Total thyroidectomy for clinically benign disease of the thyroid gland

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Background: The role of total thyroidectomy in the treatment of patients with benign thyroid disease remains controversial. However, this procedure may be appropriate when both thyroid lobes are involved and when the risk of recurrence is significant. This study is a review of a 15-year experience of total thyroidectomy for benign disease.

Methods: Between 1988 and 2002, 834 patients underwent total thyroidectomy for clinically benign disease at the Sydney Head and Neck Cancer Institute, Royal Prince Alfred Hospital. There were 128 men and 706 women with a mean age of 52 (range 16–91) years. Indications for surgery were euthyroid multinodular goitre (MNG), toxic MNG and Graves’ disease in 730 (87.5 per cent), 57 (6.8 per cent) and 47 (5.6 per cent) respectively. A total of 74 patients had previously undergone partial thyroidectomy.

Results: The incidence of temporary recurrent laryngeal nerve palsy was 2.3 per cent and that of temporary hypoparathyroidism 14.2 per cent. Permanent recurrent laryngeal nerve palsy occurred in 1.1 per cent, and 2.4 per cent of patients had permanent hypoparathyroidism. Neither the initial clinical diagnosis nor a history of previous treatment significantly influenced the rate of complications. The incidence of malignancy, other than incidental microscopic papillary carcinoma, was 4.6 per cent.

Conclusion: Total thyroidectomy has an important role in the management of patients with benign disease when both lobes of the thyroid gland are involved. This approach avoids disease recurrence and the increased risk of morbidity associated with secondary operation.

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Introduction

Goitre is a common problem, with women affected more often than men. Multinodular goitre (MNG) is the most common diagnosis but its aetiology remains unclear. The cause is thought to be multifactorial, involving hereditary factors, dyshormonogenesis, iodine deficiency or goitrogens contributing to intermittent stimulation of thyroid follicle cells by thyroid-stimulating hormone (TSH) from the pituitary gland. Exposure to radiation may also cause nodular thyroid disease. Most patients with MNG have normal thyroid function, although thyrotoxicosis may develop. Graves’ disease, however, is a more common cause of hyperthyroidism.

At the Sydney Head and Neck Cancer Institute, Royal Prince Alfred Hospital, the clinical evaluation of goitre has three components: assessment of thyroid function by measurement of TSH, exclusion of malignancy by fine-needle aspiration biopsy (FNAB) and evaluation of the extent of disease by radiological imaging. Estimation of serum thyroid hormone and antibody levels, and nuclear scanning are used selectively when hyperthyroidism, hypothyroidism or thyroiditis is suspected. Ultrasonography is used frequently but not routinely, and many patients have already had this investigation before referral. Ultrasonography is most useful in the evaluation of the contralateral lobe in patients with solitary nodules or unilateral disease, in facilitating FNAB of small or impalpable nodules, and as a monitoring tool in patients with MNG that does not warrant surgery. Computed tomography (CT) is used selectively in patients with recurrent, massive, retrosternal or clinically malignant goitre, or when posterior or accessory nodule is suspected, for example when compressive symptoms are out of proportion with clinical findings (Fig. 1). It is particularly useful in planning.
Surgery has always played an important role in the treatment of thyroid disease, but not all patients with goitre require surgery. In MNG the principal indications for thyroidectomy are suspected malignancy in a dominant nodule, thyrotoxicosis, significant compressive symptoms, retrosternal extension and cosmetic deformity. There should be no major medical contraindications to surgery. Medical management, with antithyroid drugs initially and then with iodine-131, is generally preferred for the initial treatment of hyperthyroidism resulting from Graves’ disease. However, surgery is frequently recommended for young women, patients with disease resistant to medical therapy and those with significant ophthalmopathy. In this setting subtotal thyroidectomy has long been the standard operation, with the aim of restoring a euthyroid state.

The main controversy surrounding surgical treatment of benign thyroid disease relates to the appropriate extent of resection. Proponents of limited resection base their argument on the fact that total thyroidectomy is associated with a higher complication rate, particularly of recurrent laryngeal nerve injury and hypoparathyroidism, than a lesser operation. However, with appropriate surgical technique, namely capsular dissection, the complication rate of total thyroidectomy can be minimized. In the recent literature, the reported incidence of recurrent laryngeal nerve palsy varies between 0.3 and 1.7 per cent, whereas the rate of permanent hypoparathyroidism ranges from 0.7 to 3.0 per cent. The incidence of regrowth of thyroid tissue after partial or less than total thyroidectomy for MNG is between 12 and 20 per cent, and is dependent on the initial volume of diseased tissue as well as the extent of resection. In general, about half of patients who develop recurrence of benign goitre require surgical re-excision, which carries a greatly increased risk of permanent complications. With the advent of safe surgical technique and recognition of the pitfalls of incomplete excision of the gland, total thyroidectomy is being performed increasingly for benign disease.

The purpose of the present study was to analyse the results of management of patients who required total thyroidectomy for benign disease.

**Patients and methods**

Between January 1988 and December 2002, 834 patients underwent total thyroidectomy for benign disease of the thyroid gland, performed either by or under the supervision of one of the authors, and are the subject of this study. All clinical and pathological data were entered prospectively on to a computerized database. Patients presenting with solitary thyroid nodules or disease limited to one lobe, who required a unilateral lobectomy, were excluded from the study. Previously treated patients were included even if their recurrent disease involved only one lobe, for example following a previous hemithyroidectomy for benign disease.

There were 128 men and 706 women with a mean age of 52 (range 16–91) years. The indication for surgery...
was started the day after surgery at a dose of 100–200 µg per day, depending on bodyweight, and was usually stabilized within 3 months of surgery. One cord recovered after 6 weeks, allowing removal of the tracheotomy tube, but the other remained paralysed permanently. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and as a complication such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively.

There was no postoperative death after surgery. One patient had bilateral recurrent nerve palsy that required temporary tracheostomy. This 58-year-old woman had previously had bilateral partial lobectomies and presented with massive nodular recurrence and compressive symptoms. Despite identification of both recurrent laryngeal nerves, bilateral vocal cord paralysis was present after surgery. One cord recovered after 6 weeks, allowing removal of the tracheotomy tube, but the other remained paralysed permanently.

Table 3 summarizes the complications associated with total thyroidectomy. Significant early postoperative complications such as haemorrhage requiring reoperation or wound infection occurred in 1.8 and 0.5 per cent of patients respectively. Permanent recurrent laryngeal nerve palsy occurred in nine patients (1.1 per cent) and 20 patients (2.4 per cent) had permanent hypoparathyroidism. Parathyroid autotransplantation did not prevent hypoparathyroidism as five patients became permanently hypocalcaemic despite reimplantation of the gland. Four patients who developed permanent hypoparathyroidism, and required a hemithyroidectomy for recurrent disease, and 23 required bilateral surgery for recurrent disease.

Table 2 summarizes the diagnosis based on histopathological examination of the resected thyroid glands. Most patients had multinodular goitre, including 2.3 per cent who were thyrotoxic. Graves’ disease was diagnosed in 4.6 per cent of patients. An incidental malignancy was identified in 71 patients (8.5 per cent), 33 of whom had papillary microcarcinoma. The remaining 38 patients (4.6 per cent) had a cancer that might be considered clinically significant, although none was apparent clinically before operation.

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and two of those who suffered permanent recurrent laryngeal nerve palsy, had been treated previously. Complications were independent of the initial clinical diagnosis. Neither retrosternal extension nor a diagnosis of Graves’ disease had a significant influence on complication rates.

Discussion

Total thyroidectomy has an important and increasing role in the management of thyroid disease. In some centres, it represents almost half of all thyroid operations carried out.15,21,22 However, the role of total thyroidectomy in the treatment of benign disease remains controversial. There is increasing recognition that total thyroidectomy is appropriate for patients with MNG when there is significant nodular disease involving both lobes.23,24 When one lobe is relatively normal, the case for complete removal of the gland is not as strong. About 10 per cent of patients with unilateral disease might develop recurrence in the long term, but only half will need surgical treatment. Treatment with initial hemithyroidectomy is probably adequate in such patients.18 Subtotal thyroidectomy has previously been advocated by some for the treatment of bilateral nodular disease, but recurrence rates as high as 45 per cent have been reported.18,25,26 In patients with extensive disease treated with partial thyroidectomy, the rate of recurrence is proportional to the remnant volume and the average interval to recurrence is just over 8 years.17

Thyroxine suppressive therapy was once regarded as a valuable method for controlling the progression of MNG and preventing recurrence after partial thyroidectomy.27 However, this approach is increasingly being questioned, owing to its limited value and potential side-effects, especially when used as an adjuvant treatment after subtotal thyroidectomy.18,25 In the present study, patients were routinely given L-thyroxine after surgery, but only to ensure the restoration of euthyroidism.

The only substantial argument against total thyroidectomy is its potentially higher associated complication rate. However, with appropriate surgical technique, the morbidity of initial total thyroidectomy can be minimized12,14,19,22,28 and is comparable to that of subtotal thyroidectomy.11 Recent studies of total thyroidectomy for benign disease have reported an incidence of permanent recurrent laryngeal nerve palsy of between 0.3 and 1.7 per cent and of permanent hypoparathyroidism of 0.7–3 per cent.6,12,13,15,16 The introduction of capsular dissection, which reduces damage to the parathyroid glands while protecting the recurrent nerves,19,20,28,29 has contributed to a decrease in surgical morbidity in comparison to rates described in older series.20,30 However, preserving parathyroid glands on a viable vascular pedicle may still be technically difficult in large goitres.14

Reimplantation of parathyroid tissue in muscle is widely practised and is seen as an efficient way of avoiding long-term hypoparathyroidism11,13,31 although some authors believe that it increases the risk of temporary postoperative hypocalcaemia.32 In the early part of the present series parathyroid glands were not routinely reimplanted in the ipsilateral sternocleidomastoid muscle, whereas current policy is to reimplant diced parathyroid glands that do not bleed readily when incised. Despite this, five of the 20 patients with permanent hypoparathyroidism had parathyroid tissue reimplanted, suggesting the need for more careful technique. Overall, the rate of permanent recurrent nerve injury of 1-1 per cent and the incidence of permanent hypoparathyroidism of 2-4 per cent are similar to results reported elsewhere.

Secondary thyroid surgery for recurrent disease in a patient who has already undergone hemithyroidectomy for unilateral disease does not carry an increased risk if the contralateral side has been left untouched.33 In contrast, when both sides have been dissected previously, reoperation may carry a fivefold increased risk of surgical complications.20,26,28 In the present study, however, previous operations were not associated with an increase in morbidity.

Most patients in this study had a total thyroidectomy for non-toxic MNG, although 12-5 per cent had thyrotoxicosis on presentation, either toxic MNG or Graves’ disease. The commonest treatment for Graves’ disease is radioactive iodine therapy, although only patients, notably young women and those with ophthalmopathy, thyroideectomy may be the preferred option. In an attempt to avoid long-term dependence on medication and decrease

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Table 3 Complications of total thyroidectomy

<table>
<thead>
<tr>
<th>Indication for surgery</th>
<th>MNG</th>
<th>Toxic MNG</th>
<th>Graves’ disease</th>
<th>All patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4 (0.5)</td>
</tr>
<tr>
<td>Haemorrhage</td>
<td>11</td>
<td>4</td>
<td>0</td>
<td>15 (1.8)</td>
</tr>
<tr>
<td>RLN palsy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary</td>
<td>15</td>
<td>3</td>
<td>1</td>
<td>19 (2.3)</td>
</tr>
<tr>
<td>Permanent</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>9 (1.1)</td>
</tr>
<tr>
<td>Hypoparathyroidism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary</td>
<td>106</td>
<td>8</td>
<td>6</td>
<td>120 (14.4)</td>
</tr>
<tr>
<td>Permanent</td>
<td>19</td>
<td>1</td>
<td>0</td>
<td>20 (2.4)</td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
<td>16</td>
<td>8</td>
<td>187 (22.4)</td>
</tr>
</tbody>
</table>

Values in parentheses are percentages. MNG, multinodular goitre; RLN, recurrent laryngeal nerve.
morbidty in patients with Graves’ disease, subtotal thyroidectomy has been widely used; however, it does not reliably prevent hypothyroidism, which occurs in up to 70 per cent of patients\(^8\), or the risk of persistent or recurrent hyperthyroidism, which may occur in as many as 20 per cent\(^8\). The present authors are increasingly performing total thyroidectomy when surgery is indicated. Surgical treatment of Graves’ disease is often considered to be associated with a higher risk of persistent recurrent laryngeal nerve palsy and hypoparathyroidism\(^{16,34}\), although there was no significant correlation between surgical treatment of thyrotoxicosis and an increased complication rate in the present study.

Eleven patients (1.3 per cent) required a median sternotomy to facilitate safe removal of goitres extending into the chest. This is a rate of less than one patient per year, indicating that the vast majority of MNGs, including those with significant retrosternal extension, can be removed safely via the neck. Evaluation of retrosternal goitres by CT is recommended, but absolute indications for the use of median sternotomy are difficult to define and individual surgeons should base their decision making on a number of factors. In the present series, median sternotomy was associated with a slight increase in hospital stay but no other negative sequelae.

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**References**


