

## A Study of Early Post-Operative Complications of Thyroid Surgeries and its Management

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### Abstract

*Context:* Thyroid surgeries comprise one of the more commonly performed procedures by a general surgeon. Today most of the complications of thyroid surgery are related to either metabolic derangements or injury to the recurrent laryngeal nerve injury (RLN), bleeding etc. *Aims:* This study intends to examine the incidence, natural history and the factors contributing to the various complications following thyroidectomy and the effect of timely and prompt recognition and intervention in minimizing morbidity. *Material and Methods:* This randomized prospective study included 100 consecutive patients undergoing various thyroidectomy procedures and meeting the inclusion criteria, after presenting to the surgical OPDs attached to Victoria Hospital, Bangalore Medical College And Research Institute. All cases were followed up for a period of 10 postoperative days. *Results:* 44% of the patients were seen to be in the fourth decade of life with the male: female ratio being 0.8:9.2. Total thyroidectomy was the procedure done in roughly half the patients and multi nodular goitre was the most common diagnosis. The incidence of post-operative hypocalcemia was 18 %, and that of RLN paralysis, wound infection, haematoma and seroma were 4%, 4%, 4% and 2% respectively. The incidence of bleeding, airway obstruction, superior laryngeal nerve (SLN) paralysis and thyroid storm was nil. *Interpretation and Conclusion:* An adequate pre-operative preparation, thorough knowledge of anatomy and operative steps with meticulous attention to hemostasis and

dissection is essential in ensuring an uneventful post-operative recovery.

**Keywords:** Thyroid Surgery; Early Complications; Management.

### Introduction

After obesity, thyroid disorders are the most common cause of metabolic disturbances, with surgery forming the main stay of treatment of thyroid swellings. Thyroid surgery in the hands of experienced surgeons is currently one of the safest procedures performed. While complications following surgical removal of thyroid gland are rare, their consequences can often be debilitating and even life-threatening.

The major complications include postoperative hemorrhage, wound infections respiratory obstruction, hyperthyroid storm, hypoparathyroidism and laryngeal nerve injuries. Thyroidectomy remains the third most common cause of bilateral vocal fold immobility and also a significant number of unilateral vocal cord paralysis are caused by it. Patients who develop complications such as permanent hypocalcaemia and bilateral recurrent laryngeal nerve injury have a diminished quality of life and increased health costs and require lifelong replacement therapy, further surgical procedures and rehabilitation.

A study done in 2002, on 517 patients undergoing total thyroidectomy, reported an incidence of postoperative wound hematoma of 1.0%, wound infection of 2.0% and a mortality rate of 0.2%. Postoperative hypocalcaemia was reported in 6.2% of patients. The incidence of unilateral and bilateral vocal cord paralyse were 0.77% and 0.39% respectively. The most common indications for total

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thyroidectomy werethyroid malignancy and goiter. The mean length of stay was 2.5 days and wasunaffected by the occurrence of postoperative hypocalcemia [1].

Certain patients, especially those requiring reoperation, those with invasivecancers or with numerous nodal metastasis or recurrent tumors, and those with largesubsternal goiters have a low but appreciable risk for complications [2].

A study performed in 2003 reported the incidence of temporary hypocalcemia to be between 6.9% and 25%. The most common causes were manipulation of theparathyroid glands producing transient parathyroid deficiency. It was found that asingle incidental parathyroidectomy will not cause symptomatic post operativehypocalcemia. Temporary hypocalcemia was more common after totalthyroidectomy [3].

In 2005, 750 patients undergoing surgery for MNG were studied to comparecomplication rates of bilateral subtotal (BST), near total (NTT) and totalthyroidectomy (TT). After BST 14 patients (14/170 - 8.2%) developed transienthypocalcaemia and 4 patients (4/170 - 2.4%) had transient and one permanent (1/170 -0.6%) recurrent laryngeal nerve (RLN) palsy. In NTT group, 39 patients (39/320 - 12.2%) developed transient hypocalcaemia and 2 patients (0.6%) developed transientvoice disturbances. All of the patients in BST group required at least 100 micrograms of thyroxine supplementation following the operation. It was concluded that althoughthe incidence of transient hypoparathyroidism increases with the extent of theresection, permanent complication rates are similar for all three surgical procedures [4].

A study was done in 2005 which concluded that severe hypocalcemia remainsthe limiting factor for short in-hospital stay policy as tetany may affect a significantnumber of patients after early discharge [5].

In one study, 9%of the patients were found to have had inadvertent removal of parathyroid tissue. Of the 25 repeat operations for recurrent or persistent malignancy, 5 (20%) were found tohave unintentional parathyroid removal compared with 15 (7.71%) of 195 primarythyroidectomy cases [6].

Total thyroidectomy and completion thyroidectomy are not risk factors for postoperative hypocalcemia. Modified radical neck dissection may increase the risk ofincidental parathyroidectomy. Most of the glands removed were intrathyroidal, sochanges in surgical technique are unlikely to markedly reduce this risk [7].

A double-blinded randomized prospective placebo-controlled study was donein 2006 to test if a week long pre-treatment with hypercalcemic drugs may pre venttransient post-thyroidectomy hypocalcemia and reduced hospital stay. The hospitalstay was significantly shorter in the study group (2.4+/-0.6 days) in respect to thecontrol group (3.6+/-1.4 days) which was on placebo. The authors concluded that the administration of calcitriol plus hydrochlorothiazide is able to prevent transient post thyroidectomy hypocalcemia and to reduce hospital stay [8].

A retrospective review of 1221 thyroidectomies performed was done toidentify patients with hematomas requiring reoperation and compared with a control group. Eighteen patients (1.5%) developed a postoperative hematoma. Symptoms included neck pain/pressure in 10 patients, respiratory distress in 9, wound drainage in 2, dysphasia in 1, agitation and sweating in 1. Mean time to symptom onset was 12hours (range: 1.3-40 hours). Six patients required bedside hematoma evacuation. Thebleeding source was identified in 15 patients. All patients recovered well, but onerequired a temporary tracheostomy [9].

This study intends to assess the occurrence of various postoperativecomplications following the different thyroidectomy procedures and the role ofadequate preoperative patient preparation, careful, meticulous surgical technique andearly recognition of postoperative complications with the prompt institution oftreatment in reducing morbidity and providing the patient with the best chance of asatisfactory outcome.

## Methodology

This study was conducted on 100 adult patients of all sexes undergoingvarious elective thyroidectomy procedures for various pathologies who are admitted in Victoria hospital attached to Bangalore medical college and research institute. These patients were followed for 10 post- operative days.

### *Inclusion Criteria*

1. Male and Female adult patients aged more than 18 years.
2. Patients with thyroid swellings.
3. Patients who are medically fit for surgery and who have given writteninformed consent for the procedure
4. Patients who have given written consent for follow up.

*Exclusion Criteria*

1. Patients previously diagnosed with recurrent laryngeal nerve paralysis
2. Lab evidence of pre operative hypo parathyroidism
3. Patients with previous thyroid surgeries

*Sampling Procedures*

A total of 100 consecutive cases were taken from the admitted patients in Victoria Hospital attached to Bangalore Medical College and Research Institute. The cases that met the inclusion criteria cited above were included in the study.

- Institutional committee approval and written informed consent were obtained for all cases.
- Patients were monitored from the time of admission, up till the time of discharge from the hospital and were later followed up for 10 post operative days.
- Detailed analysis of these patients who underwent thyroidectomy was done regarding various aspects such as age, sex, diagnosis & indication for surgery, type of thyroidectomy procedure done, occurrence of individual complications, type of intervention and patient outcome, duration of stay and follow-up [10].

**Results**

*Age Distribution*

In our study most patients were in the age group of fourth decade (30%), followed by third decade (27%) and by fifth decade (18%). Least number of cases is seen in less than 20 years and more than 50 years of age. Youngest patient was 18 year old and eldest patient was 70 year old.

*Sex Distribution*

Out of 100 patients who underwent thyroid surgery 92 were female and 8 male. The female to male ratio was 9.2:0.8

*Mode of Presentation*

77 (77%) presented with swelling in the neck and 23 (23%) with swelling with pain. 10 cases initially presented with features of hyperthyroidism like palpitations and increased sweating along with swelling, these were treated before taking up for surgery. None of our patients presented with the complaints of difficulty in swallowing or breathing disturbances, insomnia, generalized weakness or bowel and menstrual disturbances. The most common finding was swelling moving upward with deglutition [11].

*Histopathological Diagnosis*

In this study, majority of cases were multinodular goiter in euthyroid state (63%). Followed by, solitary nodule thyroid (14%), follicular carcinoma thyroid (7%), Hashimoto's thyroiditis (6%) and papillary carcinoma thyroid and diffuse colloid goiter. Malignancy was diagnosed in 12 cases out of 100 cases [12].

*Operative Procedure Done*

The commonly performed procedure in our study was total thyroidectomy (43%) and was done in 43 cases for multi nodular goiter and for malignancy. Sub-total thyroidectomy was the second most commonly performed procedure and was done in 40 cases (40%). Right and left hemithyroidectomy was done in 9 cases (9%) and 5 cases (5%) respectively. Dunhill procedure was done in 2 cases. In one case of papillary carcinoma thyroid, total thyroidectomy and modified radical neck dissection was done [13].

**Table 1:** Incidence of post-operative complications

Post-Operative Complication	No. of Cases	Incidence in Percentage (%)
Bleeding	0	0
Hematoma	4	4
Hypocalcemia	18	18
RLN paralysis	4	4
SLN paralysis	0	0
Thyrotoxic storm	0	0
Airway obstruction	0	0
Seroma	2	2
Wound infection	4	4

In this study, hypocalcemia was the most commonly observed post operative complication (18%) following different procedures and was observed in 18 cases out of 100 cases. Wound infection was the next most common complication observed in 4 cases. Hematoma was observed in 4 cases. RLN palsy was observed in 4 cases and seroma formation was seen in 2 of cases. There was no incidence of bleeding, SLN palsy, thyroid storm and airway obstruction in this study [14,15].

Oral Calcium and Vitamin D therapy was required in 12 cases out of 100 patients who had biochemical hypocalcemia but were clinically asymptomatic. All patients improved with this therapy prior to discharge. Oral Calcium and Vitamin D therapy combined with intravenous calcium gluconate were instituted in 6 of our cases who showed evidence of both clinical and biochemical hypocalcemia. All 6 patients were advised to continue oral Calcium supplements at discharge. Wound site infection was observed in 4 out of 100 cases and was controlled with oral antibiotic therapy for 1 week. The patient who developed haematoma was treated with needle aspiration. No further intervention was required as the patient had no evidence of airway compromise. The haematoma was ascertained to be due to a faulty suction drain, which was removed [16,17].

Total thyroidectomy was the procedure most commonly associated with complications in our study.

Hypocalcemia was seen 12 of the cases and RLN paralysis, hematoma, seroma, wound infection each were seen in 2 cases. Sub-total thyroidectomy was associated with certain complications – 6 cases of hypocalcemia, 2 cases of hematoma, 2 cases of RLN paralysis.

Seroma was seen in 2 cases of total thyroidectomy. 60 cases of Total thyroidectomy with *Modified Radical Neck Dissection* (MRND), right and left hemithyroidectomy and Dunhill procedures were not associated with any complications in this study. Wound infection was seen in each case of right and left hemithyroidectomy.

Malignancy which included follicular Carcinoma and papillary carcinoma thyroid had complications of hypocalcemia in 7 cases, RLN paralysis in 2 cases and wound infection in one case.

Goiters including solitary nodule thyroid and multi nodular goiter had 7 cases of hypocalcemia and 2 cases of RLN paralysis and 3 cases of wound infection. Diffuse colloid goiter and hashimoto's thyroiditis had 2 cases of hypocalcemia. Hematoma was seen in 3 cases of goiters and one case of diffuse colloid goiter [18].

Seroma was encountered in 2 cases of malignancy. Bleeding, SLN paralysis, thyroid storm and airway obstruction were not seen in any operated procedures.

**Table 2:** Interventional procedures performed

Procedure	No. of cases	Percentage
Oral Calcium+ Vitamin D	12	12
Oral Calcium+ Vitamin D+Calcium gluconate i.v	6	6
Antibiotic therapy	4	4
Needle aspiration	4	
No intervention required	74	74

**Table 3:** Different operative procedures and associated complications

Type of surgery	Complications								
	Bleeding	Haematoma	Hypocalcemia	RLN palsy	SLN palsy	Thyroid storm	Airway obstruction	Seroma	infection
Total thyroidectomy	0	2	12	2	0	0	0	2	2
Total thyroidectomy + MRND	0	0	0	0	0	0	0	0	0
Subtotal thyroidectomy	0	2	6	2	0	0	0	0	0
Right hemithyroidectomy	0	0	0	0	0	0	0	0	1
Left hemithyroidectomy	0	0	0	0	0	0	0	0	1
Dunhill procedure	0	0	0	0	0	0	0	0	0

MRND- Modified radical neck dissection, RLN - Recurrent Laryngeal Nerve, SLN- Superior Laryngeal Nerve

**Table 4:** Relationship of diagnosis with the occurrence of complications

Diagnosis	Bleeding	Haematoma	Hypocalcemia	Complications					
				RLN palsy	SLN paralysis	Thyroid strom	Airway obstruction	Seroma	infection
Malignancy-Follicular & Papillary	0	0	7	2	0	0	0	2	0
Solitary & multinodular goiter	0	3	7	2	0	0	0	0	4
Diffuse colloid goiter	0	1	2	0	0	0	0	0	0
Hashimoto's thyroiditis	0	0	2	0	0	0	0	0	0

RLN - Recurrent Laryngeal Nerve, SLN- Superior Laryngeal Nerve

#### *Duration of Hospital Stay Following Surgery*

Most of the patients (73%) had a hospital stay between 1 to 3 days. The mean post-operative stay following surgery was 3 days. Hypocalcemia, nerve palsies and haematoma formation were the reasons for increased duration of hospital stay.

#### *Evaluation of All Patients at Follow-Up*

All hypocalcemia patients were given oral supplements of calcium along with vitamin D3 and were followed upto 3 months. None showed symptoms and signs of hypothyroidism on follow up. Hematoma and wound infection were relieved within one day and one week respectively. 2 cases of seroma relieved in 3 days. All other patients whose post-operative recovery was uncomplicated didn't have any fresh complaints during the follow up [19].

#### **Discussion**

In our study, it was found that the minimum patient age was 18 years and maximum age was 70 years. 44 years was the average age of patients in this study. Taking sex incidence, the male: female ratio was 0.8:9.2. In Stojadinovic series, the ratio is 2:8 and in Shandilya series, the ratio is 2.3:7.7

In our study 87 (87%) were benign and 13 (13%) malignant which is consistent with Rix [20] (90% and 10% respectively) and Sakorafas [21] (83% and 27%),

Among the post-operative complications, hypocalcemia was the most common post-operative complication and was seen 18% of the patients. The complications like hematoma, wound infection, RLN paralysis were seen in 4% of cases respectively. Bleeding, thyrotoxic storm and air way obstruction were not seen in any of the patients in this study.

Steurer series found 3.4%, 7.2%, and 2.5% of temporary RLN palsy in the benign thyroid nodule, thyroid malignancy and hyperparathyroidism groups respectively [18].

Richmond series shows the rate post-operative hypocalcemia to be 20% and this parameter is comparable with our series (16.6%) with a difference of 3.4%. Corresponding to 74 out of 30 patients whose recovery was uneventful after surgery, intervention procedures were not required in the same number of patients [22].

Of the 18 patients who developed hypocalcemia, all patients had normal serum calcium levels at the time of discharge. None of the patients had hypoparathyroidism at the end of our study. 4 patients who developed wound site infection subsequent to surgery were managed with oral antibiotics and 4 patients developing wound haematoma was managed with needle aspiration and did not require any further intervention.

Complications were most commonly associated with the procedure of total thyroidectomy. 43 patients of the 100 patients (43%) who underwent total thyroidectomy developed hypocalcemia in 12 patients. The incidence of RLN paralysis, wound infection, hematoma and seroma were 2% each among the patients undergoing total thyroidectomy [22].

Out of the total 14 patients (14%) who underwent hemithyroidectomies, 2 patients developed wound haematoma. No other complications were associated in any of the patients undergoing hemithyroidectomies in our study. Of the 40 patients who underwent subtotal thyroidectomy, 6 patients developed hypocalcemia. Hematoma and RLN paralysis seen in 2 patients each. No other complications occurred following subtotal thyroidectomy.

Malignancy was associated with 7 cases of hypocalcemia. 2 cases of RLN palsy and 2 cases of

seroma. Among the patients diagnosed with goiter, including benign solitary nodule, multinodular goiter and diffuse colloid goiter 9 patients developed hypocalcemia. Hematoma was developed in 4 cases and RLN paralysis 2 patients. 4 cases developed wound site infection. Out of the 6 patients diagnosed with Hashimoto's thyroiditis, 2 patients developed hypocalcemia. No other complications encountered in other patients. The mean post-operative stay in our study was 3 days. Majority of the patients 73% were discharged within 1-3 days following surgery. All the cases were operated under general anaesthesia.

### Conclusion

In our study, the most common complication occurring after thyroidectomy was hypocalcemia seen in 18 % of the cases. This can be attributed to total thyroidectomy forming almost half the number of the thyroidectomy procedures. The incidence of RLN paralysis was 4% and could be attributed to improper technique and the inability to identify both the nerves intra operatively. The paralysis was temporary. The incidence of wound site hematoma was 4% in our study and could be attributed to a faulty drain system. The possibility of inadequate hemostasis was ruled out in this patient as the hematoma was small and located superficially and there were no associated symptoms of airway compromise. Wound site infection occurred in 4% of our patients. Seroma occurred in 2% of patients.

Due to the improved pre-operative patient preparation and adequate control of blood pressure and adequate hemostasis intraoperatively, no cases of thyrotoxic storm or bleeding were seen in any of the patients in our study. Also due to improved knowledge about the thyroid gland anatomy and the variations in both course of the RLN and the position of the parathyroid glands combined with a meticulous dissection has gone a long way in reducing the incidence of post-operative complications following thyroidectomy. Hence, it is in the hands of the surgeon to give a satisfactory outcome to the patient and ensure a better quality of life.

*Conflict of Interest:* None declared

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