

# Evaluation of early postoperative complications after thyroidectomy: A retrospective study

## Tiroidektomi sonrası erken dönem ameliyat sonrası komplikasyonların değerlendirilmesi: Retrospektif çalışma

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### ABSTRACT

**Objectives:** This study aimed to report our experience in early postoperative complications of thyroid surgery.

**Patients and Methods:** This study was conducted by retrospectively analyzing the files of 196 patients (145 females, 51 males; mean age: 48.0±18.9 years; range, 18 to 86 years) who underwent thyroid surgery between January 2017 and December 2021. Patients under the age of 18, patients with preexisting hypocalcemia, vocal cord paralysis, Horner's syndrome, tracheal or esophageal injuries, previous history of thyroid surgery (lobectomy, subtotal thyroidectomy), and patients whose files could not be reached were excluded from the study. Patients' demographic data, preoperative indications, surgical technique, and early postoperative complications were recorded.

**Results:** The most common surgical indication was multinodular goiter, with a rate of 33.7% (n=66). As the surgical technique, total thyroidectomy was performed in 127 (64.8%) patients, 54 (27.6%) patients underwent isthmelobectomy, and 15 (7.6%) patients underwent neck dissection combined with total thyroidectomy. Of the neck dissection patients included in the study, 12 (6%) were bilateral central, and three (1.6%) were lateral neck dissection. Early postoperative complications developed in 89 (45.4%) patients who underwent thyroid surgery. No complications were observed in 107 (54.6%) patients. Hypocalcemia was the most common complication with 33.1% (n=65). Hypocalcemia was followed by recurrent laryngeal nerve injury in 10.2% (n=20). Hematoma was observed in 3% (n=6), seroma in 3.5% (n=7), and wound infection in 1% (n=2). Tracheal damage, hoarseness, and chylous fistula were not observed among the patients included in the study.

**Conclusion:** With close postoperative follow-up, a multidisciplinary approach to complications, and high surgical experience, the rates of complications developing in the early period due to thyroid surgery are reduced. Thyroid surgery is a safe surgery with low morbidity and mortality rates when suitable conditions are provided.

**Keywords:** Complications, hypocalcemia, morbidity, recurrent laryngeal nerve, thyroidectomy.

### ÖZ

**Amaç:** Bu çalışma, tiroid cerrahisinin ameliyat sonrası erken dönem komplikasyonları konusundaki deneyimimizi bildirmeyi amaçladı.

**Hastalar ve Yöntemler:** Bu çalışma, Ocak 2017 - Aralık 2021 tarihleri arasında tiroid ameliyatı olan 196 hastanın (145 kadın, 51 erkek; ort. yaş: 48.0±18.9 yıl; dağılım, 18-86 yıl) dosyaları retrospektif incelenerek yapıldı. On sekiz yaşın altındaki hastalar, var olan hipokalsemi, vokal kord paralizi, Horner sendromu, trakeal veya özofagus yaralanmaları olan hastalar, daha önce tiroid cerrahisi öyküsü (lobektomi, subtotal tiroidektomi) olan hastalar ve dosyasına ulaşılamayan hastalar çalışma dışı bırakıldı. Hastaların demografik verileri, ameliyat öncesi endikasyonları, ameliyat tekniği ve ameliyat sonrası erken dönem komplikasyonları kaydedildi.

**Bulgular:** En yaygın cerrahi endikasyon %33.7 (n=66) oranıyla multinodüler guatr idi. Cerrahi teknik olarak 127 (%64.8) hastaya total tiroidektomi, 54 (%27.6) hastaya istmolobektomi ve 15 (%7.6) hastaya total tiroidektomi ile birlikte boyun diseksiyonu uygulandı. Boyun diseksiyonu uygulanan hastaların 12'sine (%6) iki taraflı santral boyun diseksiyonu uygulanırken üçüne (%1.6) lateral boyun diseksiyonu uygulandı. Tiroid cerrahisi geçiren 89 (%45.4) hastada erken dönem komplikasyon gelişti. Hastaların 107'sinde (%54.6) herhangi bir komplikasyon izlenmedi. Hipokalsemi, %33.1 (n=65) ile en sık görülen komplikasyondur. Hipokalsemiyi, %10.2 (n=20) ile rekürren larengeal sinir hasarı takip etti. Hematom %3 (n=6), seroma %3.5 (n=7) ve yara yeri enfeksiyonu %1 (n=2) oranında görüldü. Trakeal hasar, ses kalitesinde bozulma ve şilöz fistül çalışmaya dahil edilen hastalar arasında izlenmedi.

**Sonuç:** Ameliyat sonrası yakın takip, komplikasyonlara multidisipliner yaklaşım ve yüksek cerrahi deneyim ile tiroid cerrahisinin erken döneminde gelişen komplikasyon oranları azalmaktadır. Tiroid cerrahisi, uygun koşullar sağlandığında düşük morbidite ve mortalite oranları ile güvenli bir cerrahidir.

**Anahtar sözcükler:** Komplikasyon, hipokalsemi, morbidite, rekürren larengeal sinir, tiroidektomi.

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Thyroid disease is one of the most common endocrine diseases. Surgical treatment may be required in the treatment of thyroid diseases. Aside from malignant thyroid illnesses, surgery is suggested for the treatment of some benign diseases, such as multinodular goiter and hyperthyroidism, that cannot be treated medically.<sup>[1]</sup>

Hypocalcemia, recurrent laryngeal nerve (RLN) injury, tracheal injury, hematoma, wound site infection, and Horner syndrome are among potential complications of thyroid surgery.<sup>[2]</sup> Based on anatomical position, hypocalcemia and RLN damage are two common problems associated with thyroidectomy. Hypocalcemia is most commonly caused by a blocked blood supply to the parathyroid glands or by the unintentional removal of the parathyroid glands. Ratio of transient hypocalcemia is 20 to 30%, while permanent hypocalcemia ratio is 1 to 4%.<sup>[3]</sup> Temporary dysphonia caused by RLN injury occurs in 5 to 11%, while persistent dysphonia occurs in 1 to 5%. In this study, early complications in patients who underwent thyroid surgery at department of otolaryngology in a tertiary hospital were analyzed and compared to the existing literature.<sup>[4]</sup>

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## PATIENTS AND METHODS

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The study was carried out by retrospectively evaluating the data of 196 patients (145 females, 51 males; mean age: 48.0±18.9; range, 18 to 86 years) who had thyroid surgery at the Ümraniye Training and Research Hospital, Department of Otolaryngology between January 2017 and December 2021. Patients under the age of 18, those who had previously experienced hypocalcemia, vocal cord paralysis, Horner syndrome, tracheal or esophageal damage, and those whose files were unreachable were excluded from the study. All procedures were performed by four head and neck specialists with at least two years of experience. Demographic data of the patients, medical history, indication of surgeries, fine-needle aspiration biopsy results, applied surgery types, and postoperative early complications were recorded.

Demographic data of the patients (sex and age), medical history, surgical indications (multinodular goiter, graves, suspicious fine-needle aspiration biopsy, and malignancy), surgical technical details (isthmelobectomy, total thyroidectomy, and total thyroidectomy + neck dissection), postoperative early complications (hypocalcemia, RLN injury, hematoma, tracheal injury, wound site infection, hoarseness, and chylous fistula) were recorded. Early vital signs of patients, wound site situation, vocal cord examinations, voice quality, and serum calcium, phosphor, and

albumin values were retrospectively reviewed. The normal range for serum total calcium was calculated to be 8.5 to 10.5 mg/dL. The corrected calcium ratio of 8.5 mg/dL, which was calculated by serum albumin levels, was assumed as hypocalcemia. All patients underwent vocal cord examination on the first and seventh postoperative days. Postoperative wound site infection situations, hematoma, seroma, chylous fistula, and hoarseness were evaluated on the first and seventh postoperative days.

All surgeries were performed under general anesthesia. The patient was positioned and supported by a roll pillow under the shoulder. A preoperative nerve stimulator was prepared for all patients included in the study. An incision was made through the skin, subcutaneous tissue, fat, and platysma. Skin flaps were then raised deep to the platysma and superficial to the sternohyoid muscle. The flaps were elevated superiorly and inferiorly to the level of the thyroid cartilage and sternal notches, respectively. The strap muscles (sternohyoid and sternothyroid) were dissected by cutting the median raphe until the thyroid capsule was identified. Blunt dissection of the superficial loose areolar tissue of the thyroid gland progressed laterally until the carotid sheath was identified. The lobe was displaced toward the midline, and the middle thyroid vein was identified, ligated, and cut. The lobe was then retracted anteriorly to expose the superior thyroid artery and vein. Once these were identified, they were ligated and divided as close to the gland. During this dissection, care was taken to identify and preserve the superior parathyroid glands and the external branch of the superior laryngeal nerve (EBSLN).

While the upper pole was ligated, the cricothyroid muscle was observed in each case, and EBSLN was identified and preserved among cricothyroid muscle fibers. Subsequently, the function of EBSLN was checked by nerve monitoring. Afterward, the inferior thyroidal artery was identified and tied. The lobe was freed from the superior to the inferior pole. On the tracheoesophageal sulcus, RLN was identified with surgical landmarks (inferior thyroid artery, common carotid artery, and trachea) and a nerve stimulator, making sure that the nerve was protected via the nerve simulator. Prior to closure, the surgical field was evaluated for hemostasis. A Jackson-Pratt drain was placed under the strap muscles. The divided strap muscles and platysma were reapproximated with absorbable sutures (3-0 Vicryl), followed by reapproximation of the skin. The subcutaneous tissue and skin were sutured a pressured dressing was applied, and the surgical operation was ended. The same procedure was repeated for the left side.

**Table 1**  
Demographic data

	Male (n=51)		Female (n=145)		Total (n=196)	
	n	%	n	%	n	%
Mean age		52.3		46.57		48.03
Past medical history* (%)						
Diabetes mellitus	8	15.6	20	13.8	28	14.3
Hypertension	13	25.5	26	17.9	39	19.9
Coroner arterial disease	1	1.9	5	3.4	6	3.1
Asthma, chronic obstructive lung disease	2	3.9	10	6.9	12	6.1
Others**					34	17.3
None	25	49	93	65	118	60

\* Some of the patients included in the study had more than one additional disease.

\*\* The other comorbidities of the patients participating in the study are presented in this table under this item. The numbers in parentheses indicate the number of patients. Renal cell cancer (n=1), pulmonary embolism (n=2), fibromyalgia (n=1), hyperprolactinemia (n=1), chronic kidney disease (n=1) tuberculosis (n=1), rhotatoid arhritis (n=1), larynx cancer (n=2), colon cancer (n=2), breast cancer (n=1), osteoporosis (n=4), Behçet disesase (n=1), glucoma (n=1), hypothyroidism (n=1), psoriasis (n=1), rosacea (n=1), hyperlipidemia (n=3), fibrous dysplasia (n=1), cerebrovascular disease (n=2), arhythmia (n=5), acute lymphocytic leukemia (n=1) observed in 34 patients.

### Statistical analysis

Data were analyzed using IBM SPSS version 20.0 software (IBM Corp., Armonk, NY, USA). In descriptive statistics of data, mean, standard deviation (SD), median (min, max) values were defined. Appropriation of variables to normal distribution were reviewed by visual (histogram and probability graphs) and analytical tests (Kolmogorov-Smirnov and Shapiro-Wilk tests). Type 1 error was assumed as 5%. A p-value <0.05 was considered statistically significant.

## RESULTS

There were no comorbidities reported in 118 (60%) of the patients, with hypertension being the most

common (19.9%; Table 1). The most common surgical indication was multinodular goiter with a rate of 33.7% (n=66). The second most common surgical indication was suspicious fine-needle aspiration biopsy with 28.1% (n=55). Graves was found at a rate of 20.9% (n=41) and malignancy at a rate of 17.3% (n=34). Total thyroidectomy was performed in 127 (64.8%) patients, thyroid isthmelobectomy in 54 (27.6%) patients, and neck dissection combined with total thyroidectomy in 15 (7.6%) patients. Of the neck dissection patients included in the study, 12 (6%) were bilateral central, and three (1.6%) were lateral neck dissection (Table 2).

Among 196 individuals, 89 (45.4%) experienced early complications. No complications were noted in 107 (54.6%) patients. Eleven (5.6%) patients

**Table 2**  
Surgical details

	Male (n=51)		Female (n=145)		Total (n=196)	
	n	%	n	%	n	%
Surgery type (%)						
Isthmelobectomy	15	7.6	39	19.5	54	27.6
Total thyroidectomy	33	16.8	94	47.9	127	64.8
Total thyroidectomy + neck dissection	2	1.02	13	6.6	15	7.6
Surgical indication (%)						
Suspicious fine needle aspiration biopsy	14	7.14	41	20.9	55	28.1
Multinodular goiter	15	7.6	51	26.02	66	33.7
Graves disease	13	6.6	28	14.2	41	20.9
Malignancy	4	2.04	30	15.3	34	17.3

	n	%
Early postoperative complications		
Hypocalcemia	65	33.1
Recurrent laryngeal nerve injury	20	10.2
Hematoma	6	3.04
Seroma	7	3.5
Tracheal injury	0	0
Wound site infection	2	1.01
External branch of the superior laryngeal nerve injury (EBSLN)	0	0
Chylous fistula	0	0
Two or more complication	11	5.6

experienced several complications. Hypocalcemia was the most common complication with 33.1% (n=65). Hypocalcemia was followed by RLN damage with 10.2% (n=20). Hematoma, seroma, and wound infection were observed in 3.5% (n=7), 1%, and 2% of the patients, respectively. Tracheal damage and EBSLN injury, weakness in voice, decrease in voice range, and chylous fistula were not observed. In 20 patients, RLN injury was unilateral. Bilateral RLN injury was not recorded (Table 3).

## DISCUSSION

In our analysis, females were more likely to undergo thyroid surgery (74%). Yan et al.<sup>[5]</sup> examined 7,385 thyroidectomy patients and found that 71% of the patients were female. Moreover, in the study by Huang et al.,<sup>[6]</sup> 3,428 patients who underwent thyroid surgery were evaluated, and a female-to-male ratio of 5.24 to 1 was found. According to an epidemiological study, thyroid diseases are more common in the female population.<sup>[7]</sup> In our study, the female patient prevalence complied with the literature data. We observed that multinodular goiter was the most common indication, with a rate of 33.7%. In a study that included 787 patients who underwent thyroid surgery, the most common indication was nontoxic multinodular goiter.<sup>[8]</sup>

The patients in the study were frequently treated with total thyroidectomy. After the operation, 45.4% of patients had at least one complication. Furthermore, the most common two complications were hypocalcemia (33.1%) and RLN damage (10.2%). Of the patients, 54.6% did not encounter any complications.

In thyroid surgery, the most common complication is hypocalcemia.<sup>[9]</sup> Hypocalcemia observed in the early postoperative period can become permanent in the long term. In this study, we focused on early-period hypocalcemia. The incidence of transient hypocalcemia following thyroidectomy has been documented in the literature at 2 to 53%.<sup>[9-11]</sup> In this study, hypocalcemia ratio was established at the same ratio as documented in the literature. Hypoparathyroidism is the most common cause of postoperative hypocalcemia. Hypoparathyroidism is the result of iatrogenic removal or damage to the parathyroid gland.<sup>[12,13]</sup> Patients with low storage vitamin D levels in the preoperative period are at risk for transient hypocalcemia in the postoperative period. If the storage or active vitamin D levels of patients at risk for hypocalcemia are regulated in the preoperative period, the rates of transient hypocalcemia might decrease.<sup>[14]</sup> Early symptomatic hypocalcemia developing in the postoperative period may lead to laryngospasm, bronchospasm, tetany, and morbidity, and mortality would be likely to happen due to arrhythmias caused by QT extension.<sup>[15]</sup>

The values of serum calcium, phosphorus, and albumin should be checked after thyroid surgery. To reduce morbidity and mortality in individuals with symptomatic and severe hypocalcemia (<7 mg/dL), intravenous calcium replacement should be administered. However, early asymptomatic hypocalcemia typically responds to therapy with oral vitamin D and calcium supplementation, thereby preventing issues.<sup>[10]</sup>

The corrected calcium values were calculated for each patient in our study, and appropriate replacement was performed for hypocalcemic patients. Thus,

hypocalcemia-related morbidity and mortality were not found in the early period.

The rate of transient hypocalcemia ratio is higher than permanent hypocalcemia ratio, and transient hypocalcemia is between the rate of 1 and 4%.<sup>[3,16]</sup> In our study, the permanent hypocalcemia ratio was observed at 4.02% (n=8), which is consistent with the literature.

In our study, RLN injury was detected in 10.2% of patients. Recurrent laryngeal nerve injury has been reported between 2.3 and 9.8% in the literature in the early postoperative period.<sup>[16,17]</sup> One-sided RLN injury leads to morbidities such as dysphonia, hoarseness, swallowing difficulties, and decrease in life quality.<sup>[17]</sup> In the early postoperative period, cord mobility should be evaluated by a flexible endoscope in every patient undergoing thyroid surgery since RLN paralysis detected in the early postoperative period can be improved with systemic steroid treatment.<sup>[18]</sup> In the early postoperative period, neuropraxia may develop due to myelin sheath damage in patients with unilateral RLN injury; however, if the RLN is intact, cord mobility may recover within a few days with careful surgical dissection, use of nerve monitoring, and appropriate hemostasis reduce risk of RLN injury.<sup>[18]</sup> Permanent RLN injury is reported in the literature at rate of 1 to 5%.<sup>[3,4]</sup> In our study, permanent RLN injury was observed in 3% (n=6), in line with the literature. Bilateral RLN injury is a life-threatening complication. It presents immediately with acute dyspnea in the early postoperative period and requires urgent intervention as it may cause mortality. In the study of Rosato et al.,<sup>[19]</sup> bilateral RLN injury was found to be 0.4% in the postoperative follow-up in patients who underwent thyroid surgery. Bilateral RLN injury was not observed in our study.

Another important complication is hematoma. If the hematomas are not noticed in the early period, they can cause mortality by compressing vital structures in the neck. The incidence of hematomas in patients undergoing thyroidectomy ranges from 0 to 6.5%.<sup>[20]</sup> In our study, the postoperative hematoma rate was 3% consistent with the literature.

Hematomas were generally observed within the first 24 h after thyroidectomy. In the study of 6,744 patients by Leyre et al.,<sup>[21]</sup> only %10 of patients who developed hematoma in the first 24 h after surgery. In our study, hematomas were observed in the first 24 h postoperatively. Early signs of hematomas are a progressive increase in the hemorrhagic flow from the drain, rapidly increasing ecchymosis at the wound site, respiratory distress, and swelling in

the neck. Recognition and immediate decompression of hematomas in the early postoperative period is lifesaving. The male sex, thyroid malignancy, extensive surgery, and insufficient surgeon experience increase the risk of hematoma. The risk of hematoma does not increase in patients using antiplatelet and anticoagulants with adequate hemostasis.<sup>[20]</sup> The most effective way to prevent postoperative hematoma is to provide adequate perioperative hemostasis.

Other complications of thyroid surgery are wound infection, tracheal injury, and esophageal injury. Wound infection is more common in patients with a high body mass index.<sup>[22]</sup> In our study, wound infection was observed in only two (%1) patients. Both patients had a body mass index >25. Tracheal or esophageal injury, which is another complication, is very rare, except for a few case reports in the literature.<sup>[19,20]</sup> Tracheal or esophageal injuries, EBSLN injury, and chylous fistula were not observed in our study.

This study has some limitations. First, this is a retrospective study conducted only on patient files. Second, the number of cases is relatively low compared to studies in the literature.

In conclusion, rarely reported early complications following thyroidectomy include life-threatening hematoma, bilateral RLN injury, and tracheal injury. More frequent complications observed are hypocalcemia and unilateral RLN damage, which may produce long-term consequences by diminishing quality of life. However, with close postoperative follow-up, a multidisciplinary approach, and high surgical experience, the rates of early complications after thyroid surgery may decrease. When optimal conditions are met, thyroid surgery is a safe procedure with low morbidity and mortality.

**Ethics Committee Approval:** The study protocol was approved by the Ümraniye Training and Research Hospital Ethics Committee (date: 20.01.2022, no: B.10.1.TKH.4.34.H.GP.0.01). The study was conducted in accordance with the principles of the Declaration of Helsinki.

**Patient Consent for Publication:** A written informed consent was obtained from each patient.

**Data Sharing Statement:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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