



## STUDY OF FACTORS INFLUENCING EARLY POST OPERATIVE MORBIDITY AFTER THYROIDECTOMY: A DESCRIPTIVE STUDY

### Surgery

**Gaurav Panchal** Resident, Dept of Surgery, Armed Forces Medical College Pune-40

**Nilanjan Roy\*** Assoc Prof, Dept of Surgery, Armed Forces Medical College Pune-40\* Corresponding Author

### ABSTRACT

**Background:** Thyroid disorders are the most common cause of metabolic disturbances with surgery as the mainstay treatment of many thyroid swellings. While complications following surgical removal of thyroid gland are rare, their consequences can often be debilitating & even life threatening. Patients who develop complications such as permanent hypocalcemia and RLN (Recurrent Laryngeal nerve) injury have a diminished quality of life and often require lifelong replacement therapy, further surgical procedures & rehabilitation. This study intend to assess the occurrence of various post operative complications following different thyroidectomy procedures & the role of adequate preoperative preparation for providing the patient with best chance of a satisfactory outcome.

**Method:** This is a descriptive observational study carried out between July 2017 and July 2019, on 60 consecutive cases who underwent thyroidectomy at a tertiary care centre.

**Result:** The average age of the participants who underwent thyroid surgery was 42.5167 years with a standard deviation of + 13.6649. Out of a total of 60 patients 48 were females corresponding to 80% of the study subjects; whereas males were 12 in number accounting for 20% of the study subjects showing predominantly female predisposition. Of the 60 patients, 17 had co-morbidities corresponding to 28.3% of the study subjects. Diffuse swelling of neck was the most common presenting complaint seen in 56.67% of patients. 56 patients were in Euthyroid state corresponding to 93.33%. Two patients each were hypothyroid and hyperthyroid state corresponding to 3.33% each. Total malignancies identified were 11 after histopathological examination after thyroidectomy. 9 patients had complications subsequent to the surgery. This corresponds to a rate of 15% of the study population. Hoarseness of the voice was the commonest complication in the patients.

**Conclusion:** This study data revealed the rate of complications subsequent to thyroidectomy was 15%. Hoarseness of voice and hypocalcemic tetany are the common complications noted in post operative period. No rare complication was noted during the study.

### KEYWORDS

RLN, hypocalcemic tetany, hoarseness of voice

### INTRODUCTION

Thyroid disorders are the most frequently encountered endocrine diseases in India [1] Thyroid surgery is a demanding surgery which requires a high expertise and may be associated with complications and post operative morbidity and mortality. This can be due to multiple reasons:

- 1) High vascularity of the gland
- 2) Important nerves such as Recurrent Laryngeal nerve (RLN), Superior Laryngeal nerve have to be carefully dissected
- 3) Parathyroid glands responsible for calcium homeostasis are in close association with the thyroid

Other complications may include post operative infections. This depends on how clean the procedure was carried out and maintenance of post operative sterility and dressings. Airway compromise can be a very rare complication. Mortality rate which was very high in last century has been brought to almost negligible levels. For all the complications, patient's underlying medical conditions may predispose to complications. Our study evaluated 60 patients who underwent thyroidectomy in our tertiary care facility. Factors influencing early post operative complications were evaluated which would be useful in assessing post operative complications and can be a stepping stone in further improvement in patient care and post operative morbidity.

### MATERIAL AND METHODS

This study is a descriptive observational study conducted between July 2017 to July 2019 at a tertiary care centre. 60 consecutive patients who presented during this duration and underwent thyroidectomy were included in the study

### INCLUSION CRITERIA:

Patients of all age groups and both sex diagnosed with thyroid swelling & requiring surgical management.

**Exclusion criteria:** Patients with uncontrolled severe hyperthyroidism preoperatively.

### RESULTS

**Patient demographics:**

The average age of the participants who underwent thyroid surgery was 42.5167 years with a standard deviation of + 13.6649. This is

depicted in Table 3. Similarly mean age was calculated in years for the different genders. For females the mean age was 41.7917 years + 13.2; whereas for men it was 45.417+ 15.75 as depicted in Table 5.

The gender of the patients who underwent the surgery was calculated and it was found that thyroid disorders have predisposition to majorly effect the female population. This is depicted in table 4 and figure 11. Out of a total of 60 patients 48 were females corresponding to 80% of the study subjects; whereas males were 12 in number accounting for 20% of the study subjects.

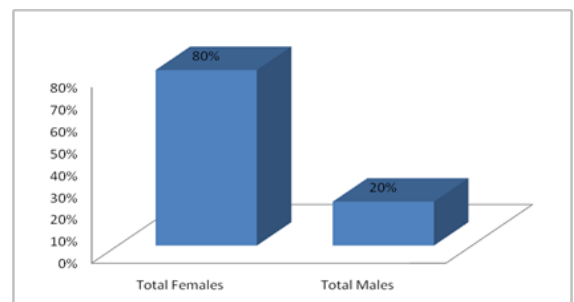
**TABLE 3: AGE OF THE PATIENTS (IN YEARS)**

Age of the patients	42.5167
Standard deviation	13.6649

**TABLE 4: GENDER PERCENTAGE**

Total patients	60	100%
Total Females	48	80%
Total Males	12	20%

**FIGURE 11: GRAPHICAL REPRESENTATION OF GENDER OF STUDY SUBJECTS**



**Table 5: Age as per gender of the patient**

Average age of female subjects (In years)	41.7917 + 13.2
Average age of male subjects (In years)	45.417+ 15.75

**CO-MORBIDITIES AT TIME OF PRESENTATION:**

Table 6 and table 7 depicts underlying co-morbidities in the patients. Of the 60 patients, 17 had co-morbidities corresponding to 28.3% of the study subjects. Of these 5 were males and remaining 12 were females corresponding. This corresponds to co-morbidities in 25% of female subjects and 41.67% of male subjects.

**Table 6: Co-morbidities**

Co-morbidities	N (Number of patients)	Percentage
No of patients with co-morbidities	17 of 60	28.30%
No of females with co-morbidities	12 of 48	25%
No of males with Co-morbidities	5 of 12	41.67%

**Table 7: Categorization of the co-morbidities as per system class**

Co-morbidities	No of patients	Percentage
Depression	1	1.66%
Metabolic disorder	1	1.66%
Polyarthritis	1	1.66%
CA Breast	2	3.33%
HTN	4	6.67%
DM type II	2	3.33%
Hypothyroidism	2	3.33%
Hyperthyroidism	2	3.33%
Recurrent thyroid disorder*	4	6.67%
CAD	1	1.66%
PIVD	1	1.66%
Pulmonary tuberculosis	1	1.66%

Abbreviations: CAD: Coronary artery disease; HTN: Hypertension; PIVD: Prolapsed inter vertebral disc; DM: Diabetes Mellitus; CA: Carcinoma

\* Indicates: Operated cases of Solitary nodules of thyroid in two patients, Hemithyroidectomy done in one patient for unknown cause and one operated case of multi nodular goiter

**PRESENTING COMPLAINTS:**

Table 8 depicts the presenting complaints in the patients who underwent thyroid surgery. Diffuse swelling of neck was the most common presenting complaint seen in 56.67% of patients

**Table 8: Presenting Complaints In The Patients**

PRESENTATION	NUMBER OF PATIENTS	PERCENTAGE
Multi nodular swelling (diffuse swelling front of neck*)	34	56.67%
Solitary nodular swelling	25	41.67%
Hoarseness of voice*	1	1.67%
Incidental finding**	1	1.67%

**DIAGNOSTIC EVALUATION AND THYROID STATE:**

Thyroid function tests were carried out in all the subjects. At time of presentation 56 patients were in Euthyroid state corresponding to 93.33%. Two patients each were hypothyroid and hyperthyroid state corresponding to 3.33% each. This is depicted in table 9.

**Table 9: Status of thyroid function**

Thyroid state	Total number of patients	Percentage
Euthyroid state	56	93.33%
Hypothyroid state	2	3.33%
Hyperthyroid state	2	3.33%

Ultrasonography and FNAC was conducted in all the patients and FNAC was conducted. FNAC detected malignancies as papillary carcinoma in 3 patients. However total malignancies identified were 11 after histopathological examination after thyroidectomy. This is depicted in Table 11. One case was follicular carcinoma and other was follicular adenoma which was diagnosed as papillary carcinoma on FNAC.

**Table 10: Diagnostic modalities**

Diagnostic modality prior to surgery	Total patients	Percentage
USG	60	100%
FNAC	60	100 %

Note: Ultrasonography and FNAC was conducted in all patients prior to surgery.

**Table 11: FNAC vs HPE**

	Total malignancy	Papillary carcinoma	Follicular carcinoma	Corroboration by HPE
HPE	11	6	5	NA
FNAC	4	3	0	One was follicular carcinoma, one was papillary carcinoma and other was follicular adenoma. One was diagnosed as multi nodular goitre

**TYPE OF SURGERY AND LYMPH NODE DISSECTION:**

Table 12 and Table 13 represent the type of surgery carried out in the study patients. Near total thyroidectomy was the common surgery performed in the subjects performed on 50 % of patients.

**Table 12: Type of surgery**

Type of surgery	No of patients	Percentage
Hemithyroidectomy either right/left	22	36.67%
Completion thyroidectomy	1	1.66%
Near total thyroidectomy	30	50%
Total thyroidectomy without lymph node dissection	4	6.67%
Total thyroidectomy with lymph node dissection	3	5%

**Table 13: Details about patients who underwent Lymph Node dissection**

FNAC DIAGNOSIS	SURGERY WITH LYMPH NODE DISSECTION	HPE/FINAL DIAGNOSIS
Nodal mets of papillary ca thyroid Bethesda VI	TT + CCLND	Papillary carcinoma
MNG in background of aberrant thyroid tissue	TT + B/L SELECTIVE LN DISSECTION	Papillary microcarcinoma Rt
Differentiated thyroid carcinoma	TT & CCLND	MNG with Hashimoto's Thyroiditis

Note: TT: Total thyroidectomy; CCLND: Central compartment lymph node dissection; RT: Right; b/l: bilateral.

**COMPLICATIONS:**

Of total 60 patients who underwent thyroidectomy, 9 patients had complications subsequent to the surgery. This corresponds to a rate of 15% of the study population. These are depicted in Table 14 and Table 15 along with Figure 12. Hoarseness of the voice was a common complication in the patients. 3 patients had hoarseness of voice corresponding to 5 % of total operated patients.

**Table 14: Complications rate**

	No of patients
Total complications in patients	9
Rate of complications	15%

**Table 15: Details of complications**

Complication	No of patients	Percentage
Hoarseness of voice	3	5%
RLN neuropraxia	1	1.67%
Seroma	2	3.33%
Ecchymosis	1	1.67%
Hypocalcemic Tetany	2	3.33%

Note: RLN: Recurrent laryngeal nerve

Figure 12: Pictorial representation of complications

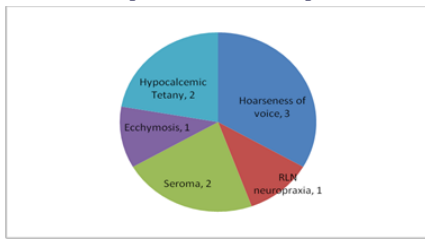


Table 16: Hypocalcemic complications

Hypocalcemic tetany	Patient 1	Patient 2
Age	46 years	60 years
Gender	Female	Female
Day of occurrence	POD 2	POD 1
Symptoms & signs	carpopedal spasm, tingling numbness for 01 day; Trousseau's sign +, Chvostek sign +	carpopedal spasm, tingling numbness for 01 day
Lab investigations	Corrected Ca: 7.43 mg%	Pre-op Ca 9.2 mg%, Post op 8.24 mg%, 48 Hrs Post op 7.96 mg%, 72Hrs Post op 7.44 mg%.
Management	alcium Gluconate IV	Calcium Gluconate & Magnesium infusion

Note: Ca: Calcium; POD: Post operative day; OP: operative; IV: intravenous; +: Positive

DISCUSSION

This study shows that there is a female preponderance for thyroid diseases. Cotran RS et al [2] in pathological basis of diseases specified that goiter had a higher incidence in the females. They stated that depending on the severity of iodine deficiency, goiter which is associated with a hypothyroid state may appear early in the childhood but usually peaks at about puberty or soon after then in the adolescent age, affecting more females than males population. They also mentioned that thyroid carcinoma have a higher incidence in the female population. They stated female preponderance in the ratio of 2.3 female against 1 male for thyroid carcinoma. It is a known fact that thyroid disorder can also be associated with other medical conditions such as diabetes, metabolic disorders, depression, etc. though the mechanisms are unknown. In a study conducted by Jones AJ et al. [3] in 175 patients with thyroid swellings compared USG and FNAC. For FNAC the sensitivity, specificity and positive predictive value for thyroid cancer were 92%, 85% and 41% respectively compared to 75%, 61%, 19% for ultrasound. Hoarseness after thyroid surgery is generally due to RLN injury. The resultant injury results in paresis/paralysis of vocal cords leading to alteration in the voice. Intraoperative control of nerves is necessary to avoid damage to Recurrent laryngeal nerve. In a series of 3660 thyroidectomies, Bergenfelz et al. identified 142 unilateral recurrent nerve injuries in the first month post-operative period, but an injury to the nerve was seen during thyroid surgery in only 14 patients [4]. This corresponds to 3.8% of the total cases operated and is almost similar to our study where 5% of the patients had hoarseness of voice where no injury to Recurrent laryngeal nerve was identified during surgery. One of the patient in our study had RLN neuropraxia corresponding to 1.66%. A meta-analysis was conducted by Higgins et al. [5] which showed that systematic visualization of the recurrent laryngeal nerve was the best technique to avoid injury to RLN. They also concluded that RLN injury rate of 3.25% using the nerve stimulator against 3.12% for visualization of the RLN. The reported incidence for seroma subsequent to conventional thyroid surgeries such as the ones conducted in our study varied from 1.3% to 7% [6-7] in the studies conducted by Sheahan P et al and Lee YS et al. respectively. For Seroma prevention some of the surgeons use drain subsequent to the surgeries. The efficacy of post operative drains is unknown [8]. However these can be considered in critical cases and in surgeries where the dead space following the surgery is high. Post-thyroidectomy hemorrhage shows some different clinical patterns between the superficial and deep cases. It could be considered that superficial hematoma may frequently cause ecchymosis, while hematoma deep to the strap muscles could lead to airway obstruction which can be life threatening. The incidence of post operative hemorrhage following thyroidectomy complication varies from 0 to

6.5% [9] in a study conducted by Calo PG et al. They studied postoperative hematomas after thyroid surgery, there incidences and risk factors. This corresponded with our study where the incidence was 1.67%. Oltmann et al. [10] also showed that post-operative bleeding rates of 2.2 and 10.7%, respectively, for those patients receive particular antiplatelet or anticoagulant therapies, which are significantly higher than the overall post-operative bleeding rates subsequent to thyroid surgeries of 0.5%. The incidence of post-operative bleeding was 1.67% in our study which manifested in form of ecchymosis. These values of 0.5% incidence corresponded with our study with an incidence of 1.67%. The female sex is associated with an increased risk of hypocalcemia, as demonstrated by several studies [11, 12]. The two patients were female patients who suffered hypocalcemia. Hypoparathyroidism is the most frequent complication of total thyroidectomy. The incidence of hypo-parathyroidism varies between 0.5 and 65% [13, 14]. Hypoparathyroidism manifested in our patients in form of tetany caused by hypocalcemia. The incidence was 3.33% in our study which corroborated with other studies. Unfortunately, it is not possible to detect hypocalcaemia before 24 to 48 hours post-operatively of thyroidectomy and Parathormone can be used as an early biomarker. Many workers have studied the possibility of predicting hypoparathyroidism by measuring the level of i-PTH [15-17]. In a study in 1180 patients, workers recommend oral calcium for all patients following thyroidectomy and vitamin D for high-risk people [18]. Hypocalcemia should be kept in mind and patients should not be over loaded with calcium supplements. Though long term calcium is out of scope for the present study, early post operative complication were managed by conservative treatment which included calcium gluconate given intravenously.

CONCLUSION

The results prove that the rate of complications subsequent to thyroidectomy was 15%. Hoarseness of voice and RLN paresis are the common complications noted in post operative period. Thyroid abnormalities including goiter, malignancies have a higher female preponderance. Commonest presentation of patients undergoing thyroid surgeries is neck swelling which can be generalized or unilateral or solitary in nature. Malignancies of thyroid required additional lymph node dissection to determine the lymph node status. Incidences of Ecchymosis, RLN neuropraxia, seroma, hypocalcemic tetany, hoarseness of voice as post operative complications matched with studies conducted by other workers. High suspicion of alteration in calcium levels should be suspected in female and at risk patients. Serial calcium levels needs to be measured in the post operative period in patients who are symptomatic. No rare complications were observed in our study.

Conflicts of interest: The author declare no conflicts of interest  
Disclosures and funding: None

REFERENCES

1. S. Standing, Gray's Anatomy: The Anatomical Basis of Clinical Practice, Elsevier, London, UK, 39th edition, 2008.
2. Cotran RS, Kumar V, Robins SL. The thyroid in Robins, SL. ed. Pathological bases of disease. Philadelphia W. B. Saunders Company 5th edition 1994.
3. Jones AJ, Aitman TJ, Edmonds CJ, Burke M, Hudson E, Tellez M. Comparison of fine needle aspiration cytology, radioisotopic and ultrasound scanning in the management of thyroid nodules. Postgrad Med J. 1990 Nov;66(781):914-7
4. Bergenfelz A, Jansson S, Kristofferson A et al (2008) Complication to thyroid surgery: results are reported in a database from a multicenter audit comprising 3660 patients. Langenbecks Arch Surg 393:667-673
5. Higgins TS, Gupta R, Ketcham AS, Sataloff RT, Wadsworth JT, Sinacori JT (2011) Recurrent laryngeal nerve monitoring versus identification alone on post-thyroidectomy true vocal fold palsy: a meta-analysis. Laryngoscope 121:1009-1017
6. Sheahan P, O'Connor A., Murphy M. Comparison of incidence of postoperative seroma between flapless and conventional techniques for thyroidectomy: a case-control study. Clin. Otolaryngol. 2012;37:130-135.
7. Lee Y.S., Nam K.-H., Chung W.Y. Postoperative complications of thyroid cancer in a single center experience. J Korean Med. Sci. 2010;25:541-545.
8. Morrissey A.T., Chau J., Yunker W.K. Comparison of drain versus no drain thyroidectomy: randomized prospective clinical trial. J. Otolaryngol. 2008;37:43-47.
9. Calo PG, Pisano G, Piga G et al (2010) Postoperative hematomas after thyroid surgery. Incidence and risks factors in our experience. Ann Ital Chir 81:343-347
10. Oltmann S, Alhefdhi A, Rajaei M, Schneider D, Sippel R, Chen H (2016) Antiplatelet and anticoagulant medications significantly increase the risk of postoperative hematoma: review of over 4500 thyroid and parathyroid procedures. Ann Surg Oncol 23(9):2874-2882
11. Kalyoncu D, Go'nu'llu' D, Gedik ML, Er M, Kurog'lu E, I'g'dem AA, Koksoy FN (2013) Analysis of the factors that have an effect on hypocalcemia following thyroidectomy. Turk J Surg 29:171-176
12. Raffaelli M, De Crea C, D'Amato G, Moscato U, Bellantone C, Carrozza C, Lombardi CP (2015) Post-thyroidectomy hypocalcemia is related to parathyroid dysfunction even in patients with normal parathyroid hormone concentrations early after surgery. Surgery 159:78-85
13. Harris SC (1992) Thyroid and parathyroid surgical complications. Am J Surg 163:476-478
14. Proye C, Carnaille B, Maynou C et al (1990) The parathyroid risk in thyroid surgery. Argument against the early postoperative prescription
15. Lang H, Yih L, Ng K (2012) A prospective evaluation of quick intraoperative parathyroid hormone assay at th time of skin closure in predicting clinically relevant hypocalcemia after thyroidectomy. World J Surg 36:1300-1306
16. Ambe P, Bromling S, Knoefel W, Rehders A (2014) Prolonged duration of surgery is not

- a risk factor for postoperative complications in patients undergoing total thyroidectomy: a single center experience in 305 patients. *Patient Saf Surg* 8:45
17. Soon P, Magarey C, Campbell P, Jalaludin B (2005) Serum intact parathyroid hormone as predictor of hypocalcaemia after total thyroidectomy. *ANZ J Surg* 75:977-980
  18. Alhefdi A, Mazeh H, Chen H (2013) Role of postoperative vitamin D and/or Calcium routine supplementation in preventing hypocalcemia after thyroidectomy: a systematic review and meta analysis. *Oncologist* 18:533-542