

Postoperative Hypothyroidism after Lobectomy for Colloid Goiter

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ABSTRACT

Aim and objective: The study aimed to evaluate the incidence and associated risk factors for the development of hypothyroidism in patients who underwent lobectomy for colloid goiter.

Materials and methods: The study included 50 patients, out of which postoperative hypothyroidism was observed in 18 patients, with an overall incidence of 36%. Hypothyroidism was diagnosed in 90% of patients within 9 months after the surgery. The preoperative TSH levels were directly proportional to the postoperative TSH levels and were confirmed as independent risk factors for the development of hypothyroidism.

Discussion and conclusion: The incidence of postoperative hypothyroidism after lobectomy is quite significant and cannot be ignored. Elevated preoperative TSH levels are associated with an increased risk. A long follow-up period is required to find the true incidence of postoperative hypothyroidism and identify those having subclinical hypothyroidism.

Keywords: Colloid goiter, Hypothyroidism, Lobectomy, Thyroid.

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INTRODUCTION

Thyroid disorders, the second commonest endocrine disorders, often present as solitary or multinodular goiter.¹ Lobectomy has been generally recommended as an optimal surgical approach for symptomatic unilateral goiter, toxic adenoma, cytologically indeterminate nodule, and low-risk differentiated thyroid cancer (DTC).^{2,3} The development of hypothyroidism following lobectomy is a known complication of thyroid surgery. It reportedly develops in 5.6–48.9% of patients who undergo lobectomy, and this value varies according to the follow-up period and follow-up strategy or the definition of hypothyroidism used in the study.^{2,4–7} Given that the incidences of well-known complications of hemithyroidectomy, including laryngeal nerve injury, postoperative bleeding, and wound infection, are approximately 1%, it seems that postoperative hypothyroidism may represent the most common complication of hemithyroidectomy. However, its clinical significance has been underestimated given that it is not an acute complication; moreover, thyroid hormone replacement therapy—used for the management of hypothyroidism—has definite long-term adverse cardiovascular and skeletal outcomes, particularly increased heart rate and left ventricular mass, atrial fibrillation, and osteoporosis.^{8,9}

The study was conducted to evaluate the incidence and risk factors for postoperative hypothyroidism in patients who underwent lobectomy for colloid goiter and to frame a strategy for patient care and surveillance of postoperative hypothyroidism in such patient.

MATERIALS AND METHODS

The study was conducted in the Department of ENT, Head & Neck Surgery at a tertiary care institute of North India from August 2017 to August 2019 and included 50 patients who underwent lobectomy for colloid nodule of the thyroid. Collected data included age, sex, findings on USG neck preoperatively, preoperative FNAC findings of

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the nodule, preoperative and postoperative serum thyroid function study, antithyroid peroxidase antibody [anti-TPO] levels, final postoperative pathologic results, and coexistence of thyroiditis. Patients who did not have preoperative thyroid function study, antithyroid peroxidase antibody levels [anti-TPO], those with a preoperative history of thyroid hormone replacement or antithyroid medication, those who received empirical TSH suppression after lobectomy, or those who were not followed up for at least 12 months were excluded from the study. Patients with preoperative subclinical hypothyroidism based on thyroid function profile were also excluded from the study. Any patient with features of thyroiditis based on clinical examination, cytology report, and USG findings preoperatively were treated medically for thyroiditis before taking up for surgery, and such patients were excluded from this study to avoid confounding bias as such patients are more prone to develop hypothyroidism. Similarly, any patient needing more than lobectomy (e.g., colloid cyst/nodule at isthmus, FNAC reported as TBRTC category III or more) were not included in the study.

The reference range of TSH, free L-thyroxine (T₄), and triiodo-L-thyronine (T₃) concentration was defined as 0.45–4.5, 0.8–2.0, and 0.6–1.9 ng/mL, respectively.^{10,11} Euthyroidism was defined as the

presence of normal levels of serum TSH, free T4, and T3. Subclinical hypothyroidism was defined as an elevation in serum TSH levels beyond the upper limit of the reference range, with normal free T4 levels.¹² Overt hypothyroidism was defined as an increase in serum TSH levels above the reference range and a decrease in free T4 levels below the reference range.^{13,14} Subclinical hyperthyroidism was defined as a decrease in serum TSH levels below the reference range, with normal serum free T4 and T3 concentrations.¹⁵ Positive anti-TPO levels were defined as levels >60 IU/mL.

The first measurement of postoperative thyroid function was performed 1 month after surgery. If it was found to be normal, follow-up measurements of thyroid function were performed at 6 months and 12 months. If subclinical hypothyroidism was identified at any time during the follow-up period, thyroid function measurement was performed 3 months after that point and was repeated every 3 months without any treatment, as long as the TSH level remained between 4.5 mIU/L and 10 mIU/L and the patient did not show any signs/symptoms. In patients with subclinical hypothyroidism, if the TSH level increased to 10 mIU/L or if progression to overt hypothyroidism was noted, levothyroxine replacement was initiated. In cases where overt hypothyroidism was diagnosed during follow-up, levothyroxine replacement was initiated immediately.

RESULTS

The study included 50 patients, out of which 38 were females and 12 were males with the mean age being 35.58 yrs (SD +10.226) (Table 1). Preoperative USG of thyroid swelling was done in all patients, and the findings are summarized in Table 2. The

Table 1: Age Distribution

Age in years	n (no. of patients)
21–30	17
31–40	20
41–50	10
51–60	3
Total	50

Table 2: Preoperative USG findings

	N (Number of patients)
1. Size	
>3 cm	37
<3 cm	13
Total	50
2. Consistency	
Solid	40
Cystic	10
Total	50
3. Multicity	
Solitary	42
Multiple	8
Total	50
4. Status of opposite lobe	
Normal	41
Small solid nodule <1 cm	7
Small cyst <1 cm	2

mean preoperative TSH was 2.0186 (SD+1.72471), and the mean postoperative TSH at 12 months was 8.4562 (SD+8.21445). During the follow-up period of 12 months, postoperative hypothyroidism was observed in 18 of 50 patients, with an overall incidence of 36% (Table 3). The mean time interval between surgery and the development of hypothyroidism was 3.9 months. Hypothyroidism was diagnosed in 90% of patients within 9 months after the surgery. Preoperatively, 22 patients had TSH levels of >2.0 mIU/L and 10 patients had positive anti-TPO levels (>60 IU/mL) (Tables 4 and 5). Postoperative histopathological examination confirmed the colloid nature of the nodule in 37 patients, whereas 8 patients were labeled as follicular adenoma, and 5 patients as papillary carcinoma thyroid on histopathological examination. In addition, features of thyroiditis were present in 16 patients on HPE.

The association between the clinicopathological characteristics and the development of hypothyroidism after lobectomy was analyzed. Though female sex, TSH >2.0 mIU/L, positivity for anti-TPO, and coexistence of thyroiditis were found to be more frequently associated with the development of hypothyroidism, no statistical correlation was observed between postoperative hypothyroidism and sex, age, positivity for anti-TPO, and presence of thyroiditis. The risk for postoperative hypothyroidism was higher when preoperative TSH level was higher than 2.0 mIU/L. Using linear regression equation, the preoperative TSH levels were directly

Table 3: Thyroid status

	Preoperative at 12 months	Postoperative at 12 months
No. of euthyroid patients	50	32
No. of hypothyroid patients	0	18
Total	50	50
Mean TSH levels	2.0186	8.4562
Median TSH levels	1.6400	4.7000
Standard Deviation	1.72471	8.21445
Euthyroid		

Table 4: Preoperative anti-TPO levels

Levels	n
< 60 IU/mL	40
>60 IU/mL	10
Total	50

Table 5: Postoperative Histopathology report

	n
1. Pathology	
Colloid	37
Follicular adenoma	8
Papillary carcinoma	5
2. Thyroiditis	
Present	16
Absent	34

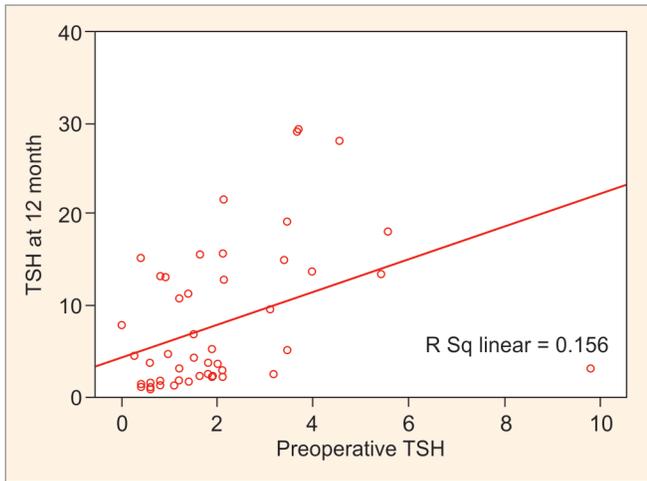


Fig. 1: Linear regression relationship between preoperative and postoperative serum TSH levels.

proportional to the postoperative TSH levels (95% confidence interval, 0.598 to 3.074; p -value = 0.005) and were confirmed as independent risk factors for the development of hypothyroidism (Fig. 1).

DISCUSSION

Although hypothyroidism is a well-recognized sequel after lobectomy, the incidence often has been underestimated because patients' thyroid function often is monitored for only a limited period.^{2,16,17} Nevertheless, given that the incidence of postoperative hypothyroidism could be as high as 55%, it is undoubtedly a common sequel after hemithyroidectomy.^{2,5,16–18}

In terms of risk factors leading to hypothyroidism, advanced age, high preoperative thyroid-stimulating hormone (TSH) levels (within the normal range), presence of antithyroid peroxidase (anti-TPO), antithyroglobulin (anti-Tg), and thyroiditis have been reported as risk factors.^{2,5,16–18}

In the present series, the prevalence of postoperative hypothyroidism was 36%, which is comparable with most international series.^{6,19,20} There was a significant correlation with preoperative TSH level, and there was a direct relationship between the occurrence of postoperative hypothyroidism and preoperative TSH levels greater than 2.0 mU/L. This observation has been confirmed by other authors^{6,19,20} and might be attributed to decreased functional reserve of the thyroid gland. According to Miller et al.²⁰ a preoperative TSH level in the upper-normal reference range should alert the surgeon to the possibility of postoperative hypothyroidism.

In the present study, the mean time interval between surgery and the development of hypothyroidism was only 3.9 months and the pattern in the incidence over time pointed that hypothyroidism developed during the early postoperative periods in most cases. Hypothyroidism was diagnosed in 90% of patients within 9 months after the surgery. This result suggests that thyroid function should be followed up for at least 9 months in patients who have undergone lobectomy to ensure that at least 90% of cases of postoperative hypothyroidism are detected though the other 10% cannot be ignored.

Thyroiditis is also related to postoperative hypothyroidism. The lymphocytic infiltrate of the thyroid gland decreases thyroid

function, and a semiquantitative analysis of this infiltrate usually reflects the risk of hypothyroidism.^{21,22} Though thyroiditis was found more frequently in the HPE specimens of patients who developed hypothyroidism, no such statistical correlation was found in the present series.

The presence of thyroid antibodies has been associated with thyroiditis.²⁰ In this series, the patients who developed postoperative hypothyroidism were more frequently associated with elevated anti-TPO but no direct relationship between elevated thyroid antibodies and higher degrees of lymphocytic infiltration was noted.

Traditionally, the hypothyroidism that develops after hemithyroidectomy has been incorrectly assumed to be permanent; hence, most patients who developed hypothyroidism after the surgery received thyroid hormone replacement therapy without any consideration for the natural recovery, even in cases of subclinical hypothyroidism with mild TSH level elevation.^{2,23} In addition, once thyroid hormone replacement is initiated, it is unlikely that it will be discontinued to assess whether the remaining thyroid is functioning adequately to maintain the euthyroid state.²³ The adverse effects of thyroid hormone replacement therapy have recently become a major issue in the management of subclinical thyroid disorders, and its negative influence on the cardiovascular and skeletal system was found to be greater than expected.^{8,9,10,15,24} Several clinical trials, population-based studies, and comprehensive scientific reviews in the 2000s have suggested that routine thyroid hormone replacement is not recommended for cases of subclinical hypothyroidism with TSH level less than 10 mIU/L and without signs/symptoms, due to the lack of clinical benefits and concerns regarding the adverse effects of thyroid hormone replacement.^{10,11,15,24,25} In the present study, we evaluated postlobectomy hypothyroidism with a relatively long-term follow-up to observe the recovery of thyroid function in subclinical hypothyroidism without levothyroxine replacement.

CONCLUSION

To conclude with, the incidence of postoperative hypothyroidism after lobectomy is quite significant and cannot be ignored. Roughly, one-third of lobectomy patients develop hypothyroidism and need thyroxine oral supplementation. This study suggests that elevated preoperative TSH levels are associated with an increased risk. The role of thyroiditis was not clear. To ensure that at least 90% of cases of postoperative hypothyroidism are detected, it is recommended that regular thyroid function measurements should be performed for a minimum of 9 months after surgery in patients undergoing lobectomy. In addition, further follow-up of thyroid function is required in selective patients, particularly those with preoperative TSH at least 2 mIU/L. However, the administration of levothyroxine supplementation for subclinical hypothyroidism following lobectomy should be determined in a more careful manner, as thyroid function can spontaneously normalize in approximately two-thirds of patients. Mild postoperative subclinical hypothyroidism might be followed up without immediate levothyroxine replacement with the expectancy of recovery.

Ethics approval: The study was approved by the ethical committee of the institute.

Consent to participate: Informed consent was obtained from all individual participants included in the study.

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