ORIGINAL ARTICLE

Risk Factors of Post-Hemithyroidectomy Hypothyroidism

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ABSTRACT

Introduction: Hemithyroidectomy is one of the most frequently performed procedures often associated with complications, among which hypothyroidism is the most common. However, the risk factors for post hemithyroidectomy hypothyroidism are still unclear.

Objectives: To assess the incidence, risk factors and time taken to develop hypothyroidism after hemithyroidectomy.

Methods: A retrospective chart review of patients who underwent hemithyroidectomy between 2004 and 2012 in two different hospitals was performed. Patients were analyzed for age, gender, weight, height, body mass index (BMI), previous medical history and histological findings. The incidence of post hemithyroidectomy hypothyroidism was determined based on the thyroid stimulating hormone levels during the postoperative period.

Results: From a total of 213 patients, 83 met our inclusion criteria; 67 (80.7%) were women and 16 (19.3%) were men. Thirty-seven (45%) patients developed biochemical hypothyroidism postoperatively whereas 46 patients remained euthyroid (55%). The time taken to develop hypothyroidism was variable. Twenty-four (61.5%) of 37 patients developed hypothyroidism within the first 3 months postoperatively. There were no significant differences in gender, age, BMI, history of diabetes mellitus, the presence of thyroiditis in histopathological examination and postoperative pathologies between the postoperative hypothyroid and euthyroid groups.

Conclusions: Our results showed a high overall incidence of hypothyroidism following hemithyroidectomy (45%). As the majority of the patients in the hypothyroid group (70.3%) developed hypothyroidism within the first 6 months of post surgery, frequent thyroid function testing in the first 6 months, may help in initiating the treatment before the patient becomes symptomatic. We demonstrated that there are no predictive risk factors for post hemithyroidectomy hypothyroidism.

Key words: Hemithyroidectomy, hypothyroidism, thyroiditis

ملخص البحث:

تناقش هذه الدراسة الاسترجاعية عوامل الخطر وعامل الزمن في نسبة حدوث قصور في وظائف الغدة الدرقية بعد إجراء عملية جراحية فيها. تمت مراجعة ملفات هؤلاء المرضى في اثنين من مستشفيات الرياض الحكومية معتمدة على إنزيم (TSH). بينت هذه الدراسة أن نسبة حدوث القصور في وظائف الغدة الدرقية، بعد إجراء العملية فيها بلغت (45%) ، وان (70.3%) منهم اكتسب هذا القصور خلال ستة أشهر بعد إجراء العلمية.

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INTRODUCTION

Hemithyroidectomy, which involves the removal of one of the thyroid lobes, is a frequently performed procedure often associated with hypothyroidism as a surgical complication and less frequent complications such as postoperative bleeding, recurrent laryngeal nerve injury and wound infection.[1] Although hypothyroidism cannot be definitely predicted after hemithyroidectomy, its negative effect on the patient's health cannot be overlooked.[2] Previous studies have reported the incidence of post hemithyroidectomy hypothyroidism to be 5–35%, depending on the follow-up interval and how the investigators defined hypothyroidism.[3] Despite this high incidence, risk factors for post hemithyroidectomy hypothyroidism are still unclear. Based on the results of several studies, these risk factors include the presence of antithyroid antibodies, thyroiditis on histological examination, high thyroid stimulating hormone (TSH) levels before surgery and lymphocytic infiltration.[1-8] The time period between the surgical procedure and the diagnosis of hypothyroidectomy ranged from 6 to 12 months.[4,5] The objective of this study was to determine the incidence, risk factors, and development time for hypothyroidism in Saudi patients undergoing hemithyroidectomy.

METHODS

We carried-out a retrospective chart review of 83 patients who underwent hemithyroidectomy between 2004 and 2012 in King Abdulaziz University Hospital and King Fahad Medical City. This study was approved by the Institution Review Board of King Saud University. Demographic data were gathered from the patients' medical records including age, gender, weight, height, body mass index (BMI) and previous medical history. The inclusion criteria were as follows: The patient should have undergone hemithyroidectomy defined as unilateral thyroid lobectomy with or without ismethectomy with preservation of the contralateral lobe at the Department of Otorhinolaryngology, Head and Neck Surgery for various indications and undergone thyroid function test preoperatively and at least up to 1 year postoperatively. Patient should have been diagnosed with postoperative biochemical hypothyroidism (defined as a TSH level >5 mIU/L) at any time during the postoperative period (normal range of TSH is 0.25–5 mIU/L). All patients who underwent complete thyroidectomy were hypothyroid preoperatively, or did not undergo serial thyroid function tests preoperatively and up to 12 months postoperatively were excluded. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp. *t*-test was used for parametric data, Wilcoxon Mann–Whitney test for nonparametric variables and Pearson's and Chi-square and Fisher's exact tests for categorical data with *P* value considered to be significant if ≤0.05.

RESULTS

From the 213 patients who underwent hemithyroidectomy between 2004 and 2012 in King Abdulaziz University Hospital and King Fahad Medical City. 83 patients met the inclusion criteria. Eighty patients were excluded as they had not been followed up regularly, 24 due to missing preoperative data, four due to preoperative hypothyroidism, and 22 patients were excluded as they had undergone completion thyroidectomy <1 month post their hemithyroidectomy procedure. Of the 83 patients included in the study, 67 (80.7%) were women and 16 (19.3%) were men. Their mean age was 38 years. Table 1 shows the patients' demographic data: Age, weight, height and BMI. Thirty-seven (44.6%) patients developed biochemical hypothyroidism postoperatively whereas 46 (55.4%) patients remained euthyroid with an average follow-up time of 12 months. Twenty-one of the 37 patients with postoperative hypothyroidism were symptomatic before receiving treatment. The first postoperative thyroid function follow-up test was performed at different time points; whereas 40 patients (48.2%) had their first postoperative thyroid function test at 3 months, 26 patients (31.13%) had it at 6 months, 6 patients (7.2%) at 9 months, nine patients (10.8%) at 12 months and two patients (2.4%) at 18 months. There were no significant differences in age, gender, BMI, history of diabetes mellitus and the presence of thyroiditis on histopathology between the patients with postoperative hypothyroidism and the euthyroid group. Of the 37 patients who developed hypothyroidism, 33 were women. Of the 11 patients in the cohort who were known to have diabetes, seven developed hypothyroidism. However, 32 of the 37 patients who developed hypothyroidism had no significant medical history. Moreover, diabetes *per se* was not a significant risk factor ($P = 0.194$) for the development of hypothyroidism. Histological evidence of thyroiditis in the form of lymphocytic infiltration was seen in 13 patients, eight (61.5%) of them developed hypothyroidism with a nonsignificant *P* value. Table 2 shows the comparison between the hypothyroid and euthyroid groups. Table 3 shows the frequency of our patients' final pathology. There were no significant

differences in postoperative pathology between the two groups.

TIME TAKEN TO DEVELOP HYPOTHYROIDISM

Sixteen patients developed hypothyroidism within 3 months postoperatively; 10 within 3–6 months, four within 6–9 months, six within 9–12 months and one patient developed hypothyroidism within 12–18 months. Almost half of our patients were diagnosed with hypothyroidism within the first 3 months after surgery and two-thirds within the first 6 months. These data are reflected in Table 4.

DISCUSSION

Hypothyroidism following hemithyroidectomy developed in 44.6% of our patients, which is comparable to the overall incidence reported in previous studies.[3-5] Hypothyroidism is a potentially debilitating complication after hemithyroidectomy, yet prophylactic use of thyroxine should not be initiated postoperatively as it requires close monitoring to avoid the development of subclinical hyperthyroidism. Moreover, the use of thyroxine may not give the remaining thyroid tissue a chance to recover its normal function after surgical trauma. The half-life of TSH is approximately 7 days and it took at least four to five half-lives of TSH post hemithyroidectomy to obtain an accurate assessment of thyroid hormone production by the residual thyroid tissue.[5] Hence, it was preferable to perform the first TSH test at 12 weeks postoperatively in order to provide sufficient time for the traumatized thyroid to heal and resume its maximum function.

Although the majority (70.3%) of our hypothyroid patients developed high TSH levels within the first 6 months, the time to exclude the possibility of hypothyroidism development directly attributed to the surgery is unpredictable. Among our patients, 48% had their first postoperative TSH test 3 months after surgery, yet it was impossible to have it done at 3 months postoperatively for all the patients. This was influenced by many factors, including the patients' ability to attend the hospital as they resided in peripheral areas and their preference to being followed up by their primary care physician or endocrinologist. Only two patients in our cohort were found to have high TSH levels at 18 months postoperatively; one of them had not undergone any prior testing, so it is unknown whether the hypothyroidism could Have been detected, (if they) had the TSH test been performed earlier. This precludes us from setting 18 months as the maximum follow-up duration required.

Table 1: Demographic data

Data	Mean
Age	38 years (18-67)
Weight (kg)	79 (37-160)
Height (m)	1.61 (1.48-1.81)
BMI	30.7 (16.0-54.7)

BMI – Body mass index

Table 2: Comparison between euthyroid and hypothyroid groups in sex, age group, body mass index, history of diabetes mellitus, and presence of thyroiditis on histopathology

Factors	Postoperative euthyroid (46 patients)	Postoperative hypothyroid (37 patients)	*P*
Gender			
Male	12 patients	4 patients	0.068
Female	34 patients	33 patients	
Age			
40 years or less	29 patients	24 patients	0.524
More than 40 years	17 patients	13 patients	
BMI			
Underweight: <20	4 patients	1 patients	0.154
Ideal weight: 20-25	12 patients	5 patients	
Overweight: >25	30 patients	31 patients	
DM			
Diabetic	4 patients	7 patients	0.149
Nondiabetic	42 patients	30 patients	
Presence of thyroiditis			
Yes	5 patients	8 patients	0.234
No	41 patients	29 patients	

BMI – Body mass index; DM – Diabetes mellitus

Table 3: Postoperative pathologies in the patients

Pathology	Euthyroid group	Hypothyroid group
Follicular adenoma	13	5
Multinodular goiter	24	26
Autoimmune thyroiditis	0	3
Colloid cyst	3	0
Papillary thyroid carcinoma	3	1
Hurthle cell nodule	1	1
Follicular carcinoma	0	1
Others	2	0

Table 4: Time taken to develop hypothyroidism

Months	Frequency	Percent	Cumulative percent
3	16	43.2	43.2
6	10	27	70.3
9	4	10.8	81.1
12	6	16.2	97.3
18	1	2.7	100
Total	37	100	

Risk factors for post hemithyroidectomy hypothyroidism have been described in previous reports. These include the presence of antithyroid antibodies, thyroiditis in histology, high TSH levels before surgery, and lymphocytic infiltration.[1-8] In our study, there was no association between the development of hypothyroidism and previously mentioned risk factors. This could be attributed to small number of patients in this study and the absence of preoperative thyroid antibody testing. One of the limitations of our study is that most of our patients did not have complete preoperative antithyroid antibody data. As suggested in previous studies, the presence of anti-thyroid antibodies is a risk factor for hypothyroidism post hemithyroidectomy. Therefore, it is recommended that antithyroid antibody screening should be undertaken for every patient undergoing hemithyroidectomy.[1-8] All of our patients who developed hypothyroidism received thyroxine before TSH normalization; 16 of them were asymptomatic. However, in a study by Piper *et al.*, 33% of the patients who developed biochemical hypothyroidism within the first 19 months, normalized their TSH levels without treatment within 28 months postoperatively; therefore, a significant number did not need thyroxin.[3] Hence, we recommend that biochemical hypothyroidism should not be Treated at (least) until first detection of high TSH.

CONCLUSIONS

Our study showed that the overall incidence of hypothyroidism following hemithyroidectomy in the two hospitals was 45%; however, it was not possible to determine exactly when hypothyroidism developed postsurgery. However, the majority of patients (70%) in our hypothyroid group developed hypothyroidism within the first 6 months after surgery. Because we did not find a significant association between the previously mentioned risk factors and the development of hypothyroidism in our study, we could not conclusively come up with predictive risk factors. Further studies with more precise postoperative TSH and preoperative thyroid antibody testings are needed to define the risk factors and appropriate time for testing.

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Conflicts of interest

There are no conflicts of interest.

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