

## Recurrent Laryngeal Nerve palsy in the immediate post- thyroidectomy period – a retrospective study from a tertiary care centre

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### Abstract

**Background:** Recurrent laryngeal nerve (RLN) palsy is the second common complication after thyroid surgery. The prevalence of RLN palsy depends on various factors like surgical expertise, pathology and extent of the thyroid dissection. Institution specific prevalence rates can help in formulating methods to prevent the occurrence as well as the associated morbidity. **Objective:** This study is to estimate the prevalence of RLN palsy in a tertiary care institution. **Materials and Methods:** A retrospective study of 850 thyroidectomy cases done in a tertiary care centre from January 2017 to December 2018. Data analysis was performed using R software. **Results:** Prevalence of RLN palsy was 6.7%. Only 3 patients had intraoperative RLN Injury and one patient had documented vocal cord palsy on extubation. Prevalence of hoarseness in the immediate post-operative period was 6.3%. **Conclusions:** Prevalence of Recurrent Laryngeal Nerve palsy was not high in our group. We had only 3 patients with recurrent laryngeal nerve injury in 850 thyroidectomies. As we have included patients with post-operative hoarseness, a routine indirect laryngoscopy after surgery is warranted for exact prevalence assessment.

**Keywords:** Recurrent Laryngeal Nerve Palsy, Recurrent Laryngeal Nerve Injury, Thyroidectomy.

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### Introduction

Total thyroidectomy is one of the common surgeries done all over the world and recurrent laryngeal nerve (RLN) injury is a common complication associated with it. [1] Thyroidectomy is one of the main causes for bilateral vocal cord paralysis secondary to RLN injury. [2] The RLN injury can cause a trivial change in voice to even stridor. It is an unavoidable complication even when performed by high volume surgeons. [3, 4] RLN injury causes significant morbidity and reduction in quality of life. [9]

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Combining complete visualisation, dissection and intraoperative nerve monitoring have helped to reduce the incidence of RLN Injury to 1-2%. [3]. Incidence of RLN injury varies between different studies over years. Earlier studies reported an incidence of 7.6% of RLN injury in thyroidectomy. [5] A very recent large-scale study of 11,370 patients in 2020, reported an incidence of 6.0% revealing the much unchanged incidence rate of RLN injury over 2 decades. [6] There is a report that permanent RLN palsy occurred only in 1% of cases, while transient palsy was seen in 10.6%. [7] The studies from India also shows varying statistics on RLN injury following thyroidectomy ranging from 5% to 11.2%. [8, 9] The incidence is much higher, up to 16.2% in redo surgery. [8] The occurrence of RLN injury mainly depends on the type of surgery, volume of surgery and type of thyroid disease. [10,11] Recurrent laryngeal nerve injury often occur due to anatomical

variations, improper visualization of the field at the time of surgery due to bleeding, unplanned clamping and electrocoagulation, malignant infiltration of nerve, displaced nerve and stretching of the nerve. Oedema in post-operative period compress the nerve and also can lead to transient paresis of the nerve. [10, 11] Our institution, being a tertiary care centre with high volume thyroid surgery and recent reports of increase in prevalence of thyroid cancer in our region based on Population Based Cancer Registry data, [12] it will be of relevance to study the complications associated with thyroid surgeries and the factors influencing. This will help in anticipating the problem so that the type and extend of surgery can be planned accordingly. In this study we aim to estimate the prevalence of RLN Palsy following thyroidectomy in the immediate post-operative period inclusive of intraoperative RLN Injury, RLN paresis reported while extubation and post-operative hoarseness in a tertiary care centre in Thiruvananthapuram.

### Materials & Methods

The study adopted a retrospective registry-based descriptive study. The study participants were patients aged above 13 years who underwent all types of thyroidectomy in the Department of General Surgery of Government Medical College, Thiruvananthapuram, Kerala during the period from January 2017 to December 2018. Those with documented vocal cord palsy before surgery and incomplete case sheets were excluded. The incidence of recurrent laryngeal nerve injury ranges between 1% to 16% from various studies [5-8] and hence 850 thyroidectomy case records was identified as a sampling frame. A list of all thyroidectomy cases were made from the histopathology register from the Department of Pathology, Computer database and surgery register after deduplication. The case records were collected from the Medical Records Department of Govt. Medical College, Thiruvananthapuram after getting formal permission from the custodian. Recurrent laryngeal nerve palsy in the immediate postoperative period till discharge was defined by combining these three criteria - hoarseness, documented intra-operative recurrent laryngeal nerve injury by the surgeon or lack of movement of the cords as documented by the anaesthetists while extubating the patients undergoing thyroidectomy.

### Statistical Analysis

Data analysis was performed using R software, the baseline demographic and clinical variables were

described using the descriptive statistics. Quantitative variables were summarized as mean and standard deviation, while qualitative variables were tabulated as frequency and percentage.

### Ethical Considerations

The protocol and all relevant documents were reviewed and approved by the Institutional Research Committee and Human Ethics Committee. Being a registry based retrospective study minimal risk is associated with the study and all data were deidentified to ensure anonymity and kept under the custody of the investigators to ensure confidentiality.

### Results

Among the 850 patients who underwent thyroidectomy, females constituted the majority (90%). The mean age was 41.6(12.6). Pre-operative vocal cord palsy was present only in 14(1.7%) patients with missing data for 6 patients. RLN injury occurred in 3 patients only, However data was missing in 14 patients. Most of the patients (69.6%) underwent total thyroidectomy with 22(2.6%) neck dissection in addition. We excluded the 14 patients with pre-operative vocal cord palsy from further analysis.

Only 3 patients sustained intraoperative recurrent laryngeal nerve injury out of 836 patients with no information available for 19 patients. If we assume these 19 patients had recurrent laryngeal nerve injury, the prevalence of RLN injury would be 2.6%(22/836) with a 95% confidence interval of 1.7 to 4. One patient had vocal cord paresis on inspection by indirect laryngoscopy after thyroidectomy.

On sensitivity analysis with 18 missing data counted as bad outcome, the vocal cord paresis would have been 2.3 (confidence interval 1.4 -3.5).

The hospital prevalence of post-operative voice changes was 6.3 % ( 95% CI 4.8-8.2) (53/836). Using the predefined criteria for RLN palsy, only around 6.7%(56/836) of the patients hence developed RLN palsy in the immediate post thyroidectomy period.

### Discussion

Thyroidectomy is associated with well-known complications of which hypocalcaemia is the commonest followed by RLN involvement. RLN involvement can be asymptomatic or even cause stridor which is life threatening. The primary objective of this study was to describe hospital prevalence of thyroidectomy related RLN palsy in the immediate post-operative period. Our study showed that the

prevalence is 6.7%. Various prospective and retrospective studies have been done to study the incidence, risk factors as well as post-operative course of RLN involvement. Incidence of RLN injury varies between different studies over years. A study in 1998 reported 7.6% [6]. In a study of 11,370 patients in 2020, incidence of 6.0% was reported [7]. Joliat et al reported that permanent RLN palsy occurred only in 1% of cases, while transient palsies in 10.6% [8]. Studies from India also shows varying results on RLN injury following thyroidectomy. A prospective study from TMH, Mumbai with 152 patients reported overall temporary vocal cord palsy of 11.2% with 9% for primary surgery and 16.2% for re do surgery [9]. In a study from South India, by Sonnepalli et al, the transient RLN palsy was 5%. [5] A systematic review in 2009, which included 27 articles and 25,000 patients concluded that average incidence of post thyroidectomy temporary RLN palsy is 9.8% and permanent RLN palsy is 2.3%. They also commented RLN palsy rate changed from 26% to 2.3%, when different methods were used for the post-operative assessment of larynx [13]. Jiang et al retrospectively analysed 623 thyroidectomy patients and reported 4.98% incidence of RLN injury and incidence of 4.61% (27/586) in the first surgery and 10.81% (4/37) in re-surgeries. [11]. Retrospective Study of 340 patients by Zakeria et al had a rate of 4.1% RLN injury. [14] The rate of nerve palsy was 1.8% in a study by Erbil et al. [15]

Review by Gambardella et al concluded that even in the hands of highly experienced surgeons, an intentional injury can occur in 1 to 2% of cases. [3] The difference in the incidence of unexpected unilateral vocal cord paresis of nerves at risk with intraoperative nerve monitoring was not significant (2.09% vs 2.96%). [16] The prevalence of vocal cord palsy in immediate postoperative period may be high (9 to 10%) as reported by Sancho et al. [17]

In our study, only 3 patients out of 836 patients sustained intraoperative RLN injury. Even by including the 19 patients with missing data, the prevalence came to 2.6%. This correlates well with the figure of 1 to 2% unintentional injuries even by highly experienced surgeons by Gambardella et al. The low prevalence may be due to the high volume of thyroidectomies in our centre as well as thyroidectomies done by highly experienced consultants who perform more than 25 thyroidectomies per year. Only one patient had vocal cord paresis on inspection while extubation after thyroidectomy. The prevalence of post-operative voice changes was 6.3% (95% CI 4.9-8.4). When this was

also considered, the total prevalence of RLN palsy was 6.7%. In our centre, routinely the vocal cords will be examined while extubating the patients and we don't do indirect laryngoscopy in all post thyroidectomy hoarseness due to high patient load. As a protocol, usually it will be done on follow up only if the symptoms doesn't improve. Hence prevalence figures can vary based on how the institutional policy of postoperative laryngeal examination. [18] Surgeon's experience, histopathology diagnosis, previous thyroid surgery, surgical technique and anatomic variations are important factors affecting this complication [19]. Hoarseness after thyroidectomy can be due to various reasons like surgical error, intubation injury as well as psychological reasons. Intubation injury causes hoarseness only in a minority [20].

Lack of post-operative indirect laryngoscopy for objective assessment of vocal cords though we considered post-operative hoarseness in our diagnosis is a limitation of this study.

### Conclusion

RLN palsy is the second common post thyroidectomy complication next to hypocalcaemia. This can be a life-threatening complication which should be expected early and patients monitored for this possibility. Post-operative objective evaluation and follow up for resolution of symptoms can give a clear picture regarding this complication. Institution specific figures on the complications as well as the risk factors can help in taking necessary preventive steps and thereby reducing the patient's discomfort.

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### Declarations

Ethical approval: Approved by Institutional Research Committee and Human Ethics Committee.

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