

Total thyroidectomy as the single surgical option for benign and malignant thyroid disease: a surgical challenge

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Abstract

Introduction: 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 is to show that total thyroidectomy can be safely performed for both malignant and benign disease.

Material and methods: A retrospective study on 216 patients was conducted. Once an indication for surgery was established, our single surgical treatment was total thyroidectomy. Age, sex, nature of thyroid disease, final pathology and postoperative complications were recorded.

Results: For both benign and malignant disease, total thyroidectomy resulted in no permanent laryngeal nerve injury and no permanent hypoparathyroidism. Temporary laryngeal nerve palsy occurred in 0.9% and 3% of patients with benign and malignant disease respectively ($p = 0.245$). Six percent of patients with benign and 10.0% of patients with malignant thyroid disease suffered temporary hypoparathyroidism ($p = 0.280$). Immediate reoperation for postoperative hemorrhage was performed in 1.7% of patients with benign disease and in 1.0% of patients with malignancy with an uneventful outcome ($p = 0.650$).

Conclusions: When performed by surgeons experienced in endocrine surgery, total thyroidectomy may be considered as the treatment of choice for both malignant and benign thyroid disease requiring surgical treatment. Total thyroidectomy virtually eliminates the requirement of completion thyroidectomy for incidentally diagnosed thyroid carcinoma and significantly reduces the rate of reoperation for recurrent disease, as it provides an immediate and permanent cure for all benign thyroid diseases, with a low incidence of postoperative complications.

Key words: total thyroidectomy, benign thyroid disease, thyroid cancer.

Introduction

Total thyroidectomy has been well established as the treatment of choice for patients presenting with malignant thyroid nodules > 1 cm or pathologically indeterminate large nodules > 4 cm (due to increased risk for malignancy), as well as for patients with a family history of thyroid carcinoma or with a previous history of head and neck radiation. However, the efficacy and safety of this surgical approach for the treatment of patients

with benign multinodular goiter, toxic multinodular goiter, Graves-Basedow disease and even for small, well-differentiated thyroid carcinomas is still a matter of debate [1, 2]. This is mainly in order to avoid the possible detrimental complications of total thyroidectomy, such as permanent recurrent laryngeal nerve palsy and permanent hypoparathyroidism. Such complications are especially excruciating and practically inexcusable should they occur following surgery for benign disease. 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, 4]. 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 [5, 6].

In our institution, total or near-total thyroidectomy has been the treatment of choice for all patients suffering from thyroid disease who require surgical treatment, regardless of their preoperative diagnosis.

The aim of the present study was to prove that total thyroidectomy is a safe surgical procedure and can be considered as the optimal surgical approach for treating both benign and malignant thyroid diseases, in order to avoid the possibility of a technically challenging future reoperation for residual disease or recurrence.

Material and methods

A retrospective review of 216 patients who underwent total thyroidectomy between January 2007 and December 2009 at the 2nd Department of Surgery of the University of Athens, Greece, at Aretaieon Hospital, a tertiary university teaching hospital, was conducted. Data were extracted from their medical files, with regard to sex, age, nature of thyroid disease, final pathology and incidence of postoperative complications.

Preoperative evaluation

Indications for surgery were malignancy or suspected malignancy, compressive symptoms, hyperthyroidism resisting conservative treatment and progressive goiter increase. Once an indication for surgery was established, our single surgical treatment was total thyroidectomy. Preoperative evaluation included serum thyroid hormones, thyroid antibodies, calcium and neck ultrasound in addition to the regular preoperative assessment. Patients with serum thyroid hormones higher or lower than normal were referred for consultation to the Department of Endocrinology of our hospital and became euthyroid in order to undergo the operation. Fine-needle aspiration biopsy and Tc-99m scan were also performed when necessary.

Surgical procedure

The surgical procedure was accomplished through high definition loupes (Surgical acuity TTL Telescopes × 3.5, 2006, Kerr Corporation, USA) and involved dissection of both thyroid lobes, with definite identification and preservation of both recurrent laryngeal nerves and 2-4 parathyroid glands. If a parathyroid gland was accidentally removed or devascularized, it was autotransplanted into the ipsilateral sternocleidomastoid muscle. Surgically placed vacuum drains were used in most patients for a maximum of 24 h, according to the surgeon's personal judgment. The patients were usually discharged on the 2nd-3rd postoperative day.

Postoperative assessment/management

Postoperative assessment included measurement of serum calcium levels at 24 h and 48 h after surgery. Temporary hypoparathyroidism was defined as a serum calcium level lower than 8 mg/dl, corrected according to the serum albumin concentration. Permanent hypoparathyroidism was defined as the need for calcium and oral vitamin D, 6 months after the operation.

Postoperative laryngoscopy was performed when necessary by an expert otorhinolaryngologist. Temporary injury to the recurrent laryngeal nerve was defined as palsy of the vocal cord that was diagnosed by direct laryngoscopy and lasted less than 6 months postoperatively. Recurrent laryngeal nerve injury that lasted more than 6 months was considered permanent.

Statistical analysis

SPSS 15.0 for Windows (SPSS Inc., Chicago, IL) was used for statistical analysis. The incidence of postoperative complications was compared between patients with benign and malignant thyroid disease. Statistical differences between the two groups were assessed using the χ^2 test for nominal variables. The level of statistical significance was $p < 0.05$.

Results

The present study included 116 cases of benign thyroid disease and 100 cases of malignant disease for which total thyroidectomy was performed.

Among the patients with benign disease there were 82 women and 34 men (male to female ratio: 1/2.4). Their mean age was 54.0 years. The clinical features of these patients are summarized in Table I. On physical exploration, 46.4% had grade 0 goiter, 61.5% had grade I goiter, 18.6% had grade II goiter and 8.1% grade III goiter. Among the 16 patients presenting with hyperthyroidism, 2 had Graves' disease and the rest had toxic nodular goiters. Three (3.4%) patients had an intrathoracic component of

Table I. Clinical profile of patients with benign disease as illustrated by: thyroid hormone assessment (A), grade of goiter (B), histopathologic diagnosis (C)

A)					
Thyroid hormone assessment	Euthyroid	Hyperthyroid	Hypothyroid		
Number of patients n (%)	45 (52.2)	16 (18.6)	55 (63.8)		
B)					
Grade of goiter	0	I	II	III	
Number of patients n (%)	40 (46.4)	53 (61.5)	16 (18.6)	7 (8.1)	
C)					
Histopathologic diagnosis	Multinodular	Solitary nodule	Graves'	Diffuse goiter	Hashimoto
Number of patients n (%)	68 (78.9)	14 (16.2)	2 (2.3)	29 (33.7)	3 (3.5)

Data are expressed as number and percentage of patients; n – number of patients

their goiter. The mean weight of the specimens was 40 g. On histopathologic examination thyroid cancer was incidentally found in 13 patients (Table II). In the postoperative period, complications presented in 13 (11.2%) patients and included 1 temporary laryngeal nerve palsy, 7 temporary hypoparathyroidisms, 2 hemorrhages and 3 wound infections (Table III).

The mean age of the 100 patients with malignant disease included in the present study was 54.1 years. Thirty-six (36.0%) patients were younger than 45 years of age and the rest (64.0%) were older than 45 years. Male to female ratio was 1/3.5. The prevalence of the histopathologic types of malignant thyroid disease is illustrated in Table II. According to the AMES classification [7], among patients with differentiated thyroid carcinoma, 28.0% were categorized as low risk and 72.0% were categorized as high risk. According to the American Joint Committee on Cancer system of staging thyroid cancer, 74.0%, 21.0%, 3.0% and 2.0% of the patients were grouped in stage I, II, III and IV respectively. In particular, lymphadenopathy was observed in 7 patients. No patient had extra thyroidal invasion or distant metastases. Postoperative complications occurred in 14 (14.0%) patients and included 3 tem-

porary laryngeal nerve injuries, 10 temporary hypoparathyroidisms and 1 hemorrhage (Table III).

For both benign and malignant disease, it should be mentioned that total thyroidectomy resulted in no permanent laryngeal nerve injury and no permanent hypoparathyroidism. There was no mortality in the postoperative period. The incidence of postoperative complications was compared between patients with benign and malignant disease (Table III). The differences in terms of temporary laryngeal nerve palsy ($p = 0.245$), temporary hypoparathyroidism ($p = 0.280$), hemorrhage ($p = 0.650$) and wound infection ($p = 0.105$) were not significant.

Preoperatively, all patients had normal serum calcium levels ranging between 8.5 mg/dl and 10.5 mg/dl. Seventeen patients developed temporary postoperative hypoparathyroidism (mean serum calcium levels \pm SD, 7.1 ± 0.4) (Table III). In the majority of patients with hypoparathyroidism, serum calcium levels returned to normal when calcium and vitamin D were discontinued, 15 days after the operation. Dysphonia resolved within 1.5 months and was confirmed by laryngoscopy that showed restored vocal cord mobility. Reoperation was immediately performed in order to control the postoperative hemorrhage in 3 cases; however, no bleeding ves-

Table II. Prevalence (%) of histopathologic types of thyroid cancer in multifocal (A) and unifocal (B) thyroid disease. Histopathologic diagnosis of malignant thyroid disease (total = 100): A – histopathologic diagnosis of malignant multifocal thyroid disease (n = 57), B – histopathologic diagnosis of malignant unifocal thyroid disease (n = 43)

A)					
Histopathologic diagnosis	Papillary carcinoma	Incidental papillary carcinoma	Follicular carcinoma	Papillary-follicular carcinoma	Medullary carcinoma
Number of patients n (%)	36 (63.1)	0	4 (7.0)	17 (30.0)	0
B)					
Histopathologic diagnosis	Papillary carcinoma	Incidental papillary carcinoma	Follicular carcinoma	Papillary-follicular carcinoma	Medullary carcinoma
Number of patients n (%)	9 (21.0)	13 (30.2)*	6 (14.0)	13 (30.2)	2 (4.7)

n – number of patients. *It should be mentioned that incidental papillary carcinoma was found in the setting of follicular adenoma in 4 cases, in multinodular goiter in 7 cases and in Hashimoto's thyroiditis in 2 cases. In 7 out of 13 patients with initially diagnosed benign thyroid disease, incidental papillary carcinoma was located in the contralateral lobe

Table III. Postoperative complication rates after total thyroidectomy for patients with benign and malignant disease

Postoperative complications		Benign disease (n = 116)	Malignant disease (n = 100)	Statistical significance (value of p)
Recurrent laryngeal nerve palsy	Temporary	0.9%	3.0%	0.245
	Permanent	0	0	–
Hypoparathyroidism	Temporary	6.0%	10.0%	0.280
	Permanent	0	0	–
Hemorrhage		1.7%	1.0%	0.650
Wound infection		2.6%	0	0.105

Data are expressed as percentage of patients. n – number of patients

sel was identified and the patients had an uneventful recovery.

Discussion

Although total thyroidectomy is well established as the procedure of choice in patients diagnosed with thyroid carcinoma, the extent of thyroid resection for multinodular thyroid disease (MND), Graves' disease and toxic adenomas is still a matter of debate. It remains unclear whether this procedure confers an advantage on overall patient survival when associated with the risk of postoperative complications, such as hypoparathyroidism and recurrent laryngeal nerve injury [2, 3, 8-14]. Some authors claim that total thyroidectomy adds an unnecessary risk of complications in patients with MND and that postoperative use of thyroid hormone supplementation can be very effective in preventing the recurrence in most patients subjected to function-preserving thyroidectomies [2, 4].

However, recently total thyroidectomy has tended to replace subtotal thyroidectomy as the preferred surgical procedure even for benign conditions, particularly among patients with significant recurrence risk [1, 2]. Thus, patients who have received head and neck radiation, especially during childhood, should invariably be treated with total thyroidectomy regardless of their diagnosis, due to the 15 to 53 fold increase in their risk of developing thyroid carcinoma [1, 14].

In total thyroidectomy for benign disease, goiter size (evaluated by goiter grade, weight of the excised thyroid and intrathoracic component) has been found to be a risk factor for postsurgical complications [15]. Enlarged (> 100 g) thyroid glands or goiters with an intrathoracic component have been associated with postoperative hypoparathyroidism [16]. In this study, despite the presence of risk factors, total thyroidectomy has been safely performed with a 0% rate of permanent complications. Similarly, Reeve *et al.* [9], Koyuncu *et al.* [10], Hisham *et al.* [17] and Wilhelm and McHenry [18] report a 0% rate of permanent complications in total thyroidectomy

for benign disease. The rates of permanent complications are reportedly low even after total thyroidectomy and neck node dissection [19-21].

Moreover, when dealing with multinodular goiter, it is commonly acknowledged that there is no apparently normal tissue in the thyroid gland [1, 2]. Therefore, it is evident that total thyroidectomy in such cases confers various advantages: immediate relief from symptoms, definite pathological diagnosis and elimination of the risk of recurrence. In contrast, non-total thyroidectomy leaves the patients with residual thyroid disease, exposing them to high risk of recurrent disease (23-45%), which is generally refractory to thyroxine suppression therapy and will require completion thyroidectomy [2-4].

An additional argument favoring total thyroidectomy is the high risk of incidental thyroid carcinoma in patients who underwent an operation for multinodular goiter, despite the lack of preoperative indications for coexisting malignancy. This risk is estimated at 3-16.6% [2, 4, 5, 6, 22] and the need for reoperation in a small proportion of patients (3.5%) is well documented [22]. In accordance with these findings, in the present study, incidental papillary carcinoma coexisted with multinodular goiter in the majority of cases. It is worth mentioning that in 54% of the benign cases with incidental papillary carcinoma, the malignancy was located in the contralateral lobe. It is generally accepted that not all such lesions are of clinical significance or a threat to the patient; however, total thyroidectomy represents the treatment of benign goiters and in the event of malignancy constitutes the correct treatment with the minimum rate of associated morbidity.

Total thyroidectomy is also currently recommended for the treatment of Graves' disease because it eliminates the source of the autoantibodies that are responsible for its symptoms and progression [23]. Furthermore, the related risk of incidental coexisting malignancy, although small (4%), is also appropriately managed [2, 18, 24, 25].

The argument of those opposing the uniform utilization of total thyroidectomy for the treatment of both malignant and benign thyroid diseases is the

high rate of complications that has been associated with this extensive operation. Indeed, there have been numerous reports in the past linking total thyroidectomy with high rates of hypoparathyroidism and recurrent laryngeal nerve palsy; however, a meta-analysis of more recent studies has demonstrated that although the rate of transient hypocalcemia is higher following total thyroidectomy (26-37.7% vs. 9.8-15.6% for near-total thyroidectomy), the rate of permanent complications and the rate of recurrent laryngeal nerve palsy remain low, in experienced hands [24]. Specifically, the rate of permanent or temporary recurrent laryngeal nerve paresis is reportedly < 2%, regardless of the type of the surgical procedure [24]. It is evident that, as surgical experience accumulates, the morbidity of total thyroidectomy is becoming identical, or at least comparable, to that of less radical thyroidectomies. Moreover, whenever completion thyroidectomy is warranted for recurrent thyroid disease, the reported risks are significantly higher, with the incidences of recurrent laryngeal nerve palsy and permanent hypoparathyroidism amounting to 20.0% and 3.4%, respectively [2, 8, 15].

In conclusion, total thyroidectomy is a safe and efficient surgical procedure for benign thyroid diseases when performed by surgeons experienced in endocrine surgery. Moreover, it virtually eliminates the requirement of completion thyroidectomy for incidentally diagnosed thyroid carcinoma and significantly reduces the rate of reoperation for recurrent disease, as it provides an immediate and permanent cure for all benign thyroid diseases, with a low incidence of postoperative complications. Therefore, total thyroidectomy may be considered as the treatment of choice for both malignant and benign thyroid disease requiring surgical treatment. Further prospective studies are required to definitely establish the value of total thyroidectomy as the gold standard for the treatment of surgical thyroid disease.

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