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ORIGINAL RESEARCH

A Clinicopathological Study of Patients with Multinodular Goitre Undergoing Thyroidectomy at a Tertiary Hospital in Thiruvananthapuram

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ABSTRACT

Background: Benign thyroid disease can be classified into diffuse hyperplastic goitre, multinodular goitre and solitary nodule thyroid. Thyroid nodules can be detected in 4% to 8% of the adult population by palpation, but in 40% to 50% of the population by ultrasound. Among these, endemic goitres, thyroiditis and toxic adenomas may present with altered thyroid function. Fine needle aspiration, preferably ultrasound guided with cytological examination will determine the exact pathogenesis. Ultrasound is the investigation of choice to identify nodularity, cystic changes and extent of disease. Surgical management includes total thyroidectomy or hemithyroidectomy and decided by correlating thyroid function, cytology and ultrasound. Surgery is indicated in symptomatic patients, large goitre and in retrosternal extension. Aim of the study is to identify the right surgical option after correlating Fine needle aspiration Cytology, Ultrasound and Thyroid Function Test.

Methodology

It is a study to describe the clinicopathological profile of patients with multinodular goitre undergoing thyroidectomy in a tertiary care hospital in Kerala. After getting approval from the human ethics committee, the study was conducted on 76 patients, which was the calculated sample size. Study population included patients with multinodular goitre admitted in surgical wards of MCH, Thiruvananthapuram and underwent thyroidectomy. For all statistical interpretations, $p<0.05$ was considered the threshold for statistical significance. Statistical analyses was performed by using a statistical software package SPSS, version 20.0

Results

In this study total of 76 patients were studied. FNAC showed patients in Bethesda category 2 in 59.2%, 3 in 28.9%, 4 in 5.3%, 5 in 2.6%, and 1 in 3.9%. 56% of patients were on thyroxine supplementation, 14% on anti thyroid drugs and 30% were taking no thyroid medication. On Ultrasonography neck, single lobe of thyroid was involved in 56.6% of patients and both lobes involved in 43.4% of patients. Total thyroidectomy was done in 88.2% of patients and hemithyroidectomy in 11.8%.

Conclusions

Total thyroidectomy has evolved as the preferred surgery of choice for nodular goiters. Hemithyroidectomy is advised only in patients with preserved thyroid function and involvement of a single lobe in ultrasound. Asymptomatic patients with minimal enlargement and proved benign in FNAC, are advised follow up.

Key words: Multinodular goiter, Total Thyroidectomy.

INTRODUCTION

The thyroid gland, a significant endocrine gland located in the neck, regulates the basal metabolic rate and promotes somatic and psychological development. The word thyroid comes from the Greek word for shield (thyros-shield, eidos-form). The most typical symptom of thyroid disease is goitre, which is an enlargement of the thyroid gland. On the basis of the etiology, the nontoxic goitre is further separated into sporadic and endemic goitre. A goitre that is considered to be endemic occurs when more than 10% of the population exhibits thyroid enlargement. India has a high prevalence of thyroid disorders, particularly multinodular goitre (MNG) caused by an iodine deficit.

The normal thyroid gland is a fairly homogenous structure, but nodules often form within its substance. These nodules may be only the growth and fusion of localized colloid-filled follicles, or more or less discrete

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adenomas, or cysts. Nodules larger than 1 cm may be detected clinically by palpation. Careful examination discloses their presence in at least 4% of the general population. Nodules less than 1 cm in diameter not clinically detectable unless located on the surface of the gland are much more frequent.

Goitre is an enlargement of thyroid gland. A diffusely heterogeneous, enlarged thyroid gland is referred to as a Multinodular goitre. Diffuse enlargement may be evident initially; however the mass frequently becomes asymmetrically nodular. Majority of patients present with complaints of swelling in the anterior aspect of neck. The deficiency of iodine is typically the cause of this tumour. Thyroid function tests may be deranged in these patients and hence, thyroid function tests are evaluated as part of the workup and diagnosis. Ultrasonography and Fine Needle Aspiration Cytology (FNAC) are part of routine evaluation of thyroid swellings. Sometimes, thyroid enlargement is cosmetically unacceptable for the patient or sometimes produces obstructive symptoms. Some patients may have thyrotoxic symptoms. Hyperthyroidism may be adequately controlled by drugs, but surgical management is the preferred treatment. Radioisotopic scanning and ultrasound imaging show heterogeneous appearance of thyroid. According to reports, 5% to 10% of people with multinodular goitre develop cancer. Based on FNAC, surgical removal of thyroid gland is planned. Indication for thyroidectomy includes symptoms due to compression and cosmetic reasons. Drugs may be able to regulate hyperthyroidism effectively; however surgery is the preferred method of therapy. Total or partial thyroidectomies can be done.

The basic concerns in majority of patients are loss of voice or potential for malignancy, either at the time of presentation or later, malignancy developing in long standing goitre.

Earlier surgical options include subtotal thyroidectomy, hemithyroidectomy, isthmusectomy and total thyroidectomy. Recently with the advent of bipolar cautery and better understanding of thyroid and parathyroid anatomy, total thyroidectomy has become an acceptable surgical option with minimum morbidity. [1]

Techniques like orange peel dissection, identification of Zuckerkandle tubercle, individual ligation of pedicles and specifically ligating thyroid branches only, have changed the surgical outcome with minimal injury to recurrent laryngeal nerve and parathyroids. Zuckerkandl tubercle is a prominent landmark during dissection of thyroid which helps in identifying recurrent laryngeal nerve. The nerve will normally be found as the thyroid lobe is mobilized laterally, lying under the most posterolateral portion of the gland under the tubercle of Zuckerkandl.[2]

Recurrent laryngeal nerve, parathyroides and vascular pedicles supplying them are preserved when capsular or orange peel dissection is done meticulously with bipolar cautery.

The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) established a standardized, category-based reporting system for thyroid fine-needle aspiration (FNA) specimens. [3-6] Thyroid Imaging Reporting and Data System (TI-RADS) determines and categorizes the physical characteristics of benign thyroid nodules based on echogenicity, cystic changes, shape and margins. [7]

MATERIALS AND METHODS

The study was conducted as a hospital based descriptive one and the study population included patients with multinodular goitre admitted and who underwent total thyroidectomy in Department of General surgery, Government Medical College, Thiruvananthapuram, a tertiary care centre in Kerala.

Sample size: $n=\frac{Z[1\text{-ALPHA}/2] \text{ X } p \text{ X } q}{d^2}$

Where, $Z_{[1\text{-ALPHA}/2]} = 1.96$ at 5% level of significance

p = proportion of Hashimoto's thyroiditis (histopathological) in reference study [12] =14 %, q = 100-p= 100-14= 86 %, d = absolute precision =8% Substituting all values, n=75.25

Sample size = 76

Statistical Analysis

Data is collected from patients with MNG who undergo thyroidectomy and case sheet records. Histopathological reports are collected from Pathology department database, after getting permission for the same. Data will be entered into Excel sheet. Categorical were expressed as frequency (percentage). Chi-square test was used to find association between categorical variables. For all statistical interpretations, $p<0.05$ was considered the threshold for statistical significance. Statistical analyses were performed by using a statistical software package SPSS, version 20.0.

RESULTS

In this study total of 76 patients were studied. Majority of patients belonged to age group of 3rd decade followed by 4th decade. 64% of the study sample was females and 12 % males (Table 1). In both males and females,

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majority belonged to 3rd decade of age. 90.8% of patients had TSH within normal limits prior to surgery. 6.6% were hyperthyroid and 2.6% were hypothyroid. Swelling in front of neck was the primary presenting complaint in 75% of patients. FNAC showed patients in Bethesda category 2 in 59.2%, 3 in 28.9%, 4 in 5.3%, 5 in 2.6%, and 1 in 3.9% (Table 2) and features of nodular colloid goiter was seen in 68.4%, hashimoto's thyroiditis/lymphocytic thyroiditis in 13.2%, papillary hyperplasia/ hyperplastic nodules/ nodular hyperplasia in 10.5% and follicular neoplasm/secondary changes/papillary foci in 7.9% of patients (Table 3). 56% of patients were on thyroxine supplementation, 14% on antithyroid drugs and 30% were taking no thyroid medication. On Ultrasonography neck, single lobe of thyroid was involved in 56.6% of patients and both lobes involved in 43.4% of patients (Table 4). Total thyroidectomy was done in 88.2% of patients and hemithyroidectomy in 11.8% (Table 5).

Peak incidence for both males and females was found to be in 3rd decade.

Age	Male		Female		Total	
	Count	Percent	Count	Percent	Count	Percent
10–20 years	0	0.0	2	3.1	2	2.6
20-30 years	3	25.0	16	25.0	19	25.0
30-40 years	6	50.0	22	34.4	28	36.8
40-50 years	3	25.0	19	29.7	22	28.9
50-60 years	0	0.0	4	6.3	4	5.3
60-70 years	0	0.0	1	1.6	1	1.3

Table 1: Distribution of age and gender

Majority of the patients had FNAC, TBSRTC Category 2 followed by Category 3.

Bethesda	Count	Percent
1	3	3.9
2	45	59.2
3	22	28.9
4	4	5.3
5	2	2.6

Table 2: Percentage distribution of the sample according to Bethesda

Majority (68.4%) of the patients had FNAC showing nodular colloid goitre.

FNAC	Count	Percent
Nodular colloid goitre	52	68.4
Hashimoto's thyroiditis/Lymphocyticthyroiditis	10	13.2
Papillary hyperplasia, Hyperplastic nodules, Nodular hyperplasia	8	10.5
Follicular neoplasm, secondary changes, adenoma, papillary foci	6	7.9

Table 3: Percentage distribution of the sample according to FNAC

Single lobe of thyroid gland was involved in 56.6% of patients both lobes were involved in 43.4%

Ultrasound features	Count	Percent
Single lobe involved	43	56.6
Both lobes involved	33	43.4

Table 4: Percentage distribution of the sample according to Ultrasound features

Total thyroidectomy was done in majority of patients (88.2%) hemithyroidectomy was done in 11.8%

Type of surgery	Count	Percent
Total Thyroidectomy	67	88.2
Hemithyroidectomy	9	11.8

Table 5: Percentage distribution of the sample according to type of surgery

DISCUSSION

In a comprehensive population survey of 2,749 persons in northern England, Tunbridge et al found obvious goiters in 5.9% with a female/male ratio of 13:1. Single and multiple thyroid nodules were found in 0.8% of men and 5.3% of women, with an increased frequency in women over 45 years of age.[8] In Framingham the prevalence of multinodular goiter as found in a population study of 5234 persons over 60 years was 1%.[9] By the time the

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goiter is well developed, serum TSH levels and TSH production rates are usually normal or even suppressed.[10]Ultrasonography may detect nonpalpable nodules cysts, will estimate nodule and goiter size (volume),will monitor the changes following therapy and will guide the Fine Needle Aspiration Cytology(FNAC). After the introduction of ultrasonography it has become clear that nodules in the thyroid gland are very prevalent, ranging from 17% to 60% if older people are included in the study.[11] Multinodular goitre is more common among females in third and fourth decades. The most common presentation is swelling of the gland which may be associated with discomfort. This may be associated with clinical signs of palpitations, anxiety, and sweating and weight loss. Depending on the functioning balance MNG can present as hyperthyroid, hypothyroid but mostly in euthyroid state. The indication for surgery in patients with MNG includes cosmesis, hyperthyroidism and local compressive symptoms. Subtotal thyroidectomy was the preferred surgery by most clinicians, but a trend towards total thyroidectomy is noticeably replacing the old belief in subtotal thyroidectomy.[12] Earlier surgeons were concerned about injury to recurrent laryngeal nerve and parathyroids. Incidence of carcinoma in multinodular goiter was 10.5 % (3.6-17.4 with 95% confidence interval) which was similar to the previous studies referred to. [13-15] FNAC is not a fool proof investigation and Histopathological examination report may vary from FNAC report.[16-19]

Total thyroidectomy was done in majority of patients and choice of this surgery seems to be based on the fact that with increasing surgical expertise and knowledge about anatomy and anatomical variations, surgical complications rates are low and chances of recurrence can also be reduced.[20]Better thyroxine supplementation drugs allow fairly adequate functional replacement of thyroid hormones, post total thyroidectomy. These findings were consistent with previous studies referred to. Unlike, previous studies, which showed subtotal and near total thyroidectomies also being performed, such surgeries were not found in our study.

CONCLUSIONS

Majority of patients with MNG who underwent total thyroidectomy belonged to 3rdand 4th decade. Majority were on thyroxine supplementation, showing inadequate hormone production by the residual normal thyroid tissue. Involvement of both lobes were demonstrated by ultrasound in considerable number of patients even though single lobe was involved on clinical examination. FNAC showed majority with nodular colloid goitre and Bethesda Category 2. After correlating thyroid function test, FNAC and ultrasound, total thyroidectomy was done in majority of patients with bilobar involvement and a low functional thyroid gland to prevent future recurrence.

DECLARATION

No funding sources

ETHICAL APPROVAL

The study was approved by the Institutional Research Ethics Committee, Government Medical College, Thiruvananthapuram.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

DATA AVAILABILITY STATEMENT

Data will be made available on request

CONSENT TO PARTICIPATE

Written Informed Consent was obtained from all patients before initiating the study

CONTRIBUTORS

All authors contributed to the design and interpretation of the study and to further drafts

Author contribution statement

1. First author: Conceived and designed the experiments; Performed the experiments.
2. Second Author: analyzed and interpreted the data; contributed materials, analysis tools and data
3. Third Author: Performed the experiments; Analyzed and interpreted the data.
4. Fourth and Corresponding Author*: Conceived and designed the experiments; Contributed materials, analyzed tools and data; Wrote the paper.

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