

Efficacy of Total Thyroidectomy for Treatment of Benign Thyroid Lesions

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ABSTRACT

Background: Total thyroidectomy is currently the preferred treatment for thyroid cancer, multinodular goitre (MNG) and Graves' disease. However, many surgeons choose not to perform total thyroidectomy to treat benign thyroid diseases owing to the associated risk of postoperative hypoparathyroidism, recurrent laryngeal nerve damage and bleeding. We reviewed 100 total thyroidectomies performed for benign thyroid diseases, when surgery was indicated.

Objective: Assessment whether total thyroidectomy is safe and can be considered as the optimal surgical approach for treating benign thyroid diseases.

Patients and methods: This study was conducted on 100 patients presented by thyroid swellings and admitted to Mansoura University Hospitals, Endocrine Surgery Unit over one year during the period between November, 2017 and October, 2018. All patients were submitted to careful history taking, clinical examination and radiological and laboratory investigations. Total thyroidectomy was done to all patients. Patients were evaluated early postoperative at 1, 6 and 12 months by sr. TSH, total & ionized calcium, PTH and vocal cord assessment.

Results: Preoperative diagnoses in our patients revealed that there were 74 cases MNG (74%), 2ry toxic 19 cases (19%) and 1ry toxic 7cases (7%). The incidence of permanent bilateral recurrent laryngeal nerve palsy was 0% and that of permanent unilateral recurrent laryngeal nerve palsy was 1%. Whereas the incidence of temporary unilateral recurrent laryngeal nerve palsy was 5%. Permanent hypocalcaemia occurred in 2% and overall temporary hypocalcaemia occurred in 8% of patients. Hemorrhage requiring repeat surgery occurred in 1% of patients.

Conclusion: In our study, total thyroidectomy showed no significant operative and/or postoperative complications. Also, it was noticed that total thyroidectomy operation gave very good results in patients with benign thyroid diseases provided that they were done in qualified center and by experienced endocrine surgeons.

Keywords: Total Thyroidectomy, Treatment, Benign Thyroid Lesions.

INTRODUCTION

Historically, the risks associated with major surgery for treating thyroid diseases and the problems of adequate hormonal replacement have deterred surgeons from performing total thyroidectomies. In fact, thyroid surgery was rarely performed until the late 19th century. Total thyroidectomies were only performed occasionally for indications other than cancer until the last quarter of the twentieth century⁽¹⁾.

Total thyroidectomy (TT) is defined as both total lobectomy and isthmectomy. Total thyroidectomy is the treatment of choice for patients with malignant thyroid disease. However, the efficacy and safety of this procedure for patients with benign disease is still a matter of debate due to the possible detrimental complication of total thyroidectomy such as permanent recurrent laryngeal nerve palsy and permanent hypoparathyroidism⁽²⁾. On the other hand, a considerable number of patients undergoing function-preserving thyroidectomy will require reoperation for recurrent disease and this completion thyroidectomy has been shown to carry a higher rate of complications compared to the

primary procedure⁽³⁾.

Moreover, total thyroidectomy is considered extremely effective in halting the progress of ophthalmopathy in Graves' disease, while it practically eliminates the risks arising from the incidental finding of carcinoma in surgical specimens resected for benign indications⁽⁴⁾.

AIM OF THE WORK

Assessment whether the results support the hypothesis that total thyroidectomy is safe and can be considered as the optimal surgical approach for treating benign thyroid diseases.

PATIENTS AND METHODS

This study was conducted on 100 patients presented by thyroid swellings and admitted to Mansoura University Hospitals, Endocrine Surgery Unit over one year during the period between November, 2017 and October, 2018.

Inclusion criteria:

All patients undergoing total thyroidectomy for:

- Simple multi-nodular goiter
- Toxic nodular goiter

- Diffuse toxic goiter

Exclusion criteria:

- Malignant thyroid diseases.
- Recurrent thyroid diseases.
- Patients that may be pregnant, unconscious, having mental disorders and vocal cord problems.

Methodology

All patients were submitted to careful history taking, clinical examination and radiological and laboratory investigations.

A) History taking included patient's;

• Name, age, sex, occupation, marital status, residence, menstrual history in females and special habits. Symptomatic neck swelling or accidentally discovered, development of pain either local or referred, dyspnea, hoarseness of voice, dysphagia, compression symptoms, insomnia, irritability, tremors, weight loss, hot weather intolerance or palpitation (toxic symptoms) and subsequent development of lymph nodes enlargement in the neck.

- History of intake of antithyroid drugs (type, dose and duration), neck irradiation or surgery.
- History of pathological fractures, bone aches.
- History of hemoptysis.
- History of familial diseases or similar condition in the family.
- Other endocrinal disorders as (parathyroid or supra renal gland diseases) or comorbidities as diabetes mellitus, hypertension or liver disease.

B) Clinical examination;

I) General examination;

Body built, look of patients, decubitus, mental state, vital signs (pulse, blood pressure and temperature), facial expression, upper and lower limbs, chest, heart, abdomen and skeletal examinations.

II) local thyroid examination;

Classical examination of the thyroid was done that included inspection, palpation, percussion and auscultation. The comment on thyroid swelling included its site, side, size, shape, surface, overlying skin (dilated veins, scars, fixation or ulceration), relation to surrounding structures, mobility, tenderness, edges, pulsation, retrosternal extension and audible bruit. This was followed by lymph nodes examinations in the neck (central & lateral L.N.). Local examination ended by E.N.T examination and assessment of

vocal cords mobility.

C) Investigations;

All patients were submitted to;

- Thyroid function tests (S. T3, T4 and TSH).
- Complete blood count, liver function tests and s. creatinine to assess effect of disease on it & as pre-operative preparation.
- E.C.G.
- Neck U/S & Duplex; special probe to give idea about the nodule, (solid, cystic, size, homogenous, heterogeneous, well defined, ill defined, vascularity, infiltration to surrounding structures, retrosternal extension and associated L.N with comment on its shape & hilum).
- Preoperative F.N.A.C (cytological examination) done for all patients. It was helpful in detection of different types as (colloid nodule, papillary, follicular lesions and in suspicious of malignancy & atypical cells).
- Post-operative pathology.

Operative tips:

- The middle thyroid vein must be identified & divided (**Figure 1**).
- Identification of upper and lower parathyroid gland (**Figure 2**).
- Careful exposure of the upper pole of the thyroid gland & identification of upper thyroid vessels (**Figure 3**).
- Selective ligation & division of the superior thyroid vessels.
- The inferior thyroid artery and vein must be identified and ligated away from the thyroid gland at the lower pole of the gland (**Figure 4**).
- The recurrent laryngeal nerve must be identified and preserved during inferior thyroid artery ligation (**Figure 5**).



Figure (1): Identification of middle thyroid vein, ligation & division.



Figure (2): Parathyroid gland identification.

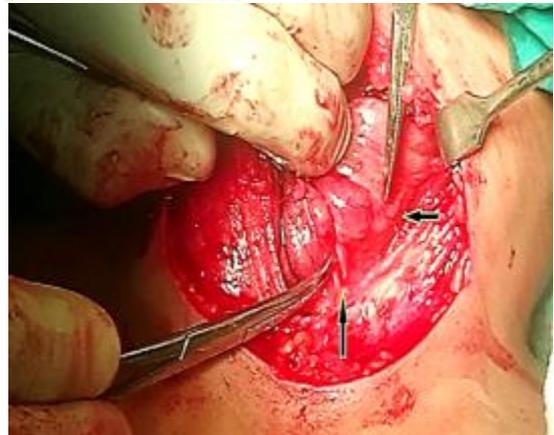


Figure (3): Identification of superior thyroid artery, vein & ligation.



Figure (4): Identification of recurrent laryngeal nerve.

Figure (5): Identification of Inferior thyroid artery, vein & ligation.

Patient No.1



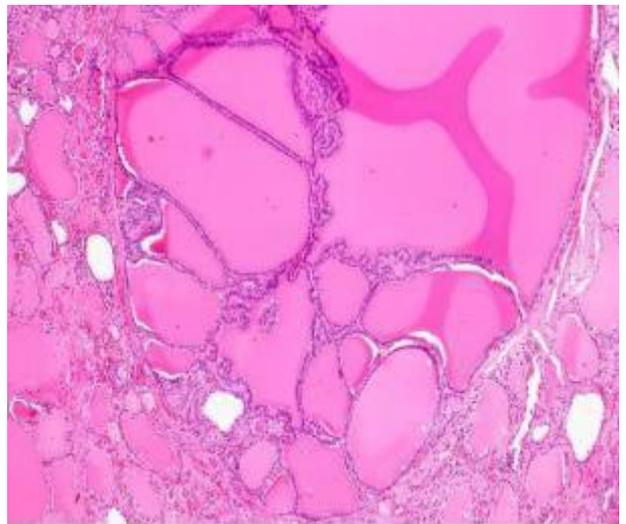
Female patient with MNG and Lt dominant nodule.



Thyroid bed after total thyroidectomy.



Removed specimen after total thyroidectomy.



Colloid goiter with lymphocytic infiltration.

Patient No. 2



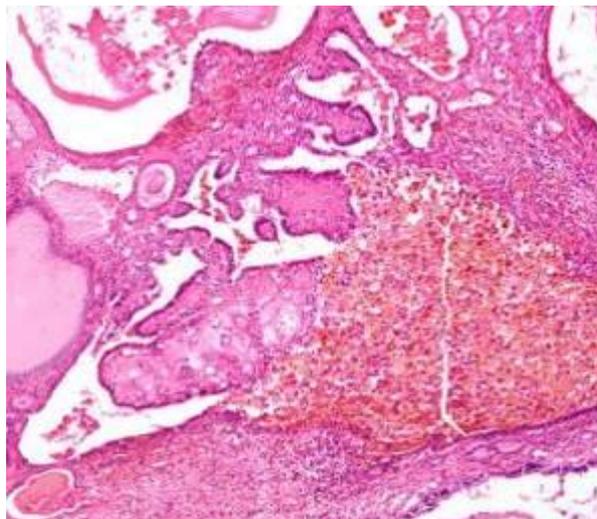
Female patient 34 years old with MNG.



Thyroid bed after total thyroidectomy.



Removed specimen after total thyroidectomy.



Colloid nodular goiter with secondary changes.

Postoperative follow up

Early

- Postoperatively we followed up vital signs and drain for postoperative haemorrhage.
- We exposed the wound for early detection of wound haematoma to avoid its compression manifestation and detection if the patient was in need for re-exploration or conservative management.
- In patients who were complaining of hypocalcemic manifestation, we measured serum calcium on the day of the surgery and on subsequent 2 days
- We defined postoperative hypocalcemia as a calcium level lower than 8.0 mg/dL (reference range 8.2– 10.2 mg/dL)
- We defined temporary hypocalcemia as a calcium level lower than 8.0 mg/dL in at least 2 consecutive samples. In these patients, hypocalcemia resolved within days.
- We considered temporary hypocalcemia to be severe when calcium levels remained lower than 8.0 mg/dL for more than 3 days. In these patients, hypocalcemia resolved within 6 months.
- The drain was removed after 24 hrs and voice assessment was done in all patients before they were discharged.
- We defined temporary recurrent laryngeal nerve palsy as hoarseness associated with vocal cord paralysis at laryngoscopy within 6 months postoperatively.
- In the first visit to outpatient clinics (one week after operation) the stitches were removed and patient was advised to take eltroxine as a replacement therapy after total thyroidectomy.

Late

- In the subsequent visits, one month, six months and 12 months ultra-sensitive TSH was estimated and eltroxine was given accordingly.
- Also we measured serum calcium in the subsequent visits, one month, six months and one year, patients who required vitamin D and calcium supplementation for more than 6 months, we considered hypoparathyroidism to be permanent.
- We considered recurrent laryngeal nerve palsy to be permanent if hoarseness associated with vocal cord paralysis at laryngoscopy after 6 months postoperative.

Ethical approval and written informed consent:
An approval of the study was obtained from Mansoura University academic and ethical committee. Every patient signed an informed written consent for acceptance of the operation.

Statistical analysis

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean \pm standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.

- Chi-square (χ^2) test of significance was used in order to compare proportions between two qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. The p-value was considered significant as the following:
 - P-value < 0.05 was considered significant.
 - P-value < 0.001 was considered as highly significant.
 - P-value > 0.05 was considered insignificant.

RESULTS

Table (1): Demographic data of the cases in the study

Items	Study cases n=100
Age (years)	43.59 ± 9.58
Sex	
-Male	18 (18%)
-Female	82 (82%)

One hundred patients included in our study over a period of one year (June 2017 and May 2018). Males represented 18 patients (18%) while females represented 82 patients (82%). The mean age of the included cases was 43.59 ± 9.58 years old (Table 1).

Table (2): Complaint data of cases

Items	Study cases n=100
Complaint	
Neck swelling	71 (71%)
Compression manifestations	19 (19%)
Neck pain	10 (10%)

Among these patients, there were 71 cases presented by compression manifestation (71%), 19 cases presented by neck swelling (19%) and 10 cases presented by neck pain (10%) as shown in table (2).

Table (3): Sonographic data of cases

US	Study cases n=100
TIRAD 2	53 (53%)
TIRAD 3	40 (40%)
TIRAD 4a	7 (7%)

US examination of our patients revealed that 53 cases were TIRAD 2 (53%), 40 cases (40%) were TIRAD 3, while 7 cases (7%) were TIRAD 4a (Table 3).

Table (4): FNAC data of cases

FNAC	Study cases n=100
Bethesda 2	71 (71%)
Bethesda 3	29 (29%)

FNAC was done to all patients, where there was 71 case Bethesda 2 (71%) and 29 cases Bethesda 3 (29%) as shown in table (4).

Table (5): RSE data of cases

RSE	Study cases n=100
Absent	89 (89%)
Present	11 (11%)

Retrosternal extension in our patients was 11 cases (11%) as shown in table (5).

Table (6): Early postoperative complications of the cases in the study

Items	Study cases n=100
Postoperative Hypocalcemic manifestations	10 (10%)
Recurrent laryngeal nerve (RLN) injury	6 (6%)
Postoperative hematoma	5 (5%)

Early postoperative complications in our study were 10 cases showing hypocalcemic manifestations; 3 of them improved spontaneously in the 1st 3 days (mild transient hypocalcemia 3%) and the other 7 cases discharged on antihypocalcemic treatment. RLN injury in our patients was 6 cases. They showed hoarseness of voice (6%) 2ry to unilateral RLN injury while no patient showed aphonia or stridor. Postoperative hematoma in our study was 5 cases (5%), only one case needed for re-exploration while 4 cases did not require and improved by conservative management (Table 6).

Table (7): Clinical data of the cases in the study at 1 month after surgery

Items	Study cases n=100
Hypocalcemic manifestations	5 (5%)
Recurrent laryngeal nerve injury	4 (4%)

One month postoperatively, we found that two of the seven discharged cases on antihypocalcemic medications showed improvement and stopped

treatment (moderate transient hypocalcemia 2%), while the 6 patient showed hoarseness of voice (6%) 2ry to unilateral RLN injury, 2 of them were showed spontaneous improvement (transient RLNI 2%) as shown in table (7).

Table (8): Postoperative complications at 6 months data of the cases in the study

Items	Study cases n=100
Hypocalcemic manifestations	2(2%)
Recurrent laryngeal nerve injury	1 (1%)

Six months postoperatively, we found that three of the 5 cases still on antihypocalcemic medications showed improvement and stopped treatment (sever transient hypocalcemia 3%), while the 4 patient were still showing hoarseness of voice (4%) 2ry to unilateral RLN injury, 3 of them showed spontaneous improvement (transient RLNI 3%) as shown in table (8).

Table (9): Postoperative complications at 12 month of the cases in the study

Items	Study cases n=100
Hypocalcemic manifestations	2 (2%)
Recurrent laryngeal nerve injury	1 (1%)

One year postoperatively, we found that two patients who still on antihypocalcemic medications did not show improvement and required long-life treatment (permanent hypocalcemia 2%), while one patient was still showing hoarseness of voice (1%) 2ry to unilateral RLN injury and did not show spontaneous improvement at 1 year post-operative (permanent RLNI 1%) as shown in table (9).

DISCUSSION

Total thyroidectomy has a benefit over other types of thyroid operations that showed reduction of the incidence of recurrence provided that parathyroid glands and RLN are identified and preserved. This depends on personal experience of the surgeon.

Park et al. (5) reported in his study that on 565 patients who underwent total and completion thyroidectomy, postoperative temporary hypocalcaemia was recorded in 27 patients (4.8%) while 4 patients (0.7%) had permanent hypocalcaemia.

In our study, total thyroidectomy was performed in (100%) of cases. Post-operative hypocalcemia was recorded in 10%. In the 1st 3 days postoperatively, 3 of them showed spontaneous improvement and did not require antihypocalcemic treatment (mild transient hypocalcemia 3%). One month postoperatively, we found that two of the seven cases discharged on antihypocalcemic medications showed improvement and stopped treatment (moderate transient hypocalcemia 2%). Six months postoperatively, we found that three of the 5 cases still on antihypocalcemic medications showed improvement and stopped treatment (sever transient hypocalcemia 3%). One year postoperatively, we found that two patients who still on antihypocalcemic medications did not show improvement and required lifelong treatment (permanent hypocalcemia 2%).

Gough and Wilkinson (6) reported that there were 283 patients with benign multinodular goiter. Total thyroidectomy was the procedure, permanent recurrent laryngeal nerve (RLN) injuries that occurred unintentionally was two patients (0.7%). In the endocrine surgery unit the rate was 5 of 1017 (0.5%), and in the other general surgery units it was 3 of 97 (3.01%). Total thyroidectomy can be done safely with a low rate of complications. Studies that have been reported with considerably higher complication rates, the complication rate appeared to be higher when surgery is done by surgeons other than those with special endocrine surgical interest. Expertise and experience, in our study showed nearly the same results.

In our study 100 patients were operated with identification and preservation of bilateral RLN. RLN injury in our patients was 6 cases that showed hoarseness of voice (6%) while no patient showed aphonia or stridor. One month postoperatively, we found that two cases showed spontaneous improvement (transient RLNI 2%). Six months postoperatively, we found that 3 cases showed spontaneous improvement (transient RLNI 3%). One year postoperatively, we found that one patient was still showing hoarseness of voice (1%) and did not show spontaneous improvement (permanent RLNI 1%).

Postoperative hematoma detected in our patients was 5 cases, only one case needed for re-exploration (1%) while 4 cases improved by conservative management. This agrees with **Efremidou et al.** (7) who reported that postoperative hematoma requiring reoperation occurred in 2 patients (0.2%); the bleeding source was from branches of the inferior thyroid artery in

1 patient and from branches of the middle thyroid vein in the other patient.

CONCLUSION

In our study, total thyroidectomy showed no significant operative and/or postoperative complications. Also it was noticed that total thyroidectomy operation gave very good results in patients with benign thyroid diseases provided that it done in qualified center and by experienced endocrine surgeons.

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