



Total Thyroidectomy: The Procedure of Choice for Toxic Goitre

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OBJECTIVE: Over the years, subtotal thyroidectomy has been the mainstay of treatment for toxic goitre; however, total thyroidectomy is increasingly being considered as the procedure of choice. This study aimed to review our experience with total thyroidectomy in toxic goitre and evaluate the outcome of this procedure.

METHODS: A total of 67 consecutive patients who were diagnosed with toxic goitres and had total thyroidectomy from January 2003 to February 2005 were included in this prospective open study. The pre-operative diagnosis in all patients was benign goitre. The surgical outcomes were reviewed with regard to mortality and morbidity.

RESULTS: A standardized operative technique was adopted and practiced among all surgeons in our department. Of the 67 patients with toxic goitre, 36 (53.7%) patients had toxic multinodular goitre (Plummer's disease) and 31 (46.3%) patients had diffuse goitre (Graves' disease). Although there were no documented injuries to the recurrent laryngeal nerves, one patient had temporary hoarseness of voice. In our series of total thyroidectomy, 18 patients (26.8%) developed transient hypocalcaemia but only one patient (1.5%) had persistent hypocalcaemia. Four (5.9%) patients had occult papillary thyroid cancer and one patient (1.5%) had Hashimoto's thyroiditis discovered on histological examination. There were no other postoperative complications except for wound infection in one patient (1.5%).

CONCLUSION: Total thyroidectomy should be considered as the procedure of choice for toxic goitres. It is paramount that sufficient attention be paid to the preservation of the laryngeal nerves and the parathyroid glands. [*Asian J Surg* 2008;31(2):59-62]

Key Words: Graves' disease, hyperthyroidism, multinodular goitre, total thyroidectomy, toxic goitre

Introduction

Over the years, subtotal thyroidectomy (STT) has become the mainstay of treatment for toxic goitre; however, total thyroidectomy (TT) is now increasingly being considered.^{1,2} STT has been the standard procedure as it was thought to avoid long-term thyroxine replacement therapy and presumed to be a safer operation with low complication rates compared to TT. But on the contrary, the long-term

results of STT are not without their consequences. This is evidenced by the progressive increase in the incidence of hypothyroidism and recurrent hyperthyroidism from remnant thyroid tissue left behind.^{3,4}

On the other hand, the advantages of TT are that it avoids recurrent disease and future repeat thyroidectomy, which is known to be associated with higher morbidity even if performed with great care and skill. If the risk of complications from TT is no higher than that from STT,

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and coupled with significant advantages in the prevention of recurrence and avoidance of repeat surgery, perhaps TT should be considered as a treatment option for toxic goitre. Moreover, TT is increasingly being accepted as the procedure of choice for toxic multinodular goitre (MNG) involving both lobes, particularly those with significant compression symptoms.^{5,6}

This paper provides a wider perspective of TT as the choice of treatment for toxic MNG and diffuse goitre and evaluates the outcome of this procedure in our institution. It is hoped that this paper can answer the question as to whether or not TT should be considered as the procedure of choice in the management of all toxic goitres.

Patients and methods

All patients who were diagnosed with toxic goitre (Graves' disease or Plummer's disease) and who underwent TT between January 2003 and February 2005 were included in this prospective open study. Graves' disease was diagnosed based on the clinical presentation of thyrotoxicosis, either in the presence of a diffuse goitre with or without thyroid eye signs and symptoms. The preoperative diagnosis in all patients was benign goitre. All repeat surgery for toxic goitres was excluded from this study.

Bilateral recurrent laryngeal nerves were routinely identified and preserved during surgery. Identification of all parathyroid glands was attempted and preserved in all patients, but inadvertently removed or devascularized parathyroid glands were routinely autotransplanted into the neck muscle. Routine measurement of serum calcium was performed within 6 hours of the operation and at least once daily until stabilization before discharge. Calcium supplement and vitamin D analogue were given to patients with symptoms of hypocalcaemia or low serum calcium level < 1.8 mmol/L. Those who needed the supplement for less than 12 months after the operation were defined as having temporary hypocalcaemia. Permanent hypocalcaemia was defined as the need for calcium supplement for more than 12 months after operation and a low serum calcium level.

Specific data obtained were patient demographics, indication for the operations, operative details, postoperative complications and long-term outcome. Complete follow-up data with respect to postoperative hypocalcaemia were retrieved and all patients were followed-up for a minimum of 12 months.

Results

During the study period, 67 consecutive patients underwent TT. Their median age was 38 years (range, 22–68 years), and the female:male ratio was 5:1. Of the 67 patients, 31 were diagnosed with Graves' disease and 36 with Plummer's disease. Fifteen patients had severe eye signs (orbitopathy), 10 of whom had Graves' disease. The main indications for surgery were failed medical treatment (86%), significant compression symptoms (33%), or substernal extension of the goitre. All the patients who failed medical therapy were treated with neomecazole and propranolol for at least two courses.

A total of 134 avascular (cricothyroid) spaces were clearly identified during operation and 91 (68%) of the external laryngeal nerves were identified and classified. According to the proposed classification, 20 (15%) of the nerves were type 1, 41 (31%) of the nerves were type 2a, and 30 (22%) were type 2b.⁷ All the recurrent laryngeal nerves were identified, with the majority of them (70%) being a single branch, which coursed along the tracheal oesophageal groove.⁸

The morbidity of transient hypocalcaemia occurred in 18 of 67 (26.8%) patients. Although there were no documented injuries to the recurrent laryngeal nerves, one (1.5%) patient had temporary hoarseness of the voice. This patient had prolonged intubation in the intensive care unit before and after operation because of severe compressive symptoms. In addition, this particular patient had developed thyroid storm before the operation, which continued in the postoperative course. One (1.5%) patient also developed minor wound infection, which resolved with antibiotic therapy.

Permanent hypocalcaemia was uncommon and occurred in only one (1.5%) patient in our series. There was no permanent recurrent laryngeal nerve palsy or mortality in this series. It is interesting to note that in a few patients, there were incidental findings in the histopathology report other than toxic goitre: papillary thyroid carcinoma in four (6%) patients, and underlying Hashimoto's thyroiditis in one (1.5%), as shown in the Table.

Discussion

Whether or not TT should be the preferred treatment of choice for all toxic goitres remains controversial, although there is an increasing number of reports recommending its use for the disease.^{1,2} More importantly is that STT, which leaves behind the posterior nodules (Zuckermandl

Table. Histopathology report from total thyroidectomy

	Patients (n)
Malignant disease (papillary thyroid carcinoma)	4
Hashimoto's thyroiditis	1
Graves' disease	29
Toxic multinodular goitre	33

tubercle), may account for a substantial incidence of recurrence and persistence compression symptoms.^{9,10} We would emphasize that at least 33% of our patients had either significant compression symptoms or substernal extension of the toxic goitre, which required at least TT as the procedure of choice. Fifteen patients who were referred by an ophthalmologist for surgery had orbitopathy, in particular, proptosis; 10 patients were diagnosed with Graves' disease and five with toxic MNG.

We adopted TT for both toxic MNG and Graves' disease. The surgery for toxic goitre is very challenging due to the highly vascularized gland. Our main concern here was to evaluate the safety of the operation, which was the aim of this study. STT has been the mainstay for the surgical management of toxic goitre in many centres and is advocated in the belief that it avoids prolonged thyroxine replacement therapy whilst being a relatively safe operation with low complication rates. In STT, limited dissection is performed in the tracheo-oesophageal grooves and it is presumed that there is minimal risk of damaging the recurrent laryngeal nerve and the parathyroid glands. Therefore, it is presumed to be a safer operation than TT.

However, there is an increasing number of reports of recurrent toxic goitre from remnant thyroid tissue after STT and increasing incidence of hypothyroidism on long-term follow-up. It is interesting to learn that with a longer follow-up period, more patients with abnormal thyroid function are detected. Dominello et al showed a progressive onset of both hypothyroidism and recurrent hyperthyroidism with time.⁴ The proportion of patients with hypothyroidism increased from 48.5% at 6 months to 69.3% at 15 years after STT.

In contrast, thyroid function is more predictable after TT and can be easily maintained with thyroxine replacement. In fact, hypothyroidism should be regarded as an endpoint of surgical treatment rather than a complication of TT. Furthermore, TT and thyroxine therapy allows rapid control and return to the normal euthyroid state,

with no possibility of recurrent hyperthyroidism. Hence, it provides a more certain surgical outcome than STT.

In our centre, we have stopped performing STT so we do not have data to compare with the outcome of TT. Nonetheless, when we compare our outcome of TT with other endocrine centres, our results are comparable. Many studies have found no statistically significant difference in postoperative morbidity with regard to the incidence of permanent hypoparathyroidism or recurrent laryngeal nerve injury.

The incidence of permanent hypocalcaemia following TT, which ranges between 0.8% and 3.1%, is not significantly different from that following STT, which ranges between 0.1% and 0.8%. Our result of 1.5% is comparable to these figures. Similarly, the incidence of permanent recurrent laryngeal nerve injury was < 1%. However, both studies showed a significant difference in the incidence of temporary hypocalcaemia in favour of STT. If we compare the temporary complications of hypocalcaemia, which ranged from 21% to 32.8%, and those of recurrent laryngeal nerve palsy, which ranged from 1.7% to 5.1%, our study clearly showed a comparable outcome.

A further argument in the support of TT for toxic goitre is that it also provides effective initial treatment for any coexistent occult thyroid cancer. In our study, cancer was incidentally found in four of 67 (6%) pathology reports. Barakate et al reported that 32 (2.3%) patients had incidental thyroid cancer.² Given the benefit of the doubt, the only argument in favour of STT is the assumption that it is associated with a lower complication rate, but it has an unpredictable outcome with a substantial rate of recurrence and hypothyroidism.

We conclude that in skilled hands, TT for both Graves' disease and Plummer's disease can be performed with minimal morbidity to the laryngeal nerves and parathyroid glands. Our study provides further evidence that TT is an appropriate operation for toxic goitre and should be considered as the procedure of choice for the surgical treatment of toxic goitre.

References

1. Ku CF, Lo CY. Total thyroidectomy replaces subtotal thyroidectomy as the preferred surgical treatment for Graves' disease. *ANZ J Surg* 2005;75:528-31.
2. Barakate MS, Agarwal G, Reeve TS. Total thyroidectomy is now the preferred option for the surgical management of Graves' disease. *ANZ J Surg* 2002;72:321-4.

3. See ACH, Soo KC. Hypocalcaemia following thyroidectomy for thyrotoxicosis. *Br J Surg* 1997;84:95-7.
4. Dominello A, Guinea A, Reeve TS, et al. Progressive increase in thyroid dysfunction after subtotal thyroidectomy for Graves' disease. *Asian J Surg* 2000;23:131-5.
5. Hisham AN, Azlina AF, Aina EN, Sarojah A. Total thyroidectomy: the procedure of choice for multinodular goitre. *Eur J Surg* 2001; 167:403-5.
6. Delbridge L, Guinea AI, Reeve TS. Total thyroidectomy for bilateral benign multinodular goiter: effect of changing practice. *Arch Surg* 1999;134:1389-93.
7. Hisham AN, Bliss R, Reeve TS, Delbridge L. Recognition of the avascular space medial to the upper pole of thyroid and its surgical implications. *Asian J Surg* 2000;23:143-6.
8. Hisham AN, Lukman MR. Recurrent laryngeal nerve in thyroid surgery: a critical appraisal. *ANZ J Surg* 2002;72:887-9.
9. Pelizzo MR, Toniato A, Gemo G. Zuckerkandl's tuberculum: an arrow pointing to the recurrent laryngeal nerve (constant anatomical landmark). *J Am Coll Surg* 1998;187:333-6.
10. Hisham AN, Aina EN. Zuckerkandl tubercle of the thyroid gland in association with pressure symptoms: a coincidence or consequence? *ANZ J Surg* 2000;70:251-3.