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INCIDENCES OF HYPOTHYROIDISM IN HEMITHYROIDECTOMY PATIENTS: A PROSPECTIVE STUDY

General Surgery

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ABSTRACT

Background: Routine thyroid function tests obtained as early as one month after surgery may identify the patient with subclinical as well as clinical or overt hypothyroidism. The early recognition of this postoperative complication prevents symptoms of hypothyroidism or recurrent thyroid discase. **Aim:** To access the incidences of hypothyroidism in patients undergoing hemithyroidectomy surgery at our tertiary care centre. **Methods:** This is a prospective study conducted with total of 100 patients underwent hemithyroidectomy at Department of General Surgery. Thyroid function tests viz. free triiodothyronine (FT3), free thyroxine (FT4), thyroid-stimulating hormone (TSH) were performed in all cases included in the study at 4, weeks, 12 weeks, 18 weeks and 24 weeks following hemithyroidectomy. **Results:** The mean age of study subjects was found to be 43.50 years with female predominance as compared to male. Majority of the study subjects i.e., 26% were diagnosed with colloid goiter followed by benign thyroid lesion (22%), malignancy thyroid (13%), and nodular colloid goiter (12%). A total of 29 subjects out of 100 underwent hemithyroidectomy and among them 16% and 13% underwent right hemithyroidectomy and left hemithyroidectomy respectively. Majority of the study subjects i.e., 20.68% of study subjects who underwent hemithyroidectomy procedure (n=29) developed subclinical hypothyroidism followed by 10.34% developed overt hypothyroidism. **Conclusion:** At our tertiary care centre about one third of the study subjects underwent hemithyroidectomy procedure developed hypothyroidism (31.03%) this includes subclinical hypothyroidism (20.68%) and overt hypothyroidism (10.34%).

KEYWORDS

Hemithyroidectomy, Hypothyroidism, Thyroid disorders, Incidences, Colloid goiter

INTRODUCTION

Thyroid is an endocrine gland which is responsible for normal growth, development and metabolism.[1] Thyroid hormone is vital for life and lack of it results in a slowing of body's chemical process and metabolism. It can also lead to serious potential life-threatening complications. It can be caused by variety of diseases and conditions e.g. viral thyroiditis, Hashimoto's or autoimmune, disorders of pituitary gland or due to treatment of thyroid disorders viz. thyroid surgery or radiation or medication.[2,3]

Thyroidectomy is performed for various thyroid condition in all over the world and hemithyroidectomy is one of them. Hemithyroidectomy is considered an adequate treatment for several thyroid diseases such as unilateral goiter, toxic adenoma, follicular neoplasm and some suspected malignancies. Theoretically hemithyroidectomy preserves sufficient functioning native thyroid tissue for patients to keep euthyroid status postoperatively without the need for thyroid hormone replacement. But in some patients who have undergone hemithyroidectomy will require thyroid hormone replacement because they have developed hypothyroidism. During the post-operative follow up this hypothyroidism is commonly diagnosed with the help of elevated levels of thyroid stimulating hormone (TSH). Although there is a transient feedback response of pituitary gland to raise serum TSH to induce hyperplasia of the residual thyroid gland immediately after thyroid surgery, this usually returns to normal level within six to 12 weeks.[4-8]

The development of hypothyroidism following hemithyroidectomy reportedly develops in 5.6–48.9% of patients who undergo hemithyroidectomy, and this value varies according to the follow-up period and follow-up strategy.[9] 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.[10] However, its clinical significance has been underestimated as it is not an acute complication. Thyroid hormone replacement therapy, used for the management of hypothyroidism has definite long-term adverse cardiovascular and skeletal side effects like increased heart rate, atrial fibrillation, and osteoporosis.[11]

Most studies have primarily focused on the incidence of risk factors for hypothyroidism development, and used a relatively short follow-up period. However, the measurement of thyroid function at a relatively early stage after hemithyroidectomy, without any further follow up, may increase the likelihood of detecting only a transient compensating TSH elevation.[12] Furthermore, routine thyroid function tests obtained as early as one month after surgery may identify the patient with subclinical as well as clinical or overt hypothyroidism. The early recognition of this postoperative complication prevents symptoms of hypothyroidism or recurrent thyroid discase.[3] With this context, the present study was designed to with the main purpose to access the incidences of hypothyroidism in patients undergoing hemithyroidectomy surgery at our tertiary care centre.

Methodology

Study Design and Patients

This is a prospective study conducted with total of 100 patients underwent hemithyroidectomy at Department of General Surgery, S. S. Institute of Medical Sciences & Research Centre, Davangere, Karnataka. The ethical committee approval was obtained before the conduct of study.

Inclusion Criteria

1. Age: ≥ 15 years
2. All patients eligible for hemithyroidectomy surgery
3. Who were ready to sign informed consent form

Exclusion Criteria

1. Age: <15 years old
2. Patients with history of hypothyroidism or hyperthyroidism
3. Patients with preoperative abnormal thyroid function tests
4. Patients with thyroid carcinoma
5. Patients with previous radioactive iodine treatment, or radiation therapy in the head and neck region
6. Patients taking medications that might affect thyroid functions
7. Patients with critical illnesses
8. Patients who were not ready to sign informed consent form

Study Procedure

Thyroid function tests viz. free triiodothyronine (FT3), free thyroxine (FT4), thyroid-stimulating hormone (TSH) were performed in all study subjects at 4, weeks, 12 weeks, 18 weeks and 24 weeks following hemithyroidectomy. Patients with serum TSH value more than 6 microIU/mL with clinical features were diagnosed as hypothyroid. Those having normal FT4 (Table 1) with raised TSH level (more than the higher limit of reference range) were termed as subclinical

hypothyroidism and were carefully followed up for developing overt hypothyroidism.[11]

Table 1. Reference Range Values for Thyroid Function Tests

Tests	Reference range
Free triiodothyronine (FT3)	3.10-6.80 pmol/L
Free thyroxine (FT4),	12.00 - 22.00 pmol/L
Thyroid-stimulating hormone (TSH)	0.27-4.20 microIU/mL

Statistical Analysis

Data were entered in Microsoft Excel 2021 and statistical analysis was done using IBM Statistical Software for Social Sciences (SPSS) version 22. Categorical variables were represented in the form of percentages and frequencies. Continuous variables were presented as descriptive statistics (Mean and Standard deviation).

RESULTS

The mean age of study subjects was found to be 43.50 years. The majority of the study subjects i.e., 26% were found to be in the age group of 31-50 years followed by 21-30 (19%), 51-60 (14%), and 11% of the study subjects were found to be in the age group of 61-70 years (Table 2).

Table 2. Distribution Of Study Subjects Based On Age

Age (Years)	Frequency (N)	Percentage (%)
15-20	2	2.00
21-30	19	19.00
31-40	26	26.00
41-50	26	26.00
51-60	14	14.00
61-70	11	11.00
71-80	2	2.00
Mean ± SD	43.50 ± 14.20	

SD, Standard deviation

The results of distribution of study subjects based on gender was illustrated Figure 1. Results revealed that female predominance (85%) was observed as compared to male (15%).

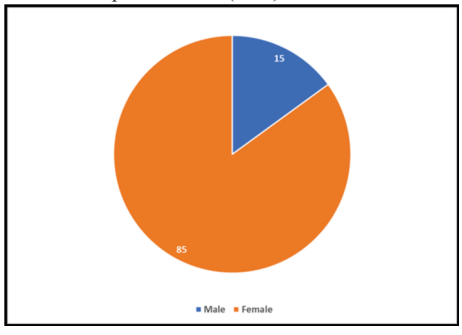

Figure 1. Distribution Of Study Subjects Based On Gender

Majority of the study subjects i.e., 26% were diagnosed with colloid goiter followed by benign thyroid lesion (22%), malignancy thyroid (13%), and nodular colloid goiter (12%). Various other forms of diagnosis found among study subjects were summarized in Table 3.

Table 3. Distribution Of Study Subjects Based On Diagnosis

Diagnosis	Frequency (N)	Percentage (%)
Lymphocytic thyroiditis	1	01.00
Suspicious for follicular neoplasm	2	02.00
Colloid goiter	26	26.00
Benign thyroid lesion	22	22.00
Nodular colloid goiter	12	12.00
Malignancy thyroid	13	13.00
Chronic lymphocytic thyroiditis.	1	01.00
Follicular neoplasm	8	08.00
Lymphocytic thyroiditis	6	06.00
Others	9	09.00

Majority of the study subjects i.e., 53% of patients underwent total thyroidectomy followed by right hemithyroidectomy (16%), left hemithyroidectomy (13%), left partial thyroidectomy (12%), and right partial thyroidectomy (6%) (Figure 2).

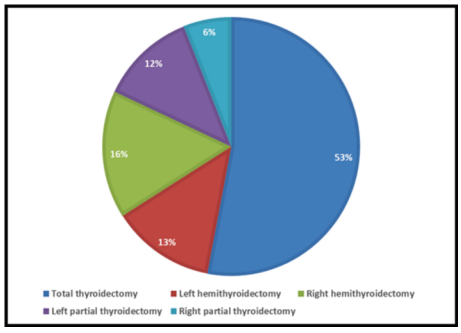

Figure 2. Distribution Of Study Subjects Based On Procedure

Majority of the study subjects i.e., 20.68% of study subjects who underwent hemithyroidectomy procedure (n=29) developed subclinical hypothyroidism followed by 10.34% developed overt hypothyroidism (Table 4).

Table 4. Distribution Of Study Subjects Based On Incidences Of Hypothyroidism After Hemithyroidectomy Procedure (n=29)

Procedure	At 4-weeks	At 12-weeks	At 18-weeks	At 24-weeks	Total
Overt hypothyroidism	-	-	1 (3.45)	2 (6.90)	3 (10.34)
Subclinical hypothyroidism	-	1 (3.45)	2 (6.90)	3 (10.34)	6 (20.68)

Values are expressed as n (%).

DISCUSSION

Development of hypothyroidism has been an obvious effect after total, near total, or subtotal thyroidectomy; however, it recently becomes increasing concerns for the patient after hemithyroidectomy.[13] Moreover, hypothyroidism has been mentioned as rare but potential sequelae of hemithyroidectomy. But, the incidence of hypothyroidism and the timing of follow-up investigations after hemithyroidectomy remain uncertain. From a practical standpoint, all patients, who have undergone hemithyroidectomy have not been followed up in regular schedule. Furthermore, there is a resurgence of selection of patients at risk of developing the hypothyroidism.[3] With these viewpoints, the present prospective study was conducted with the main purpose to access the incidences of hypothyroidism in patients undergoing hemithyroidectomy surgery at our tertiary care centre.

Results of our study revealed that, the mean age of study subjects was found to be 43.50 years with female predominance as compared to male. Majority of the study subjects i.e., 26% were diagnosed with colloid goiter followed by benign thyroid lesion (22%), malignancy thyroid (13%), and nodular colloid goiter (12%). A total of 29 subjects out of 100 underwent hemithyroidectomy and among them 16% and 13% underwent right hemithyroidectomy and left hemithyroidectomy respectively.

Literature reports evidenced that the incidences of hypothyroidism after hemithyroidectomy in several studies ranges between 11 and 43 %.[14-17] In concurrence with literature findings in our study about one third of the study subjects underwent hemithyroidectomy procedure developed hypothyroidism (31.03%) this includes subclinical hypothyroidism (20.68%) and overt hypothyroidism (10.34%).

Most patients with hypothyroidism after surgery would develop sign or symptoms within six months. In fact, the half-life of thyroxine that was produced by thyroid gland is seven days and we should allow four to five half-life of thyroxine to get an accurate assessment of the residual thyroid lobe capacity. Therefore, the optimal time for post-operative TSH evaluation should start beyond six weeks.[4-6,15,16] Concurrently, in our study, post-operative 12-weeks serum TSH evaluation revealed incidences of subclinical hypothyroidism in 3.45% of the cases and at 18-weeks, the incidences of subclinical hypothyroidism and overt hypothyroidism were detected in 6.90% and 3.45% of patients respectively. Similarly, at 24-weeks 10.34% and 6.90% of subclinical hypothyroidism and overt hypothyroidism cases were detected respectively.

Literature reports evidenced that there are many contributing factors had been related to increasing risk of hypothyroidism after

thyroidlobectomy such as age, sex, multinodular goiter, preoperative serum TSH, circulating thyroid antibodies (anti-microsomal and thyroglobulin antibodies) and the degree of lymphocytic infiltration in the resected thyroid.[6-8,15,18]

CONCLUSION

In conclusion, at our tertiary care centre about one third of the study subjects underwent hemithyroidectomy procedure developed hypothyroidism (31.03%) this includes subclinical hypothyroidism (20.68%) and overt hypothyroidism (10.34%).

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