

CLINICAL STUDY

Analysis of surgical complications of thyroid diseases: results of a single institution

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Abstract: *Background:* The purpose of this study is to compare the complications of different types of thyroidectomy for benign and malignant thyroidal diseases.

Methods: Between January 2001 and March 2006, 982 patients underwent thyroidectomy in single institute. A retrospective analysis was performed on demographic characteristics and pathology reports of patients, complications of surgery as well as the follow-up of patients. Sixty patients could not be fully followed up and were excluded.

Results: The types of the surgical procedures were as follows; 451 (48.9 %) total, 137 (14.9 %) subtotal, 60 (6.5 %) near-total thyroidectomy and 274 (29.8 %) lobectomy with isthmectomy. In the benign group, temporary recurrent laryngeal nerve injury (RLNI) was the most common complication in patients with toxic diffuse goiter (TDG 2 %) while this complication occurred in patients with differentiated thyroid cancer (DTC 1.5 %) in the malign group. Permanent RLNI in benign thyroidal diseases was seen more commonly in patients with toxic multinodular goiter (1.3 %). In benign thyroidal diseases, temporary hypoparathyroidism (THPT) was mostly found in patients with TDG (8%), whereas in malignant thyroidal diseases this was found more in patients with DTC (2 %). Permanent HPT (PHPT) in benign thyroidal diseases was observed more commonly in patients with multinodular goiter (0.9 %). In malignant thyroidal diseases, it was more frequently observed in patients with DTC (0.5 %). Infective complications after thyroid surgery are rarely observed and have a low incidence (0.4 %).

Conclusion: RLNI and HPT are the most common complications of after thyroid surgery but they may be avoided with an accurate technique (Tab. 3, Ref. 15). Full Text (Free, PDF) www.bmj.sk.

Key words: thyroidectomy, complications, hypoparathyroidism, recurrent laryngeal nerve injury, thyroid diseases.

Health problems related to the thyroid gland are known to be common. The prevalence of goiter in Turkey is reported to range between 5 to 56 % (1). Thyroidectomy is the best choice for the treatment of thyroid gland diseases (2). In cases of solitary or multinodular goiter (MNG), the indications for surgical treatment are following; the presence of obstructive symptoms, cosmetic problems (size of the goiter), hyperthyroidism, and any clinical suspicion of malignancy (3, 4). The type of thyroidectomy depends on the benign or malignant characteristics of the lesion, the size of the nodule(s) and the extent of the impairment (2). Although the morbidity and mortality of thyroid surgery have decreased markedly over the past century, technical complications such as recurrent laryngeal nerve injury (RLNI), hypoparathyroidism (HPT), superior laryngeal nerve injury (SLNI), bleeding and wound infection still occur (5). The incidence and severity of complications is highly dependent on the experience of the

surgical team, extent of the operation/re-operation, neck dissection and the different types of benign or malignant diseases.

There are limited studies found in the literature, which compare the complication rates for different types of benign or malignant diseases after various types of thyroidectomy. The aim of this study is to compare the complications of different types of thyroidectomy performed due to different types of benign or malignant diseases.

Patients and methods

Patient selection and preoperative evaluation: Between January 2001 and March 2006, 982 patients underwent a thyroidectomy in the General Surgery Departments of Gazi University Medical School. Patients who were operated for recurrent thyroidal disease or underwent a complementary thyroidectomy were excluded. A retrospective study was designed to assess the efficiency and complications of different types of thyroidectomy in benign and malignant thyroidal disease. Patients' demographic characteristics, pathology reports, complications and follow-up were recorded in a computerized database. As 60 patients could not be fully followed up, 922 patients were eventually enrolled in this study.

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The preoperative work-up included a medical history and physical examination, complete blood tests, thyroid hormone profile, ultrasound of the neck and a direct radiography of the thorax. Thyroid scintigraphy, neck computed tomography and magnetic resonance imaging of the neck were performed selectively. The fine-needle aspiration cytology was performed in all cases with clinically suspicious nodules. Preoperatively, selected patients who have aphonia, respiratory distress, and history of dysphagia or odynofagia underwent a laryngoscopic examination of the vocal cords. Postoperatively, this examination was only reserved for patients with the suspected RLNI.

Surgical procedures: The indication for thyroidectomy was benign for 689 (75 %) and malignant for 233 (25 %) patients. Before the surgery, the antibiotic prophylaxis was not used. All patients were operated on by or under the supervision of the same surgeon (F.T). All operations were performed using the standard technique and only absorbable sutures were used. RLN were routinely explored during dissection and were followed up to their entrance into the larynx. The electrocautery was not used in the dissection around RLN. Attempts were made to visualize the parathyroid glands and to protect their blood supply. The total thyroidectomy (TT) was performed in all cases for which a benign-malignant identification could not be achieved preoperatively and in suspected malignancy in the intraoperative frozen section. At the end of the surgery, no topical clotting agents were used for local homeostasis.

Postoperative evaluation: the total serum calcium and phosphorus levels were measured preoperatively and 24 hours postoperatively. Postoperative vocal cord palsy was defined as the presence of immobility or decreased movement of the vocal cords at laryngoscopic examination. A persisting vocal cord dysfunction after six months was considered a permanent paralysis. A temporary HPT was defined as a total serum calcium level less than 8.5 mg/dl associated with symptoms of tetany, muscle spasm and peroral paresthesia that resolved with an exogenous calcium administration within six months. If HPT persisted for more than six months, it was defined as a permanent HPT.

All patients were classified regarding the occurrence of postoperative complications. RLN dysfunction, HPT and other complications were recorded according to the different types of thyroidal diseases (benign or malignant) and the type of thyroidectomy.

Statistical analysis: The incidence of complications was assessed by the descriptive statistical methods using frequency and descriptive analyses.

Results

The study consisted of 922 patients who were operated on for thyroid disorders between January 2001 and March 2006. There were 746 (81 %) female patients and 176 (19 %) male patients, with a mean age of 48 years (20 to 87 years). The mean age was 47 (range 23–80) in female patients and 49 (range 20–87) in male patients. The types of the surgical procedures were as follows; 451 (48.9 %) TT, 137 (14.9 %) subtotal thyroidec-

tomy (STT), 60 (6.5 %) near-total thyroidectomy (NTT) and 274 (29.8 %) lobectomy with isthmectomy.

Details of complications according to the benign and malignant (differentiated/undifferentiated) thyroidal diseases are shown in Table 1. In the benign group, a temporary RLNI was most commonly seen in patients with the toxic diffuse goiter (TDG – 2 %), while this complication occurred mainly in patients with the differentiated thyroid cancer (DTC – 1.5 %) in the malignant group. A permanent RLNI in benign thyroidal diseases was seen more commonly in patients with the toxic multinodular goiter (TMNG – 1.3 %). However, in malignant thyroidal diseases, it was more frequently seen in patients with the undifferentiated thyroid cancer (UDTC – 2.9 %). Furthermore, in benign thyroidal diseases, a temporary HPT was mostly found in patients with TDG (8 %), whereas in malignant thyroidal diseases, this was found more frequently in patients with DTC (2 %). A permanent HPT in benign thyroidal diseases was observed commonly in patients with MNG (0.9 %). However, in malignant thyroidal diseases, it was observed more frequently in patients with DTC (0.5 %).

The temporary HPT (3 %) and RLNI (1.5 %) occurred more often in benign thyroid diseases with Hashimoto's thyroiditis. The temporary RLNI (2.7 %) occurred more frequently in malignant thyroid diseases with Hashimoto's thyroiditis (Tab. 2).

Details of complications for the various types of thyroidectomy are shown in Table 3.

Infective complications after thyroid surgery were rarely observed and had a low incidence (0.4 %) in our study. Likewise, wound hematoma developed in two patients (0.2 %), requiring re-exploration the day after operation. There were no deaths.

Discussion

The operative management of thyroid disease is one of the major accomplishments of modern surgery. At present, the incidence of complications is quite low in thyroid surgery. Although the morbidity and mortality have declined markedly over the years, surgical complications remain a disappointing problem to surgeons (5, 6).

TT is indicated in the treatment of all patients with a primary malignant differentiated cancer of the thyroid gland (2). The unilateral or bilateral paratracheal dissection is usually performed in patients with a differentiated carcinoma. Knowledge of the surgical anatomy of the neck, thyroid pathology, and proper surgical technique are basic factors to keep complications within reasonable range (7). STT has been the surgical treatment of choice in surgery for MG, but it does have several inconveniences, among which is a high rate of recurrence (10–30 %). TT does not have these disadvantages, but it does involve a higher potential risk of complications. The reported morbidity rates are as high as 3.5 % for the definitive HPT and 3.1 % for the permanent RLNI, to reach 5 % and 17 %, respectively, regarding recurrent goiters (8, 9).

A dysfunction of the recurrent laryngeal nerve is the most common complication of thyroid surgery, with severe implica-

Tab. 1. Details of complications for the benign and malignant thyroid diseases.

| | n | RLNI T/P (% / %) | HPT T/P (% / %) | SLNI (%) | Hematoma(%) | Wound infection (%) |
|------------------|------------|----------------------|-----------------------|----------------|----------------|---------------------|
| Benign | | | | | | |
| MNG | 314 | 3/2 (0.9/0.6) | 15/3 (4.7/0.9) | 1 (0.3) | 1 (0.3) | – |
| NG | 212 | 1/0 (0.5/–) | 1/0 (0.5/–) | – | – | – |
| TMNG | 76 | 1/1 (1.3/1.3) | 2/0 (2.6/–) | 1 (1.3) | – | 2 (2.6) |
| TDG | 50 | 1/0 (2/–) | 4/0 (8/–) | – | – | – |
| TNG | 37 | – | – | – | – | – |
| Malignant | | | | | | |
| DTC | 199 | 3/0 (1.5/–) | 4/1 (2/0.5) | – | 1 (0.5) | 2 (1) |
| UTC | 34 | 0/1 (–/2.9) | – | – | – | – |
| Total | 922 | 9/4 (0.9/0.4) | 26/4 (2.8/0.4) | 2 (0.2) | 2 (0.2) | 4 (0.4) |

RLNI – Recurrent Laryngeal Nerve Injury, HPT – Hypoparathyroidism T – Temporary, P – Permanent, SLNI – Superior Laryngeal Nerve Injury, MNG – Multinodular goiter, NG – Nodular Goiter, TMNG – Toxic Multinodular Goiter, TDG – Toxic Diffuse Goiter, TNG – Toxic Nodular Goiter, DTC – Differentiated Thyroid Cancer, UTC – Undifferentiated Thyroid Cancer

Tab. 2. Details of complications for the benign and malignant thyroid diseases with thyroiditis.

| | n | RLNI T/P (% / %) | HPT T/P (% / %) | SLNI (%) | Hematoma (%) | Wound infection (%) |
|--------------|------------|----------------------|-----------------------|----------------|----------------|---------------------|
| BTD+HT | 64 | 1/0 (1.5/–) | 2/0 (3/–) | 1 | 1 | 1 |
| BTD | 624 | 5/3 (0.8/0.4) | 16/3 (2.5/0.4) | 1 | – | 1 |
| MTD+HT | 37 | 1/0 (2.7/–) | – | – | – | – |
| MTD | 197 | 2/1 (1/0.5) | 4/1 (2/0.5) | – | 1 | 2 |
| Total | 922 | 9/4 (0.9/0.4) | 26/4 (2.8/0.4) | 2 (0.2) | 2 (0.2) | 4 (0.4) |

RLNI – Recurrent Laryngeal Nerve Injury, HPT – Hypoparathyroidism, T – Temporary, P – Permanent, SLNI – Superior Laryngeal Nerve Injury, BTD – Benign Thyroid Disease, HT – Hashimoto's thyroiditis, MTD – Malignant Thyroid Disease

Tab. 3. Details of complications for the different types of thyroidectomy.

| | n | RLNI T/P (% / %) | HPT T/P (% / %) | SLNI (%) | Hematoma (%) | Wound infection (%) |
|--------------|------------|----------------------|-----------------------|----------------|----------------|---------------------|
| TT | 451 | 6/4 (1.3/0.8) | 19/4 (4.2/0.8) | 2 (0.4) | 1 (0.2) | 4 (0.8) |
| ST | 137 | 2/0 (1.4/–) | – | – | 1 | – |
| NT | 60 | 1/0 (1.6/–) | 2/0 (3.3/–) | – | – | – |
| Lobectomy | 274 | – | 1/0 (0.3/–) | – | – | – |
| Total | 922 | 9/4 (0.9/0.4) | 26/4 (2.8/0.4) | 2 (0.2) | 2 (0.2) | 4 (0.4) |

RLNI – Recurrent Laryngeal Nerve Injury, HPT – Hypoparathyroidism, T – Temporary, P – Permanent, SLNI – Superior Laryngeal Nerve Injury, TT – Total Thyroidectomy, STT – Subtotal Thyroidectomy, NTT – Near-total Thyroidectomy

tions for the patient. The resulting phonetic paralysis is a serious defect for patients who use their voices professionally and it may sometimes cause serious ventilation disturbances (10). RLNI is considered to be a postsurgical alteration in the tone, timbre, or intensity of the voice, with the confirmation of vocal chord alteration by laryngoscopy; and is considered as definitive if it per-

sists for more than 12 months (11). Data from the literature regarding the rate of postoperative functional disturbances of the recurrent laryngeal nerve vary a lot. Large statistical series of over 12000 documented thyroid resections have reported rates of 1.2 % or 5.2 % of the permanent RLNI (10). Recent research showed that, in benign and malignant thyroid diseases, tempo-

rary and permanent RLNI ratios for TT were 2–3 % and 1–2 %, respectively. These ratios for STT were 1–2 % and <1 %, respectively (12). However, in this study, the ratio of temporary RLNI for NTT was the highest when compared to other types of thyroidectomy. But still, the ratios in our study were very low indeed when compared to the ratios in literature. The permanent RLNI was only observed in patients who underwent TT. RLN injury can be prevented during thyroid surgery by identifying the nerve and following its course.

The infective complications after the thyroid surgery were rarely observed and had a low incidence (0.4 %) in our study. In the benign disease group, the infection rate was high compared to the malign disease group. This outcome was not scientifically important.

HPT is considered when the calcium readings are below 7.5 mg/dl or less than 8.5 mg/dl if there are symptoms due to hypocalcemia; if the calcemia remained below 8.5 mg/dl at 1 year it is considered as permanent (11). In a survey of 24108 thyroid operations in the United States in 1978, Foster noted an incidence of the permanent HPT in 3 % for the benign disease and 7 % for the malignant disease (13). In a multicenter study by Rosato et al, according to the types of thyroidectomy, temporary and permanent HPT ratios for TT were 11–12 % and 2–3 %, respectively. However, for STT, these ratios were 4–5 % and <1 %, respectively (12). In our study, temporary and permanent HPT ratios for TT were 4.2 % and 0.8 %, respectively. For other types of thyroidectomy, these ratios were 3.3 % and 0 %, respectively. In our study, HPT ratio was lower than the values in literature. In our previous study, we applied a daily dose of oral calcium 600 mg combined with vitamine D3 400 IU (Cal-D-Vita, Bayer, Istanbul, Turkey). The administration started on the first postoperative day and was discontinued on the postoperative day 7. Thus, we demonstrated that a routine postoperative calcium and vitamin D supplementation therapy might be useful for the prevention of symptomatic hypocalcemia after thyroidectomy (14). In addition, the meticulous identification of parathyroid glands during the thyroid surgery can result in a lower risk of HPT.

Hyperthyroidism was an important risk factor in our study for the development of complications. The temporary RLNI and HPT ratios for TDG were 2 % and 8 %, respectively. Likewise, Thomusch et al reported in a multivariate study in Germany that hyperthyroidism was a risk factor for the development of surgical complications and HPT (9, 15).

The reason why we had less complication rates compared to the literature may be partially attributed to our routine exploration of the parathyroid glands, attempts to preserve the vessels of the parathyroid glands and protection of the arteries. In addition, we routinely identified RLN before performing the ligation of the inferior thyroid pedicles and did not use electrocoagulation around the nerve, and new operative techniques and medical management of benign thyroid diseases should be considered.

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