

Damage to Recurrent Laryngeal Nerve (RLN) with and without Exposure in Thyroidectomy

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ABSTRACT

Objectives: To determine damage of RLN with and without exposure during thyroidectomy. **Study design:** Randomized control study **Sampling technique:** Non-probability consecutive sampling. Sample size: 150 patients. Setting: Surgical units of Allied Hospital Faisalabad. **Methodology:** With informed consent, study was conducted on two groups (75 in each group). Patients were distributed on alternate basis into group A & group B for thyroidectomy with and without identification of RLN respectively. **Results:** In group A 30(40%) patients were between 31-40 Years & 18(24%) between 41-50 Years. In group B 32(42.7%) were between 31-40 Years, 13(17.3%) between 41-50 Years & 15(20%) between 50-60 Years. Mean of age was 38.5 ± 10.9 (standard deviation). In group A, 28(37.3%) were male and 47(62.7%) females while in group B 25(33.3%) were males and 50 (66.7%) females. In group A 38(50.7%) patients were of MNG, 10 (13.3%) diffuse goiter, 7(9.3) solitary nodules, 13 (17.3%) suspicion of malignancy & 7(9.3%) malignancy. In group B 33(44%) patients were having MNG, 15(20%) diffuse goiter, 10(13.3%) solitary nodule, 6(8%) suspicion of malignancy & 11(14.7%) malignant disease. In group A 39(52%) patients underwent STT, 20(26.7%) NTT, 10(13.3%) TT and 6(8%) hemi-thyroidectomy. In group B 35(46.7%) patients underwent STT, 21(28%) NTT, 12(16%) TT and 7 (9.3%) hemi-thyroidectomy. In group A 3 (4%) patients developed transient paralysis & 1(1.3%) permanent paralysis of RLN. In group B 7(9.3%) patients developed transient paralysis & 3(4%) permanent paralysis of RLN. **Conclusion:** Preservation of RLN is more likely with exposure and identification of RLN post-operatively.

Keywords: RLN identification, Thyroidectomy, Nerve damage.

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INTRODUCTION

Thyroid diseases are common worldwide and the surgery of thyroid gland is one of the frequent operation¹. Total thyroidectomy or thyroid lobectomy has been accepted as current surgical therapy for benign and malignant thyroid disorders but extensive resection might increase the risk of postoperative complications².

But today with the improvements in surgical technique, thyroidectomy has become a relatively safe procedure³. One of the most feared complications of thyroid surgery is the Recurrent Laryngeal Nerve (RLN) injury. Reported incidence of permanent injury to RLN ranges from 0% to 5.2% and for temporary injury from 0.4% to 7.2%. Injury can occur during surgery due to transection, traction, diathermy or ischemia⁴. Thyroid surgery is a potential risk for vital nerves which include recurrent laryngeal nerve and superior laryngeal nerve. Out of these two damage to recurrent

laryngeal nerve leaves the patient with a hoarse voice. Situation is more disastrous if recurrent laryngeal nerve is damaged on both sides during total thyroidectomy. This leads to bilateral abductor paralysis condemning the patient to lifelong tracheostomy

The surgical technique is one of the important factors affecting the outcome of thyroidectomy⁵. In the past, most surgeons avoided dissections in close proximity to the RLN to prevent its injury⁶. Recently, endocrine surgeons consider this totally unacceptable. The identification and preservation of the RLN are essential to avoid its injury⁷. Meticulous hemostasis and delicate technique are required to prevent nerve injury. Once found, the nerve with all the identified branches must be followed superiorly through the entire course, until it enters the larynx⁸. In a study, injury to RLN was (0) when it was exposed during procedure that was

significantly lower than 7.9% in patients in which nerve was not exposed.²

The overall conclusion is that extensive RLN dissection facilitates visual control of nerve integrity during resection and is superior to limited exposure or non-exposure of nerve.⁹ Few studies carried out in Pakistan stressed on identification of nerve only but in this study my emphasis will be on complete exposure of nerve till it enters the larynx.

The rationale of my study is to provide guideline to surgeons who are doing thyroidectomy by exposing RLN as well as comparing the results of old traditional surgeons who are still performing the thyroidectomies without properly exposing and dissecting the recurrent laryngeal nerve during surgery in various teaching hospitals.

Objectives

The objective of my study is to compare the frequency of damage of RLN with exposure and without exposure during thyroidectomy in patients with goiter.

Operational Definitions

Damage to recurrent laryngeal nerve: It is declared when the patients revealed absent or decreased mobility of vocal cords on laryngoscopy and had symptoms of hoarseness of voice and /or laryngeal aspiration. RLN injury was labeled permanent if the immobility of vocal cords persisted up to 6 months after thyroidectomy³.

Post-operative follow up: Patients in both groups were called to visit on 7th postoperative day to assess the vocal cord function in association with RLN injury. Those patients who showed immobility of vocal cords on laryngoscopy were counseled for further follow up visits at intervals of 1 month, 3 months, and 6 months after operation to see sign of recovery or persistence of vocal cord dysfunctions.

METHODOLOGY

Study design: Randomized control study.

Setting: Surgical units of Allied Hospital Faisalabad.

Duration of study: One year August 2013 to July 2014

Sample size: By using WHO sample size calculator for two proportions sample size was 150 (75 in each group)

Sample technique: Non-probability consecutive sampling.

Sample selection

- **Inclusion criteria**

1. All the patients between 13 to 60 years of age of either gender having goiter with euthyroid status undergoing thyroidectomy.

2. Patients with normal pre-operative vocal cord function on laryngoscopy.

- **Exclusion criteria**

1. Patient with hoarseness of voice.

2. End stage liver disease.

3. End stage renal disease.

4. Advanced malignancy with encasement of carotid artery.

5. Patient who did not consent or respond for follow up

6. Patients with recurrent disease.

Operative procedure

After approval from hospitals ethical committee all patients included in the study were admitted throughout patient department (OPD). Patients were explained the nature of procedure, its benefits and drawbacks and an informed consent was obtained. The patients were divided into two groups by using computer generated random number table. In Group A-RLN was exposed and in group B-RLN was not exposed. All patients were operated under general anesthesia. All patients received a single dose of prophylactic intravenous antibiotic half an hour before induction of anesthesia. All patients underwent preoperative IDL by ENT specialist. Surgical procedure was performed by consultants in surgical ward. The patient was in spine position on operating table with table tilted up 15 degrees at head end to reduce venous engorgement. A sand bag was placed under shoulder with neck in extended position. Operative field was cleaned with povidine iodine solution. A gently curved skin crease incision was made midway between the notch of thyroid cartilage and suprasternal notch. Flaps of skin, subcutaneous tissue and platysma were raised upward and downward. Deep cervical fascia was divided. The strap muscles were retracted or cut depending on exposure needed. The superior thyroid pedicle was ligated close to thyroid gland and inferior thyroid pedicle away from thyroid gland to avoid damage to nerves.

In half of the patients recurrent laryngeal nerve was exposed and identified till it entered into berry's ligament while in other half, dissection was proceeded without exposure and identification of nerve. Absolute hemostasis was maintained by ligation of individual vessels and by suturing thyroid remnant to tracheal fascia. After removing

thyroid gland, Redivac drain was placed. Pretracheal fascia and muscles were sutured. Skin was closed by subcuticular stitches with prolene. Examination of vocal cord was performed immediately after extubation by anesthetics. Drain removed with in 24-72 hours after operation. Patient was called for follow up by his/her contact number.

Data analysis procedure

The data obtained was entered and analyzed in SPSS version 11.

RESULTS

1-Age Group

In group A out of 75,3(4%) were between 13-20Years,14(18.7%) were between 21-30 Years,30(40%) were between 31-40 Years,18(24%) were between 41-50 Years,10(13.3%) were between 50-60 Years. In group B out of 75,5(6.7%) were between 13-20 Years,10(13.3%) were between 21-30 Years,32(42.7%) were between 31-40 Years,13(17.3%) were between 41-50 Years and 15(20%) were between 51-60 Years of age .

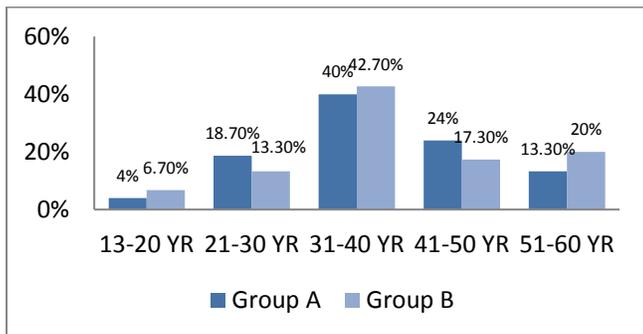


Figure 1: Age distribution

2-Sex

In group A out of 75,28(37.3%) were male and 47(62.7%) were females while in group B 25(33.3%) were males and 50 (66.7%)were females.

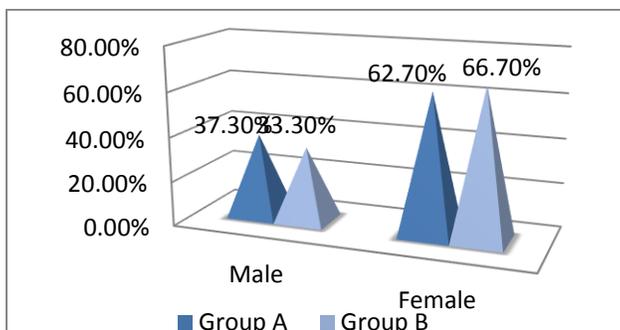


Figure 2: Sex distribution

3-Preoperative Diagnosis

In group A 38(50.7%) patients were having MNG,10(13.3) were having diffuse goiter,7(9.3) solitary nodules,13(17.3%) suspicion of malignancy and 7(9.3%) malignanacy.In group B 33(44%) patients were having MNG,15(20%) diffuse goiter,10(13.3%) solitary nodule,6(8%) suspicion of malignancy and 11(14.7%) malignant disease .

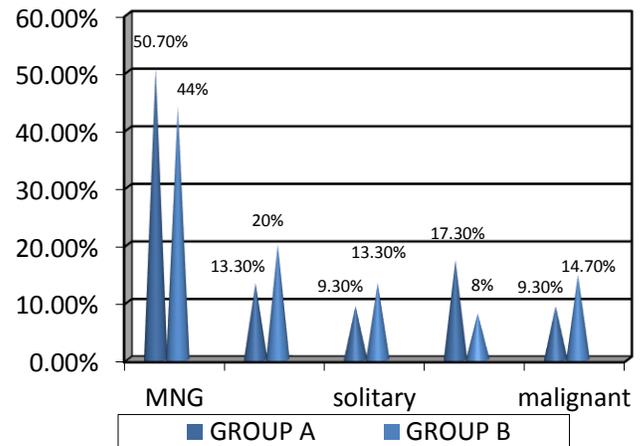


Figure 3: Preoperative diagnosis

4-Type of Surgery:

In group A 39 (52%) patients underwent subtotal thyroidectomy, 20 (26.7)neartotal thyroidectomy, 10 (13.3%) total thyroidectomy and 6(8%) hemithyroidectomy.In group B-35 (46.7%) patients underwent subtotal thyroidectomy, 21(28%) neartotal thyroidectomy, 12(16%) total thyroidectomy and 7 (9.3%) hemithyroidectomy.

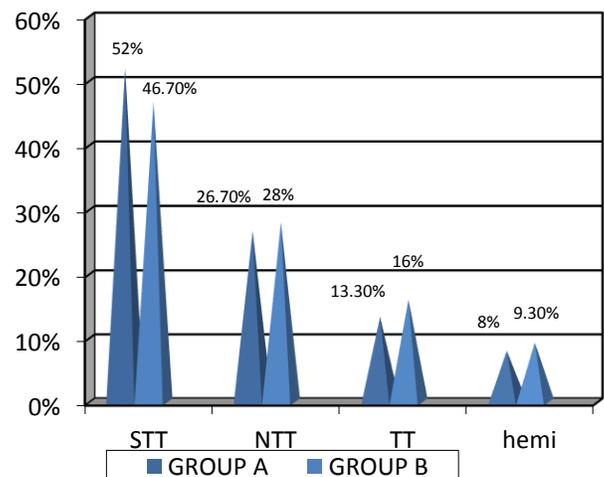


Figure 4: Type of surgery

5-Recurrent Laryngeal Nerve Damage:

In group A 3 (4%)patients developed transient paralysis while 1(1.3%) patient developed

permanent paralysis of recurrent laryngeal nerve. In group B 7(9.3%) patients developed transient paralysis while 3(4%) developed permanent paralysis of recurrent laryngeal nerve.

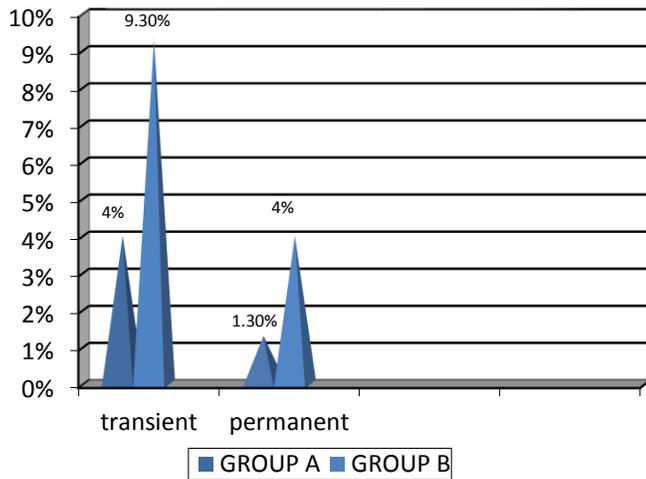


Figure 5: Recurrent laryngeal nerve damage

DISCUSSION

RLN injury in association with thyroid surgery is one of the most important and well recognized morbidity. Incidence of iatrogenic RLN injury is variable. The overall incidence of RLN injury after thyroidectomy ranges from 0 % to 7 %⁵. Damage to RLN results from transaction, ligation or traction on nerve, temporary injury due to neuroparaxia may be due to excessive manipulation. The incidence of RLN paralysis may be as high as 13% to 30% in patients with thyroid cancer and secondary thyroidectomy in recurrent disease respectively.⁶ Hoarseness of voice following thyroidectomy is considered as an indicator of RLN damage by most of surgeons but it may be caused by vocal cord hematoma, post-operative laryngitis or even psychogenic dysphonia.

The risk of complications also varies with skill and experience of surgeon as well as the extent of resection performed during surgery. Surgical experts have linked the safety of RLN with the exposure, identification of nerve till its entry into larynx and preservation in thyroid surgery. Nerve monitoring has been developed to facilitate the identification of RLN, to map its contour, to avoid its iatrogenic injury and to obtain prognostic information about postoperative vocal cord function during thyroid surgery.

In my study carried on total 150 patients most of patients (40% in group A & 42.7% in group B) were in 31-40 year age group while only few (4% in

group A & 6.7% in group B) were in 13-20 year age group. Also thyroid disease was more common in females(62.7% in group A & 66.7% in group B). This is in accordance with the studies carried out earlier.^{4,5}

In my study most of patients were having MNG(50.7% in group A & 44% in group B). Few patients included in this study were having malignant disease(9.3% in group A & 14.7% in group B). Most common procedure performed in my study was subtotal thyroidectomy (52% in group A & 46.7% in group B) while hemithyroidectomy was performed in few patients(8% in group A & 9.3% in group B).

In my study 4% patients in group A and 9.3% patients in group B developed transient paralysis of RLN which improved with conservative measures within 6 months. 1.3% patients in group A and 4 % patients in group B developed permanent paralysis of RLN.

A comparative observational study was conducted at Liaquat University of Medical and Health Sciences, Jomshoro¹ in two groups of patients to see the incidence of nerve injury in thyroidectomy. In one group nerve was identified and exposed while in other group thyroidectomy was done without identification and exposure of nerve. The result of this study showed a significant decrease in incidence of nerve injury from 5% to 1.6% with identification of RLN. It was also observed that RLN injury was associated with huge MNG and total thyroidectomy. Result of this study was comparable to my study which showed incidence of RLN only 1.3% with exposure of RLN.

In international literature, a comparative study conducted in Turkey revealed intact RLN in all patients of group in which RLN was exposed and identified during thyroidectomies. While 7.9% patients faced RLN injury in the second group of patients in which thyroidectomy was done without exposing and identifying the RLN².

Several other studies in literature have also demonstrated that risk of permanent RLN palsy is less with the identification of nerve. While non-identification of nerve may lead to damage to nerve. once the surgeon identifies the nerve, he is sure that he has not damaged the nerve and even if accidental damage occurs, injury can be recognized on table and repaired or marker can be put for future repair.^{4,5,6}

Keeping in view the result of my study and that of literature, the incidence of RLN injuries is more in patients who undergo thyroidectomy without exposure and identification of RLN. Moreover, the risk of RLN injuries increases in patients who have thyroidectomies for huge goiter, malignant disease.

CONCLUSION

In this study I compared the occurrence of RLN damage in thyroidectomy by identifying and not identifying RLN. Thyroidectomies with safe recurrent laryngeal nerve is more likely with exposure and identification of RLN its entry into Berry's ligament post-operatively.

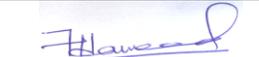
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AUTHORSHIP AND CONTRIBUTION DECLARATION

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