

# Study of Hypocalcemia and Recurrent Laryngeal Nerve Injury in Operated Cases of Total Thyroidectomy

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## Abstract:-

**Background:** One of the main obstacles in thyroid surgery is vocal cord paresis or paralysis due to iatrogenic injury of recurrent laryngeal nerve (RLN). The incidence of recurrent nerve palsy varies from 1.5-14%. Also considerable morbidity can be caused by hypocalcemia following thyroidectomy.

**Materials and Methods:** This was a prospective observational study conducted between January 1, 2017, to December 1, 2017, forty two patients who were subjected to total thyroidectomy were included in the study.

**Results:** Total number of 42 cases of total thyroidectomy were performed during the study period. Females contributed to the majority. Multinodular goitre was the most common FNAC proved pathology for which total thyroidectomy was indicated. RLN injury was observed in 3 (7.14%) cases in our study which occurred post total thyroidectomy. Overall incidence of hypocalcemia was 33%. Onset of hypocalcemia was delayed upto 3<sup>rd</sup> day in 2 patients.

**Conclusion:** Precise surgical dissection can lower the incidence of RLN palsy and post-thyroidectomy hypocalcemia.

**Keywords:-**Hypocalcemia; Recurrent Laryngeal Nerve; Total Thyroidectomy.

## I. INTRODUCTION

Thyroidectomy is the procedure of choice for multinodular goitre and neoplastic thyroid disorders.<sup>1</sup> It is removal of all visible thyroid tissue.<sup>2</sup> Total thyroidectomy carries potential risk of Hypothyroidism, bleeding, hypoparathyroidism and recurrent laryngeal nerve injury.<sup>3,4</sup> Normal serum calcium level is 8.5 -10.2 mg/dl. Hypocalcemia is defined as serum calcium level less than 8.4 mg/dl.<sup>5</sup> Improvements in surgical technique can decrease the risk of hypocalcemia.<sup>6</sup> Mechanism of injury to recurrent laryngeal nerve includes complete or partial dissection, traction, contusion, thermal damage, compromised blood supply.<sup>7</sup>

Proper assessment of vocal cord function by indirect and direct laryngoscopy, pre and post operatively is necessary to rule out injuries to these nerves during surgery.<sup>8</sup>

The study aims to evaluate the incidence of hypocalcemia and recurrent laryngeal nerve injury in patients undergoing total thyroidectomy in our institute.

## II. AIM & OBJECTIVE

To study the incidence of hypocalcemia and recurrent laryngeal nerve injury in patients undergoing total thyroidectomy for multi nodular goitre and neoplastic thyroid disorders.

## III. PATIENTS AND METHODS

Between January 1, 2017, to December 1, 2017, forty two patients who were subjected to total thyroidectomy were included in the study after prior informed consent, from department of surgery, DVVPPF's Medical college and hospital, Ahmednagar, Maharashtra.

### A. Inclusion Criteria:

- Patients diagnosed as multinodular goitre and neoplastic thyroid disorders.
- Patients of age group 20-60 years.
- Both sexes included.

### B. Exclusion Criteria:

- Non euthyroid patients.
- Pre-existing parathyroid disorder.
- Pre-operative RLN palsy.
- Pre-existing deranged calcium levels.
- Patients on medication known to affect serum calcium level.
- Pregnant patients

**IV. PLAN OF STUDY**

- A detailed clinical examination for patient with anterior neck swelling coming to surgery OPD will be selected and cytopathological investigations (FNAC) will be done and specimen will be send for histopathological evaluation
- For Further confirmation, investigations like; Thyroid function test, radiological investigatios will be done.
- Pre-operative serum calcium level and indirect laryngoscopy will be planned.
- Following this pre-anaesthetic check-up will be done and patient will subjected to total thyroidectomy.
- Post operative Serum calcium levels will be assessed every 24 hourly for 3 post operative days.
- Vocal cord mobility will be checked pre-operatively, at the time of extubation and post-operatively.
- Pre-operatively and post-operatively by indirect laryngoscopy and during extubation by direct laryngoscopy.

**V. RESULTS**

The study included 42 patients which were prospectively evaluated over a period of 1 year.

*A. Age Distribution of Patients*

Age group	No. of patients
20-30	10 (24%)
30-40	18 (43%)
40-50	9 (21%)
50-60	5 (12%)

Table 1-Age Wise Distribution of Patients

The commonest group of patients to be operated in this study group was 30-40 years. Age distribution of 42 cases is shown in above table and maximum number of patients 18 (43%) presented in the age group 30-40 years.

*B. Sex Distribution*

Male	4 (10%)
Female	38 (90%)

Table 2- Sex Distribution of Patients

Among 42 patients in the study, 4 (10%) patients were male and 38 (90%) were female.

*C. Indication for Thyroid Surgery*

Indications for surgery ( as per pre-op FNAC report)	No. of cases
Mutinodular goitre	28 (67%)
Papillary carcinoma	8 (19%)
Follicular neoplasm	5 (12%)
Medullary carcinoma	1 (2%)

Table 3- Indications for Total Thyroidectomy

The most common pathology observed in the thyroid gland for which surgery was indicated, according to preoperative FNAC report was multinodular goitre (67%) followed by papillary carcinoma, follicular neoplasm and medullary carcinoma.

Operative procedure	No. of cases developing RLN injury	Percentage
Total thyroidectomy	3	7.14%

Table 4- No. of Patients Developing Recurrent Laryngeal Nerve (RLN) injury

Meticulous dissection was done in all cases to identify recurrent laryngeal nerve as a routine procedure. 3 (7.14%) cases out of 42 were observed to have RLN injury which occurred post total thyroidectomy. All these patients had unilateral vocal cord palsy. These cases were put on speech therapy and were regularly followed up till 6 months. All these cases had temporary palsy and recovered with speech therapy.

*C. Hypocalcemia and its Final Outcome*

Onset	Total
1 <sup>st</sup> day	8 (19%)
2 <sup>nd</sup> day	4 (10%)
3 <sup>rd</sup> day	2 (5%)
Total	14

Table 5- Onset of Hypocalcemia and Relation to Final Outcome

The mean value of preoperative serum calcium was 8.6 mg (8-10.5) and at the time of discharge was 8.4 mg (8-10.5). The overall incidence of hypocalcemia was 33% (n=14). Symptomatic hypocalcemia occurred in 9.52% (n=4). Hypocalcemia was detected on the 1<sup>st</sup> postoperative day in 8 (19%) patients and was delayed upto 3<sup>rd</sup> postoperative day in 2 (5%) patients. Calcium supplementation was given to all the above patients and continued throughout.

## VI. DISCUSSION

Recurrent laryngeal nerve injury is a disabling complication of thyroid surgery. Impairment of laryngeal function is a well known possible complication of thyroid surgery, because of the close anatomical relation between thyroid gland and laryngeal nerve. RLN injury can lead to temporary or permanent paralysis.

The consequences of RLN injury is the vocal fold paresis or paralysis with varying degrees of symptoms and signs depending upon the severity and side involved. Unilateral RLN injury causes the ipsilateral vocal cord to remain in the median or paramedian position. The voice may be hoarse. The patients cough is weak, and aspiration may occur. Presentation is often sub acute. Definite voice changes may not manifest for days or weeks. The paralyzed vocal fold undergoes atrophy, causing voice to worsen. Dysphagia and aspiration are other potential sequelae of unilateral vocal fold paralysis.<sup>9</sup>

Bilateral RLN paralysis may manifest immediately after extubation and patient exhibit signs of airway obstruction in the immediate postoperative period. As a result, the patient exhibits inspiratory stridor, dyspnea, tachypnoea, and nasal flaring, although the voice is near normal.<sup>9</sup>

RLN injury is an annoying but avoidable complication which results from severing, clamping or stretching of the nerve during surgery, clamping or stretching of the nerve during surgery and may result in severe untoward sequelae for the patient.<sup>8</sup> Routine exposure of RLN throughout its course has been shown to reduce the rate of nerve injury.<sup>10</sup> By adopting this principle, nerve injury rate of zero has been reported in the literature even after total thyroidectomy for thyroid cancer.<sup>11</sup> Conversely, when nerve is not clearly identified, the reported injury rate is three to four times higher.<sup>8</sup>

Review of literature revealed that the prevalence of RLN palsy varies from centre to centre depending upon the level of experience in thyroid surgery and the nature of surgery. Aytec and colleagues<sup>12</sup> reported 3.5% and 1.2% incidence of transient and permanent RLN injury, respectively and Hayward et al.,<sup>13</sup> Reported that permanent RLPN occurs in 0.3-3% of cases, with transient palsies in 5-8%, chaign<sup>14</sup> has reported figures of 5.1% and 0.9% for transient and permanent RLN injury. On the hand Shah and his colleagues have reported it to be 13.5%.<sup>15</sup> Incidence of RLNI is about 6.9% in video assisted thyroid surgery. In our study RLNI was 7.14% cases.<sup>10</sup>

Although the morbidity of thyroid surgery has decreased over the past century. Postoperative hypocalcemia is the most frequent complication after TT and continue to challenge even the experienced surgeon. The incidence of hypocalcaemia varied from 1.6% to above 50%. In the several studies , type of thyroid disease (i.e., malignant vs benign) or extent of thyroid surgery, hyperthyroidism, retrosternal goitre, concomitant neck dissection, completion thyroidectomy/reoperations, inadvertent removal of parathyroid glands, the number of experience of the surgeon

have been correlated with an increased risk for unintentional parathyroidectomy.

A higher incidence of hypocalcaemia was noted in non-toxic nodular goiters but was associated with incidental parathyroidectomy. Many previous studies felt that accidental removal of parathyroid gland was not associated with postoperative hypocalcaemia. But we noticed that incidental removal of the gland was significantly associated with hypocalcaemia. This feature was interestingly noted along with non-toxic nodular goiters without risk factors. So we feel that a refinement in surgical techniques could have improved the outcomes.<sup>16</sup> In our study incidence of hypocalcemia was 33%.

## VII. CONCLUSION

One of the most common complications after thyroid surgery which can be avoided by careful thyroid dissection is recurrent laryngeal nerve palsy. Proper identification and monitoring is the key to functional preservation of the nerve. Incidence of post-thyroidectomy hypocalcemia can be lowered by refined surgical techniques. Preservation of parathyroid glands is essential to avoid this complication.

### Footnotes

Conflict of interest- None.

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