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Factors affecting need for hormone replacement after thyroid lobectomy

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ABSTRACT

Aims: The aim of this study is to determine the incidence and risk factors of postoperative hormone replacement in patients who underwent thyroid lobectomy.

Methods: Patients who underwent thyroid lobectomy in our clinic between January 2015 and January 2021 were retrospectively scanned. Age, gender, preoperative hemogram and thyroid function tests (TFT) were screened. During postoperative follow-up, current TFT, height, weight, thyroid hormone replacement status and hypothyroidism symptoms were questioned. Pathology reports were examined.

Results: The pathology (patological examination results of specimen of the patients) were nodular hyperplasia in 81.1% (n=30) and Papillary thyroid carcinoma (PTC) in 18.9% (n=7). While the need for hormone replacement developed in 37.8% (n=14) of the patients in the postoperative follow-up, it did not develop in 62.2% (n=23). It was determined that high preoperative thyroid stimulating hormone (TSH) significantly increased the need for postoperative hormone replacement ($p<0.05$). In addition, it was found that the need for hormone replacement increased significantly in patients whose pathology results were compatible with malignancy ($p<0.05$).

Conclusion: Malignancy and preoperative high TSH are important predictors of postoperative levothyroxine need.

Keywords: Thyroid lobectomy, hormone replacement, levothyroxine, risk factors

INTRODUCTION

Though 20% of individuals have palpable thyroid nodules on physical examination, approximately half of the adult population has thyroid nodules incidentally on imaging.[1] Thyroid carcinoma occurs less frequently, with a malignancy rate of 5-15% of all thyroid nodules.[2]

Thyroid lobectomy is generally indicated for the treatment of benign symptomatic nodules, intermediate nodules, or low-risk well-differentiated carcinoma less than 4 cm.[2,3] The need for lifelong thyroid hormone supplementation is an important consideration when deciding on the extent of surgery. Thyroid hormone supplementation is required after total thyroidectomy. Preservation of approximately half of the thyroid gland and eliminating the need for permanent thyroid hormone supplementation is thought to be an important advantage of thyroid lobectomy. In the literature, approximately 10-50% of patients require thyroid hormone supplementation after thyroid lobectomy.[4-7] There are some studies in the literature that can be used to calculate the risk of hiopthyroidism after lobectomy.[8-16] Numerous studies have focused on the prediction of thyroid hormone supplementation after thyroid lobectomy. Historically, rates of thyroid hormone supplementation after thyroid lobectomy have been studied from patients with benign pathology, as those with malignant outcomes were recommended complementary thyroidectomy according to previous guidelines.[17]

This study was designed to analyze the need for thyroid hormone replacement (levothyroxine) in patients who underwent thyroid lobectomy for benign and malignant reasons, and to analyze the relationship of post-lobectomy hypothyroidism with preoperative parameters and histopathological findings.

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METHODS

Our study is a retrospective study, and the study was started after receiving approval from the ethics committee (Date: 26.06.2020, Decision No: E-71522473-050.01.04-368). The Helsinki Declaration of Principles was complied with during the study. The files of patients who underwent thyroid lobectomy in our clinic between January 2015 and January 2021 were retrospectively scanned and their age, gender, preoperative hemogram, and thyroid function tests (TFT) were scanned. Current TFT, height, weight, thyroid hormone replacement status and hypothyroidism symptoms during postoperative follow-up were questioned. Pathology reports were examined.

Patients who underwent completion thyroidectomy, patients who received hormone replacement therapy (levothyroxine) before surgery, patients whose pathology report reported chronic lymphocytic thyroiditis, and patients with missing data were not included in the study.

The patients were divided into two groups: benign-malignant, with and without postoperative levothyroxine. Preoperative and postoperative values and hormone replacement needs were compared between the groups. The postoperative follow-up period of the patients was 2 years. The values at the 2nd year after surgery were compared. Additionally, patients were contacted and their current height, weight, and hypothyroidism symptoms were questioned. BMI (Basal metabolic index) of the patients was calculated. Hypothyroidism symptoms were considered to be present if at least two of the symptoms of fatigue, weight gain, constipation, decreased menstruation and sensitivity to cold were present.

Thyroid lobectomy protocol was performed in accordance with the 2015 ATA (American Thyroid Association) guidelines. Lobectomy was performed in unilateral benign pathologies. However, thyroid lobectomy was performed in patients with malignancy or suspected malignancy in FNAB, if the tumor diameter was smaller than 4 cm, if it was a unifocal lesion, if the patient did not have a history of radiotherapy, and if there was no malignant lymph node or distant metastasis. Levothyroxine replacement was performed in all cases with a serum TSH level of 10 mU/L in the postoperative follow-up. Levothyroxine replacement was performed in patients with serum TSH levels of 4-10 mU/L and hypothyroidism symptoms.

Statistical Analysis

Descriptive statistical analysis was performed to determine the general characteristics of the patients. The data were analyzed using the SPSS 23.0 program. The Kolmogorov-Smirnov test was used to determine whether the quantitative variables were normally distributed. Accordingly, Student-t test was used for parametric data and Mann-Whitney u test was used for non-parametric variables. Categorical variables were analyzed with the Chi-square test. Significance level was accepted as <0.05. SPSS statistical software (IBM SPSS Statistics, Version 26.0. Armonk, NY: IBM Corp.) was used for analysis.

RESULTS

Thirty-seven patients whose long-term information could be accessed and whose symptoms could be questioned were included in the study. 43.2% (n=16) of the patients were male and 56.8% (n=21) were female. The mean age was 46.6 (21-73). Preoperative FNAB of 7 (20.5%) patients had suspected malignancy, 10 (29.5%) patients had atypia of uncertain significance (AUS), and 17 (50%) patients had benign diagnosis. While 59.5% (n=22) of the patients had right lobectomy, 40.5% (n=15) had left lobectomy. The pathology result was nodular hyperplasia in 81.1% (n=30) and PTC in 18.9% (n=7). While the need for hormone replacement developed in 37.8% (n=14) of the patients in their postoperative 2-year follow-up, it did not develop in 62.2% (n=23). In the postoperative follow-ups, 37.8% (n=14) had hypothyroidism complaints independent of hormone replacement, while 62.2% (n=23) did not.

When evaluated according to the need for postoperative hormone replacement, it was determined that the higher TSH than the preoperative values significantly increased the need for postoperative hormone replacement (p<0.05) (**Table 1**). In addition, it was determined that the need for hormone replacement increased significantly in patients with a malignant pathology report (p<0.05) (**Table 1**).

When the patients were divided into groups according to the lobectomy side, it was observed that the lobectomy side did not affect postoperative calcium (Ca), hypothyroidism complaints, and hormone replacement dose (**Table 2**).

Table 2. Comparison of postoperative features according to the lobectomy side

Clinicopathological parameters	Right lobectomy (n=22)	Left lobectomy (n=15)	p value
Postop Ca	8.35 (7.8-10.0)	8.30 (7.6-9.4)	0.641*
Hypothyroidism complaints			0.823**
Yes	8 (57.1%)	6 (42.9%)	
No	14 (60.9%)	9 (39.1%)	
Hormone replacement dose (mcg)	75 (25-125)	66,6 (25-175)	0.770*

* Mann-Whitney-U test, ** Chi-square test

There was no correlation between levothyroxine dose and height, weight, and BMI (p=0.981, p=0.24, p=0.445, respectively).

Table 1. Comparison of demographic, laboratory and pathology results of all patients, those who received and did not receive postoperative hormone replacement

Clinicopathological parameters	All Patients (n=37)	Hormone Replacement (-) (n=23)	Hormone Replacement (+) (n=14)	p value
Age	46.6 ± 12.3	47.2 ±11.2	45.7 ±14.4	0.738*
Gender				0.733**
Female	21 (56.8%)	14 (66.7%)	7 (33.3%)	
Male	16 (43.2%)	9 (56.3%)	7 (43.8%)	
Preoperative Hgb	13.5 ±1.7	13.4 ±1.8	13.7 ±1.4	0.582*
Height (cm)	166.7 ±8.8	165.8 ±7.9	168.1 ±10.2	0.456*
Weight (kg)	78.3 ±13.4	76.6 ±12.0	81.2 ±15.5	0.311*
BMI (kg/m²)	28.2 ±4.8	27.9 ±4.8	28.7 ±4.9	0.632*
Preoperative Ca (mg/dl)	8.3 (7.6-10)	8.4 (7.6-10)	8.3 (7.7-9.4)	0.912***
Preoperative TSH (mU/L)	0.99 (0.02-5.19)	0.72 (0.03-3.8)	1.7 (0.02-5.1)	<0.05***
Preoperative T3 (pmol/L)	4.5 (3.6-10)	4.5 (3.9-5.9)	4.5 (3.6-10)	0.603***
Preoperative T4 (pmol/L)	13.1 (8.4-25.5)	13.3 (8.4-14.5)	12.9 (11.3-25.5)	0.963***
Lobectomy				0.546**
Right	22 (59.5%)	14 (63.6%)	8 (36.4%)	
Left	15 (40.5%)	9 (60%)	6 (40%)	
Pathology				<0.05***
Benign	30 (81.1%)	22 (73.3%)	8 (26.7%)	
Malign	7 (%18.9%)	1 (14.3%)	6 (85.7%)	

* Independent samples t-test, ** Chi-square test, ***Mann Whitney-U test

DISCUSSION

In the postoperative period, 37.8% of the patients required hormone replacement. This rate is consistent with the studies reported in the literature.[18] In our study, it was determined that the need for hormone replacement increased significantly in patients with higher preoperative TSH values and in patients whose pathology report was compatible with malignancy.

Patients can be ascribed that the advantage of lobectomy over total thyroidectomy is that it does not require hormone replacement throughout their life. However, we found that although the treatment was in accordance with the ATA guideline, some of the patients may still need hormone replacement.

In the study of Lee et al.[19] with 276 patients with lobectomy, it was observed that the preoperative TSH level and also the presence of microsomal antibodies were effective on the postoperative hormone replacement requirement, similar to our result. In the study of Wilson et al.[17] with 100 patients with lobectomy, it was determined that the preoperative increased TSH level also increased the need for postoperative hormone replacement. Likewise, Stoll et al.[6] It was determined in the study conducted by TSH that increased TSH level increased the need for postoperative hormone replacement. However, Hashimoto patients were not excluded in this study. In addition, it was observed that thyroiditis and remnant small-volume thyroid independently increased the postoperative hormone requirement.[17] Another study found that the volume of the remaining thyroid lobe increased the need for postoperative hormone replacement.[20] In this study, remnant thyroid volume was estimated from preoperative ultrasonography images. Similar to our study, in the study conducted by Wilson et al.[17] it was determined that the need for hormone replacement may develop after lobectomy if preoperative TSH is >2 mIU/L and the pathology result is related to malignancy.

Most studies are based on lobectomies performed due to benign diseases. We guessed that one of the reasons for this was the limited indication of lobectomy in patients diagnosed with malignancy. The biochemical mechanisms that will explain malignancy's effect on the remnant tissue in the resected tissue are still not fully elucidated.

As seen in the studies mentioned above, the results of our study were consistent with the literature. In patients planned for lobectomy, the current TSH level and the possibility of malignancy should be taken into consideration. TSH value and malignancy should be taken into consideration once again when determining lobectomy indications in the guidelines.

Limitations

The limitation of our study was that it was retrospective and single-center. Due to the lack of data, the number of our cases was small.

CONCLUSION

We found that preoperative TSH level is an important predictive factor. In addition, we determined that the presence of malignancy as a result of pathology is an important predictive factor. More comprehensive prospective randomized studies are needed to evaluate the effect of preoperative TSH level and malignancy on postoperative levothyroxine requirement.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study was approved by Sakarya University Ethics Committee (Date: 26.06.2020, Decision No: E-71522473-050.01.04-368).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper and that they have approved the final version.

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