



TOTAL THYROIDECTOMY- COMPLICATIONS AND MANAGEMENT-AN INSTITUTIONAL AUDIT

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ABSTRACT Thyroid disorders are one of the most common endocrine diseases known worldwide for which patients require medical or surgical intervention. There had been tremendous increase in the incidence and prevalence of various benign and neoplastic pathologies of the gland in the recent past and hence their respective surgical interventions too have increased proportionately. Thyroid pathology is extremely common in the sub Himalayan terrain and considering the geographical location of North Bengal Medical College, we had been performing a significant number of thyroid surgeries since a long time. Our present study is a descriptive retrospective cohort study which deals with the complications after total or completion thyroidectomy with or without neck dissection (CND with/without MRND). A detailed review of the complications along with the management and its respective literature review are also presented herewith.

KEYWORDS : Total Thyroidectomy, Hypocalcemia, RLN Palsy

INTRODUCTION:

Thyroid surgery, since the days of Sir Theodore Kocher, is one of the most common surgical procedures, done by both General Surgeons and ENT surgeons. Thyroid disorders are one of the most common endocrine diseases.⁽¹⁾ Surgical removal of the gland is indicated both for benign condition such as symptomatic large goiters as well as for the treatment of malignant disease of the thyroid gland.⁽²⁾ Due to its proximity to vital structures of neck like the great vessels and cranial nerves and presence of parathyroid glands in the close proximity to the posterior surface of the gland, the surgeon need to be a master of his art to successfully perform the procedure. The presence of recurrent laryngeal nerve and superior laryngeal nerve in the close vicinity of the gland makes the learning curve for thyroid surgery even steeper due to their paramount importance in regulation of voice. In fact, several studies have conclusively shown that increased experience of the surgeon is significantly associated with decrease in complications post thyroid surgery.^(3,4) Our study pertains to study of complications of total thyroidectomy, the predictive factors, their respective management and a brief review of the literature pertaining to the same.

AIMS AND OBJECTIVES:

The above mentioned study was conducted in the department of Otolaryngology at North Bengal Medical College, situated in the district of Darjeeling, in the foothill of Himalayas. Considering the potential possibility of iodine deficiency goiter in this endemic zone, we started studying about the benign thyroid disorders; nevertheless, the incidence of chronic inflammatory thyroid disorders and thyroid neoplasm had a very high incidence and prevalence. Hence we decided to restrict our study to the complications post total removal of thyroid gland, either as a primary procedure or as a revision procedure. The primary aims and objectives of our study were

1. To study the complications post total or completion thyroidectomy with or without neck dissection.
2. Management of the aforesaid complications.

MATERIALS AND METHODS:

The study was a descriptive retrospective cohort study, conducted in the department of Otolaryngology and Head Neck surgery at North Bengal Medical College and Hospital from Jan 2016 to Jan 2020. The patients were selected from the OPD pool who had attended with midline neck swelling, which was clinically as well as cytologically diagnosed as neoplastic or inflammatory thyroid swelling. Meticulous preoperative investigations were done like USG neck with TIRADS score, USG guided FNAC with Bethesda score, biochemical evaluation by FT4, FT3, TSH and Anti TPO, along with serum calcium preoperative. Radio-imaging in the form of CECT neck was done

whenever indicated. CXR-PA view was done in all cases to exclude rare possibility of any chest metastasis. Appropriate clinical staging was done subsequently for neoplastic cases. Four types of surgical procedures were defined. Cases subjected to hemithyroidectomy were completely excluded from our study. The other three modalities, total thyroidectomy, completion thyroidectomy and total/ completion thyroidectomy with neck dissection (CND with or without MRND) were included in our study.

All patients who were operated were subjected to routine preoperative anesthetic evaluation. After proper antiseptic dressing and draping, standard Kocher's incision was made. Strap muscles were cut or retracted followed by identification of thyroid gland. Prior to ligation of upper pole, the EBSLN was identified and pedicle was ligated as close as possible to the gland. Inferior thyroid artery was identified in the lower part and Lorey's triangle was defined. The trunk of ITA was traced till it branches off to supply the parathyroid glands. The inferior thyroid artery or its branches were ligated as close as possible to the thyroid gland. RLN and parathyroid glands embedded in the pad of fat was identified in most of the cases. In those cases which required nodal dissection, central compartment was dissected in all cases of papillary carcinoma with the primary more than 1 cm in dimension. Level II, level III and level IV were dissected, whenever and wherever required or indicated. Suction drain was applied and closure done in two layers. Drain was removed around 72 hrs to 96 hrs post surgery when drain removal criteria were fulfilled. Patients were discharged after 4 to 7 days, except in very few cases, when patients had persistent symptomatic hypocalcaemia. Few patients required re admission for recurrent symptomatic hypocalcemia spells, which is detailed in analysis.

RESULT AND ANALYSIS:

52 cases of total thyroidectomy were done in our series, spanning over 4 years. 38 patients were females and 14 patients were males.

Table 1: sex distribution of the study population

Sex distribution	No. of patients
Male	38 (73.1%)
Female	14 (26.9%)
Total	52

21 patients were diagnosed with papillary carcinoma thyroid preoperatively and hence were subjected to neck dissection (CND with or without MRND) In addition to total thyroidectomy, 7 patients were subjected to completion thyroidectomy subsequent to HPE report of hemithyroidectomy. 12 patients were diagnosed with follicular

neoplasm. 4 patients were planned for hemithyroidectomy preoperatively, owing to benign FNAC report, but considering the firm to hard gland on palpation, were subjected to total thyroidectomy; the HPE report of those cases turned out to be chronic lymphocytic thyroiditis. 7 patients were suffering from non toxic multinodular goiter and a solitary case was operated for colloid goitre, the size of which was 16.5x10cm. Thus 40 patients were operated for neoplasm and 12 patients for benign thyroid disease.

Table 2: indications of total thyroidectomy

Indication of total thyroidectomy (pre op pathology)	No of cases	Percentage (%)
Papillary carcinoma	28	53.8
Follicular carcinoma	12	23.1
Chronic lymphocytic thyroiditis	4	7.7
Multinodular goiter	7	13.5
Colloid goiter	1	1.9

Hypocalcemia was the most common complication encountered in our study. 21 patients developed temporary hypocalcemia (21/52) and 1 patient developed permanent hypocalcemia (1/52), which accounts for 40.3 percent and 1.9 percent respectively. It is noteworthy that 12 of the temporary hypocalcemia cases were during the first 25 cases in our series. Use of prophylactic calcium preoperatively resulted in marked reduction in the incidence of this acute complication post operatively, the details of which are mentioned in discussion. One patient developed three episodes of clinical hypocalcemia during first 12 weeks, for which she required inhouse admission, treated appropriately by IV infusion of calcium gluconate, following which she became normal. One of the patients developed permanent hypocalcemia and had to be treated by parathormone replacement.

Wound infection was surprisingly the second most complication encountered and accounted for 9 of the patients. Very surprisingly this complication was seen in the initial period of 3 months of our study and were treated with antibiotics, both by parenteral and oral route. Inadequate sepsis was an important cause and was dealt urgently. Most were superficial soft tissue infections and none required further surgical treatment.

6 patients developed temporary unilateral recurrent laryngeal nerve palsy in our series and one developed permanent RLN palsy. Extensive level V nodal metastasis and adhesion was a contributory factor for permanent RLN palsy in a solitary case. Out of the six cases of temporary palsy as mentioned above, initial four patients were amongst first 20 cases, which imply the expected learning curve of thyroid surgery. None of the patients had developed RLN with EBSLN palsy in our entire series. Isolated temporary EBSLN was noted in 2 patients, though all were asymptomatic clinically with no noteworthy alteration of speaking voice. A long recovery period was noted in one of the patients, who improved after 12 weeks of conservative treatment.

Seroma was noted in 2 cases and was appropriately treated by guided aspiration. Pressure dressing and antibiotics resulted in complete recovery in both.

Immediate post operative hematomas developed in 2 cases and were treated by urgent exploration of the site. In both of these patients, there were accidental slippage of ligature from superficial veins and had a subsequent uneventful recovery.

One of the patients had an ugly hypertrophic scar, which didn't respond to topical steroid therapy and had been referred to dermatologist for subsequent management.

All complications were treated appropriately following standard protocols and are briefly mentioned herewith.

Table 3: distribution of observed complications; N=52

S.no	Type of complications	cases(n=52)	Percentage
1.	Hypocalcemia (TEMPORARY)	21/52	40.3%
2.	Hypocalcemia(PERMANENT)	1/52	1.9%
3.	Wound Infection / Superficial skin and soft tissue infection	9/52	17.35%
4.	RLN palsy (Unilateral) (Temporary)	6/52	11.53%

5.	RLN palsy (Unilateral) (Permanent)	1/52	1.9%
6.	EBSLN palsy (unilateral)	2/52	3.8%
7.	RLN + EBSLN	0/52	0%
8.	Bilateral RLN (Severe respiratory distress)	0/52	0%
9.	Seroma	2/52	3.8%
10.	Immediate post operative hematoma	2/52	3.8%
11.	Hypertrophic scar/ keloid	1/52	1.9%

DISCUSSION:

Thyroid surgery is the most common endocrine surgery done in the world.⁽¹⁾ Thyroid pathology is extremely common in the sub Himalayan terrain and considering the geographical location of North Bengal Medical College, it is no surprise that every outpatient department is flooded with patients suffering from thyroid pathology. In our series, females (73%) were expectedly more common sufferers than males (27%), as mentioned in previous literature. In his study, Yan et al. showed that out of 7385 patients undergoing thyroidectomy, 71% were female⁽⁵⁾ and Huang et al. in his study of 3428 patients undergoing thyroidectomy, the ratio of female to male was 5.241⁽⁶⁾.

In depth analysis suggested hypocalcemia as the most common post operative complication, accounting for almost (22/52) 40% of the cases. This finding correlates with almost similar epidemiology of hypocalcemia reported in literature post thyroidectomy. In previous studies pertaining to this specific complication, the incidences of temporary hypocalcemia and permanent hypocalcemia were reported about 2%–53% and 0.4%–13.8%, respectively.^(7,8,9)

Early postoperative hypocalcemia was 42% in the study done by Seo et al.⁽⁸⁾, while Suwannasarn et al. reported immediate hypocalcemia in 38.5% patients.⁽⁹⁾ Meticulous analysis of our cases revealed a high incidence of hypocalcemia in the initial half of our series (12/25), almost accounting for 48%. Meticulous dissection in the subsequent 27 cases resulted in the said complication in only 9 cases (33%), further suggesting that utmost care and caution must be taken while dissecting off the gland and preserving the intact blood supply of parathyroid gland; keeping it not only anatomically, but also physiologically functional.⁽¹⁰⁾ In fact overzealous dissection of the parathyroid glands may result in ischemic discoloration. An interesting study worth mention suggests that incidental excision of parathyroid glands may cause a two-fold higher risk of transient hypocalcemia⁽¹¹⁾.

Nature of the thyroid disease plays an important role too. Out of 40 patients with malignancy (28papillary+12follicular), 17 patients had temporary hypocalcemia and 1 patient had permanent hypocalcemia. Amongst the 17 cases in which temporary hypocalcemia developed, 6 patients had undergone extensive node dissection (MRND+CND). Thus hypocalcemia developed transiently in 17 cases out of 40 recorded thyroid malignancies postoperatively, in contrast to 3 cases out of 12 benign cases (42% versus 25%). Thus the nature of the pathology definitely appeared to have a role in the outcome. This was however in contrast to a study done by khazeyni et al. in Iran where the stage of the tumour was found to have a correlation, but not the type of the pathology or size of the tumour⁽¹²⁾.

In all the patients operated, preoperative serum calcium was measured as a routine protocol along with serum albumin. A value of 8-10.5 mg/dl was considered as physiological range and value of less than 8mg/dl was considered as biochemical hypocalcemia irrespective of the symptoms. 19 of the patients developed clinical as well as biochemical hypocalcemia between 2nd to 5th postoperative day, while 2 patients developed on first post-op day and 1 patient developed after 5th day postoperative day. This finding correlates with a study done by Tredici et al⁽¹³⁾. The difference in 1st postoperative day serum calcium and preoperative serum calcium was measured and a value of more than 1.1mg/dl was considered as cutoff for starting prophylactic calcium supplementation. This was done in accordance to the study done at European Institute of Oncology, Milan.⁽¹³⁾

Various biochemical predictors have been used in past like serum iPTH as important predictive factors. Asari et al. measured iPTH levels, 24 hours after total thyroidectomy, and calcium levels, on the second post operative day and found that with these measurements it was possible to predict hypoparathyroidism with high sensitivity, specificity and positive predictive value⁽¹⁴⁾. However, in another study, no significant correlation was found between PTH levels 24 hours after surgery and

the development of significant hypocalcemia⁽¹⁵⁾. Yet another study supported the usefulness of iPTH monitoring, but noted that the high cost of monitoring represented a major limitation to clinical use⁽¹⁶⁾. Patients were started prophylactically on 2 gm of elemental calcium and 0.5 mcg of 1,25 di hydroxyl Vit D per day from postoperative day 1. Symptomatic hypocalcemia with positive Chvostek's sign and carpedal spasm were treated with IV calcium gluconate in prescribed dose. Only one patient developed frequent episodes of symptomatic hypocalcemia which was confirmed by iPTH estimation.

The next important complication worth discussion is the RLN palsy, which was noticed in 6 out of 52 cases. That accounts for 11%, which commensurate with the expected incidence as reported in literature.

A study done by Joliat et al. in 1997 outlined few important points responsible for the RLN palsy⁽¹⁷⁾. The respective cohort included 451 thyroidectomies (756 nerves at risk) and 197 parathyroidectomies (276 nerves at risk). There were 63 postoperative vocal cord paresis after thyroidectomy and 13 after parathyroidectomy. Sixty-nine were transient (10.6%) and 7 permanent (1.1%). Our study too reported almost similar incidence of temporary RLN palsy.

Identifying the RLN during thyroid dissection is the gold standard to avoid iatrogenic injury⁽¹⁸⁾. However, finding the RLN intraoperatively is not always that easy and can even be challenging in some cases (e.g., voluminous multinodular goiter and redo surgery)⁽¹⁸⁾. The difficulty of finding the RLN during head neck surgery is principally due to great anatomical variability of its position as well as differences in location on right and left side⁽¹⁹⁾. In the case of exposition difficulty during bilateral neck exploration, surgeons can always change their dissection site because the RLN can be exposed on different anatomical levels. Use of intraoperative nerve monitoring can definitely aid, but never is a substitute of a robust anatomical knowledge and meticulous dissection^(20,21). The RLN is very sensitive and can easily be affected by cutting, clamping, stretching, compressing, and heating, which explains the noteworthy number of transient RLN palsies, even in experienced hands⁽²²⁾.

Considering the retrospective nature of the study, it does have many limitations and a prospective one will be more accurate in future assessment. Taking cue from our previous results, a prospective study has been planned for near future.

CONCLUSION

The intricate details of complications have been described in detail in the literature in past. A Considerable large series of patients from North Bengal, where various thyroid pathologies are so common and who have undergone total thyroidectomy and their complications have not been yet analysed as far as pubmed search is concerned. Our study regarding the aforesaid complications along with the detail review of each complication can act as a template for further studies in future.

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