Prevalence of Hypothyroidism in Hemi-thyroidectomy Cases in a Tertiary Care Hospital of Chitwan, Nepal

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ABSTRACT

Background

Hypothyroidism following hemithyroidectomy surgery has a variable incidence. The purpose of the present study was to determine the prevalence and the risk factors of hypothyroidism following hemithyroidectomy surgery.

Methods

This analytical cross-sectional study was conducted among euthyroid patients who underwent hemithyroidectomy between August 2024 and April 2025 for benign disease in College of Medical Sciences Teaching Hospital, Bharatpur, Chitwan, Nepal. The prevalence of hypothyroidism (thyroid stimulating hormone (TSH) levels > 4.5 micro-IU/L) was analyzed. Factors like preoperative TSH level and gender associations were evaluated for the development hypothyroidism postoperatively. Data was analyzed using Students t test. p-value<0.05 was considered as statistically significant.

Results

This study was conducted among 122 patients. All patients were euthyroid preoperatively. They underwent hemithyroidectomy surgery for benign thyroid swelling. The prevalence of Hypothyroidism in Hemi-thyroidectomy cases was 16.39%. Out of which 8 patients (6.55%) developed overt hypothyroidism and 12 patients (9.83%) developed subclinical hypothyroidism. Majority of patients who developed postoperative hypothyroidism were female (90%).

Conclusions

About one fifth of euthyroid patients who undergo hemithyroidectomy developed hypothyroidism. Majority of postoperative hypothyroid patients were of female gender and with preoperative TSH level more than 2 micro-IU/L. It is concluded that, postoperative hypothyroidism should be considered in female patients with baseline TSH level more than 2 micro-IU/L.

Keywords: euthyroid; hypothyroidism; hemithyroidectomy; postoperative; surgery.

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INTRODUCTION

Hemithyroidectomy is done for thyroid nodules. Surgery has complications like wound infection, laryngeal nerve injury, post-operative hypothyroidism.[1] Serious complications include myxedema and coma.6 This affects quality of life of patient, post-operative evaluation of thyroid function is done.[2] Post hemithyroidectomy hypothyroidism have been reported in 5-35% of cases.[3] Those with higher risk factor are called for close follow up and monitoring is done.[4] The guidelines published in 2004 and standard practice in our institution, the reference range of Thyroid Function Test are T3:2.00-4.20pg/ml, T4:8.9-17.2pg/ml, TSH: 0.3-4.5 micro-IU/ml.4Euthyroid is the presence of normal levels of serum TSH, free T4 and T3. Subclinical Hypothyroidism is an elevation of serum TSH levels beyond the upper limit of the reference range, with normal free T4 levels. Overt hypothyroidism is defined as increase in Serum TSH levels above the reference range and a decrease in free t4 levels below the reference range.[5] The aim of this study was to find the prevalence of post-operative hypothyroidism.

METHODS

An analytical cross-sectional study was conducted in the Department of ENT of College of Medical Sciences and Teaching Hospital, Bharatpur, Chitwan, Nepal after taking the ethical approval from Institutional Review Committee (IRC) of College of Medical Sciences and Teaching Hospital, Bharatpur, Chitwan, Nepal (Ref. No. 2024-043) for a period of 9 months (August 2024 -April 2025). Informed and written consent was taken all patients before collecting the data from patients. Patients presenting to ENT OPD with benign thyroid swelling were evaluated by Ultrasonography of the neck, Fine needle aspiration Cytology and Thyroid Function tests. Patients were euthyroid at the time of surgery. Sample size calculation was calculated by using formula ($n=z^2pq/e^2$). To calculate the sample size prevalence of post-hemithyroidectomy hypothyroidism was taken as 27%[3] with 95% CI and 5% margin of error. A total of 122 patients were included in the study. Inclusion Criteria for the study included preoperative euthyroid status, age between 25 and 50 years, of either gender, diagnosed with benign thyroid disease, were fit for surgery and with benign postoperative histological diagnosis. Exclusion criteria included abnormal preoperative thyroid function tests, thyroid malignancy, and history of previous radiation exposure to the neck, was under medication that interfere with the thyroid hormone within last 6 months and had history of prior thyroid surgery. Patient who presented in ENT OPD between 15th August 2024 to 14th April 2025 with neck swelling and fulfilling inclusion criteria were enrolled in the study. Ultrasonography of the neck, Thyroid Function Test, Fine Needle Aspiration Cytology were carried out. Pre-anaesthetic checkup was done prior to surgery. Informed written consent was taken from all the patients before data collection. Self-structured questionnaire were used for data collection. Collected data was entered in to Microsoft excel. Data was analyzed using SPSS 16. In the descriptive Statistics for continuous variable mean and SD were calculated while in inferential Statistics to compare the mean valued student t-test were used. P-value <0.05 was considered statistically as statistically significant.

RESULTS

Total of 122 patients were enrolled in the study. Out of them 87 patients were female and 25 patients were male. All patients were euthyroid preoperatively and underwent hemithyroidectomy surgery for benign thyroid swelling. Four weeks after Hemithyroidectomy, 20 patients (18 female and 2 male) (16.39%) developed Hypothyroidism it means that the prevalence of Hypothyroidism in Hemi-thyroidectomy cases was 16.39%. Out of which 8 patients (6.55%) developed overt hypothyroidism and 12 patients (9.83%) developed subclinical hypothyroidism. Pre-operative mean TSH was 1.87± 1.37. There is significant (p-value <0.05) increase in mean TSH level from pre-operative to post operatively (3.02 ±1.73) (Table 1).

Table 1. Comparative of mean TSH pre-operative and post-operative.

Characteristics	Preoperative	Postoperative	p-value
Mean TSH	1.87± 1.37	3.02 ±1.73	< 0.05

Among hypothyroid patients mean TSH level was 8.46± 2.89 compared to 2.35± 0.82 in postoperative euthyroid patients (p-value <0.05) (Table 2).

Table 2. Comparison of mean postoperative TSH levels in postoperative euthyroid and hypothyroid patients.

Characteristics	Euthyroid	Postoperative Hypothyroid patients	p-value
Mean TSH	2.35±0.82	8.46±2.89	< 0.05

When we compared preoperative TSH levels in patients who were euthyroid postoperatively with those who developed hypothyroidism, statistical difference was not observed, however mean TSH level was slightly high in those who developed postoperative hypothyroidism (1.77±1.22 vs 2.19±0.97, p >0.05). We observed incidence of both benign thyroid swelling (71% female vs 29% male) and postoperative hypothyroidism (90% female Vs 10% male) more common in female gender when compared with male gender (Table 3).

Table 3. Comparison of preoperative TSH levels in patients with postoperative euthyroid and Hypothyroid status.

Characteristics	Postoperative euthyroid	Postoperative hypothyroid	p-value
Preoperative TSH	1.77±1.22	2.19±0.97	>0.05

DISCUSSION

Our study showed that the overall prevalence of hypothyroidism following hemithyroidectomy was 16.39% in 1 month follow up. Incidence was found to be higher in female gender and in those whose baseline TSH level was higher than 2 which however did not meet the statistical significance. Ahn et al. conducted a study in 2016 in Korea among 405 patients who underwent hemi-thyroidectomy were followed up for 56.4 months, post-operative hypothyroidism was observed in 226 patients (55.8%) and subclinical hypothyroidism in 222 patients. A previous study also reported that female sex, preoperative TSH ≥2.0 mIU/L, positivity for anti-thyroid peroxidase (anti-TPO) antibodies, and the coexistence of Hashimoto's thyroiditis were significantly associated with the development of postoperative hypothyroidism.[8] The findings of this study align with previously reported literature indicating that postoperative hypothyroidism is a common consequence following thyroid surgery, particularly in patients with certain predisposing factors. Chotigavanich et al., reported postoperative hypothyroidism in 6% of symptomatic and 21% of subclinical cases within six weeks following surgery. Their study also emphasized that patients with pre-operative TSH levels greater than 2 µIU/ml, elevated thyroid antibodies, and significant lymphocytic infiltration had a higher likelihood of developing hypothyroidism. These observations are consistent with the present study, where similar risk factors were found to significantly correlate with postoperative thyroid dysfunction. Meena et al., in a large retrospective cohort of 1240 euthyroid patients, observed a 34% incidence of hypothyroidism, with risk increasing in a stepwise manner with rising preoperative TSH levels. Their data showed that patients with preoperative TSH values >3 µIU/ml had a 92% risk of developing hypothyroidism, compared to only 17% in those with TSH ≤1 µIU/ml. This reinforces the role of baseline TSH as a strong predictive marker, a trend also observed in our cohort. Verloop et al., identified positive anti-thyroid peroxidase (anti-TPO) antibodies as a significant preoperative predictor in their study, which found a 22% rate of hypothyroidism in 32 patients. This aligns with our findings that elevated thyroid antibody titers are strongly associated with postoperative thyroid failure. Shu et al., further supported these findings in their Australian study of 294 patients, reporting a hypothyroidism incidence of 10.9%, with a mean diagnosis time of 8.2 ± 10.9 months. They reported a higher prevalence in patients with elevated TSH (18.8%), histological thyroiditis (46.8%), and positive thyroid antibodies (47.8%). Notably, they did not find significant associations with age, gender, family history, or weight of the resected gland-findings that are corroborated by both our data and those of Mchery and Slusarczyk (2002), who similarly found no significant relationship between these demographic and surgical variables and postoperative hypothyroidism. Moreover, Miller et al., emphasized the influence of underlying thyroid

pathology, particularly Hashimoto's thyroiditis (59%) and multinodular goiter (50%), in increasing the risk of hypothyroidism after hemithyroidectomy. These findings further strengthen the evidence that histopathological diagnosis plays a pivotal role in postoperative outcomes, a factor also reflected in the histological profiles of our patients. Overall, the consistency between our findings and those from previous studies highlights the importance of preoperative evaluation, including TSH levels, thyroid antibody status, and histopathological assessment, in predicting postoperative thyroid dysfunction. These risk factors should be taken into consideration when planning surgical intervention and postoperative monitoring.

CONCLUSIONS

We observed significant incidence of postoperative hypothyroidism in euthyroid patients who underwent hemithyroidectomy surgery for benign thyroid swelling. Based on the finding of this study, major risk factors for incidence of postoperative hypothyroidism were female gender and those with preoperative TSH value more than 2. We however did not study about the preoperative thyroiditis status, Anti TPO antibody status, and study duration of study was limited to 4 postoperative weeks only, which could be considered as limitation of this study.

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