Evaluation of the Total Thyroidectomy in Treatment of Bilateral Benign Thyroid Disease

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Background and aim: *Total thyroidectomy has been 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. The aim of this study was to evaluate safety and efficacy of total thyroidectomy in treatment of bilateral benign thyroid disease.*

Methods: *A total of 60 patients underwent total thyroidectomy between January 2013 and May 2014 at General Surgery Department in Tanta University Hospital. Patients with thyroid cancer or suspicion of thyroid malignancy were excluded. Type of benign disease, cancer incidence (histopathological surprise), complication rates, and local recurrence rate in the follow-up period were evaluated.*

Results: *Diagnoses before surgery were; Euthyroid multinodular goitre (n = 42, 70%), Graves disease (n = 11, 18.2%), toxic multinodular goitre (n = 5, 8.3%), and recurrent goitre (n = 2, 3.4%). Temporary unilateral recurrent laryngeal nerve palsy occurred in one patient (1.7%). We observed no temporary or permanent bilateral recurrent laryngeal nerve injury. Temporary hypocalcemia occurred in 5 patients (8.3%) with no permanent hypocalcemia. Postoperative seroma occurred in one patient (1.7%). There was no postoperative hemorrhage, infection or mortality. During the follow-up period, we observed no disease recurrence.*

Conclusion: *Total thyroidectomy is safe and is associated with a low incidence of disabilities, recurrent laryngeal nerve palsy and hypoparathyroidism. Furthermore, it seems to be the optimal procedure, when surgery is indicated, for Graves disease and multinodular goitre, as total thyroidectomy has the advantages of immediate and permanent cure and no recurrences. It also eliminates the requirement of completion thyroidectomy for incidentally diagnosed thyroid carcinoma.*

Key words: *Total thyroidectomy, recurrent laryngeal nerve, hypoparathyroidism, benign thyroid disease.*

Abbreviations: *TT (Total thyroidectomy), RLN (recurrent laryngeal nerve), ITA (Inferior thyroid artery), PTG (Parathyroid gland).*

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 has an important role in the management of patients with benign diseases when both lobes of the thyroid gland are involved. This approach avoids recurrence and increased risk of morbidity associated with secondary operation.[2]

Furthermore, it has been shown that the complication rates of permanent recurrent laryngeal nerve palsy (0–1.3%) and permanent hypoparathyroidism (1%) following subtotal thyroidectomy are similar to those following total thyroidectomy.[3–8] Toxic multinodular

goiter is an indication for radical treatment. Medical treatment is required before surgery. Total thyroidectomy is used increasingly, providing a definitive cure for toxic hyperthyroidism and avoiding the risk for recurrence. With increasing surgical skill, the risk for RLN and parathyroid gland injury is greatly reduced.[9]

Total thyroidectomy is the treatment of choice in multinodular goiter and thyroiditis, when there is bilateral gland involvement posterior to the middle thyroid veins, and in Graves'disease because it decreases the likelihood of future repeated operations for recurrent disease and thus the associated risks, when performed safely.[10,11]

In addition, the disadvantages of subtotal thyroidectomy to treat Graves'disease are that the procedure does not prevent persistent or recurrent disease in up to 20% of patients; it does not stop the process of the disease and, as a result, it cannot stop the progress of ophthalmopathy. The disadvantages of subtotal thyroidectomy to treat multinodular goitre are that the procedure does not reduce the risk of persisting symptoms and has a high recurrence rate (30% –50%) owing to gland remnants, even under suppression hormonal treatment with L-thyroxine.[2]

Patients and methods:

A total of 60 patients underwent total thyroidectomy between January 2013 and May 2014 at General Surgery Department in Tanta University hospital. Informed consent was taken for the operation and inclusion in this study after detailed description. Approval by the local ethical committee was obtained before initiating this study.

Age, sex, details of thyroid disease, preoperative assessment, recurrent laryngeal nerve palsy and hypoparathyroidism rates, rates of other postoperative complications, final pathology and recurrence rates were analyzed. Patients with documented thyroid cancer or cytological suspicion of malignancy were excluded from this study.

Preoperative assessment:

Clinical assessments in all patients included measurements of serum thyroid stimulating hormone (TSH), free triiodothyroxine (T3), thyroxine (T4), thyroid antibodies and calcium. Ultrasound was done to estimate thyroid volume and morphology. Where appropriate (e.g., large or retrosternal goitres), we obtained a computed tomography scan of the neck. To exclude pre-existing vocal cord palsy, an otolaryngologist assessed vocal cord motility preoperatively in all patients. All thyrotoxic patients received pharmacologic therapy, which was continued until the day of the surgery, to prevent perioperative thyroid crisis.

Surgical procedure:

Extracapsular dissection of the thyroid gland was carried out after the identification and preservation of both laryngeal nerves and superior and inferior parathyroid glands. If we inadvertently removed or devascularized a parathyroid gland, we autotransplanted the gland into the ipsilateral sternocleidomastoid muscle. We drained the neck with suction drains for 48 hours, and patients were usually discharged within 4 days after surgery **Figures (1-4)**.

Postoperative management:

Postoperatively, we measured serum calcium on the day of the surgery and twice daily on subsequent days in all patients. We defined postoperative hypocalcemia as a calcium level lower than 8.0 mg/dL (reference range 8.2 –10.2 mg/dL). In patients who were asymptomatic and did not require vitamin D or calcium supplementation, we defined temporary hypocalcemia as a calcium level lower than 8.0 mg/dL in at least 2 consecutive samples (twice daily for 3 days). In these patients, hypocalcemia resolved within days. Conversely, in patients who were symptomatic and required vitamin D with or without calcium supplementation, 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. In patients who required vitamin D and calcium supplementation for more than

6 months, we considered hypoparathyroidism to be permanent.

We defined recurrent laryngeal nerve palsy as hoarseness or loss of voice quality associated with vocal cord paralysis at laryngoscopy within 6 months postoperatively. After 6 months, we considered recurrent laryngeal nerve palsy to be permanent. At the time of extubation, the anesthesiologist evaluated vocal cord motility in all patients. Because unilateral recurrent laryngeal nerve palsy sometimes can be clinically difficult to detect, an otolaryngologist performed a laryngoscopy in all patients before discharge. Hormonal treatment with L-thyroxine began within 5 days after thyroidectomy in all patients. Thyroid hormone serum levels were measured every 6 months.

Follow-up:

Follow-up visits were conducted for all patients; weekly in the first month, then monthly in the first 3 months and every 3 months thereafter. We evaluated patients' hormonal replacement, vocal cord motility, parathyroid function and therapeutic outcome. Evaluation included clinical examination, serum thyroid hormones and calcium measurements. Patients with severe or permanent hypocalcemia were re-evaluated every month postoperatively until their serum calcium normalized, with or without vitamin D and calcium supplementation. In patients with recurrent laryngeal nerve palsy an otolaryngologist performed a laryngoscopy every 6 months postoperatively to monitor vocal cord function.

Results:

Between January 2013 and May 2014; 60 patients with benign thyroid disease underwent total thyroidectomy. Of these, 12 patients (20%) were men and 48 (80%) were women. The median age of patients was 47 (range 18–72) y ears. Of the 60 total thyroidectomies, 58 (96.7%) were primary procedures and 2 (3.4%) were completion total thyroidectomies in patients with recurrent goiters after previous thyroid surgery (hemithyroidectomy and subtotal thyroidectomy). None of the patients had previous exposure of his or her neck to radiation.

Diagnoses before surgery were euthyroid multinodular goitre (n = 42, 70%), Graves disease (n = 11, 18.2%), toxic multinodular goitre (n = 5, 8.3%), and recurrent goitre (n = 2, 3.4%) **Table (1)**.

The patients with Graves disease and patients with toxic multinodular goiter had been treated medically before surgery for a mean interval of 36 months. These 16 (26.6%) patients received antithyroid drugs alone (n 10 = , 62.5%) or in combination with β-adrenergic blocking drugs (n = 6, 37.5%). The indications for total thyroidectomy in these 16 thyrotoxic patients were relapse of hyperthyroidism after medical treatment (n = 6, 37.5%), worsened endocrine ophthalmopathy with medical treatment (n = 2, 12.5%), side effects and subjective complaints of discomfort with medical treatment (n = 2, 12.5%) and large multinodular goiter (n = 6, 37.5%).

The indications for completion thyroidectomy among the 2 patients with recurrent goitre after previous partial thyroidectomy were recurrence of hyperthyroidism (n = 1, 50%) and local recurrence of nodular disease involving one or both lobes (n = 1, 50%). The final pathology after total thyroidectomy is shown in **Table (2)** and **Figure (5)**.

Complications are described in **Table (3)**: Temporary recurrent laryngeal nerve palsy that resolved within 3 months occurred in 1 patient (1.7%); this patient had recurrent nodular disease after subtotal thyroidectomy for multinodular goitre. We observed no temporary or permanent bilateral recurrent laryngeal nerve injury. In all patients, preoperative laryngoscopy showed normal vocal cord motility. Temporary hypocalcemia occurred in 5 patients (8.3%) with no permanent hypocalcemia. Postoperative seroma occurred in one patient (1.7%). There was no postoperative hemorrhage, infection or postoperative mortality. During the follow-up period, we observed no disease recurrence.

All patients remained euthyroid with L-thyroxine supplementation. At

postoperative follow-up, serum calcium levels (9.4–10.2 mg/dL) were within the normal range. The patients with thyroid carcinoma were sent to clinical oncology department to receive radioactive iodine therapy.

Discussion:

Historically, the risks associated with major surgery to treat thyroid disease and the problems of adequate hormonal replacement deterred surgeons from performing total thyroidectomies. Although the procedure remains controversial it is increasingly being performed, and current indications include cancer, toxic and nontoxic multinodular goitre and Graves disease.[1,3,12]

When the thyroid is resectable at presentation, total thyroidectomy is the current treatment of choice for malignant disorders of the thyroid and valuable surgical option for the management of several benign thyroid diseases, particularly among patients with an increased risk of recurrence.[1,13–16]

Total thyroidectomy is recommended for patients with Graves disease because it eliminates the source of the Graves disease autoantibodies; it eliminates the risk of disease recurrence; hypothyroidism is predictable and controllable by immediate thyroxine replacement; it alleviates any associated endocrine ophthalmopathy and the risk of malignancy among patients with Graves disease.[9,17,18]

Moreover, the risk of postoperative complications to the recurrent laryngeal nerve and parathyroid glands are equivalent for total and subtotal thyroidectomy.[1,12]

Total thyroidectomy is also the appropriate surgical treatment for benign toxic and nontoxic multinodular goitre, particularly when the nodular disease involves both lobes.[1,3,12,19–21] Because it promptly relief symptoms, provision of a definite histological diagnosis, especially when the clinical features indicate the possibility of thyroid malignancy; and no risk of disease recurrence. On the other hand, nontotal thyroidectomy, is a less satisfactory procedure because, by leaving residual thyroid tissue, the patient is exposed to a higher risk of recurrent disease that is not treatable by thyroxine suppression therapy and will, therefore, involve repeat surgery.[1,2,22]

In our study temporary recurrent laryngeal nerve palsy that resolved within 3 months occurred in 1 patient (1.7%) with no temporary or permanent bilateral recurrent laryngeal nerve injury. Temporary hypocalcemia occurred in 5 patients (8.3%) with No Permanent hypocalcemia. Postoperative seroma occurred in 1 (1.7%) patients. There was no postoperative hemorrhage or mortality. During a median follow-up of 2 years, we observed no disease recurrence.

Our results agree with Ioannis et al[23] who reported 6% temporary hypoparathyroidism in benign disease and 10% in malignant cases treated with total thyroidectomy, but lower than Gough and Wilkinson[1] whom reported recurrent laryngeal nerve palsy in 0.7% of patients. Also Perzik[24] reported an incidence of nerve injury of only 0.4% and no hypoparathyroidism probably because of cumulative experience and in our series there was two recurrent disease after previous partial thyroidectomy. Similar low rates of permanent complications associated with total thyroidectomy have been reported in other studies as dissection and ligature of the vessels on the thyroid capsule preserve the blood supply of the parathyroid glands and minimize inadvertent injury of the RLN.[2,4,5,25-27]

Moreover, repeat surgery for recurrent thyroid disease carries significantly higher risks than the initial surgery with the incidences of recurrent laryngeal nerve palsy and permanent hypoparathyroidism as high as 20.0% and 3.4% respectively.[1,2,27,28–31]

In our study, we observed no postoperative hemorrhage requiring reoperation (due to meticulous haemostais). This agree with other authors whom concluded that; hemostasis can be better achieved with total thyroidectomy because all vessels are identified and tied, whereas subtotal thyroidectomy leaves residual vascularized thyroid tissue.[28,29,31]

In our study no disease recurrence was observed; this agree with the study of Piraneo[32] who had associated the recurrence with the

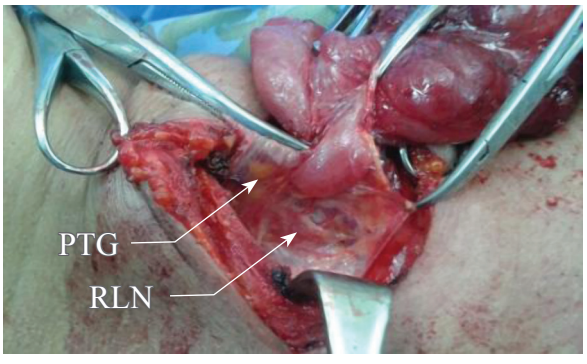

Figure (1): Intraoperative picture showing right recurrent laryngeal nerve (note, the accompanying vessels gives the signal II sign) and parathyroid gland (Arrows).

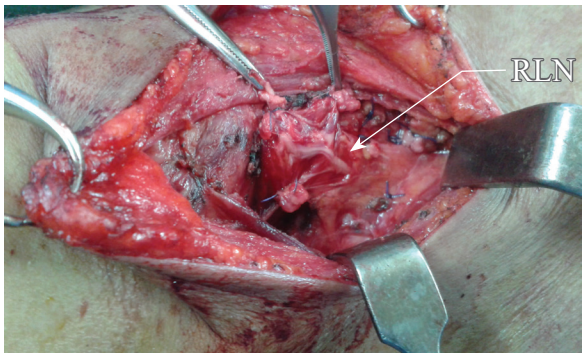

Figure (2): Intraoperative picture showing branched right recurrent laryngeal nerve after total thyroidectomy (Arrow).

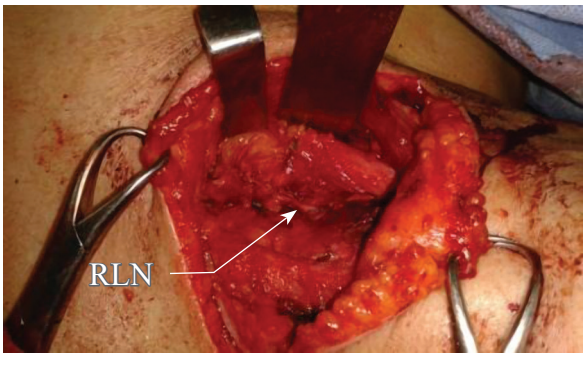

Figure (3): Intraoperative picture showing a laterally placed right recurrent laryngeal nerve after total thyroidectomy (Arrow).

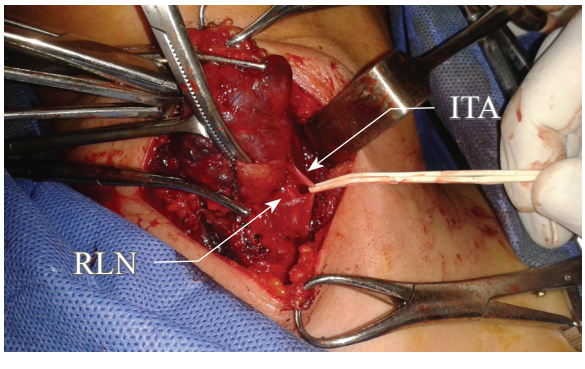

Figure (4): Intraoperative picture showing identification of the left recurrent laryngeal nerve by traction applied to the trunk of the inferior thyroid artery, The RLN is just medial to the artery (arrows).

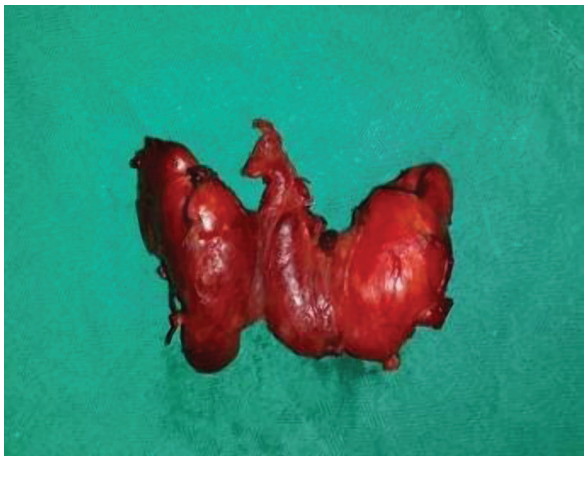

Figure (3): Total thyroidectomy specimen that proved to be Graves disease by histopathology.

size of the remnant gland, reporting 20% of recurrence after lobectomy alone, while only 4% in bilateral subtotal thyroidectomy and also agree with the result of Madhu.C.P et al[33] who found no disease recurrence after total thyroidectomy.

Conclusion:

Total thyroidectomy can be undertaken safely with a low complication rate (e.g., recurrent laryngeal nerve injury, hypoparathyroidism, hemorrhage). As a result, it is now widely accepted for the management

Table 1. Benign thyroid diseases among 60 patients who underwent total thyroidectomy.

Diagnosis (prior to surgery)	No. of patients	(%)
Multinodular nontoxic goiter	42	(70)
Graves disease	11	(18.2)
Multinodular toxic goiter	5	(8.3)
Recurrent nodular goiter	2	(3.4)

Table 2. Final pathology after total thyroidectomy.

Thyroid pathology	No. of patients	(%)
Benign multinodular goitre	42	(70)
Graves disease	11	(18.2)
Hashimoto thyroiditis	2	(3.4)
Papillary carcinoma	3	(5)
Follicular carcinoma	2	(3.4)

Table 3. Complications after total thyroidectomy.

Complication	No. of patients	(%)
Temporary recurrent laryngeal nerve palsy	1	(1.7)
Permanent recurrent laryngeal nerve palsy	0	(0)
Temporary hypocalcemia	5	(8.3)
Permanent hypocalcemia	0	(0)
Seroma	1	(1.7)
Hemorrhage	0	(0)
Mortality	0	(0)
Disease recurrence	0	(0)

of both malignant and benign thyroid disease. Total thyroidectomy is a valuable option, when surgery is indicated, for treating benign thyroid conditions such as multinodular goitre and Graves disease. It achieves immediate and permanent cure with no risk of disease recurrence or repeat surgeries. Total thyroidectomy offers a definite management of thyroid cancer. Long-term euthyroidism after total thyroidectomy is achieved easily with L-thyroxine supplementation.

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