

IDENTIFICATION OF RECURRENT LARYNGEAL NERVE DURING THYROIDECTOMY DECREASES THE RISK OF NERVE INJURY

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ABSTRACT

Objectives: To determine the effect of Recurrent Laryngeal Nerve (RLN) exposure on the incidence of nerve injury, and compare the injury rate with that when nerve is not exposed during thyroid surgery.

Methodology: This prospective observational study was carried out in department of general surgery, at Liaquat University of Medical and Health Sciences, Jamshoro, from January 2005 to December 2006. A total of 120 patients were included, with 24 males and 96 females (male: female of 1: 4). Mean age of our patients was 30.85 years (range 14-68 years). The different surgical procedures, performed on thyroid gland included total thyroidectomy 23, near total thyroidectomy 58, subtotal thyroidectomy 28, and hemi-thyroidectomy 11. The RLN was exposed in 60 patients, in other group of 60 patients thyroidectomy was carried out without exposing RLN, and incidence of nerve injury was compared between two groups.

Results: RLN identification decreased the nerve injury incidence from 5% to 1.6%. When recurrent laryngeal nerve is not identified during thyroid surgery the chance to incur damage to RLN is statistically significant (Chi square at 1df 0.000)

Conclusion: We believe that RLN identification during thyroidectomy would be the best approach to avoid nerve injury.

KEY WORDS: Recurrent Laryngeal Nerve, Thyroidectomy, Nerve injury.

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INTRODUCTION

Thyroid diseases are common worldwide, and the surgery of thyroid gland is one of the frequent operations. First recorded thyroidectomy was performed by Albucasis in AD 500 in Baghdad that was associated with catastrophic haemorrhage.¹ Since then till late nineteenth century operations on thyroid gland were largely confined for treating the life threatening conditions only. But today with the developments in anaesthesia, antisepsis and improvements in surgical technique, thyroidectomy has become a relatively safe procedure. Usually the complications are rare, but when they occur they may be life threatening or lead to severe functional impairment.²

One of the most feared complications of thyroid surgery is the Recurrent Laryngeal Nerve (RLN) injury^{3,4}, also the most common reason of litigation related to the complications of thyroid surgery.⁵ Reported incidence of permanent injury to RLN ranges from 0% to 5.2% and for temporary injury from 0.4% to 7.2%.^{3,4,6} Injury can occur during surgery due to transection, traction, diathermy or ischemia.

Incidence of RLN injury is expected to be higher with total thyroidectomy, though many clinical reports have shown that difference in incidence is insignificant after either total or subtotal thyroidectomy.⁷ So in the past the saying was 'if the nerve is seen, it is damaged', and most surgeons used to avoid dissection in proximity to RLN. But the experience has contradicted the belief, and studies have proved that surgical exposure of the nerve avoids the incidence of damage.⁸ Recently surgeons advocate the routine identification and dissection of RLN to reduce its injury risk to minimum, and for endocrine surgeons it is unacceptable if RLN is not identified during thyroid surgery.⁹

The aim of our study was to determine the effect of RLN exposure on nerve injury during thyroid surgery, and to compare the results with blind surgical approach – without exposing the RLN. Keeping in view this objective all patients presenting with goiter irrespective of its cause were included in this study.

METHODOLOGY

This prospective observational study was carried out in department of general surgery, at Liaquat University of Medical and Health Sciences, Jamshoro, from January 2005 to December 2006. In our study a total of 120 patients with a male to female ratio of 1:4 (24 males and 96 females), with goiter who under-went thyroid surgery were included. Their age range was 14-68 years, with mean age of 30.85 years. Patients were allocated to two groups on alternate basis for, whether to dissect and identify the RLN (group A) or to perform the surgery without exposing the nerve (group B). All the operations were performed by two surgeons jointly, one

having an experience of more than fifteen years, and other one with an experience of more than five years.

Majority (61/120) of our patients had multinodular goiter, diffuse goiter was the next common condition (39), while 11 patients were of solitary nodule, and 9 of malignancy (Table-I). Depending on the extent of resection of thyroid tissue, surgery was categorized as, hemi-thyroidectomy (complete resection on one side along with isthmus), subtotal thyroidectomy (bilateral resection with leaving a slice of thyroid tissue on each side), near total thyroidectomy (bilateral resection with leaving a slice of tissue on one side only), and total thyroidectomy.

Almost half of the patients (58/120) underwent near total thyroidectomy, while subtotal thyroidectomy was performed in 28, total thyroidectomy in 23, and hemithyroidectomy in 11 patients (Table-II). In group A, nerve was dissected bilaterally in all patients, apart from those who underwent hemithyroidectomy, where nerve on relevant side only was identified. The nerve was identified in the tracheo-esophageal groove, its relationship with inferior thyroid artery and its branches examined, and was then followed where it entered the larynx.

Along with routine laboratory investigations, sonography was performed in all patients, while scintigraphy and fine needle aspiration cytology were selectively carried out, where appropriate. Vocal cord function was evaluated by laryngoscopy (indirect or direct) by an otolaryngologist, preoperatively and postoperatively on day 3-5. Direct laryngoscopic examination was also performed immediately after surgery to confirm the movement of vocal cords. Patients with preoperative immobility or reduced mobility of vocal cords were excluded from study. Postoperative vocal cord immobility on day 3-5, and reduced mobility beyond 15 days was considered as an indicator of RLN injury, and follow up examination was arranged on day 15 and 30, and then at two, four, six and 12 months. Patients in whom cord mobility did not recover at 12 months were considered as having permanent RLN injury.

Table-I: Diagnosis of Patient v/s Operative Procedure

	<i>Operative Procedure</i>				<i>Total</i>
	<i>Hemi-thyroidectomy</i>	<i>Sub Total Thyroidectomy</i>	<i>Near Total Thyroidectomy</i>	<i>Total Thyroidectomy</i>	
Multinodular	0	9	43	9	61
Diffuse	0	19	15	5	39
Solitary nodule	11	0	0	0	11
Malignancy	0	0	0	9	9
Total	11	28	58	23	120

RESULTS

In this series, the overall frequency of RLN injury was found to be 3.34%. For group A, where RLN was identified routinely during surgery, one out of sixty patients (1.6%) developed temporary injury. The injury was noticed immediately after surgery, when direct laryngoscopy revealed immobility of vocal cord on one side, and on first post operative day patient had hoarseness of voice. This patient had undergone total thyroidectomy for malignancy. The patient showed complete recovery of vocal cord after four months follow up.

In group B, where RLN was not identified, RLN injury was seen in three patients (5%), in two patients the injury was temporary, and in one patient it was permanent. Among the patients with temporary injury one underwent hemithyroidectomy for solitary nodule, and the other one total thyroidectomy for diffuse goiter, while permanent injury was seen in near total thyroidectomy for multinodular goitre. In two patients, one with temporary and one with permanent injury, vocal cord immobility was observed on postoperative direct laryngoscopy.

Table-II: Operative Procedure v/s. Nerve Identification

	<i>Nerve Identified</i>	<i>Nerve Not Identified</i>	<i>Total</i>
Hemithyroidectomy	5	6	11
Sub Total thyroidectomy	14	14	28
Near Total Thyroidectomy	30	28	58
Total Thyroidectomy	11	12	23
Total	60	60	120

While third one with temporary injury developed hoarseness of voice on day one after surgery, and on laryngoscopic examination reduced mobility of vocal cords was seen.

All patients with evidence of RLN injury were followed up regularly for a period of 12 months. The only patient that sustained injury to RLN from group A showed complete recovery within four months. Among three patients from group B, 2 patients recovered from RLN injury within two months while another patient from B group where RLN was not identified failed to show sign of recovery even after 12 months of follow-up and we consider the injury to RLN as permanent.

When recurrent laryngeal nerve is not identified during thyroid surgery the chance to incur damage to RLN is statistically significant. This is evident from Table-III-V.

DISCUSSION

The overall incidence of RLN injury after thyroidectomy ranges from 0% to 5.2% for permanent injury and, from 0.4% to 7.2% for temporary injury.^{3,4,6} Permanent injury results from transection, ligation, or traction, while temporary are due to neuropraxia resulting from excessive manipulation. Hoarseness of voice after thyroidectomy is considered by many authors as an indicator of RLN palsy, Steurer et al, on the contrary, are of the view that hoarse-

Table-III: RLN Identified/ Not Identified

	<i>Observed N</i>	<i>Expected N</i>	<i>Residual</i>
RLN Identified	60	60.0	0.0
RLN Not Identified	60	60.0	0.0
Total	120		

Table-IV: RLN Damage/Not Damage

	<i>Observed N</i>	<i>Expected N</i>	<i>Residual</i>
RLN Not Damage	116	60.0	56.0
RLN Damage	4	60.0	-56.0
Total	120		

ness may be caused by vocal cord haematoma, post-operative laryngitis, or even psychogenic dysphonia.³

The main indications for thyroid surgery are the presence of thyroid nodules, multinodular goiter, and malignancies. The risk of complications varies with the skill and experience of the surgeon, as well as the extent of resection. When during surgery the nerve is identified and its continuity ensured, cord palsy does not need re-exploration, regular follow-up and observation is all that is required with expectant recovery by itself.¹⁰ The goal of every surgeon is a safe thyroid surgery, and safe thyroid dissection demands RLN identification through out its course. Practice of avoiding the nerve rather than undertaking a careful search carries as high as 10% risk of permanently damaging the nerve, an unacceptable outcome in today's era.⁹

However, routine identification and exposure of recurrent laryngeal nerve has been a matter of discussion, with varying results. Kasemsuwan et al in their study has reported that RLN identification does not significantly reduce the nerve injury¹¹, while in our study the overall nerve injury decreased from 5% to 1.6%. And also, based on a study of 27,000 nerves, Hermann et al have found that careful dissection of the RLN significantly reduces the major complication of nerve injury, & are of the opinion that the approaches which do not expose the nerve can not be recommended.¹² In our study we have only seen unilateral nerve injuries, while Sikandar Ali Shaikh, et al, who did not routinely dissect the nerve, have reported a 1.5% incidence of bilateral nerve injury.¹³

CONCLUSION

In present study, the RLN dissection during thyroid surgery demonstrates lower incidence of nerve injury, compared to the surgeries when

Table-V

	<i>RLN Identified/ Not Identified</i>	<i>RLN damage/ Not Damage</i>
Chi-Square ^a	0.000	104.533
df	1	1
Asymp. Sig.	1.000	0.000

a=0 cells (0.0%) have expected frequencies less than 5
The minimum expected cell frequency is 60.0.

the nerve is not identified. And we are of the opinion that RLN dissection is mandatory to avoid the injury to nerve.

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