

Review of Recurrent Laryngeal Nerve Palsy in Patients after Thyroidectomy

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Abstract: Reoccurring Laryngeal Nerve Palsy (RLNP) is a recognized possible complication following thyroid and parathyroid surgery and may lead to significant comorbidity to the patient (4,6). Symptoms may vary in severity and in minor cases RLNP may take place undiscovered. Hoarseness might take place after RLNP. The aim of this study was to discuss the complications associated with RLNP after thyroidectomy and the different mode of strategies to avoid this devastating condition. We performed a literature search using the PubMed and Medline database up to 2016. The following keywords were used ‘recurrent laryngeal nerve palsy’, ‘thyroidectomy’, ‘thyroid operations, complications’ and ‘evaluation’. The search was restricted to English-language literature and human evidence trails. We also checked the reference lists of all studies identified for more eligible study to be included in our review. Significantly higher RLNP rates were shown after operations for thyroid cancer, Graves' disease, and reoccurring goiter, in lots of research studies consisted of in our review the irreversible and short-term RLNP was shown when cases of preoperative cable palsy and deliberate sacrifice of the RLN were left out in. Different approaches of localizing the RLN have been explained, cosmetic surgeons should be conscious of the variations and have a comprehensive knowledge of regular anatomy in order to attain a high standard of care. This will guarantee the stability and safety of the RLN in thyroid surgery.

Keywords: Thyroidectomy, Reoccurring Laryngeal Nerve Palsy.

1. INTRODUCTION

In thyroid surgery, optimum direct exposure of the gland and clear recognition of physiological structures are the foundation to improve the patient safety ^(1,2). Complications such as bleeding, hypoparathyroidism and Recurrent Laryngeal Nerve Injury (RLNI) represent almost half of all the complications of thyroid surgical treatment ^(3,4,5). The latter complication after thyroidectomy, although occasionally encountered, can threaten the quality of life ⁽⁶⁾. The occurrence of RLN injury after thyroidectomy widely differs in the literature, ranging from 0.4% to 7.2% for momentary paresis and from 0% to 5.2% for permanent paralysis ^(1,2,3).

Reoccurring Laryngeal Nerve Palsy (RLNP) is a recognized possible complication following thyroid and parathyroid surgery and may lead to significant comorbidity to the patient (4,6). Symptoms may vary in severity and in minor cases RLNP may take place undiscovered. Hoarseness might take place after RLNP, chronic cough might result due to goad and in bilateral RLNP stridor and severe air passage blockage may happen. Irreversible RLNP is reported to happen in 1- 3% of thyroid surgeries, while the short-lived RLN injury is seen in 5-8% ⁽⁷⁾. Several minor modifications to thyroidectomy have been introduced to reduce trauma to the RLN ^(8,9). The British Thyroid Association Guidelines in the Management of Thyroid cancer recommend direct and/or indirect laryngoscopy (IL) for voice dysfunction continuing beyond 2 weeks after thyroidectomy ⁽¹⁰⁾.

The aim of this study was to discuss the complications associated with RLNP after thyroidectomy and the different mode of strategies to avoid this devastating condition.

2. METHODS

We performed a literature search using the PubMed and Medline database up to 2016. The following keywords were used 'recurrent laryngeal nerve palsy', 'thyroidectomy', 'thyroid operations, complications' and 'evaluation'. The search was restricted to English-language literature and human evidence trails. We also checked the reference lists of all studies identified for more eligible study to be included in our review.

3. RESULTS & DISCUSSION

RLN palsy is a severe problem after thyroid surgery leading, depending upon its seriousness, to voice disorders, breathing distress and goal ⁽¹¹⁾. As a result, quality of life might be impacted, perhaps prompting medico-legal lawsuits versus the cosmetic surgeon ^(12,13). Throughout thyroidectomy, injury to the RLN may be a result of unintentional sectioning, stretching, thermal injury, entrapment by a ligature or ischaemia. Clear recognition of the nerve by careful dissection, even in case of unusual anatomy, is the very best technique to avoid nerve injury. IONM by electrical stimulation has been explained and proposed during thyroid surgery for more than 4 years ^(14,15).

This complication is generally unilateral and transient, but sometimes it can be bilateral and irreversible and it may ponder either be or unintentional ^(16,17). The permanent sore of harmed RLN often manifests as a permanent dysfunction of phonation and is the most common issue following thyroid surgery ⁽¹⁸⁾. Permanent injuries to the frequent laryngeal nerve are best avoided by determining and thoroughly tracing the path of the frequent nerve ⁽¹⁹⁾. Surgeon's experience, histopathologic diagnosis, previous thyroid surgery, surgical technique and anatomic variations are important factors impacting this issue ⁽²⁰⁾.

Mechanisms of injury to the nerve include complete or partial transection, traction, or handling of the nerve, contusion, crush, burn, clamping, lost ligature, and jeopardized blood supply ^(21,22). In unilateral RLNI the voice becomes husky due to the fact that the singing cords do not approximate with one another. Dysphonia starting on the 2nd-5th post-operative days is frequently due to edema, whereas traction injury of the nerve and damage of axons may result in dysphonia lasting approximately 6 months. Dysphonia continuing after 6 months is commonly long-term caused by cutting, ligating or cauterization of the nerve ⁽²³⁾. Bilateral RLNI is a lot more severe, because both singing cords may assume an average or paramedian position and cause airway obstruction and tracheostomy might be required. Unintentional transaction typically happens at the level of upper two tracheal rings, where the nerve closely estimates the thyroid lobe in the location of Berry's ligament ^(24,25).

In one determined study ⁽²⁶⁾ which involving 340 patients in Saudi Arabia, the rate of RLNI was 12.8% in thyroid carcinoma and in benign goiter cases, the transient RLN injury rate was 2.9%, and long-term in 0.33%. The rate was highest (21.7%) in persistent goiter cases. Type of surgical procedure is another factor influencing the rate of RLN injury. In subtotal thyroidectomy cases RLNI rate was low while it is higher in total thyroidectomy cases ⁽²⁹⁾. In the pointed out study ⁽²⁶⁾, short-term RLNI rate was 1.9% in subtotal compared to 7.2% in overall/ near total thyroidectomy. (Table1) demonstrate some literature evaluation relating to the incidence of RLNI. ^(19,20,26,27,28). Just recently, Echternach et al. ⁽³⁰⁾ in a study of 761 patients concluded that laryngeal issues after thyroidectomies are mostly caused by injury to the vocal folds from intubation and to a lower level by injury to the laryngeal nerve.

Table1: Recurrent laryngeal nerve injury in some literatures review

Author	Year	Years	N	Procedure	Temporary	Permanent
Jatzko el at. ⁽²⁷⁾	1994	84-91	21	Total	9.5%	4.8%
Kasemsuwan el at. ⁽²⁸⁾	1997	93-96	105	Total	6.7%	7.6%
Aytac el at. ⁽²⁰⁾	2005	1989- 2003	418	Total lobectomy	13.6% 12%	9% 4%
Chaudhary el at. ⁽¹⁹⁾	2007	2000-2005	310	Total lobectomy	7.69% 6.25%	3.84% 1.42%
Zakaria el at. ⁽²⁶⁾	2010	90-2005	340	Total lobectomy	3.8%	0.29%

N: Number of patients

Preserving RLN to avoid RLNP:

Achieving a safe and reliable operation on the thyroid gland is the objective of all cosmetic surgeons. Adherence to basic principles, such as the recognition and preservation of important anatomical structures, form the basis for attaining this goal (Figure 1 and 2)⁽³⁴⁾. A safe dissection on the thyroid gland demands that the RLN be determined throughout its course in the neck. To avoid any injury to the nerve demands a thorough knowledge of the normal anatomy of the nerve and awareness of the common variations in its course.

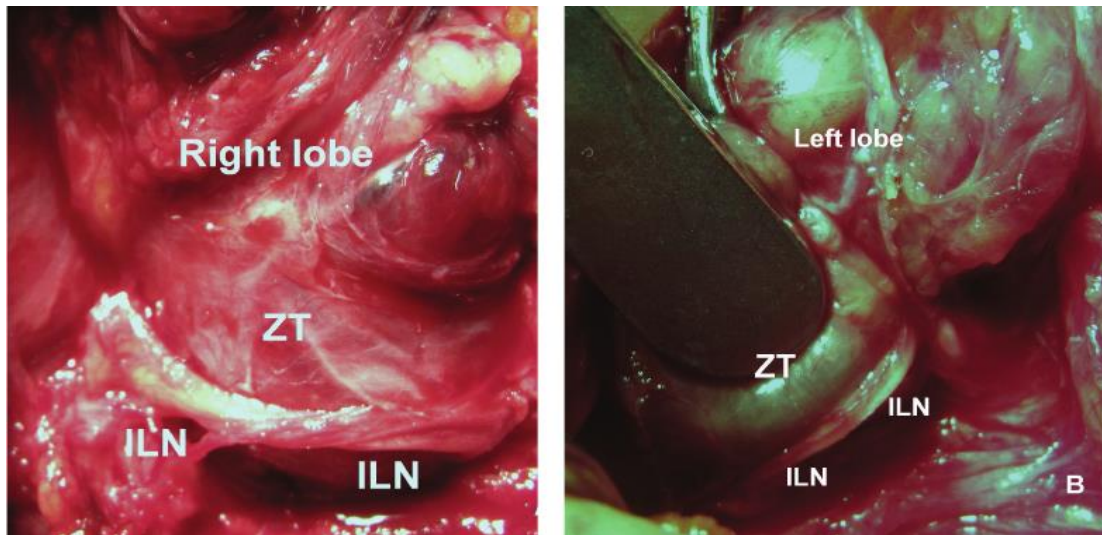
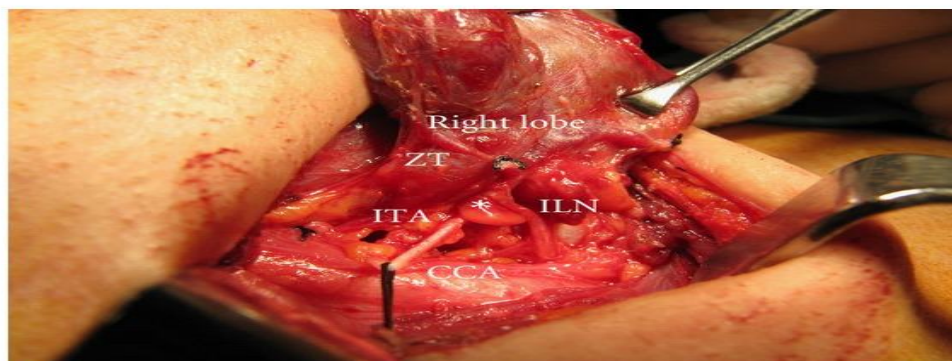
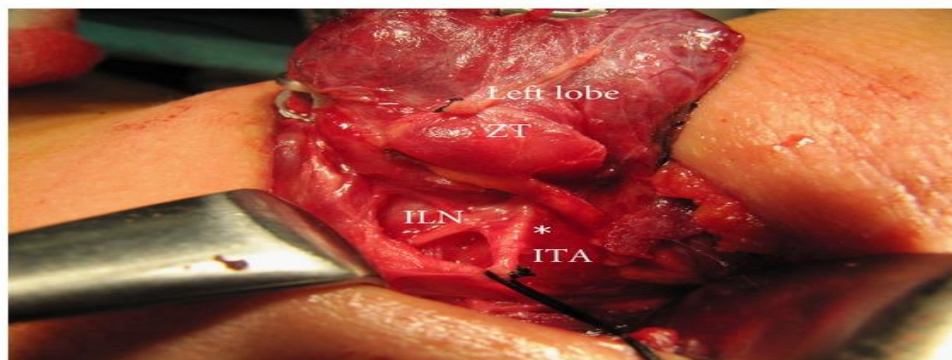


Figure1: The inferior laryngeal nerve (ILN) unusually passes anterior (lateral) to the Zuckerkandl's tubercle (ZT). (a) Right side and (b) left side of two different patients.⁽³⁴⁾



(a)



(b)

Figure 2: The inferior laryngeal nerve (ILN) passes posterior (medial) to the Zuckerkandl's Tubercle (ZT) near neurovascular crossing point (*) with inferior thyroid artery (ITA). (a) Right side and (b) left side of two different patients.⁽³⁴⁾

The most efficient method for protection of RLN from injury is still questionable. Some cosmetic surgeons claim that leaving out the identification of RLN may cause little trauma. Nevertheless, other research studies have shown that this is not real^(31,32,33). Opposing this concept, identification of RLN throughout operation requires cosmetic surgeon to have the understanding of the structural course of the nerve and its variations resulting in decreased RLN injury incidence^(20,21,22). If failure to recognize RLN occurs, intra-parenchymal dissection or subtotal excision would be advised.

Most of the nerves in several research studies were posterior to the inferior thyroid artery (ITA), specifically on the left side. The relation of RLN to ITA in one recognized research study⁽³⁵⁾ was similar to that reported by Ozer et al⁽³⁶⁾. in their research study. Repeat evaluations at a minimum follow-up of 3 months validated this as voice modifications resolved completely in all patients and none of the patients revealed RLNP on I/L or D/L. Although Bergamaschi et al⁽³⁷⁾. reported that RLN identification cannot decrease injury rate, there are lots of research studies demonstrating a considerable decrease in the rate of RLN injury maintained by the recognition of the nerve^(38, 39,40).

Nerve damage there are other causes of voice change and preservation of RLN is not the only factor in the preservation of normal voice after operation⁽⁴¹⁾. in a formerly mentioned research study⁽³⁵⁾ Seventeen from the total 19 patients in the present study having postoperative voice changes had many difficult surgical treatments or negative functions. Twelve (63%) were operated for malignancy including one patient undergoing conclusion thyroidectomy. 5 had large hard goitres and 2 had chronic lymphocytic thyroiditis with fibrosis. Six patients with retrosternal extensions had tracheal compression with variance in all the cases however none developed RLNP or voice change although Arici et al⁽⁴²⁾. have actually reported short-term and long-term RLNP of 4% in patients with retrosternal goitre. Regardless of an attempt to determine the ESLN, the nerve could not be determined in all the cases although none of our patients with voice change had functions of ESLN injury.

Zuckerkindl's tubercle (ZT) is defined as posterior extension of the lateral lobes composing of thyroid tissue only [3]. It should be included in the Nomina Anatomica as the "processus posterior glandulae thyroideae" described by Zuckerkindl [4]. It is classified into four groups according to size [5, 6]. The surgical importance of ZT can be summarized as (1) dissection and excision of ZT for total thyroidectomy and (2) close relationship between ZT and recurrent laryngeal nerve (RLN). The completeness of thyroidectomy requires removal of enlarged ZT which is posterolateral extension of thyroid lobes adjacent to RLN Zuckerkindl's tubercle (ZT) is defined as posterior extension of the lateral lobes composing of thyroid tissue only [3]. It should be included in the Nomina Anatomica as the "processus posterior glandulae thyroideae"

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4. CONCLUSION

Significantly higher RLNP rates were shown after operations for thyroid cancer, Graves' disease, and reoccurring goiter, in lots of research studies consisted of in our review the irreversible and short-term RLNP was shown when cases of preoperative cable palsy and deliberate sacrifice of the RLN were left out in. Operation for Graves' disease was connected with a greater rate of short-term RLNP because stretching takes place more often during dissection of the nerve. some studies revealed the reoperation patients had a considerably higher rate of permanent RLNP compared with those undergoing a primary operation for benign thyroid disease, particularly when previous partial or subtotal lobectomy had actually been performed. Different approaches of localizing the RLN have been explained, cosmetic surgeons should be conscious of the variations and have a comprehensive knowledge of regular anatomy in order to attain a high standard of care. This will guarantee the stability and safety of the RLN in thyroid surgery. The anatomical variation might be minor in degree, however is of excellent importance as it might impact the outcome and the patient's quality of life.

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