

RECURRENCE OF THYROID DISORDERS IN PATIENTS WHO UNDERWENT SUBTOTAL THYROIDECTOMY FOR MNG

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ABSTRACT

BACKGROUND

Subtotal thyroidectomy is the preferred procedure currently done in our institution for multinodular goitre. However, many surgeons prefer near-total thyroidectomy for this condition as the recurrence of Multinodular goitre is less with this procedure. The main advantage of subtotal thyroidectomy is that the post-operative complications like hypothyroidism, hypocalcaemia and recurrent laryngeal nerve palsy are found to be less with this procedure. In this study, we assess the hypothesis that Subtotal thyroidectomy is not associated with increased risk of recurrence as compared to Near-total thyroidectomy and Total thyroidectomy in cases of benign thyroid disease, multinodular goitre.

MATERIALS AND METHODS

We conducted a retrospective study among patients who underwent subtotal thyroidectomy in Govt. Medical College, Calicut during a 5-year period from 2008 to 2012. We collected data from the record library and contacted them through letter. A total of 108 patients were included. Then, detailed history taking, physical examination and relevant investigations were done.

RESULTS

Postoperative USG and FNAC showed 3 cases of recurrence, that is 2.8%. Postoperative functional status shows that 21% remained euthyroid and about 79% were hypothyroid. No cases of hypocalcaemia or recurrent laryngeal nerve palsy were reported.

CONCLUSION

There is no increased risk among these subjects considering recurrence, but had advantage of lesser complications. So it concludes that subtotal thyroidectomy is a better procedure for benign thyroid diseases compared to total thyroidectomy and is not with increased risk of recurrence.

KEYWORDS

Multinodular Goitre, Thyroidectomy, Euthyroid, Hypothyroid, Hypocalcaemia, Recurrent Laryngeal Nerve.

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BACKGROUND

Multinodular goitre (MNG) is a common disease of thyroid gland worldwide and surgery is a desired option of treatment for this disease. Common modes of surgeries are subtotal thyroidectomy (STT), near-total thyroidectomy (NTT) and total thyroidectomy (TT).

Subtotal thyroidectomy is the choice of surgery for most of benign thyroid disorders as the post-operative complications are less with this procedure. Post-operative hormone replacement is usually not needed following subtotal thyroidectomy. Near-total thyroidectomy is the preferred option of surgery for many surgeons because of lower post-operative recurrence. Total thyroidectomy is also a surgical procedure frequently practised in our setup recently. No remnant thyroid tissue is left in total thyroidectomy and thus postoperative complication rates and

recurrent laryngeal nerve palsy are high compared to subtotal thyroidectomy and near-total thyroidectomy.

Historical Aspects

The thyroid gland was discovered by Wharton in 1656. Its function was, however, not known. In 1874, Gull described thyroid hypofunctioning in man. Magnus Levy reported increased basal metabolic rate in patients with hyperthyroidism.⁽¹⁾

Although thyroid surgery is now routinely performed for the treatment of thyroid neoplasm, multinodular goitre and some forms of hyperthyroidism, it was formerly a precious undertaking that even the world's greatest surgeons were reluctant, many in fact condemned. The first thyroidectomy was reportedly performed by a Moorish Surgeon – Albucasis.⁽¹⁾

Lister's discovery of antiseptics in 1867 and the development and use of haemostatic forceps in European clinics heralded a new era of thyroid surgery. In to this arena enters the Professor of Surgery in Berne, Theodor Kocher, the pioneer in thyroid surgery. He performed his first thyroidectomy in 1872. Initially the mortality rate was 13% and by 1898 it was brought down to less than 1%. His mean perfect results were achieved by careful attention to control of blood loss and protection of the parathyroid glands.⁽¹⁾ He also emphasised on the avoidance of recurrent laryngeal nerve injury.

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At the end of his career, he had performed more than 5000 thyroidectomies with the amazing low mortality of only one percent.⁽¹⁾

In addition to his contribution to surgery, Kocher also recognised thyroid insufficiency following thyroidectomy. He had given a detailed description about the post-operative thyroid insufficiency. Theodor Kocher is considered to be the father of thyroid surgery.⁽²⁾

In 1891, Murray, Gley and Varsale demonstrated improvement in a myxoedematous patient after the administration of the sheep thyroid extract. Bartman established the presence of high iodine content in thyroid tissue in 1896. In 1915, Kendall isolated thyroxine and in 1927, Harrington and Bargery synthesised it. Triiodothyronine (T3) was detected, isolated and synthesised by Gross and Pitt Rivers in 1952.⁽¹⁾ The availability of radioiodine and the introduction of chromatographic techniques have contributed significantly to a clearer understanding of thyroid physiology.⁽²⁾ With the surgical techniques of thyroidectomy established, knowledge of the metabolic function and regulation of thyroid provided the base for further effective treatment of its disorders.⁽²⁾

Adult Surgical Anatomy

A normally developed adult thyroid is a bilobed structure that lies next to the thyroid cartilage in a position anterior and lateral to the junction of larynx and trachea. In this position, the thyroid encircles about 75% of the diameter of the junction of the larynx and the upper part of the trachea. The two lateral lobes are joined at the midline by an isthmus, whose superior edge is situated at or just below the cricoid cartilage. The pyramidal lobe represents the most distal portion of the thyroglossal duct and in an adult may be a prominent structure that can extend from the midline of the isthmus as far cephalad as the hyoid bone.⁽²⁾

A thin layer of connective tissue surrounds the thyroid. This tissue is part of the fascial layer that invests the trachea.⁽²⁾ This fascia is different from the thyroid capsule, and during surgery it can easily be separated from the capsule, whereas the true capsule of the thyroid cannot. This fascia coalesces with thyroid capsule posteriorly and laterally to form a suspensory ligament known as ligament of Berry. The ligament of Berry is closely attached to the cricoid cartilage and has the important surgical implication because of its relationship to the recurrent laryngeal nerve.⁽²⁾

Physiology of the Thyroid Gland

The thyroid gland is responsible of the production of two families of metabolic hormones, the thyroid hormones-thyroxine (T4) and triiodothyronine (T3), and the calcium-regulating hormone calcitonin.⁽³⁾ The spherical thyroid follicular unit is the important site of thyroid hormone production. The thyroid follicle is made up of single layer of cuboidal follicular cells that encompass a central depository of colloid filled mostly with thyroglobulin (TG), the protein within which T4 and T3 are synthesised and stored. Each follicle is surrounded by a rich network of capillaries that interdigitate among the multiple follicular units continued within normal thyroid matrix.⁽³⁾

C cells, derived from the neural crest, migrate into the thyroid during embryologic development.⁽²⁾ These cells rest in a parafollicular position, predominantly in the upper lobe of each thyroid, C cells are responsible for production of the

hormone calcitonin, which has important regulatory in calcium metabolism.⁽³⁾

Thyroid Surgeries

Terminology for thyroid surgery is inconsistent in the literature.⁽⁴⁾ Total thyroidectomy involves division of all thyroid tissue between the entrance of the recurrent laryngeal nerves bilaterally at the ligament of Berry and results in complete removal of all visible thyroid tissue.⁽⁵⁾ Near-total thyroidectomy involves complete dissection on one side while leaving a remnant of thyroid tissue laterally on the contralateral side, which incorporates the parathyroid and leaves less than 1 g of tissue adjacent to the recurrent laryngeal nerve at the ligament of Berry. Subtotal thyroidectomy leaves a rim of thyroid tissue bilaterally to ensure parathyroid viability and avoid entrance of the recurrent laryngeal nerves into the larynx.^(5,6)

If a subtotal or total thyroidectomy is planned, the same approach is taken for anaesthesia, patient position, and site preparation.⁽⁷⁾ When obtaining consent, additional discussion should include the risk of hypoparathyroidism, as all four parathyroid glands will be at risk during this procedure. In addition, both recurrent laryngeal nerves are at risk, which may increase the potential for nerve injury and although rare, bilateral nerve injury is a possibility.^(5,6)

One should perform the operation on the most abnormal side of the thyroid first, so that if the nerve is inadvertently injured or invaded by thyroid cancer, a less extensive procedure can be performed on the opposite side to ensure the contra lateral nerve is preserved⁽⁵⁾. Bilateral recurrent laryngeal nerve palsy should be avoided at all costs, as this often requires a tracheostomy to protect the patient's airway.⁽⁷⁾ Patients should be aware that after total or near thyroidectomy, they would require lifelong thyroid hormone replacement.⁽⁸⁾

If the underlying thyroid condition is benign, the isthmus can still be divided. This creates more room in the operative field and dissection of the posterior surface of the thyroid off the trachea enables better mobilisation of the gland inferiorly.^(5,9)

If the thyroidectomy is being performed for a proven or potential underlying malignancy, isthmus division should be avoided and the entire thyroid excised en bloc.⁽¹⁰⁾ A near-total thyroidectomy leaves less than 1 g (1 cm) of thyroid tissue on one side of the neck. It is performed when a total thyroidectomy is planned, but a minute portion of thyroid is purposely left in situ, in close proximity to the recurrent laryngeal nerve or parathyroid gland.⁽¹¹⁾

Postoperative management

Postoperative monitoring of thyroid and parathyroid function is extremely important. The surgeon is obligated to evaluate and inform the patient and referring physician of the details of the resection and its expected impact on postoperative function.⁽¹²⁾ A calcium assay is performed within 24 hours of surgery. If no signs of hypocalcaemia are present, particularly if the surgeon has visualised the glands during surgery, no calcium supplementation may be necessary. If symptoms occur or if the surgeon is concerned about the patient's parathyroid status, daily supplements of 1500 to 3000 mg of elemental calcium may be started.^(13,14)

If the patient was euthyroid before surgery, it is reasonable to expect that replacement may not be needed for

at least 10 days, even after total thyroidectomy.⁽¹⁵⁾ This allows time for complete evaluation of the specimen by pathology. Thyroid replacement generally requires a daily dose of 1.6 microgram/kg of levothyroxine. Most endocrinologists believe that the levothyroxine dose needs to be adjusted to keep TSH levels at low normal values after resection for cancer or suppressive therapy.⁽⁵⁾

There are many clinical trials comparing complications and recurrence of thyroid disease from subtotal thyroidectomy, near-total thyroidectomy, and total thyroidectomy.⁽¹⁵⁾ In this study, we focus on the recurrence rate of benign thyroid disease and postoperative complications in case of patients who underwent subtotal thyroidectomy in our institution.

MATERIALS AND METHODS

We conducted a retrospective study on recurrence and postoperative complications in patients who had undergone subtotal thyroidectomy in Govt. Medical College, Calicut during the five-year period from 01/01/2008 to 31/12/2012. Objectives were to assess the recurrence and postoperative complications like hypothyroidism, hypocalcaemia and recurrent laryngeal nerve palsy and also to assess the feasibility of subtotal thyroidectomy as compared to near-total thyroidectomy and total thyroidectomy.

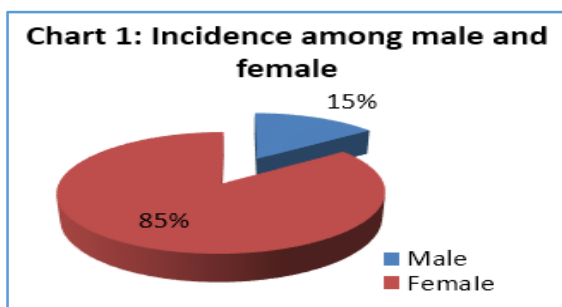
Patients who underwent subtotal thyroidectomy for Multinodular goitre during the period of 01.01.2008 to 31.12.2012 are included in the study. Patients who were not willing to participate in the study are excluded. Patients with pathological evidence of thyroid cancer and patients with family history of thyroid cancer are also excluded.

We collected data on age, sex, details of thyroid disease and details of thyroid surgery done and followed up the patients by calling them with letters for review. Then, we conducted detailed clinical examination of the patients and investigated them with Free T3, Free T4, TSH and USG neck to rule out recurrence. Those who had thyroid nodule in USG were subjected to FNAC from the nodule. The data thus collected were analysed to prove the hypothesis that subtotal thyroidectomy is not associated with increased risk of recurrence.

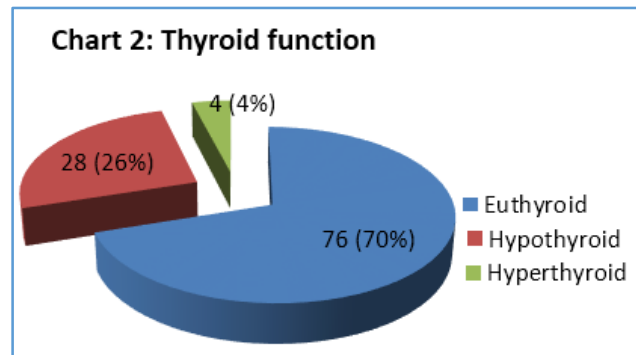
RESULTS

Preoperative Analysis

A total of 204 cases were contacted and 108 persons responded. All of them were preoperatively diagnosed to have benign goitre excluding proven or suspicious malignancy. All clinically presented as neck swelling, two of them had hoarseness, none had dysphagia or dyspnoea. All cases were evaluated by ENT Department and showed no recurrent laryngeal nerve palsy.



Total number of cases followed up were 108. Of these, 92 (85%) were female and 16 (15%) were male. The thyroid disorders are more common among females in these areas. Preoperative functional status of thyroid hormone showed 76 subjects were euthyroid; 28 subjects were hypothyroid and 4 subjects were hyperthyroid. All hypothyroid cases were on thyroxin replacement and hyperthyroid cases were on antithyroid drugs.



Preoperative FNAC was performed in all subjects, the results were: 97 cases (89.8%) were suggestive of nodular colloid goitre and 11 cases (10.2%) were goitre with thyroiditis. All cases were subjected to imaging by ultrasonography and the results showed about 80% were suggestive of multinodular goitre and about 20% cases were solitary nodule thyroid.

FNAC	Frequency	Percent
Nodular colloid	97	89.8
Thyroiditis	11	10.2
Total	108	100

Table 1. Preoperative FNAC

Postoperative Analysis

Out of the total 108 patients, 3 patients had recurrence of goitre which constitutes 2.8% of total patients studied. Out of 79 Multinodular goitre patients, 76 (96.2%) had no swelling and 3 (3.8%) had recurrent thyroid swelling. Among 29 Solitary thyroid nodule patients and 11 thyroiditis patients, none had recurrence.

All recurrent cases were nodular colloid goitre on histopathology. No patients were reported to have postoperative recurrent laryngeal nerve palsy or hypocalcaemia.

Pre-op	Post-op		Total
	No Swelling	Thyroid Swelling	
MNG	76 (96.2%)	3 (3.8%)	79 (100%)
SNT	29 (100%)	0 (0%)	29 (100%)
Total	105 (97.2%)	3 (2.8%)	108 (100%)

Table 2. Comparison of Pre- and Post-operative Status of Thyroid Swelling

Postoperative functional status showed about 21% still remained euthyroid and about 79% were hypothyroid. Among 76 euthyroid patients, 36.8% (28) remained as euthyroid and 63.2% (48) became hypothyroid. Among 28 hypothyroid patients, 3.6% (1) became euthyroid and 96.4% (27) remained as hypothyroid. Among 4 hyperthyroid

patients, no one became euthyroid and 4 (100%) became hypothyroid. Postoperatively, 51 patients (47.2%) were continuing on thyroxine.

Pre-op functional Status	Post-op Functional Status		Total
	Euthyroid	Hypothyroid	
Euthyroid	28 (36.8%)	48 (63.2%)	76 (100%)
Hypothyroid	1 (3.6%)	27 (96.4%)	28 (100%)
Hyperthyroid	0 (0%)	4 (100%)	4 (100%)
Total	29 (26.9%)	79 (73.1%)	108 (100%)

Table 3. Comparison of Thyroid Functional Status

DISCUSSION

In our study, the focus is on the rate of recurrence among people who underwent subtotal thyroidectomy. This is by mainly through clinical examination then they may be subjected to radiological histological investigations. The study also includes the major complications of subtotal thyroidectomy. In case of subtotal thyroidectomy, a part of thyroid tissue is kept near the Recurrent laryngeal nerve. This is to avoid complications like nerve palsy and hypocalcaemia.

Even though recurrence rate is high compared to total thyroidectomy, other complications like hypocalcaemia and Recurrent laryngeal nerve palsy is less. In case of total thyroidectomy, the transient and permanent hypocalcaemia and the rate of Recurrent laryngeal nerve palsy are high. Postoperative permanent hypothyroidism is another factor which is decided by the choice of surgery. Those with features of hypothyroidism are more in complete procedures. Those who need thyroxine after surgery are also more in total thyroidectomy.

A study conducted by Young et al showed the recurrence rate of about 6% and those with transient parathyroid deficiency of up to 24% as compared to up to 9% in cases of subtotal thyroidectomy. In an Italian study comparing subtotal thyroidectomy and total thyroidectomy, the result showed recurrence rate more in case of subtotal thyroidectomy, but low postop complications.⁽¹⁸⁾ In this study, almost all subjects needed thyroxine replacement who underwent total thyroidectomy. On comparing this data with subtotal thyroidectomy, less patients needed thyroxine following surgery. In both these studies, permanent recurrent laryngeal nerve palsy and permanent hypocalcaemia are similar in both groups.

CONCLUSION

In our study, my observation is that the recurrence rate of thyroid disorder is only 2.78% in those who underwent subtotal thyroidectomy during followup of cases. The patients who required lifelong thyroxin were less. The subjects who became hypothyroid from euthyroid status following subtotal thyroidectomy were only 63% and 37% remained as euthyroid itself. No one in group had permanent hypocalcaemia or Recurrent laryngeal nerve palsy. Here there is no increased risk among these subjects considering recurrence, but had advantage of lesser complications.

So subtotal thyroidectomy is a better procedure for benign thyroid diseases compared to total thyroidectomy and risk of recurrence is less.

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