ease retraction of the thyroid gland and facilitates better identification of the RLN. Subsequently, the research for the RLN is seek out by the cervical inferior approach through the RLN triangle. This triangle lies 2-cm lateral to trachea, its apex faces inferiorly and lies between: the inferior lobe of the gland, trachea and the common carotid artery.

RLN is exposed completely in a stepwise fashion to the point where it enters the larynx behind the inferior cornu of the thyroid cartilage. The parathyroid glands were also identified.

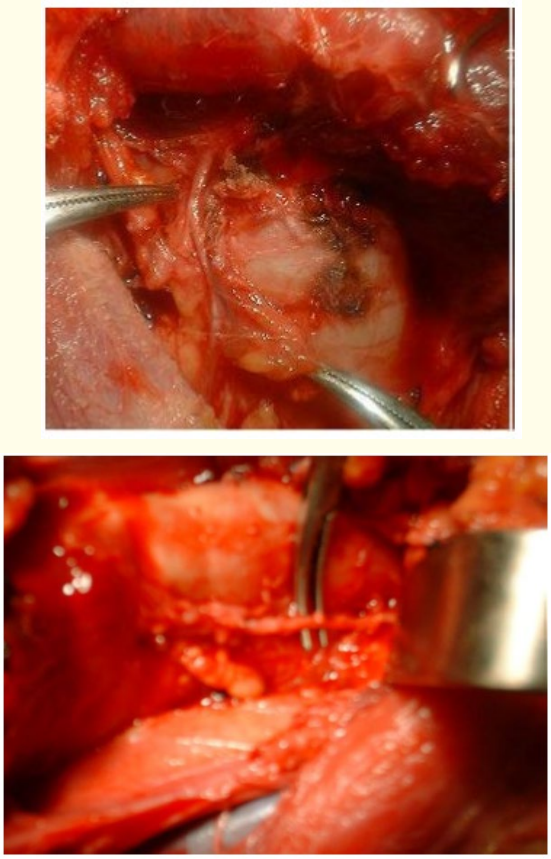

Figure 1 and 2: *Shows identification of the RLN at the tracheo-esophageal groove as it enters the larynx.*

According to pathology, 10 patients underwent thyroid lobectomy for solitary thyroid nodule had unilateral RLN identification and stimulation, 2 patients underwent subtotal thyroidectomy for multinodular goiter had bilateral RLN identification and stimulation, 6 patients underwent total thyroidectomy with bilateral RLN identification and 2 patients underwent completion thyroidectomy for recurrent goiter had unilateral RLN identification and stimulation (Table 1).

Type of procedure	Site of RLN identified
Thyroid lobectomy	Unilateral
Subtotal thyroidectomy	Bilateral
Total thyroidectomy	Bilateral
Completion thyroidectomy	Unilateral

Table 1: *Type of procedure performed and site (unilateral or bilateral) of RLN identification and stimulated.*

Surgery was performed as follows: thyroid lobectomy for solitary thyroid nodule in 10 patients represents 50% of total surgery executed, subtotal thyroidectomy for multinodular goiter in 2 patients represents 10%, total thyroidectomy in 6 patients represents 30% and completion thyroidectomy for recurrent goiter in 2 patients represents 10% (Table 2).

The mean postoperative hospital stay was 2 days.

Clinical presentation	Surgery performed	Percentage (%)
Solitary thyroid nodule	Thyroid lobectomy	50%
Multinodular goiter	Subtotal thyroidectomy	10%
Huge MNG	Total thyroidectomy	30%
Recurrent goiter	Completion thyroidectomy	10%

Table 2: *Clinical presentation, surgery performed and their % in twenty patients underwent thyroid surgery.*

Results

RLN identification was done in all twenty patients (100%). All nerves were identified at RLN triangle. This triangle lies 2-cm lateral to trachea, its apex faces inferiorly and lies between: the inferior lobe of the gland, trachea and the common carotid artery. RLN is exposed completely in a stepwise fashion to the point where it enters the larynx behind the inferior cornu of the thyroid cartilage.

In all patients, removal of the endotracheal tube after the patient emerged from general anesthesia was accomplished without complications. By the using of laryngoscopy of anesthesia, the anesthesiologist was instructed to report about any vocal dysfunction. All patients had no vocal cord dysfunction or respiratory embarrassment while performing extubation under direct vision by laryngoscopy.

Postoperative laryngeal examination was done 7 days after surgery by flexible fiberoptic examination. No patient had temporary or permanent dysfunction of the vocal folds.

Discussion

Recurrent laryngeal nerve palsy is the most common and serious complication after thyroid surgery [2] and it is the leading cause of medico legal litigation after endocrine surgery [12].

The incidence of recurrent laryngeal nerve palsy varies from less than 1% to as high as 20% [13]. Several factors influence the likelihood of nerve injury, including the underlying disease, the extent of resection, and the experience of the surgeon [4].

Earlier, surgeons suggested that the RLN is so vulnerable that it should not be touched or visualized. However, nowadays, the recommended procedure for avoiding injury to the RLN is localization during surgical dissection. Most surgeons advise RLN identifying rather than avoiding when performing thyroid surgery. Identification of RLN is associated with a significantly lower rate of temporary and permanent paralysis. Reports showed that the incidence of RLN paralysis is 3 - 4 times greater in cases where the nerve is not exposed than in cases where it is routinely exposed [9].

Several retrospective studies established that the identification and preservation of the RLN is essential to avoid injury to it [14]. Numerous methods have been proposed, but in this study, identification done through visual identification.

Visual identification of recurrent laryngeal nerve during thyroid operations has been associated with lower rates of permanent recurrent laryngeal nerve palsy and is considered the gold standard of recurrent laryngeal nerve treatment by many studies [11].

In 1938 Lahey first dissected the recurrent laryngeal nerve in virtually every case; careful dissection decreased the number of injuries to the recurrent nerves and this approach is accepted by most endocrine surgeons [7].

A large single-centre study of 1000 consecutive nerve at risk found that continuous nerve monitoring offered absolutely no benefit in reducing the risk of nerve injury compared with the adoption of routine nerve identification, with no difference in both the temporary and the permanent nerve injury rates [15].

In this study total dissection of the RLN over its cervical course was done. This helped in decrease the risk for RLN injury. This was also verified postoperatively, one week after surgery, by the flexible nasolaryngoscopy which confirmed the normal mobility of both vocal cords in all patients (100%).

Conclusion

A safe dissection on the thyroid gland demands searching, identification and exposing the RLN throughout its course in the neck, via awareness of the anatomy of the neck region and meticulous surgical techniques.

Visual identification of recurrent laryngeal nerve during thyroid operations is considered the gold standard of recurrent laryngeal nerve identification by many studies.

Recommendation

Intraoperative identification of the RLN is recommended for thyroid surgery. The visual identification is a safe and reliable method for avoiding injury during surgery. Furthermore, to verify the postoperative function of the RLN, flexible fiberoptic nasolaryngoscopy, rigid laryngoscopy or indirect laryngoscopy is necessary and should always be performed.

Bibliography

1. Sanabria A., *et al*. "Neuromonitoring of the laryngeal nerves in thyroid surgery: a critical appraisal of the literature". *European Archives of Oto-Rhino-Laryngology* 270.9 (2013): 2383-2395.
2. Chiang FY., *et al*. "Standardization of intraoperative neuromonitoring of recurrent laryngeal nerve in thyroid operation". *World Journal of Surgery* 34.2 (2010): 223-229.

3. Calò PG., *et al*. "Late bleeding after total thyroidectomy: report of two cases occurring 13 days after operation". *Clinical Medicine Insights: Case Reports* 6 (2013): 165-170.
4. Calò PG., *et al*. "Forgotten goiter. Our experience and a review of the literature". *Annali Italiani di Chirurgia* 83.6 (2012): 487-490.
5. Dralle H., *et al*. "Intraoperative monitoring of the recurrent laryngeal nerve in thyroid surgery". *World Journal of Surgery* 32.7 (2008): 1358-1366.
6. Domosławski P., *et al*. "Safety and current achievements in thyroid surgery with neuromonitoring". *Advances in Clinical and Experimental Medicine* 22.1 (2013): 125-130.
7. Sari S., *et al*. "Evaluation of recurrent laryngeal nerve monitoring in thyroid surgery". *International Journal of Surgery* 8.6 (2010): 474-478.
8. Julien N., *et al*. "Intraoperative laryngeal nerve monitoring during thyroidectomy and parathyroidectomy: a prospective study". *European Annals of Oto-rhino-laryngology, Head and Neck Diseases* 129.2 (2012): 69-76i.
9. Hemmerling TM., *et al*. "Intraoperative monitoring of the recurrent laryngeal nerve in 151 consecutive patients undergoing thyroid surgery". *Anesthesia and Analgesia* 93.2 (2001): 396-399.
10. Angelos P. "Ethical and medicolegal issues in neuromonitoring during thyroid and parathyroid surgery: a review of the recent literature". *Current Opinion in Oncology* 24.1 (2012): 16-21.
11. Chiang FY., *et al*. "The mechanism of recurrent laryngeal nerve injury during thyroid surgery - The application of intraoperative neuromonitoring". *Surgery* 143.6 (2008): 743-749.
12. Duclos A., *et al*. "Influence of intraoperative neuromonitoring on surgeons' technique during thyroidectomy". *World Journal of Surgery* 35.4 (2011): 773-778.
13. Calò PG., *et al*. "Intraoperative recurrent laryngeal nerve monitoring in thyroid surgery: is it really useful?" *Clinical Therapeutics* 164.3 (2013): e193-e198.
14. Procacciante F., *et al*. "Palpatory method used to identify the recurrent laryngeal nerve during thyroidectomy". *World Journal of Surgery* 24.5 (2000): 571-573.
15. Loch-Wilkinson TJ., *et al*. "Nerve stimulation in thyroid surgery: is it really useful?". *ANZ Journal of Surgery* 77.5 (2007): 377-380.

Volume 13 Issue 2 February 2024