

A PROSPECTIVE STUDY OF SURGICAL MANAGEMENT OF THYROID SWELLINGS

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ABSTRACT

Background: As the number of patients with palpable thyroid swellings and incidental thyroid nodules raised with the advent of newer imaging modalities, the number of thyroid surgeries being performed also increased. Through understanding of the surgical anatomy has been crucial in decreasing the morbidity. The pathologically enlarged gland make difficult to recognize the vital structures and the variations in the surgical anatomy which further increase the morbidity. This study was conducted to study Incidence and prevalence of thyroid swellings presenting in Otolaryngology department. Age and sex related incidence of benign & malignant thyroid disease, the surgical management of thyroid swelling, its histopathology and complications of surgery were observed. **Materials and Methods:** The present study was Observational study conducted on 100 patients of thyroid swelling, who were admitted in Department of Otorhinolaryngology, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan. The study duration was one year. A six month follow up of all the patients was made. The study protocol was reviewed and approved by the Ethics Committee of Hospital. **Results and conclusion:** Solitary nodule (62%) is commonest thyroid swelling presentation on USG. Thyroid swelling is more common in female (89%), majority of which belong to 21-40 years of age group. The chief complaint in majority of the patients is swelling (100%) in front of the neck. FNAC and USG neck are very useful in the diagnosis and management of thyroid swelling. Frozen section is useful intra-operatively after hemithyroidectomy to prevent inadvertent total thyroidectomies, to prevent need for revision (completion) thyroid surgeries. Commonest surgical procedure performed was Hemi thyroidectomy in 77 cases and total thyroidectomy in 23 cases. Complications noted were four cases of Reactionary haemorrhage, Temporary recurrent laryngeal nerve palsy in 3 cases (3%), which recovered within a month and Transient hypoparathyroidism was seen in 27 patients are were managed.

KEYWORDS: goitre, hemithyroidectomy, total thyroidectomy

INTRODUCTION:

Thyroid disease is a common presentation in Otolaryngology Departments. Untreated thyroid disease is associated with morbidity, which can be reduced by effective treatment. According to a prediction from numerous studies on thyroid disorders, it's been calculable that about forty two million individuals in india suffer from thyroid

diseases. (1) According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases.(1) Thyroid disease can present in otolaryngology clinic with symptoms of hypothyroidism, hyperthyroidism, or with neck swelling.

Amongst the clinically detectable thyroid nodules vast majority are benign. Prevalence of palpable thyroid nodules to be approximately 5% in women and 1% in men living in iodine-sufficient parts of the world 12

The incidence of occult cancer in the thyroid gland ranges from 4% to 35% in adults based on autopsy studies and increases with advancing age. (2)

During the past two decades, a steep rise in the incidence of differentiated carcinoma of the thyroid gland has been observed worldwide. According to the American Cancer Society, the annual estimate for thyroid cancer has raised from 18,400 new cases in the year 2000 to 48,020 new cases in 2011. (2)

As the number of patients with palpable thyroid swellings and incidental thyroid nodules raised with the advent of newer imaging modalities, the number of thyroid surgeries being performed also increased. Potential major complications of thyroid surgery include bleeding, injury to the recurrent laryngeal nerve, hypoparathyroidism, hypothyroidism, thyrotoxic storm, injury to the superior laryngeal nerve, and infection. By developing a thorough understanding of thyroid anatomy and of the ways to prevent each complication, patient's risk can be minimized. (2, 3)

Mostly the morbidity is due to technical failure to identify the vital structures and the variations in the surgical anatomy when the gland is pathologically enlarged. Several studies have been published revealing the anatomy of the laryngeal nerves as seen during thyroid surgery. (5-8) The RLN is routinely exposed and traced during all thyroid surgeries. It has been realised that the RLN has extralaryngeal branching and this can be damaged if the individual branches are not taken care of by meticulous dissection.5,6 Exposure of EBSLN and individual ligation of superior thyroid artery branches in the medial thyroid space was initially stressed to avoid injury to it. (7, 8)

Transient hypocalcaemia and permanent hypoparathyroidism are well-known sequels of total thyroidectomy. Therefore, it is crucial to be aware of the incidences and to identify potential predictive clinical factors for these morbidities. (9, 10)

Estimates indicate that transient hypoparathyroidism prevalence rates range between 6.9% and 46% and

permanent hypoparathyroidism rates vary from 0.4% to 3%.11 Hypocalcaemia occur secondarily to surgical trauma, devascularization, and unintentional removal of parathyroid glands.

In this study we have analysed the Incidence and prevalence of thyroid swellings in Otolaryngology. The characterization along with various modes of surgical management of thyroid swellings.

AIMS AND OBJECTIVES

1. Incidence and prevalence of thyroid swellings and their characteristics.
2. To study the various modes of surgical management of thyroid swellings.
3. Age and sex related incidence of benign & malignant thyroid disease.
4. To analyze the surgical anatomy of laryngeal nerves (Recurrent Laryngeal Nerve and External Branch of Superior Laryngeal Nerve) with proper identification of parathyroid glands and their preservation.

MATERIALS AND METHODS

The study was conducted over period of one year who consulted in Department of Otorhinolaryngology, Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan

The study protocol was reviewed and approved by the Ethics Committee of Mahatma Gandhi Medical College and Hospital, Jaipur. The Study design was Hospital based observational study. A Sample size of 100 patients were included for study, so were operated and then the study was stopped. For all the patients both clinical examination and biochemical testing were done. Patients selection and surgical planning was done according to the ATA guidelines 2015.

Patients excluded from surgery

1. Patients with deranged thyroid function test.
2. Patients unfit/ unwilling for surgery.
3. Patients who have undergone previous thyroid surgery.

OBSERVATIONS AND RESULTS

Patients had undergone thorough clinical examination, Telelaryngoscopy, FNAC, USG, pre-

operative thyroid scan and intraoperative frozen section (whenever required). All the patients were euthyroid at the time of admission 6 patients were on thyroxine, out of them three were on 100µgm and other three on 50ugm. In all of the cases surgery was uneventful except some minor complications. All surgeries were performed by senior surgeon. All the patient completed 6 months follow-up.

Table 1: Age distribution in study population of thyroid swellings

Age in Years	Male (n) (%)	Female (n) (%)	Total
11-20	1 (12.5%)	7 (87.5%)	8
21-30	0 (0%)	22 (100%)	22
31-40	5 (13.5%)	32 (86.5%)	37
41-50	2 (10.5%)	17 (89.5%)	19
51 & above	3 (21.4%)	11 (78.6%)	14
Total	11	89	100

A total of 100 thyroid surgeries were performed during the study period in 100 study patients. Majority (89) of them were females and 11 were males. On preoperative evaluation, all cases had normal mobile vocal cords. Most common age group of presentation (37/100) was 31-40 years. The most common surgical procedure performed was Hemi thyroidectomy (77%) followed by total thyroidectomy.

Table 2: Clinical presentation of study patients with thyroid swelling

Total No. of cases (n=100)	Number of patients n (%)
Presenting complaints	
Swelling	100 (100%)
Pain	9 (9%)
Recent increase in size	6 (6%)
Alteration in voice	1 (1%)
Difficulty in Swallowing	4 (4%)
Difficulty in breathing	1 (1%)
Toxic symptoms	0 (0%)
Size of swelling cases (cm)	
≤2	24 (24%)
2-4	71 (71%)
>4	5 (5%)

Duration of swelling	
1-6 months	44 (44%)
6-12 months	19 (19%)
1-2 years	13 (13%)
>2 years	24 (24%)
Progression of swelling	
Gradual	87 (87%)
Rapid	4 (4%)
Stationary	9 (9%)

The Chief complaint was swelling in front of the neck presented by all the patients (100%). Majority of patients had swelling in size range of 2-4 cm. Pressure symptoms were seen in 6 cases ie four patients presented with difficulty in swallowing, one patient with change in voice and one patient with difficulty in breathing.

Duration of swelling ranged from 1 month to 5 years. However, 44% of patient presented within 1 to 6 months of appreciation of swelling in the neck. The size of the swelling increased gradually in 87 cases, rapidly in 4 cases and was stationary in 9 cases. Most of the swellings 91 cases were painless and only 9 cases had pain.

Table 3: FNAC findings on Bethesda system of Thyroid cytopathology

Bethesda grade	FNAC finding	Cases (n) (%)
1.	Benign	70 (70%)
2.	Atypia/ follicular lesion of undetermined significance	1 (1%)
3.	Follicular neoplasm or Suspicious for a follicular neoplasm	13 (13%)
4.	Suspicious for Malignancy	2 (2%)
5.	Malignancy	14 (14%)
Total		100

The most common pathology observed in the thyroid gland for which surgery was indicated, according to preoperative FNAC report on Bethesda system of thyroid cytopathology, was benign thyroid lesion 70 cases followed by 13 cases of Follicular neoplasm or Suspicious for a follicular neoplasm, 2 cases of suspicious for malignancy (papillary carcinoma thyroid), 1 case of atypia / follicular lesion of undetermined significance and 14 case of malignancy papillary carcinoma thyroid.

Table 4: Radiological Diagnosis of Thyroid Lesions

Radiological diagnosis	Patients (n) (%)
Solitary nodule/ Colloid cyst/ cystic degeneration	62 (62%)
Diffuse Multinodular goiter	34 (34%)
Suspicion for Malignancy	04 (04%)

On USG neck Solitary nodule of thyroid goiter was the commonest indication for surgery with 62 cases (62%), followed by 34 cases (34%) diffuse multinodular goiter and 4 cases of suspicion for Malignancy (4%) on radiological diagnosis bases.

Frozen section was required in 16 cases intra-operative for characterization requiring further total thyroidectomy. These are 13 cases with Bethesda grade 3 on FNAC, 2 cases with Bethesda grade 4 and 1 case with Bethesda grade 2.

Thyroid Scan was done in 30 patients with diffuse and multinodular swelling. Seven patients were reported as warm and rest 23 had cold nodules.

In our study Commonest surgical procedure performed was Hemi thyroidectomy in 77 cases (77%) followed by 23 cases of (23%) total thyroidectomy. In 23 cases of total thyroidectomy, 3 cases underwent MRND, 6 cases underwent ACND and rest 14 are only total thyroidectomy without neck dissection.

In our study 66 (94.2%) cases of solitary nodular swelling underwent hemithyroidectomy which is commonest in solitary nodular swelling and 5 (41.66%) cases of multinodular swelling underwent total thyroidectomy which is commonest in multinodular swelling.

Table 6: Histopathology of Thyroidectomy Specimen

Histopathology Report	Number of patients (n) (%)
Colloid goitre	67 (67%)
Follicular adenoma	7 (7%)
Follicular Ca	7 (7%)
Hashimoto`s thyroiditis	3 (3%)
Medullary carcinoma	1 (1%)
Papillary Carcinoma	15 (15%)

In our study post operative final histopathology of the 67 cases reported colloid goiter, followed 15 cases of

Papillary Carcinoma, 7 cases of Follicular Carcinoma, 1 case of Medullary Carcinoma and 3 cases with Hashimoto`s Thyroiditis.

In our study out of 77 hemithyroidectomies, 67 cases (87.0%) were found to be colloid goitre on histopathological examination and out of 23 total thyroidectomies (both TT with ACND & TT with MRND 3), 15 cases (65.2%) were found to be papillary carcinoma.

Table 8: Complications of Surgery

Complications	Total No. of cases
Reactionary Haemorrhage	4 (4.0%)
Temporary Recurrent laryngeal nerve palsy	3 (3.0%)
Transient Hypoparathyroidism	27 (27.0%)

There were 4 cases of Reactionary haemorrhage reported. Temporary recurrent laryngeal nerve palsy was seen in 3 cases (3%), which recovered within a month. Transient hypoparathyroidism was seen in 27 patients (27%) (11 cases out of 77 hemithyroidectomies and 16 cases out of 23 total thyroidectomies) which was observed during the first post-operative week and all recovered completely with oral calcium and I.V. calcium therapy. There was no permanent hypoparathyroidism and permanent recurrent laryngeal nerve palsy. All patients were euthyroid at the time of surgery. 6 patients (4 of hemithyroidectomy and 2 of total thyroidectomy) were on thyroid supplement 100- 150 µgm per day. 7 patients of hemithyroidectomy and all 23 patients of total thyroidectomy developed post-operative hypothyroidism and are on thyroxin supplement 25- 150 µgm/ day and are in regular follow-up.

DISCUSSION

Hundred patients presenting with swelling of the thyroid gland were studied and evaluated in terms of history, clinical examination and subjected for relevant investigations. All patients underwent surgery with prior FNAC. Histopathology of operated specimen done-postoperatively. The results were analysed as depicted in the table 1 to 8.

Of the hundred cases studied, 11 were males (11%) and 89 were females (89%). Rios et al. in their study showed that 90% were females. (17) In the study conducted in Tsan et al. 18 female to male ratio was 7:1.

Majority (seven) male patients presented in the age group of 31-50 years. Similarly majority of the females 49%, (49 cases) presented in the age group of 31 – 50 years. In the western literature quoted by “Bremer and Moll Night” in analysis of 1280 cases of Multinodular goiter, the age incidence was maximum between 40 – 49 years. The average age incidence in our study is low compared to western series. In our study minimum age was 14 yrs. & maximum was 75 years and median age is 37.5 ± 11.9 Years.

During our study period, out of 100 thyroid surgeries solitary nodule of thyroid goiter was the commonest indication for surgery with 62 cases; then Multinodular (34 cases) followed by and suspicion of malignancy (4 cases) on radiological (USG) basis.

The chief complaint in the study was swelling in front of the neck and was present in all the patients. However, few patients had associated local symptoms like difficulty in swallowing, difficulty in breathing and/ or alteration in voice. Duration of swelling ranged from 20 days to 5 years.

Pressure symptoms were seen in 6% (6 cases) against 29% in Rios et al. (2005) study.¹⁷ In our study 4 cases (4%) presented with difficulty in swallowing,

1 case (1%) with change in voice and 1 case (1%) with difficulty in breathing. Thus, difficulty in swallowing was the commonest pressure symptom.

There was family history of goitre in 2 cases in which the patient’s mothers and sisters had multinodular goitre and had undergone surgery.

In majority of the patients the size the gland was in stage 2 according to WHO classification i.e. swelling visible with neck in normal position. There were 2 cases of retrosternal extension of MNG, which was diagnosed by clinical examination with non-visualization of the lower border of the swelling and with congested look of the face. This was also examined by arm raising test which showed facial congestion with engorgement of neck veins. On percussion, dullness was felt over the manubrium

sterni. X ray film showed a retrosternal soft tissue shadow in the superior mediastinum in these patients.

It was noted that clinical features of the nodule were not helpful in the diagnosis of malignancy. There was no correlation between the consistency, duration and size of the nodules and malignancy. Werk et al (1984) (14) reported the incidence of carcinoma in nontoxic nodular goiter as 17.1%. They also reported the incidence of carcinoma in solitary thyroid nodule was much higher than in multinodular goiter.

X-ray of neck, AP and lateral views and X-ray of the chest were done in all the cases. There was one case of tracheal shift to left side due to a goitre, mainly involving right lobe of the thyroid.

FNAC of the thyroid was done in all the cases and the results compared with histopathological report of operated specimen. Of the 13 Follicular neoplasms, 3 cases of papillary carcinoma were reported on histopathology. Other cases proved to be follicular adenomas and Follicular Carcinoma on histopathological examination. 67 cases reported colloid goiter, 3 cases with Hashimoto’s Thyroiditis and 15 cases of Papillary carcinoma on histopathological examination.

Diagnosis of Follicular carcinoma preoperatively by FNAC was not possible as angioinvasion and capsular invasion, which are features of follicular carcinoma, were not evident; it was reconfirmed in the study. This shows that FNAC is not 100% accurate in the diagnosis of follicular carcinoma.

Ashok R Shaha et al (1992) (28) suggested that as complete thyroidectomy carries more risk, it should be avoided in most patients whenever possible. Definitive decision should be made during the initial operation based on gross findings, prognostic factors and frozen sections. Frozen section was used in our study for 16 patients.

In our study postoperative complications were very few. Temporary RLN palsy seen in 3% of patients. Eisele DW et al (1996) (16) reported rate of temporary RLN injury as 3% to 7%, whereas permanent RLN injury rate was 0% to 3% per side.

Transient hypoparathyroidism was seen in 4 patients (4%) who were observed during the first post-operative week and all recovered completely with oral

calcium and I.V. calcium therapy. There was no permanent hypoparathyroidism. Day et al. (19) in their study showed that there was 28% of temporary hypocalcemia and 0.9% with permanent hypocalcemia. Jacob and Ballinger (1983) (13) reported, hypocalcaemia is a common occurrence after thyroidectomy. They reported incidence of temporary hypocalcaemia between 6.9% and 25%.

Birken and Baran (1988) (15) reported permanent or prolonged hypocalcaemia after thyroidectomy is uncommon. Total thyroidectomy results in 0.4% to 13.8% incidence of permanent hypocalcaemia.

The likelihood of identifying parathyroid glands is highly dependent on surgical technique and diligence in seeking parathyroid glands. (20) In the present series similar to Sheahan P et al. (20), we first identified inferior thyroid artery and then followed its branches to superior and inferior parathyroid area, then capsular dissection technique with use of bipolar cautery is followed to ensure the blood supply of parathyroid glands.

The results of our study show significant variability in parathyroid location as also reported by Rodgers et al. (21) The Tubercle of Zuckerkandl was a useful landmark for identifying under one half of superior parathyroid, and only one quarter of inferior parathyroid. The Tubercle of Zuckerkandl is a frequent landmark on the lateral surface of the thyroid which nearly always overlies the RLN, and serves as a very useful landmark. (22) In present study 37.03 % of these patients had RLN medial to the tubercle.

In our dissection involving 72 RLN's majority had single branch (66.67% on the right side and 66.67% on the left); however, Serpell et al. (23) had revealed RLN branching in 64.53%. Casella et al. (5) noticed that RLN had branches in 25.7% on the right side and 22.9% on the left.

Temporary recurrent laryngeal nerve palsy was seen in 2 cases, which recovered within a month. There was no permanent recurrent laryngeal nerve palsy. Temporary RLN palsy was seen in 8%, permanent RLN palsy was seen in 0.9% in Day et al. (19)

Ligament of Berry anchors the thyroid gland to the laryngotracheal complex. (24) This also corresponds to the area where the RLN is most commonly injured. In our study, more than 25% of the RLN passed

through the ligament of Berry. Even though the dissection of the nerve is not midcult in such cases where the RLN passes through the ligament, the remnant volume to be ablated may be high especially in cases of carcinoma thyroid.

Limitations:

We have not performed serum thyroglobulin and Anti-thyroid antibodies assessment due to non-availability of these investigations and financial constrains of the study population.

CONCLUSIONS

Solitary nodule / Colloid cyst / cystic degeneration and Multinodular goiter are the commonest thyroid swelling presentation on USG in our hospital. Thyroid swelling is more common in female's, majority of which belong to 21-40 years of age group. The chief complaint in majority of the patients is swelling in front of the neck and few patients had pressure symptoms. FNAC and USG neck are very useful in the diagnosis and management of thyroid swelling.

Frozen section is useful intra-operatively after hemithyroidectomy to prevent inadvertent total thyroidectomies. This prevent need for revision (completion) thyroid surgeries. Malignancy can still come as a surprise on intra-operative histopathological examination by frozen section, even when there is no suspicion of malignancy clinically and with FNAC.

Thyroid scan is important diagnostic tool in patients who are euthyroid and with multi nodular goitre to see for cold nodule.

To conclude the key for successful surgery is meticulous dissection and good understanding of thyroid and related anatomy.

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Table 5: Distribution of patients according to type of thyroid swelling and surgery done

	Hemi-thyroidectomy (n) (%)	Total thyroidectomy	Total thyroidectomy with ACND	Total thyroidectomy with MRND	Total
Diffuse swelling	9 (50.0%)	7 (38.9%)	2 (11.1%)	0 (0.0%)	18
Multi nodular swelling	2 (16.7%)	5 (41.7%)	4 (33.3%)	1 (8.3%)	12
Nodular swelling	66 (94.3%)	2 (2.9%)	0 (0.0%)	2 (2.9%)	70
Total	77 (77.0%)	14 (14.0%)	6 (6.0%)	3 (3.0%)	100

Table 7: Distribution of patients according to type of surgery done and HPE findings

	Colloid goitre	Follicular Adenoma	Follicular Ca	Hashimoto's Thyroiditis	Medullary Ca with Positive nodes	Papillary Ca	Papillary Ca with Positive nodes	Total
Hemi thyroidectomy	67 (87.0%)	7 (9.10%)	0 (0.0%)	3 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	77
Total thyroidectomy	0 (0.0%)	0 (0.0%)	7 (50.0%)	0 (0.0%)	0 (0.0%)	7 (50.0%)	0 (0.0%)	14
Total thyroidectomy with ACND	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (16.7%)	5 (83.3%)	6
Total thyroidectomy with MRND 3	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	1 (33.3%)	1 (33.3%)	3
Total	67	7	7	3	1	9	6	100

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