Frequency of Recurrent Laryngeal Nerve Injury in Thyroid Surgery For Benign Thyroid Disease

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ABSTRACT

Objective: To determine the frequency of recurrent laryngeal nerve injury (RLNI) after thyroid surgery for benign disease.
Study Design: Cross-sectional study.
Place and Duration of Study: Otorhinolaryngology Department, Combined Military Hospital Rawalpindi and Combined Military Hospital, Quetta, from May 2015 to May 2018.
Methodology: All the patients underwent preoperative evaluation of vocal cords by indirect laryngoscopy for vocal cord disease and function. Lobectomy, subtotal thyroidectomy or total thyroidectomy were performed under general anaesthesia by the consultants having more than three years post-fellowship experience of thyroid surgery. Immediate postoperative visualization of vocal cords was performed at the time of endotracheal tube extubation with a laryngoscope by an otolaryngologist with the help of an anesthesiologist to assess vocal cord mobility.
Results: Out of 179 cases, there were 42 (23.46%) males and 137 (76.54%) female patients. The recurrent laryngeal nerve injury was found in 11 (6.2%) cases. The statistical analysis did not show an association of recurrent laryngeal nerve injury with age-groups, gender or type of thyroid surgery (p>0.05).
Conclusion: The frequency of recurrent laryngeal nerve injury RLNI after thyroid surgery for the benign disease was 6.2%.

Keywords: Benign thyroid disease, Recurrent laryngeal nerve palsy, Thyroid surgery.

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INTRODUCTION

Thyroid surgery is one of the common surgeries performed in the head and neck region. Complications such as bleeding, hypoparathyroidism and recurrent laryngeal nerve (RLN) injury are commonly occurring complications of thyroid surgery.[1] The recurrent laryngeal nerve (RLN) injury after thyroidectomy, although infrequently encountered, can jeopardize the quality of life.[2] As the RLN innervates all the intrinsic muscles of the larynx except the cricothyroid, injury of this nerve induces a paresis or palsy of the vocal cord. Unilateral RLN injury can result in hoarseness, while bilateral RLN injury leads to dyspnea and often life-threatening glottis obstruction. The symptoms may or may not be associated with deglutition problems and can resolve rapidly or persist over time, depending on the type of injury.[3]

Even in the most experienced hands, RLN injury can occur, with the prevalence of 0.5-5%.[3] The causes of RLN injury could be a transaction, clamping, stretching, electro-thermal injury, ligature entrapment, or ischemia. Visual nerve identification remains the gold standard to prevent RLN injury in thyroid surgery.[1] Identifying the RLN visually during surgery had lowered the incidence of permanent RLN injury.[4,5]

The incidence of RLN injury is high in surgeries for malignant disease of the thyroid due to invasive involvement of the nerve by the malignant tissue and extensive neck dissection, whereas, for benign diseases, the incidence is relatively low.[6,7] A past study reported RLN injury in 12.8% malignant versus 2.9% in benign thyroid disease, while Hayward *et al*,[7] reported incidence of permanent and transient RLN injury in thyroid cancer surgery as 0.28% and 1.82% versus 0.13% and 1.12% respectively for benign disease. Other studies have found 5.3-13.4% RLN injury in thyroid surgeries for benign thyroid disease.[8,9] In a Pakistani study, Iqbal *et al*, have found the RLN injury as 6% after thyroid surgery for benign disease.[10]

RLN injury is a significant concern in thyroid surgery, but there is a paucity of data regarding the frequency of RLN injury after thyroid surgery in our general population. Results of international studies cannot be generalized on all the populations due to different genetic makeup. Therefore, this study was planned to get local evidence on this topic. The results would help enhance the local RLN injury data after thyroid surgery for benign disease.

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METHODOLOGY

This cross-sectional study was carried out at the Indoor Departments of Otorhinolaryngology in Combined Military Hospital Rawalpindi and Combined Military Hospital Quetta from May 2015 to May 2018 after approval from the respective Institutional Ethical Committees. The sample size of 179 was calculated through OpenEpi sample size calculator v. 3.0112 using prevalence of 13.4%,[11,12] 5% of absolute precision and 95% confidence level. Non-probability consecutive sampling was used for the data collection.

Inclusion Criteria: All the patients undergoing thyroid surgery for benign disease were include in the study.

Exclusion Criteria: Patients with the history of RLN injury, thyroid malignancy, neck surgery and laryngeal disease were excluded from the study.

Written informed consent was taken from all the patient. Baseline demographic information of patients (age, gender, and disease duration) was recorded. All the cases were operated under general anaesthesia by seven consultants with more than three years of post-fellowship experience in thyroid surgery. Lobectomy, subtotal thyroidectomy or total thyroidectomy were performed. All the patients underwent preoperative evaluation of vocal cords by indirect laryngoscopy for vocal cord disease and function. Immediate postoperative visualization of vocal cords was performed at the time of endotracheal tube extubation with a laryngoscope by an otorhinolaryngologist with the help of an anesthesiologist to assess vocal cord mobility.[12]

Statistical Package for Social Sciences (SPSS) version 22 was used for the data analysis. Frequencies and percentages were computed for qualitative variables like gender, type of thyroid surgery, and RLN injury. Mean and standard deviation were computed for quantitative variables like age, duration of nodular goitre, and duration of the procedure. Chi-square test was applied to find out the association. The *p*-value ≤0.05 was considered statistically significant.

RESULTS

A total of 179 patients fulfilling the inclusion criteria were enrolled in the study. The mean age of the patients was 37.9 ± 8.3 years. There were 42 (23.46%) male patients and 137 (76.54%) female patients.

Out of 93, 4 (4.3%) patients of ≤40 years of age had recurrent laryngeal nerve palsy while 7 (8.1) patients of >40 years had recurrent laryngeal nerve palsy. Three (7.1%) male patients and 8 (5.8%) female patients had recurrent laryngeal nerve palsy (*p*=0.49) as shown in Table-I.

Table-I: Association of recurrent laryngeal nerve palsy with age groups and gender.

Parameters		Recurrent Laryngeal Nerve Palsy		*p*-value
		Yes	No	
Age groups	≤40 years	4 (4.3%)	89 (95.7%)	0.29
	>40 years	7 (8.1%)	79 (91.2%)	
Gender	Male	3 (7.1%)	39 (92.8%)	0.49
	Female	8 (5.8%)	129 (94.2%)	

Out of 36 (20.11%) patients underwent lobectomy, seventy-one (39.67%) patients underwent subtotal thyroidectomy while seventy-two (40.22%) patients had a total thyroidectomy. The frequency of RLN injury was 11 (6.2%). There was no statistical association of RLN injury with the type of thyroid surgery (*p*>0.05) as shown in Table-II.

Table-II: Association of recurrent laryngeal nerve palsy with the type of thyroid surgery.

Type of surgery		Recurrent Laryngeal Nerve Palsy		*p*-value
		Yes	No	
Lobectomy	Yes	1(2.8%)	35 (97.2%)	0.31
	No	10 (7%)	133 (93%)	
Subtotal thyroidectomy	Yes	5 (7.04%)	66 (92.95%)	0.75
	No	6 (5.6%)	102 (94.4%)	
Total thyroidectomy	Yes	5 (6.94%)	67 (93.05%)	0.76
	No	6 (5.6%)	101 (94.4%)	

DISCUSSION

Thyroid surgery is a common surgical procedure worldwide and is performed by surgeons with varied surgical specialities. The outcome and complications mainly depend on the surgeon's skill, training, experience, the nature of thyroid disease, and the extent of surgery.[7,13] There has been a diverse range for the incidence of RLNI following thyroid surgery in benign thyroid disease. Hayward *et al*,[7] and Dralle *et al*,[14] found lower the incidence of 0.13% and 0.5% while Iqbal *et al*,[10] and Enomoto *et al*,[9] found relatively higher incidence of 6%, and 5.3% respectively. In comparison, Dutta *et al*,[8] found an even higher incidence of 13.4% after thyroid surgery for benign disease.

We could not find a significant difference in RLN injury regarding age, gender, or type of thyroid surgery. Similarly Zakaria *et al*, did not find any significant difference in terms of gender (*p*=0.849), but the incidence was significantly related to the type of thyroid surgery (*p*=0.024). It was significantly more common in

total/near-total thyroidectomy (7.2%) versus subtotal thyroidectomy (1.9%).[6]

In recent years, many surgeons have tried to reduce the incidence of RLN injury using nerve monitoring devices. Although several devices have been utilized, but all the devices have some means of detecting vocal cord movement when the RLN is stimulated.[15] A number of meta-analysis,[4,7,16,17] have reported a significant reduction in the incidence of transient RLN injury while using intraoperative nerve monitoring during thyroid surgery. In contrast, some researchers have found no significant difference,[18,19] in the incidence of permanent RLNI injury compared with routine visual nerve identification. The latter group argued that using a nerve stimulator did not aid in the anatomical dissection of the RLN and helped identify only the superior laryngeal nerve. Thus, we also believe discontinuous nerve monitoring by stimulation during total thyroidectomy confers no apparent benefit for the experienced surgeon in nerve identification, functional testing or injury prevention.[20]

Some anatomical variations may be considered to improve clinical outcomes following thyroid surgery. A non-recurrent right laryngeal nerve is an important anatomic variant. In this situation, the right inferior laryngeal nerve arises directly from the vagus and courses medially into the larynx following the superior thyroid artery or the inferior thyroid artery. This non-recurrent anatomy is found in 0.5% to 1.5% of patients and occurs in the setting of arterial anomalies, most commonly an aberrant right subclavian artery, also known as arteria lusoria. An aberrant right subclavian artery arises as a separate branch from the aortic arch, distal to the left subclavian, and passes from left to right, posterior to the oesophagus. This anomaly may be well demonstrated on computed tomography or magnetic resonance imaging. A standard cervical ultrasound scan also can detect a normal origin of the right subclavian and right common carotid from the innominate artery, which predicts a normal right RLN; the absence of this finding raises concern for a non-recurrent nerve. There are also reports of patients with a right RLN and a non-recurrent right laryngeal nerve. These two nerves normally would join in a position beneath the lower border of the thyroid. A non-recurrent left laryngeal nerve is rare and is associated with more extensive and less common arch and significant vessel anomalies than non-recurrent right laryngeal nerves.[21,22]

The findings of our study were helpful to get the local data of RLN injury after thyroid surgery for benign disease. However, other multicenter studies are required to validate our results.

LIMITATIONS OF STUDY

There are some limitations of this study that should be mentioned. We did not analyze the relationship between the frequency of post-operative RLN injury and the length of stay in the intensive care unit or the perioperative mortality and the long-term morbidity as a comprehensive outcome. Therefore, the significance of RLN injury on the clinical outcome was unclear.

CONCLUSION

The frequency of recurrent laryngeal nerve injury RLNI after thyroid surgery for the benign disease was 6.2%.

Conflict of Interest: None.

Authors' Contribution

HA: Conception data collection manucript writing, NGN: Conception manuscript writing, SBA: Manuscript writing analysis.

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