

Study of cytomorphological features of thyroid lesions and its correlation with thyroid function tests.

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Abstract

Background: Fine needle aspiration cytology along with ultrasound and assessment of thyroid function status remains the mainstay of evaluation of thyroid swellings. According to the guidelines put forth by American Thyroid Association, serum estimation of TSH should be part of initial assessment of thyroid swellings. Present study aims to assess the cytomorphological features of various thyroid lesions, classify them in different categories based on The Bethesda System of Reporting Thyroid Cytology and correlate them with thyroid hormone status of patients.

Methods: 165 cases of thyroid lesions were subjected to FNAC, smears were categorised according to The Bethesda System of Reporting Thyroid Cytopathology and cases were also assessed for T3, T4, TSH hormone levels.

Results: On interpretation of FNAC non-neoplastic lesions outnumbered the neoplastic lesions and Colloid goitre accounted for the majority of the cases (40.6%). Among the neoplastic lesions, follicular neoplasms were most common. Cytologically majority of the lesions belonged to category II (benign) as per the Bethesda System. On evaluation of thyroid function majority of the cases (69.1%) were euthyroid and were interpreted as either colloid goitre or adenomatoid nodule, whereas most patients of lymphocytic thyroiditis presented with either hypo or hyperthyroidism. Majority of malignant cases also turned out to be hypothyroid (9/12 Cases). None of the malignant case presented with hyperthyroidism.

Conclusions: Thyroid cytology proves to be a reliable, simple and cost-effective first line diagnostic procedure. FNAC together with thyroid function test can be used for early and accurate diagnosis of various thyroid lesions, and reduces unnecessary intervention.

Keywords: The Bethesda System of Reporting Thyroid Cytopathology, Thyroid Function Test, Thyroid Swelling

Introduction

Swelling of the thyroid gland is a common manifestation of various diseases of the thyroid, including both benign and malignant with some being associated with thyroid dysfunction. The prevalence of thyroid swelling ranges from 4% to 7% in the general adult population and from 0.2% to 1.8% in children^[1]. Pre-operative distinction of benign from malignant lesions is important to avoid unnecessary surgery and guide proper management.

Fine needle aspiration cytology (FNAC) is a widely accepted screening procedure in diagnosis of diffuse and solitary thyroid nodules. It is a simple, cost

effective, minimally invasive and quick to perform procedure. Widespread use of FNAC has reduced number of patients requiring surgery by more than 50%. FNAC not only prevents unnecessary thyroid surgery for benign nodules, but also has increased malignancy rate in resected nodules from 14% to 50%^[2]. However, the procedure has its own limitations since accuracy is lower in suspicious cytology and in follicular neoplasms.

The Bethesda system of reporting thyroid cytopathology established a uniform, tiered reporting system for thyroid specimens. Using The Bethesda system of reporting thyroid cytopathology (TBSRTC),

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cytopathologist can communicate thyroid FNAC interpretations to the referring physician which is not only clinically useful but also guides appropriate management^[3].

The thyroid is an endocrine organ composed histologically of 20-40 thyroid follicles. They produce hormones triiodothyronine (T3) and thyroxin (T4) which are in turn regulated by thyroid stimulating hormone produced by anterior pituitary gland^[4]. The lesions of thyroid can be categorized in hypothyroid, euthyroid or hyperthyroid condition based on the assessment of the level of T3, T4 and TSH^[1].

The present study aims to assess the cytomorphological features of various thyroid lesions and classify them in different categories based on The Bethesda System of Reporting Thyroid Cytology and also to correlate them with thyroid hormone status of patients.

Material and Methods:

The study was conducted at L.N. Medical College & Research centre, Bhopal. This was a prospective study done on patients, irrespective of age and gender, attending the surgery / ENT OPD with complaints of thyroid swelling from January 2016 to December 2017.

Relevant clinical data regarding age, sex, site, size and duration of thyroid swelling was recorded prior to FNAC. All the patients were also assessed for T3, T4, TSH hormone levels. FNAC was done with 23-gauge needle following standard procedure under aseptic precautions. From the aspirates, one dry & one wet smears were made and stained with Giemsa and PAP stains. Smears were evaluated by the Pathologist and categorised according to The Bethesda System of Reporting Thyroid Cytopathology. The Thyroid Function Test profile (T3, T4, TSH) was performed using Cobas E411 Electro Chemiluminescence immunometric assay method (Roche diagnostics).

The cytomorphological detail, FNAC diagnosis and Thyroid Function Test (TFT) details were entered in Microsoft excel and study variable were statistically analysed. A written informed consent was taken from all the subjects prior to the study. The research protocol was approved by the institutional ethical committee.

Results:

The present study comprised of 165 cases of thyroid lesions, irrespective of their age and sex, referred for cytological study from ENT/Surgery OPD or admitted to the ward. The study comprised of 13.9% males (23 cases) and 86.1% females (142 cases) with a male to female ratio of 1:6.2. The age of presentation in the

present study ranged from 12 to 75 years with mean age of 41.3 ± 12.4 years. Most of the patients were in the age group of 31 – 40 years accounting for 35.2% of cases (Table 1).

Table 1: Age and gender wise distribution of patients with palpable thyroid lesions

Age group (in yrs)	Number of Males	Number of Females	Total number
11-20	0	02	02
21-30	04	26	30
31-40	09	49	58
41-50	05	39	44
51-60	04	14	18
61-70	01	09	10
71-80	0	03	03
Total number	23	142	165
Mean Age \pm Standard Deviation = 41.3 ± 12.4			

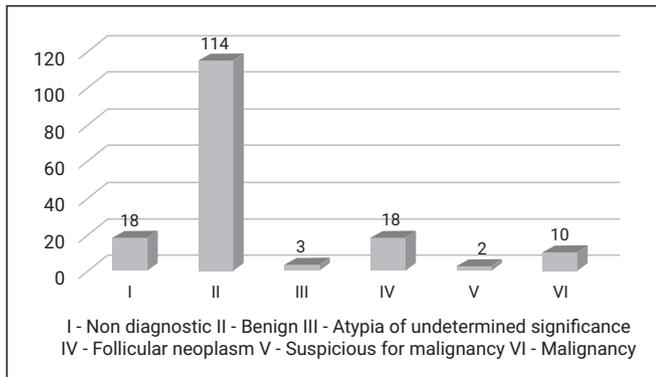
All the 165 patients in the study were subjected to FNAC of the thyroid swelling. FNAC interpretations were grouped under neoplastic and non-neoplastic categories. The Non-neoplastic lesions outnumbered the neoplastic lesions. Amongst the non-neoplastic lesions, colloid goitres were accounted for majority of the cases (40.6%), followed by adenomatoid nodule (13.3% of cases) and lymphocytic thyroiditis (10.3% of cases). Among the neoplastic lesions, follicular neoplasms were most common followed by papillary carcinoma (Table 2).

Table 2: Distribution of Thyroid lesions according to Cytological diagnosis

S No.	Cytological Diagnosis	No. of Cases	Percentage
Non - Neoplastic Lesion			
1	Inadequate	18	10.9
2	Colloid goitre/ Multinodular goitre	67	40.6
3	Adenomatoid nodule	22	13.3
4	Lymphocytic thyroiditis	17	10.3
5	Granulomatous thyroiditis	8	4.8
6	Atypia of undetermined significance	3	1.8
Neoplastic Lesions			
1	Follicular neoplasm	17	10.3
2	Hurthle cell neoplasm	2	1.3
3	Suspicious for malignancy	2	1.3
4	Anaplastic carcinoma	3	1.8
5	Papillary carcinoma	6	3.6
	TOTAL	165	100

Cytologically the lesions were also classified according to “TBSRTC-2016” into five general diagnostic categories. Majority of the lesions belonged to category II as per the Bethesda System. (Figure 1)

Figure 1: Categorisation of thyroid lesions according to the Bethesda system



Evaluation of the thyroid function status was done in all the 165 study subjects out of which 114 cases (69.1%) were euthyroid; 31 cases (18.8%) were hypothyroid and 20 cases (12.1%) were hyperthyroid. Majority of the patients with colloid goitre and adenomatoid nodule were found to be euthyroid whereas most patients of lymphocytic thyroiditis presented with thyroid dysfunction i.e., either hypo or hyperthyroidism. Furthermore, majority of the malignant cases also turned out to be hypothyroid (9/12 Cases). None of the malignant case presented with hyperthyroidism (Table 3)

Discussion:

Thyroid nodules are a common clinical problem. The clinical importance of these thyroid nodules rests with the need to exclude thyroid cancer, which occurs in 7%–15% of cases. FNAC along with ultrasound and assessment of thyroid function status remains the mainstay of evaluation of thyroid swellings. According to the guidelines put forth by ATA, serum estimation of TSH should be part of initial assessment of thyroid swellings. If overt or subclinical hyperthyroidism is present, additional evaluation is required. A higher serum TSH level, is usually associated with increased risk of malignancy in a thyroid nodule, as well as more advanced stage thyroid cancer^[5].

The present study was undertaken with the aim of evaluating the clinico-pathological profile of various thyroid lesions. The mean age of patients with thyroid lesions in our study was 41.3 ± 12.4 years with an age range of 12-75 yrs. The male to female ratio was found to be 1:6.2 in our study. Our results compare favourably with similar studies done by CK Sang et al and Gupta R et al^[6,7]. It is a well-known fact that thyroid diseases affect females more commonly than males.

Thyroid autoimmunity can cause several forms of thyroid disorders i.e. Grave's disease, Hashimoto's thyroiditis, atrophic autoimmune thyroiditis etc. In such cases cytology along with serological tests aid at reaching a correct diagnosis. Majority of benign cases (67.3%) were euthyroid in our study. While correlating the thyroid disease with hormonal status most patients with colloid goitre had euthyroid status.

Table 3: Thyroid function status in various thyroid lesions

Cytological Diagnosis	TFT			Total number
	Euthyroid	Hypothyroid	Hyperthyroid	
Inadequate	14	4	0	18
Colloid goitre/ Multinodular goitre	59	5	3	67
Adenomatoid nodule	19	2	1	22
Lymphocytic thyroiditis	3	9	5	17
Granulomatous thyroiditis	5	0	3	8
Atypia of undetermined significance	2	0	1	3
Follicular /Hurthle cell neoplasm	9	3	7	19
Suspicious for malignancy	0	2	0	2
Papillary carcinoma	3	3	0	6
Anaplastic Carcinoma	0	3	0	3
Total number	114	31	20	165

Table 4: Distribution of cases as per the six tier Bethesda system in present study and other comparable studies

Diagnostic category	Yassa L et al (2007) ¹⁵	Yang J et al (2007) ¹⁶	Jo VY et al (2010) ¹⁷	Mondal SK et al (2013) ³	Present study (2017)
I. Nondiagnostic	7%	10.4%	18.5%	1.2%	10.9%
II. Benign	66%	64.6%	59%	87.5%	69.1%
III. AUS	4%	3.2%	3.4%	1%	1.8%
IV. Follicular Neoplasm	9%	11.6%	9.7%	4.2%	10.9%
V. Suspicious for malignancy	9%	2.6%	2.3%	1.4%	1.2%
VI. Malignant	5%	7.6%	7%	4.7%	6.1%

This finding was similar to a study done by Junu et al and Siddegowda et al^[8,9].

In patients with Chronic lymphocytic thyroiditis, majority of the patients were hypothyroid (9/17; 52.9%). These results are similar to previous studies of Singh N and Bhatia A et al^[10,11] However, in our study (5/17; 29.4%) cases were hyperthyroid. Similar results have been reported in very few studies in literature. This may be due to the fact that lymphocytic thyroiditis has a slow progression to hypothyroidism. Depending upon the stage of the disease patients may present with features of hypo or hyperthyroidism.

TSH is a known thyroid growth factor and recently a strong relationship with the risk of thyroid malignancy has been reported^[12]. Several studies have revealed that the likelihood of thyroid cancer increases with higher serum TSH concentration, particularly papillary carcinoma^[13,14]. These results are in agreement with our study which also reported a higher TSH concentration in thyroid malignancy (9/12 cases) with papillary and anaplastic carcinoma accounting for maximum number of cases.

It is seen from Table:4 that the distribution of cases as per the six tier Bethesda system in our study is comparable to most of the other studies except in category III and V. The reason for the lower percentage in these categories can be attributed to the fact that, in our institute, a USG guided FNAC is performed for small nodules or nodules that appear heterogenous on palpation, so an aspirate can be procured from the exact pathological site thereby allowing a more specific cytological diagnosis.

AUS: Atypia of undetermined significance

The incidence of malignant lesions in our study was also comparable to other studies with papillary carcinoma being the commonest type. The least common were the follicular and poorly differentiated carcinoma.

Conclusion:

Thyroid cytology proves to be a reliable, simple and cost-effective first line diagnostic procedure with high patient acceptance and without complications. FNAC together with thyroid function test (TFT) can be used for early and accurate diagnosis of various thyroid lesions, which in turn can reduce unnecessary intervention. It is recommended that surgical indications must not depend solely on cytology. Indeed, the results of medical history, physical examination, laboratory tests and ultrasonography should also be evaluated simultaneously.

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