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A CROSS-SECTIONAL ASSESSMENT ON THE THYROIDECTOMY PROCEDURES IN TURKEY

TÜRKİYE'DE YAPILAN TİROİDEKTOMİ İŞLEMLERİNE İLİŞKİN KESİTSEL BİR DEĞERLENDİRME

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ABSTRACT

Objective: The aim of this study is to determine the types of thyroidectomy procedures and diagnosis, gender, age, clinical characteristics, and duration of stay in hospital in the patient population who underwent thyroidectomy in Turkey. In addition, it was aimed to determine the effect of demographic and clinical characteristics on the duration of hospital stay.

Method: This research is a retrospective cross-sectional study. In the study, the demographic and clinical data of the patients who underwent thyroidectomy procedures during one year in Turkey were examined. Research data involves the data of the 25167 patients who underwent thyroidectomy procedures in the hospitals of the Ministry of Health in 2016. ICD-10-AM was used in grouping the diagnosis and procedures related to thyroidectomy cases. Descriptive statistics, Independent Samples T-test, Mann-Whitney U-Test, and Kruskal-Wallis test were used in the analysis of the data.

Results: The most common surgical procedure performed in the patient group is total thyroidectomy. In the study group, the mean age was 49.62±12.917 years and the majority (81%) of patients were females. The average duration of hospital stay was 4.87±3.308 days.

Conclusion: It was concluded that the duration of hospital stay was longer in patients who underwent a thyroidectomy procedure, in the male sex, those aged 50 years or over, those with a diagnosis of neoplasm, those with infection, hypertensive disease, and heart disease, those who underwent other surgical procedures in addition to thyroidectomy, and those who developed complications compared to other patient groups.

Key Words: Duration of Hospital Stay, Patient Characteristics, Thyroid Disease, Thyroidectomy, Turkey

ÖZ

Amaç: Bu çalışmanın amacı, Türkiye'de tiroidektomi yapılan hasta popülasyonunda tiroidektomi işlem türleri ve tanıları, cinsiyet, yaş, klinik özellikler ve hastanede kalış sürelerini belirlemekti. Ayrıca demografik ve klinik özelliklerin hastanede kalış süresine etkisinin belirlenmesi amaçlandı.

Yöntem: Bu araştırma retrospektif kesitsel bir çalışmadır. Çalışmada, Türkiye'de bir yıl içinde tiroidektomi işlemi uygulanan hastaların demografik ve klinik verileri incelendi. Araştırma verileri 2016 yılında Sağlık Bakanlığı'na bağlı hastanelerde tiroidektomi operasyonu geçiren 25167 hastanın verilerini içerdi. Tiroidektomi vakalarına ilişkin tanı ve işlemlerin gruplandırılmasında ICD-10-AM kullanıldı. Verilerin analizinde tanımlayıcı istatistikler, Bağımsız Örneklemler T-testi, Mann-Whitney U-Testi ve Kruskal-Wallis testi kullanıldı.

Bulgular: Hasta grubunda en sık yapılan cerrahi işlem total tiroidektomiydi. Çalışma grubunda yaş ortalaması 49.62±12.917 yıl olup, hastaların çoğunluğu (%81) kadındı. Ortalama hastanede kalış süresi 4.87±3.308 gündü.

Sonuç: Tiroidektomi operasyonu geçiren erkek cinsiyette, 50 yaş ve üzerinde, neoplazm tanısı olanlarda, enfeksiyonlularda, hipertansif hastalığı olanlarda, kalp hastalığı olanlarda, tiroidektomi dışında başka cerrahi işlemler geçirenlerde, komplikasyon gelişenlerde diğer hasta gruplarına göre hastanede kalış süresinin daha uzun olduğu sonucuna varıldı.

Anahtar Kelimeler: Hastanede Kalış Süresi, Hasta Özellikleri, Tiroid Hastalığı, Tiroidektomi, Türkiye

INTRODUCTION

Thyroid disorders are among the common diseases that occur in communities [1]. Particularly due to the severe iodine deficiency in communities in certain regions of Turkey, it is considered an endemic region regarding the prevalence of goiter [2]. It has been revealed by the World Health Organization (WHO) that the prevalence of goiter must be over 5% in a region to be able to declare that region as a goiter endemic region [3]. The prevalence of iodine deficiency was found to be 31.8% in the average of 20 regions in the study, which started in 1997 and was carried out by the Republic of Turkey's Ministry of Health, WHO, United Nations Children's Fund (UNICEF) and the International Council for Control of Iodine Deficiency Disorders (ICCIDD). Even in one of the regions, the rate reaches up to 56% [2,4]. Albeit some studies have been performed to reduce the incidence of goiter, near-term data indicates that goiter is still a major

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incidence of goiter, near-term data indicates that goiter is still a major public health problem in Turkey [5].

Thyroidectomy is a surgical procedure, which is performed for benign, malignant nodules or toxic conditions of the thyroid gland [6]. In the surgical treatment of thyroid diseases, operations are performed in which part of the thyroid gland, a lobe, nearly all or complete of it is removed. Among these techniques, total thyroidectomy, which is the removal of the entire thyroid gland, is accepted as the gold standard treatment method [7].

Although the awareness regarding the goiter diseases dates back to very earlier times, surgical treatment procedures started to be performed towards the end of the 19th century [8]. Thyroid nodules are five times more common among females than males across the world [9]. The proximity of vital vascular, neural structures and organs in neck anatomy to the thyroid gland and the narrow surgical area are the primary factors that make a safe thyroid surgery challenging [6]. It is likely that complications such as hypocalcemia, hemorrhage, laryngeal nerve damage, infection, and hypoparathyroidism could occur in patients following the thyroidectomy procedures [1,8,10]. Complications are among the factors that longer the duration of hospitalization and increase other treatment costs [10,11].

Surgical thyroid interventions can be performed outpatient as well as conventionally inpatient [7,12-14]. Although outpatient treatment is recommended as an alternative to inpatient treatment in thyroidectomy to reduce both costs and incidence of complication, it is suggested that there is no compelling evidence, which shows that outpatient treatment is more effective. It is well-known that the costs of hospital bed, labor, medicine, and medical supplies are considerable regarding the increase in treatment costs [15]. From this point of view, it can be stated that the additional number of days of hospitalization increases the treatment costs [11,14,16].

In this study, it was aimed to assess cross-sectionally the effects of the types of procedures, sex, age, and clinical characteristics of the patients on the duration of hospitalization in the patient population who underwent thyroidectomy in Turkey. In addition, it was aimed to determine the effect of demographic and clinical characteristics on the duration of hospital stay.

METHOD

This research is a cross-sectional retrospective study, and the study population consists of all patients who underwent thyroidectomy procedures between January 01, 2016, and December 31, 2016, in the hospitals of the Republic of Turkey Ministry of Health. The data of the study were obtained from the Ministry of Health, General Directorate of Health Services, Department of Social Security Practices.

In this study, ICD-10-AM (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification) was used to categorize diagnoses and procedures [17]. In the study, a total of 25196 patient data were obtained including "Total thyroidectomy", "Total thyroid lobectomy, unilateral", "Subtotal thyroidectomy, bilateral", "Subtotal thyroidectomy, unilateral", "Total thyroidectomy, following previous thyroid surgery", "Total thyroidectomy, substernal", "Subtotal thyroidectomy, following previous thyroid surgery", "Subtotal thyroidectomy, substernal", "Other procedures on the thyroid gland", and "Subtotal thyroidectomy procedure for thyrotoxicosis". Although the thyroidectomy procedure was performed in 18 of these patients, it was detected that there was no diagnosis related to the procedures; hence, it was considered a coding error and was excluded from the analysis. It was determined that "Other procedures on thyroid gland" were performed in 7 patients in total, while "Subtotal thyroidectomy procedure for thyrotoxicosis" was performed in 4 patients. Since the number of observations was not adequate in these procedures, they were excluded from the analysis. Thus, the analyzes were performed with the data of the 25,167 patients.

Patients who underwent thyroidectomy procedure was examined regarding sex, age (in terms of continuous numerical data and categorically (<50 and 50), number of hospitalization days, main diagnosis requiring thyroidectomy procedure and type of thyroidectomy procedure, and based on the presence/absence of following variables; neoplasm diagnosis, infectious disease, hypertensive disease, heart disease, intensive care admission, complication diagnosis and accompanying health intervention (surgical intervention) performed in addition to the thyroidectomy procedure. In the study, accompanying health intervention was used to refer to other surgical procedures, which were performed in addition to thyroidectomy during the same hospitalization.

Statistical Analysis

Microsoft Office Excel 2016 was used to organize the data of the patients, and the statistical analysis of the data was performed via the software of IBM SPSS Statistics 23 was carried out in a multi-centered manner with individuals working as nurses across Turkey, whose e-mail and telephone information was accessed from social media networks such as Facebook, Twitter, Instagram, and Linkedin, and who voluntarily participated in the research. The data of the research were collected between March-April 2020.

Independent Samples t-Test was used for comparisons of two independent groups in continuous numerical data showing normal distribution, and Mann-Whitney U-Test was used if it was not normally distributed. The Kruskal-Wallis test was used to analyze the significance of the difference between the means of more than two independent groups, and the Mann-Whitney U-test was used to determine between which groups the difference was.

In the study, the confidence interval was determined as 95%, and the results were considered statistically significant at $p<0.05$.

Ethical Considerations

Permission for use of research data was obtained from the Republic of Turkey Ministry of Health General Directorate of Health Services. The study protocol was approved by the Non-Interventional Clinical Research Ethics Committee of İzmir Bakırçay University.

RESULTS

The distribution of data regarding the thyroidectomy procedure diagnosis and thyroidectomy types are presented in Table 1. Of the 25167 patients who underwent thyroidectomy, approximately 86% (21606) of them had "Total thyroidectomy", while nearly 7% (1841) of them underwent "Total thyroid lobectomy, unilateral". The most common diagnoses, in which the thyroidectomy procedure is applied, are E042-Non-toxic multinodular goiter (11649 patients and about 46%), C73-Malignant neoplasm of the thyroid gland (76 patients and about 15%), E049-Non-toxic goiter, undiagnosed (2629 patients and about 10%), and E048-Other diagnosed with non-toxic goiter (approximately 5% in 1220 patients). These four most common diagnostic groups account for more than 75% of the total cases.

The thyroidectomy procedures distribution of the patients in the study group regarding the sex, neoplasm occurrence, intensive care admission, complication, and presence of another accompanying health intervention are presented in Table 2. Nearly 81% of the patients who underwent thyroidectomy were females. "Total thyroidectomy" was performed on 86.4% of the females. The rate of undergoing "total thyroidectomy" was determined to be lower in male patients (83.6%) compared to females. Approximately 20% of patients have a diagnosis of neoplasm (malignant and benign). The most common procedure that was performed on patients with a diagnosis of neoplasm is "Total thyroidectomy" with a rate of approximately 86%. The rate of undergoing "total thyroidectomy" procedure in patients without neoplasm (86.4%) was found to be higher compared to patients with neoplasm (83.5%).

Table 1. Distribution of diagnoses by thyroidectomy procedures

Diagnosis-Procedure Types		Total thyroidectomy	Total thyroid, lobectomy, unilateral	Subtotal thyroidectomy, bilateral	Subtotal thyroidectomy, unilateral	Total thyroidectomy, following previous thyroid surgery	Total thyroidectomy, substernal	Subtotal thyroidectomy, following previous thyroid surgery	Subtotal thyroidectomy, substernal	Total
E042-Nontoxic multinodular goiter	n	10394	603	374	104	98	48	15	13	11649
	%	89.2	5.2	3.2	0.9	0.8	0.4	0.1	0.1	100.0
C73-Malignant neoplasm of thyroid gland	n	3262	233	60	24	129	15	50	3	3776
	%	86.4	6.2	1.6	0.6	3.4	0.4	1.3	0.1	100.0
E049-Nontoxic goitre, unspecified	n	2216	251	78	43	22	6	9	4	2629
	%	84.3	9.5	3.0	1.6	0.8	0.2	0.3	0.2	100.0
E048-Other specified nontoxic goitre	n	1028	68	90	22	9	2	1	0	1220
	%	84.3	5.6	7.4	1.8	0.7	0.2	0.1	0.0	100.0
D34-Benign neoplasm of thyroid gland	n	620	124	30	22	7	2	1	1	807
	%	76.8	15.4	3.7	2.7	0.9	0.2	0.1	0.1	100.0
E052-Thyrotoxicosis with toxic multinodular goiter	n	618	40	34	5	3	6	1	1	708
	%	87.3	5.6	4.8	0.7	0.4	0.8	0.1	0.1	100.0
E079-Disorder of thyroid, unspecified	n	554	58	17	14	6	1	1	0	651
	%	85.1	8.9	2.6	2.2	0.9	0.2	0.2	0.0	100.0
E041-Nontoxic single thyroid nodule	n	387	187	7	22	13	9	8	3	636
	%	60.8	29.4	1.1	3.5	2.0	1.4	1.3	0.5	100.0
E078-Other specified disorders of thyroid	n	462	59	32	11	7	2	1	0	574
	%	80.5	10.3	5.6	1.9	1.2	0.3	0.2	0.0	100.0
E040-Nontoxic diffuse goitre	n	416	38	40	13	3	2	0	3	515
	%	80.8	7.4	7.8	2.5	0.6	0.4	0.0	0.6	100.0
E063-Autoimmune thyroiditis	n	443	42	5	4	7	2	4	0	507
	%	87.4	8.3	1.0	0.8	1.4	0.4	0.8	0.0	100.0
D440-Neoplasm of uncertian or unknown behaviour of thyroid gland	n	234	13	3	3	2	0	0	0	255
	%	91.8	5.1	1.2	1.2	0.8	0.0	0.0	0.0	100.0
E011-Lodine-deficiency-related multinodular (endemic) goiter	n	243	2	3	1	1	2	0	1	253
	%	96.0	0.8	1.2	0.4	0.4	0.8	0.0	0.4	100.0
E050-Thyrotoxicosis with diffuse goiter	n	144	0	0	2	0	1	0	0	147
	%	98.0	0.0	0.0	1.4	0.0	0.7	0.0	0.0	100.0
E059-Thyrotoxicosis, unspecified	n	99	7	2	2	0	1	0	0	111
	%	89.2	6.3	1.8	1.8	0.0	0.9	0.0	0.0	100.0
E039-Hypothyroidism, unspecified	n	58	5	23	4	0	0	0	0	90
	%	64.4	5.6	25.6	4.4	0.0	0.0	0.0	0.0	100.0
E038-Other specified hypothyroidism	n	57	1	14	3	1	0	0	0	76
	%	75.0	1.3	18.4	3.9	1.3	0.0	0.0	0.0	100.0
C329-Malignant neoplasm of the larynx, unspecified	n	27	25	1	8	0	0	1	1	63
	%	42.9	39.7	1.6	12.7	0.0	0.0	1.6	1.6	100.0
E069-Thyroiditis, unspecified	n	47	3	4	0	1	0	0	1	56
	%	83.9	5.4	7.1	0.0	1.8	0.0	0.0	1.8	100.0

E065-Other chronic thyroiditis	n	36	1	7	1	0	0	0	0	45
	%	80.0	2.2	15.6	2.2	0.0	0.0	0.0	0.0	100.0
Other diagnoses	n	261	81	16	24	13	2	2	0	399
	%	65.4	20.3	4.0	6.0	3.3	0.5	0.5	0.0	100.0
Total	n	21606	1841	840	332	322	101	94	31	25167
	%	85.9	7.3	3.3	1.3	1.3	0.4	0.4	0.1	100.0

The rate of undergoing "Total thyroidectomy, following previous thyroid surgery" and "Subtotal thyroidectomy, following previous thyroid surgery" among patients diagnosed with neoplasm (2.7% and 1.0%, respectively) was higher compared to patients without neoplasm diagnosis (0.9% and 0,2%, respectively). Nearly 4% of the total patients were hospitalized in the intensive care unit, and there are no remarkable differences between the groups of inpatient and outpatient patients, regarding the distribution of procedures.

Complications were observed in 0.7% of the patients (186 patients). The procedures, which have the highest incidence rates of complications, are "Subtotal thyroidectomy, substernal" (3.2%) and "Subtotal thyroidectomy, followed by previous thyroid surgery" (1.1%), which are also the least commonly performed procedures. Complications were above the average (0.9%) in "total thyroidectomy, following previous thyroid surgery" (322 patients) and "total thyroid lobectomy, unilateral" (1841 patients) procedures that were applied to a larger patient group.

No complications were observed in any of the patients who underwent the "total thyroidectomy, substernal" procedure (Table 2).

Table 2. Distribution of sex and clinical characteristics by thyroidectomy procedures

Gender and Medical Characteristics Groups of Patients	Total thyroidectomy	Total thyroid lobectomy, unilateral	Subtotal thyroidectomy, bilateral	Subtotal thyroidectomy, unilateral	Total thyroidectomy, following previous thyroid surgery	Total thyroidectomy, substernal	Subtotal thyroidectomy, following previous thyroid surgery	Subtotal thyroidectomy, substernal	Total
Female	17533	1397	693	246	266	68	74	20	20297
Male	4073	444	147	86	56	33	20	11	4870
Neoplasm (no)	17383	1398	736	261	183	84	41	26	20112
Neoplasm (yes)	4223	443	104	71	139	17	53	5	5055
Intensive care (no)	20767	1772	799	321	310	95	88	29	24181
Intensive care (yes)	839	69	41	11	12	6	6	2	986
Complication (no)	21446	1825	836	331	319	101	93	30	24981
Complication (yes)	160	16	4	1	3	0	1	1	186
Concomitant surgical intervention (no)	20316	1693	812	297	282	97	81	24	23602
Concomitant surgical intervention (yes)	1290	148	28	35	40	4	13	7	1565
Total	21606	1841	840	332	322	101	94	31	25167

Accompanying health intervention is determined in 6.2% of the patients in the study group. It has been determined that the rate of undergoing "Total thyroidectomy" and "Subtotal thyroidectomy, bilateral procedure" is higher in patients without accompanying health intervention compared to the group with accompanying health intervention. The rate of having "Subtotal thyroidectomy, unilateral" and "Total thyroidectomy following previous thyroid surgery" procedures is higher in the accompanying health intervention group compared to the group without accompanying health intervention (Table 2).

The Kruskal Wallis test was used to determine whether the age varied depending on the thyroidectomy procedure groups, and the results are presented in Table 3.

The differences between the mean rank of the ages of the thyroidectomy procedure groups were determined to be statistically significant ($\chi 2$=156.513; SD=7; $p<0.05$). The Mann Whitney-U test was used to determine the ages of which groups were significantly different.

The analysis results for which the differences of patient ages based on the thyroidectomy procedure groups were found to be statistically significant are presented in Table 4. Based on the analysis results of the procedures groups' age differences, it was determined that the patients who underwent the "total thyroid lobectomy, unilateral" procedure were younger than the other six procedure patients which were compared in Table 4.

It was determined that patients who underwent the "total thyroidectomy, substernal" procedure were older than the other six procedure patients which were compared in Table 4. It was found that the patients who underwent the "subtotal thyroidectomy bilateral" procedure were older than the patients who underwent the "total thyroid lobectomy, unilateral" procedure, whereas they were younger than the patients who underwent the "total thyroidectomy, substernal" procedure. It was found that patients who underwent "total thyroidectomy, following previous thyroid surgery" were older than those who underwent "total thyroid lobectomy, unilateral", but were younger than the patients who underwent "total thyroidectomy, substernal". It was determined that patients who underwent "subtotal thyroidectomy, following previous thyroid surgery" were older than patients who underwent "total thyroid lobectomy, unilateral", whereas they were younger than patients who underwent "total thyroidectomy, substernal".

Based on the results of the Kruskal-Wallis test, which was performed to determine whether the number of days of hospitalization varies depending on thyroidectomy procedure groups (Table 3), it was found that the differences between the mean number of days of hospitalization and mean ranks of thyroidectomy procedure groups were statistically significant ($\chi 2$=61.421; SD=7; $p<0.05$). Mann-Whitney U-test results of thyroidectomy procedure groups in whom differences were determined in the number of days of hospitalization are presented in Table 5. When the differences between the mean ranks were examined based on the results of the analysis, it was found that the mean number of days of hospitalization for "Total thyroidectomy" procedure was higher than "Total thyroid lobectomy, unilateral" procedure, whereas it was lower than the "Subtotal thyroidectomy, bilateral" and "Subtotal thyroidectomy, bilateral" procedures. It was detected that the mean number of days of hospitalization for the "total thyroid lobectomy, unilateral" procedure was lower than all the procedure groups, which were compared in the table, and this difference was statistically significant.

The comparison results of the mean age of the patients who underwent thyroidectomy, regarding sex and clinical characteristics are presented in Table 4. Female patients who underwent thyroidectomy were, on average, three years older than male patients, and this difference was determined to be statistically significant. It is seen that patients with infectious disease are older (54.32 and 49.58, respectively) than patients without infectious disease. It was determined that the mean age of the patients with complications (53.92) was higher than the mean age of the patients without complications (49.59). However, the difference between the ages of inpatients and non-inpatients in the intensive care unit was not statistically significant. The difference between the mean ages of patients with and without neoplasm diagnosis was not statistically significant. It was found that patients with hypertensive disease were older (mean age: 60.16; 49.02, respectively) than patients without hypertensive disease. Similarly, the mean age of patients with heart disease (62.43) was determined to be higher than those without (49.55). It was found that patients who underwent accompanying health interventions were on average two years older than those who had not.

The comparative analysis results of sex, age, and medical characteristics of patients who underwent thyroidectomy procedures and the number of days of hospitalization are summarized in Table 5. The number of days of hospitalization was higher in male patients, patients aged 50 and over, patients with neoplasm diagnosis, infectious disease, hypertensive disease, heart disease, patients with complications and accompanying health interventions compared to other patient groups. However, although the mean number of days of hospitalization was higher in patients who were hospitalized in the intensive care unit than those who did not, the difference was not statistically significant.

DISCUSSION

To the best of our knowledge, this research is the first study in the literature in terms of examining the data of all thyroidectomy procedures that were performed in Turkey during a calendar year. However, since the study is retrospective research, which uses the records of the patients, it should be considered that there might be registration errors.

In our study, it was determined that the most common thyroidectomy procedure was performed due to multinodular goiter. Kazaure et al. [18] revealed that 45% of the patients who underwent thyroidectomy were due to multinodular goiter, and 20% were due to cancer.

The incidence of thyroid cancer has been revealed to be 4.5% in the United States, 3.4% in the United Kingdom, and the odds of thyroid nodules developing into malignancy has been revealed as 5-15% [19-21]. Similarly, it was determined in our study that in 15% of the patient’s surgery was performed due to cancer.

In our study, we found that patients who underwent total thyroidectomy had longer hospitalization periods compared to other types of procedures. Hu et al. [22] stated that there was no difference between the discharge of patients who underwent total thyroidectomy on the same day and their discharge on the postoperative day 1 or 2 in terms of re-admission to the hospital or having complications. In another study, Maroun et al. [23] revealed that the placement of catheterization in thyroid surgeries prolongs the hospital stay.

Moreover, we determined in our study that the presence of wound infection, presence of comorbidity, neoplasm, and complications as well as concurrent surgical operations prolonged hospital stay.

Kazaure et al. [18] revealed in their study that the incidence rate of severe hypocalcemia was 5.8% and it was more prevalent in total thyroidectomies. Torre et al. [24] put forward that postoperative hypoparathyroidism prolonged the duration of hospital stay. In our study, the total complication rate was 0.7% in all patients, and the most common complication was observed following the total thyroid procedure. Schwartz et al. [25] reported that the riskiest period for hemorrhage following thyroid surgery is the first 4 hours, while Dedivitis et al. [26] revealed in their study the symptomatic hematoma was between 0.1-1%. Furthermore, Dedivitis et al. [26] stated that the 1-day hospitalization period is a safe and effective duration for thyroid surgery

.

Table 3. Table of determining the differences in age and hospitalization days regarding the thyroidectomy procedure groups

	Operation Types	n	Mean/SD	χ^2	df	p
Age	Total thyroidectomy	21606	49.92/12.800			
	Total thyroid lobectomy, unilateral	1841	46.07/13.347			
	Subtotal thyroidectomy, bilateral	840	49.25/13.233			
	Subtotal thyroidectomy, unilateral	332	49.07/14.037			
	Total thyroidectomy, following previous thyroid surgery	322	49.52/12.644	156.513	7	**<0.001***
	Total thyroidectomy, substernal	101	54.73/12.792			
	Subtotal thyroidectomy, following previous thyroid surgery	94	50.53/12.667			
	Subtotal thyroidectomy, substernal	31	51.03/16.692			
	Total	25167	49.62/12.917			
Number of hospitalization days	Total thyroidectomy	21606	4.82/2.94			
	Total thyroid lobectomy, unilateral	1841	4.87/4.031			
	Subtotal thyroidectomy, bilateral	840	5.17/3.344			
	Subtotal thyroidectomy, unilateral	332	5.78/6.289			
	Total thyroidectomy, following previous thyroid surgery	322	4.96/2.856	61.421	7	**<0.001***
	Total thyroidectomy, substernal	101	7.15/17.107			
	Subtotal thyroidectomy, following previous thyroid surgery	94	5.66/5.907			
	Subtotal thyroidectomy, substernal	31	5.45/2.606			
	Total	25167	4.87/3.308			

**p<0.05, SD: standard deviation, df: degrees of freedom*

Table 4. Comparison of patient age by sex, clinical characteristics, and thyroidectomy procedure types

Patient groups	n	Mean/SD	t	df	p
Female	20297	48.94/12.810	-16.996	25165	**<0.001***
Male	4870	52.43/12.982			
Infectious disease (no)	24975	49.58/12.901	-5.063	25165	**<0.001***
Infectious disease (yes)	192	54.32/14.079			
Complication (no)	24981	49.59/12.913	-4.559	25165	**<0.001***
Complication (yes)	186	53.92/12.700			
Intensive care (no)	24181	49.6/12.904	-1.006	25165	0.315
Intensive care (yes)	986	50.02/13.231			
			U	**z**	**p**
Neoplasm (no)	20112	49.55/12.805	50115755	-1.554	0.120
Neoplasm (yes)	5055	49.88/13.348			
Hypertension disease (no)	23806	49.02/12.807	8056231	-31.249	**<0.001***
Hypertension disease (yes)	1361	60.16/9.943			
Heart disease (no)	25024	49.55/12.891	805348	-11.360	**<0.001***
Heart disease (yes)	143	62.43/10.921			
Concomitant surgical intervention (no)	23602	49.51/12.810	17080505	-4.988	**<0.001***
Concomitant surgical intervention (yes)	1565	51.19/13.340			
Total thyroidectomy	21606	49.92/12.800	16589038	-11.837	**<0.001***
Total thyroid lobectomy, unilateral	1841	46.07/13.347			

Total thyroidectomy	21606	49.92/12.800	861812	-3.650	**<0.001***
Total thyroidectomy, substernal	101	54.73/12.792			
Total thyroid lobectomy, unilateral	1841	46.07/13.347	668445	-5.637	**<0.001***
Subtotal thyroidectomy, bilateral	840	49.25/13.233			
Total thyroid lobectomy, unilateral	1841	46.07/13347	265569	-3.806	**<0.001***
Subtotal thyroidectomy, unilateral	332	49.07/14.037			
Total thyroid lobectomy, unilateral	1841	46.07/13.347	253569	-4.144	**<0.001***
Total thyroidectomy, following previous thyroid surgery	322	49.52/12.644			
Total thyroid lobectomy, unilateral	1841	46.07/13.347	59302	-6.138	**<0.001***
Total thyroidectomy, substernal	101	54.73/12.792			
Total thyroid lobectomy, unilateral	1841	46.07/13.347	69114	-3.296	**<0.001***
Subtotal thyroidectomy, following previous thyroid surgery	94	50.53/12.667			
Subtotal thyroidectomy, bilateral	840	49.25/13233	32523	-3.836	**<0.001***
Total thyroidectomy, substernal	101	54.73/12.792			
Subtotal thyroidectomy, unilateral	332	49.07/14.037	12860	-3.548	**<0.001***
Total thyroidectomy, substernal	101	54.73/12.792			
Total thyroidectomy, following previous thyroid surgery	322	49.52/12.644	12361	-3.640	**<0.001***
Total thyroidectomy, substernal	101	54.73/12.792			
Total thyroidectomy, substernal	101	54.73/12.792	3885	-2.191	**0.028***
Subtotal thyroidectomy, following previous thyroid surgery	94	50.53/12.667			
Total	25167	49.62/12.917	-	-	-

**p<0.05, SD: Standard deviation, df: Degrees of freedom*

Table 5. Comparison of the number of days of hospitalization by thyroidectomy procedure type, age, sex, and clinical characteristics

Patient groups	**n**	**Mean R.**	**U**	**z**	**p**
Female	20297	125239.45	48204261	-2.736	**0.006***
Male	4870	128342.95			
<50	12568	121713.69	73986166	-9.197	**<0.001***
≥50	12599	12995.62			
Neoplasm (no)	20112	124553.86	48246394	-5.725	**<0.001***
Neoplasm (yes)	5055	130957.09			
Infectious disease (no)	24975	125515.01	1585931	-8.272	**<0.001***
Infectious disease (yes)	192	168114.45			
Hypertension disease (no)	23806	124823.81	13780849	-9.485	**<0.001***
Hypertension disease (yes)	1361	14361.47			
Heart disease (no)	25024	125601.27	1191825	-7.048	**<0.001***
Heart disease (yes)	143	167615.63			
Intensive care (no)	24181	125732.83	11662090	-1.184	**0.236**
Intensive care (yes)	986	12846.82			
Complication (no)	24981	125406.85	1241176	-11.203	**<0.001***
Complication (yes)	186	184015.11			
Concomitant surgical intervention (no)	23602	123981.42	14081949	-16.108	**<0.001***
Concomitant surgical intervention (yes)	1565	153869.50			
Total thyroidectomy	21606	11806.69	18101664	-6.553	**<0.001***

Total thyroid lobectomy, unilateral	1841	10753.52			
Total thyroidectomy	21606	11204.67	8667725	-2.257	**0.024***
Subtotal thyroidectomy, bilateral	840	11707.78			
Total thyroidectomy	21606	10846.73	934005	-2.556	**0.011***
Total thyroidectomy, substernal	101	12409.43			
Total thyroid lobectomy, unilateral	1841	1287.49	674711	-5.415	**<0.001***
Subtotal thyroidectomy, bilateral	840	1458.27			
Total thyroid lobectomy, unilateral	1841	1067.83	270308	-3.437	**<0.001***
Subtotal thyroidectomy, unilateral	332	1193.32			
Total thyroid lobectomy, unilateral	1841	1064.30	263813	-3.229	**0.001***
Total thyroidectomy, following previous thyroid surgery	322	1183.20			
Total thyroid lobectomy, unilateral	1841	960.38	72506	-3.822	**<0.001***
Total thyroidectomy, substernal	101	1174.12			
Total thyroid lobectomy, unilateral	1841	932.63	21418	-2.446	**0.014***
Subtotal thyroidectomy, substernal	31	1166.11			

**p<0.05*

CONCLUSION

In conclusion, it was determined that sex, age, complications, presence of neoplasms, infectious diseases, circulatory system diseases such as blood pressure and heart, presence of accompanying health interventions, and types of thyroidectomy procedures impact the number of days of hospitalization in thyroidectomy procedures. Since hospital stay is one of the significant determinants of treatment costs and can be used as an indicator of healthcare service quality, it is considered to be helpful in determining the factors that impact the length of hospital stay. It is considered that investigating the impact of the number of days of hospitalization on treatment costs in further studies, which could not be examined in this study due to limitations regarding the data, would contribute to the scientific literature.

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