Near-Total Thyroidectomy Could Be the Best Treatment for Thyroid Disease in Endemic Regions

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Hypothesis: Near-total thyroidectomy, on the basis of its low morbidity rate, is an appropriate treatment option in the surgical management of various thyroid diseases in an endemic region in Turkey.

Design: Single-institution study of patients with various thyroid diseases treated by means of near-total thyroidectomy within 2 years in an endemic region, with comparison of the results vs the complication rates of bilateral subtotal and total thyroidectomy reported in the literature.

Setting: Tertiary academic referral center.

Patients: One hundred fifty-two patients who underwent near-total thyroidectomy for various thyroid diseases.

Main Outcome Measures: Surgical treatments of various benign thyroid diseases were compared according to the complication rates and the achievable benefits of the procedures.

Results: In our clinic, near-total thyroidectomy was the principal surgical procedure performed for benign thyroid disease. The temporary recurrent laryngeal nerve palsy rate with respect to the nerves at risk was 3.3% (10 of 304 nerves), whereas temporary hypoparathyroidism was 7.2% (11 of 152 patients). Neither permanent recurrent laryngeal nerve palsy nor permanent hypoparathyroidism occurred. In 1 patient, wound hematoma developed and required re-exploration. Seroma in another patient needed no medical or surgical intervention. Neither wound infection nor mortality were noted.

Conclusions: Near-total thyroidectomy achieves a lower complication rate of hypoparathyroidism and a similar complication rate of recurrent laryngeal nerve palsy and recurrence when compared with the rates reported in the literature for total thyroidectomy. It is an effective and safe surgical treatment option for various benign thyroid diseases.

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An important disadvantage of total thyroidectomy is the high incidence of hypocalcemia due to parathyroid gland devascularization. A low complication rate is the advantage of subtotal thyroidectomy, but secondary thyroidectomy may be necessary because of recurrence after subtotal thyroidectomy and is associated with increased morbidity and related to recurrent laryngeal nerve injury and hypoparathyroidism resulting from parathyroid gland devascularization. The goal of this study is to evaluate near-total thyroidectomy as an appropriate treatment for thyroid disorders in endemic regions in Turkey because its recurrence rate is lower than that of subtotal thyroidectomy and there is a lower possibil-
ity of parathyroid damage when it is compared with that of total thyroidectomy.

**METHODS**

Between April 15, 2001, and May 15, 2003, 152 patients with goiter who underwent surgical treatment in our clinic (General Surgery Department, Zonguldak Karaelmas University, School of Medicine, Zonguldak, Turkey) were included in this study. All patients provided informed consent. All patients were evaluated by means of physical examination, thyroid function tests, thyroid ultrasonography, and thyroid scintigraphy. Fine-needle aspiration biopsy was performed for hypoaactive and dominant thyroid nodules. In our surgical department, we performed total thyroidectomy in single nodules that were suspected of malignancy at fine-needle aspiration biopsy; therefore, these patients were specifically excluded. Antithyroid medications were used for hyperthyroidism before surgery to attain euthyroidism.

Videolaryngostroboscopic examinations were performed to evaluate vocal cord motility 24 hours before surgery and 48 hours after surgery in all patients and included confirmation of normal vocal cord movement in patients who had temporary neuropraxia. Near-total thyroidectomy was performed in all cases and consisted of total lobectomy in the lobe having the dominant nodule, with isthmectomy and near-total lobectomy in the contralateral side, leaving a small quantity of about 2 g of thyroid tissue adjacent to the parathyroid glands and their blood supply. Recurrent laryngeal nerves in all cases were identified and traced to the cricoid cartilage in either side. Every attempt was made to demonstrate and preserve all of the parathyroid glands and their blood supply. When a parathyroid gland was damaged, it was transplanted into the sternocleidomastoid muscle.

In each patient, serum calcium and phosphorus levels were checked on the first and second postoperative days. Hypocalcemia is defined as low ionized serum calcium levels and the presence of symptoms of hypocalcemia. We considered hypocalcemia temporary when it lasted about 3 to 6 weeks after surgery. Calcium levels were followed up in patients who were temporary when it lasted about 3 to 6 weeks after surgery.

**RESULTS**

There were 113 female and 39 male patients, with a mean age of 43 years (range, 24-77 years). We performed near-total thyroidectomy in all patients; the various indications are summarized in **Table 1**. The clinical signs in these patients are summarized in **Table 2**. Sixty-six patients were treated medically because of hyperthyroidism and require re-exploration. Wound infection occurred. Wound hematoma developed in 1 patient and required re-exploration. Seroma in another patient needed no medical or surgical intervention. Five papillary carcinomas in 4 female patients and 1 male patient were diagnosed by using paraffin blocks. We performed iodine I 131 ablation in these patients. Neither wound infection nor mortality was noted.

The surgical treatment of benign thyroid disease is still controversial. Many treatments have been described for the surgical management of multinodular goiter, including unilateral or bilateral subtotal thyroidectomy, hemithyroidectomy, near-total thyroidectomy, and total thyroidectomy. Despite numerous studies of operative strategies, we still do not have clear evidence about which option is the best. When the disorder affects both lobes,
Section. Piraneo et al\textsuperscript{14} reported a 39\% recurrence rate of multinodular goiter, the thyroidectomy must be sizable because of its lower incidence of iatrogenic injuries such as recurrent nerve palsy and hypoparathyroidism and the supposed autonomous eu-thyroidism requiring no medical intervention.\textsuperscript{7} Other authors advocate total thyroidectomy because the incidence of iatrogenic injuries is similar to that of the subtotal procedure, and there is no risk of recurrence.\textsuperscript{10,12}

Recurrence that requires further resection is a relevant factor in the choice of operation. It is difficult to evaluate the results of thyroid surgery for benign disease mainly because of the long follow-up required for complete assessment of the outcome when there may be a delay of 20 or 30 years before recurrence.\textsuperscript{13} According to our review of the literature, recurrence develops in as many as 14.5\% of cases after subtotal resection, despite drug prophylaxis; without suppressive therapy, the rate of recurrence increases to 43\%.\textsuperscript{6,14} Ambrosi et al\textsuperscript{15} found that recurrence was inversely related to the extent of resection. Piraneo et al\textsuperscript{14} reported a 39\% recurrence rate after enucleation, 27\% after lobectomy, 20\% after lobectomy and contralateral enucleating excision, and 4\% after subtotal resection. Recurrence rates after subtotal thyroidectomy vary as much as 14\%.\textsuperscript{16} Recurrence after subtotal thyroidectomy compels patients to undergo secondary thyroidectomy.

When compared with primary thyroid surgery, secondary thyroidectomy has an increased risk of complications, such as recurrent laryngeal nerve injury and hypoparathyroidism.\textsuperscript{8} The best means of diminishing the complication rate is prevention through excising all pathologically altered tissue.\textsuperscript{17-19} Simple excision of a nodule or subtotal unilateral lobectomy should no longer be recommended in primary thyroid surgery. For diffuse multinodular goiter, the thyroidectomy must be sizable because the rate of recurrence is greater than 10\% after 10 years and is directly related to the size of the thyroid remnant.\textsuperscript{14,20} The risk of damaging the recurrent laryngeal nerve is far higher during a second intervention because of the anatomic disturbance with scar tissue left behind after the first operation and degenerative changes.\textsuperscript{21} High rates of temporary (15.5\%-23.6\%) and permanent (2.6\%-15.5\%) damage of the recurrent laryngeal nerve have been reported in secondary thyroidectomy.\textsuperscript{22,23}

The indications for total thyroidectomy for managing benign thyroid disorders are not well defined; in fact, they are evolving.\textsuperscript{22,24} If a patient had an indication for total thyroidectomy that was described in the literature (ie, history of head and neck irradiation, a multinodular thyroid gland that grossly involves both lobes, locally advanced disease with compressive symptoms, and nodules highly suspected of being malignant), we performed total thyroidectomy. In our surgical department, we have a fairly low rate of indications for total thyroidectomy. In most patients, we performed near-total thyroidectomy without suspecting malignancy; however, we found papillary carcinoma in paraffin blocks for 5 patients and performed \textsuperscript{131}I ablation. An advantage of near-total thyroidectomy over subtotal thyroidectomy is that the thyroid remnant of about 2 g renders it accessible to \textsuperscript{131}I ablation if cancer is found in the specimen and obviates reoperation for completion thyroidectomy.\textsuperscript{25}

Permanent or temporary hypoparathyroidism is a well-known complication of total thyroidectomy. Excision of parathyroid glands and vascular insufficiency are the main causes of this complication. Although we would have liked to compare complication ratios between total thyroidectomy and near-total thyroidectomy in our surgical department, it was not appropriate because we had an insufficient number of patients who underwent total thyroidectomy. To compare our complication ratios, especially temporary hypoparathyroidism after near-total thyroidectomy with that after total thyroidectomy, we used reports of total thyroidectomy of both current and past authors.

According to our review of the literature, temporary hypocalcemia ranged from 24\% to 35\% after total thyroidectomy.\textsuperscript{5-6,22,26,27} Even the lowest rate of temporary hypocalcemia after total thyroidectomy in the literature is nearly 3 times higher than the rate of temporary hypocalcemia in our series. The incidence of permanent hypoparathyroidism ranged from 0\% to 0.2\% after subtotal resection and from 0\% to 3.8\% after total resection.\textsuperscript{7} The incidence of permanent recurrent laryngeal nerve injuries after subtotal and total procedures varied from 0\% to 1\% and from 0\% to 1.3\%, respectively.\textsuperscript{7,24} Neither permanent recurrent laryngeal nerve palsy nor permanent hypoparathyroidism occurred in our series.

We performed near-total thyroidectomy in all of our patients. The central premise of our study is the balance of leaving a small quantity of thyroid tissue adjacent to the parathyroid glands and their blood supply to minimize the risk of complications—principally, permanent and temporary hypoparathyroidism. Identification of the parathyroid glands and meticulous surgical technique to preserve parathyroid circulation are essential during near-total thyroidectomy.

The lower rate of temporary hypoparathyroidism in near-total thyroidectomy when compared with that in total thyroidectomy is an advantage because the patients need shorter postoperative hospitalization and medical treatment. This decreased cost is particularly important in our endemic region in Turkey because we have a great number of patients and limited medical services. Near-total thyroidectomy adds the advantages of total thyroidectomy (no recurrence) to those of subtotal thyroidectomy (low incidence of temporary and permanent hypoparathyroidism). In conclusion, being aware of the advantages and disadvantages of both total and subtotal thyroidectomy, we propose near-total thyroidectomy for the surgical management of multinodular goiter in endemic regions.

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Inverted Critique

Total thyroidectomy for bilateral nodular goiter has become the preferred surgical approach in many centers. This is because as many as 20% of incompletely resected bilateral goiters after lobectomy or subtotal thyroidectomy recur, thyroid hormone therapy for thyroid-stimulating hormone suppression does not appear to reduce the risk of postoperative recurrence, and thyroid reoperation for recurrent goiter may be associated with a higher risk of complications. Although total thyroidectomy offers these advantages, the risk of complications from total thyroidectomy is considered by some to be higher than that from less extensive resections.

Acun and colleagues report their results for near-total thyroidectomy in patients with benign nodular thyroid disease and conclude that, compared with total thyroidectomy, near-total thyroidectomy achieves a lower rate of hypoparathyroidism (7.2% transient) and similar rates of recurrent laryngeal nerve injury (6.6% transient) and recurrence. The investigators should be applauded for comprehensive and objective documentation of complications associated with near-total thyroidectomy. Unfortunately, the comparison of near-total thyroidectomy complications in the authors' experience to that published for total thyroidectomy provides no evidence-based conclusions or recommendations. At the least, the authors should provide a systematic review or meta-analysis of the literature.

The investigators show that near-total thyroidectomy for benign nodular thyroid disorders is a relatively safe operation at their institution without any long-term morbidity, but the difference in risk of complications, as compared with that for total thyroidectomy, remains to be determined. Although the authors conclude that near-total thyroidectomy has a similar recurrence rate as does total thyroidectomy, albeit a low risk given the small thyroid remnant of 2 g, their study does not provide the long-term follow-up data to make such a conclusion. Given existing evidence for the surgical outcome of treating benign nodular thyroid disorders, the extent of thyroidectomy should be tailored to the indications for the procedure, patient preference based on a discussion of the risks and benefits of the different extents of thyroidectomy, and the surgeon's experience in performing these procedures.

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REFERENCES