Implementation of Bethesda system for reporting thyroid cytology in an academic institution: A 2 year retrospective study

Sily Sreedharan[1,*], Deeshma T[2], Fatima Shamsuddin[3], Chris Thomas[4], Shobhitha D[5]

[1,2,3]Associate Professor, [4,5]Assistant Professor, Dept. of Pathology, Malabar Medical College Hospital and Research Center Modakkalur, Atholi, Calicut, Kerala, India

*Corresponding Author:
Email: sily.vinod@gmail.com

Abstract

Thyroid diseases are the most common endocrine diseases in India. Both benign and malignant diseases present as thyroid nodules. Fine needle aspiration cytology (FNAC) has proven to be one of the most effective tools for evaluation of thyroid nodules. Interpretation of FNAC has been standardized by the Bethesda system for reporting thyroid cytopathology (TBSRTC).

Aim: To categorize all the thyroid lesions utilizing TBSRTC, in an academic institution for a duration of 2 years and find its histopathological correlation.

Materials and Methods: A 2 year retrospective study included all 229 patients who underwent thyroid FNAC in the institution. All the clinical and relevant radiological investigations were retrieved from hospital information system. All Papanicolaou and May Grunwald Giemsa stained smears were categorized under TBSRTC in to 6 categories.

Results: Maximum number of cases were between the age group of 31-45yr. Male: Female ratio in our study was 1:13. There were 12 cases (5.2%) under Unsatisfactory/non diagnostic category, 196(85.5%) cases belonged to benign category, 1 case (0.04%) of Atypia of undetermined significance/follicular lesion of undetermined significance,10 cases (4.3%) belonged to follicular/ suspicious for follicular neoplasm,4 cases (1.7%) belonged to suspicious for malignancy & 6 (2.6%) belonged to Malignant category. Cyto histopathology discrepancy rate was 7.14%.

Conclusions: TBSRTC brings about uniformity in reporting of thyroid cytology, thereby helping in better patient management and avoiding unwanted surgeries.

Keywords: Bethesda system, Fine needle aspiration cytology, Follicular neoplasm, Malignant, Reporting, Thyroid.

Introduction

Thyroid diseases are the most common endocrine diseases in India.[1] The burden of thyroid diseases are formed by both benign and malignant diseases, which can present as thyroid nodules.[2] Fine needle aspiration cytology [FNAC] has proven to be the most cost effective, minimally invasive and simple tool for evaluation of thyroid nodules.[3] Interpretation of FNAC results thus becomes the key step to decide and advise if more invasive evaluation is necessary.[4] The use of different terminologies, nomenclature and diagnostic criteria by pathologists created misunderstanding among clinicians thus hindering a definitive management.[4,5]

In 2007, the Bethesda system for Reporting Thyroid cytopathology (TBSRTC] was proposed at the National Cancer Institute, FNA State of the science conference at Bethesda, Maryland. It was an attempt to standardize international terminology used in reporting thyroid lesions.[4,6]

The present study aims to categorise the thyroid lesions utilizing the Bethesda system for reporting thyroid cytology (TSRBTC) for a duration of 2 years and to find its histopathological correlation wherever possible.

Materials and Methods

This hospital based retrospective study included all thyroid FNAC between February 2016 to February 2018 in the Department of Pathology in an academic institution. Papanicolaou and May Grunwald Giemsa stained slides of all 229 patients were retrieved from Department slide sections. Relevant demographic, clinical and radiological data were collected from medical records section and hospital information system (HIS). All the thyroid FNAC procedures done in post thyroidectomy patients were excluded from the study. All the thyroid cytology slides were categorized as non diagnostic/unsatisfactory (category-1), benign (category-2), Atypia of undetermined significance/follicular lesions of undetermined significance (category-3), follicular neoplasm/suspicious for a follicular neoplasm (category-4), suspicious for malignancy (category-5) and malignant (category 6). Table 1

Table 1: The Bethesda system of reporting thyroid cytology

Category			Risk of malignancy	Clinical management
I	Non diagnostic or unsatisfactory	1. Cyst fluid only 2. Virtually acellular smear		Repeat Ultrasound guided FNAC

		3. Others (Obscuring blood, artifacts)		
II	Benign	1. Benign follicular nodule (adenomatoid nodule, colloid goiter) 2. Lymphocytic thyroiditis (Hashimoto's) 3. Granulomatous thyroiditis	0-3%	Clinical follow up
III	Atypia of undetermined significance/ follicular lesion of undetermined significance		5-15%	Repeat FNA
IV	Follicular neoplasm/Suspicious for follicular neoplasm	1. Follicular neoplasm 2. Specify if Hurthle cell type	15-30%	Surgical Lobectomy
V	Suspicious for malignancy	1. Suspicious for Papillary carcinoma 2. Suspicious for Medullary carcinoma 3. Suspicious for Metastatic 4. Suspicious for Lymphoma	60-75%	Near total thyroidectomy or surgical Lobectomy
VI	Malignant	1. Papillary carcinoma 2. Medullary carcinoma 3. Poorly differentiated 4. Anaplastic carcinoma 5. Others	97-99%	Near total Thyroidectomy

Histopathological reports of those patients who had undergone thyroidectomy was also obtained and categorized as benign and malignant.

Data was analysed as mean SD. Study protocol was approved by scientific research & Ethics committee of the academic institution.

Results

Total of 229 cases were studied in our two year retrospective study on thyroid FNAC. Maximum number of cases were in the age group of 31-45 yr as shown in Fig. 1.

Out of the total 229 cases, 213 were females (93%) & 16 were males (6.9%) as shown in Fig. 2. Male: Female ratio in our study was 1:13.

From the total 229 cases, 196 (85.5%) cases belonged to category-2, benign thus predominating all the other category. There were 12 cases(5.2%) under Unsatisfactory/non diagnostic category, 1 case (0.04%) of Atypia of undetermined significance/follicular lesion of undetermined significance,10 cases (4.3%) belonged to follicular neoplasm/suspicious for follicular neoplasm. 4 cases (1.7%) belonged to suspicious of malignancy & 6(2.6%) belonged to malignant category as shown in Table 2.

Table 2: Distribution of cases according to Bethesda category

	Category	Total number of cases	Percentage
Non diagnostic/unsatisfactory	I	12	5.2
Benign	II	196	85.5
Atypia of undetermined significance/Follicular lesion of undetermined significance	III	1	0.04
Follicular neoplasm /Suspicious for a follicular neoplasm	IV	10	4.3
Suspicious for Malignancy	V	4	1.7
Malignant	VI	6	2.6

Category–1 Unsatisfactory/non diagnostic constituted 12 cases (5.2%). Out of the 196 cases in category–2, majority 181 cases (92.3%) was constituted by benign follicular nodule (Nodular colloid goiter, adenomatoid nodule) (Fig. 3). Lymphocytic thyroiditis (Hashimoto's thyroiditis) (Fig. 4) constituted 15 cases (7.6%). Category-4 showed Follicular neoplasm/suspicious for follicular neoplasm (Fig. 5) in 7 cases (70%) and Hurtle cell neoplasm in 3 cases (30%). In the category of suspicious for malignancy category-5 there were 4 cases. All 4 cases belong to papillary carcinoma thyroid (Fig. 6). Out of the 6 cases in category 6- malignant, 4 cases (66.6%) were diagnosed as papillary carcinoma & 2 cases (33.3%) were poorly differentiated carcinoma thyroid (Fig. 7) as shown in Table 3.

Table 3: Distribution of cases in the various Bethesda category

	Category	Cases (total cases)	Percentage
Non diagnostic	I	Cyst fluid -7(12)	58.3
		Acellular-5 (12)	41.6
Benign	II	Benign follicular nodule-Nodular colloid goiter, adenomatoid-169(196)	86.2
		Lymphocytic / Hashimoto's-15(196)	7.6
Atypia of undetermined significance/Follicular lesion of undermined significance.	III	Follicular lesion of undetermined significance-1	
Follicular neoplasm/Suspicious for follicular neoplasm	IV	Follicular neoplasm-7(10) Hurthle cell neoplasm-3(10)	70
			30
Suspicious for Malignancy	V	Papillary carcinoma-4(4)	100
Malignant	VI	Papillary carcinoma-4(6) Poorly differentiated carcinoma-2(6)	66.6
			33.3

Out of the 229 cases, only in 84 cases histopathology reports could be retrieved. These were classified as benign and malignant. Out of the 84 cases, 69 cases were benign and 15 cases were malignant. Out of 60 cases diagnosed as benign according to Bethesda system, histopathologically 1 case showed malignancy. 3 cases diagnosed as follicular neoplasm according to Bethesda system, histopathologically was diagnosed as Cellular nodule of Nodular colloid goiter. 2 cases categorized under Bethesda system as Hurthle cell neoplasm was diagnosed histopathologically as Nodular colloid goiter with hurtle cell change and Hashimoto's thyroiditis. One of them diagnosed as Hashimoto's according to Bethesda was diagnosed to have diffuse large B cell lymphoma thyroid as shown in Table 4. Cytohistopathology discrepancy was 7.14%.

Table 4: Shows cyto-histo correlation of 84 cases

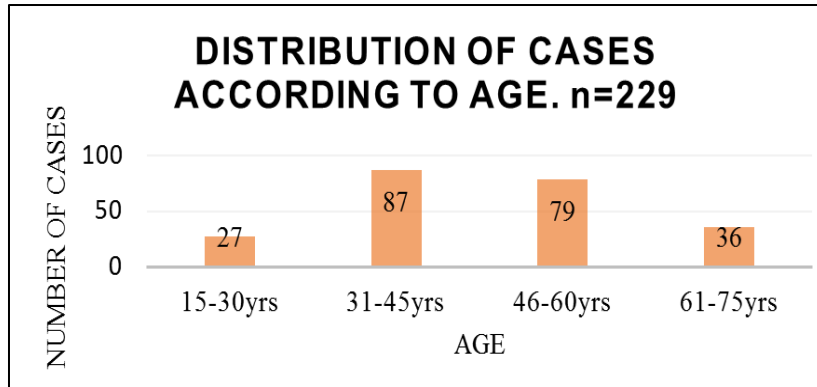| Category	Benign	Malignant
Unsatisfactory/ non diagnostic	5	Nil
Benign	59	1
Atypia of undetermined significance/follicular lesion of undetermined significance		
Follicular neoplasm/suspicious for follicular neoplasm	5	4
Suspicious for malignancy	Nil	4
Malignant	Nil	6
Total cases	**69**	**15**

Fig. 1: Bar chart showing distribution of cases according to the age
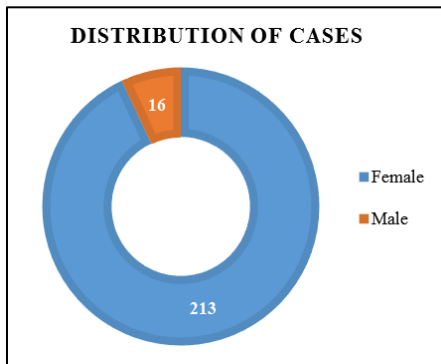
Fig. 2: Pie chart showing sex distribution

Fig. 3: 100X Giemsa stained smear showing benign follicular nodule (nodular colloid goiter)-Category-II

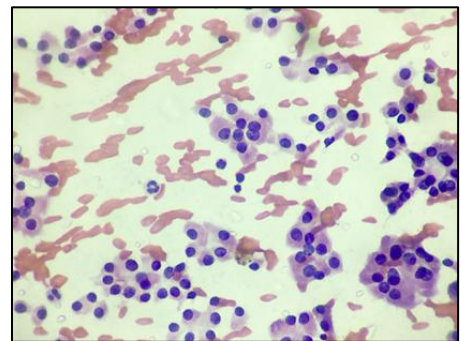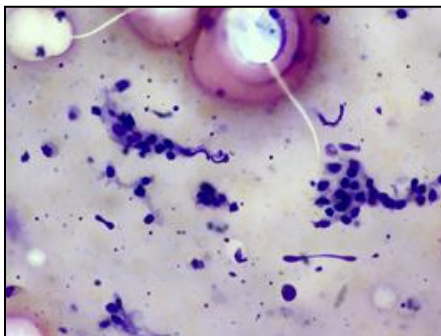**Fig. 4: 400X Pap stained smear showing Hashimoto's thyroiditis- Category**

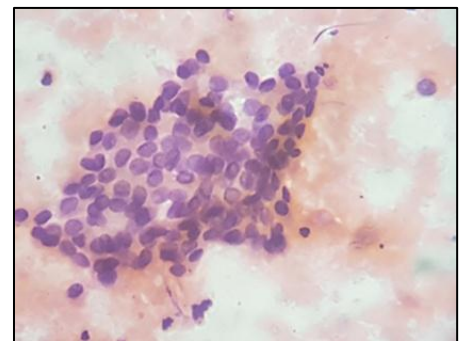**Fig. 5: 400x Pap stained smear shows follicular neoplasm/suspicious for follicular neoplasm - Category-4**

Fig. 6: 400x Pap stained smear showing suspicious for papillary carcinoma- Category-5

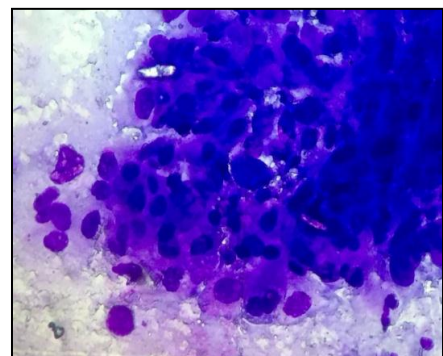**Fig. 7: 400x Giemsa stained smear shows poorly differentiated carcinoma – Category-VI**

Discussion

Fine needle aspiration cytology is an effective diagnostic tool. It helps in triage of patients with thyroid nodules as to who requires surgical line of management. Due to lack of uniformity in reporting of thyroid cytology, there was a lot of confusion regarding the management of the thyroid nodules. TBSRTC was introduced in 2007 to take care of all these shortcomings and help in appropriate communication.[7]

Present study was conducted in Department of Pathology of our academic institution. Total number of cases studied were 229. In this study attempt was made to categorise the thyroid lesions utilizing the Bethesda system for reporting thyroid cytology (TSRBTC) and to find its histopathological correlation wherever possible.

In our study maximum number of cases were in the age group of 31-45yr which is comparable to Mundasad et al.[8] Male: Female ratio was 1:13 which was comparable to studies of Safirullah et al.[9]

Out of the 229 cases in the present study, 12 cases (5.2%) were under unsatisfactory/non diagnostic category, 196 cases (85.5%) belonged to Benign, 1 case (0.04%) of Atypia of undetermined significance/follicular lesion of undetermined significance, 10 cases (4.3%) belonged to follicular neoplasm/suspicious for follicular neoplasm, 4 cases (1.7%) belonged to suspicious for malignancy & 6 cases (2.6%) belonged to malignant category. This was comparable to studies by Arpita et al,[10] Reddy P et.al,[11] Yang et al,[12] Nayar et al,[13] and Gupta et al[14] as shown in table 5.

Table 5: Comparative studies

	Present study	Reddy et al[11]	Yang et al[12]	Nayar et al[13]	Arpita Nisha et al[10]	Gupta et al[14]
ND/US	5.2	3.7	10.4	5	3.4	11
Benign	85.5	89.25	64.6	64	88.8	78
AUS/FLUS	0.04	0.002	3.2	18	1.3	2
FN/SFN	4.3	2	11.6	6	3.4	3
Suspicious for malignancy	1.7	0.6	2.6	2	0.6	1
Malignant	2.6	4.1	7.5	5	2	5

In our study 12 cases were Unsatisfactory, out of which 7 were cystic lesions and 5 were acellular out of them, 5 underwent thyroidectomy which were Multinodular goiter. Rest were lost to follow up. In order to reduce the number of cases in this category, ultrasound guided FNAC was advised for smaller thyroid nodules.

Our study showed maximum number of cases were under benign category which was comparable to studies conducted by Reddy et al,[11] Arpita et al[10] studies. Most of them were diagnosed as Nodular colloid goiter and Adenomatoid nodule whereas the number of thyroiditis cases were only 15. The number of cases under AUS was very low in our study comparable to Reddy et al[11] study, as we consider this category to be a waste basket category and the line of management for such lesions are confusing as suggested by Awasthi et al.[15] Total number of cases under SFN and Suspicious for malignancy were 4.3% and 1.7% comparable to Gupta et al.[14] and Arpita et al.[10] Our study showed that majority cases in malignant category were Papillary carcinoma which is comparable to studies conducted by Mohammed Abdulaziz et al.[16] Only 2 were poorly differentiated carcinoma which were histopathologically confirmed. Our study did not have any cases of medullary carcinoma, Anaplastic carcinoma.

Histopathological reports were obtained in 84 cases, of which predominantly were benign lesions.

Cytohistopathology discrepancy rate was 7.14% which was comparable to studies conducted by Reddy et al.[11]

Conclusion

Fine needle aspiration cytology is an inexpensive effective tool in diagnosis of thyroid nodules. Adopting The Bethesda system of reporting thyroid cytology brought about uniformity in reporting and helping in better management of cases. This reporting system also assesses the risk of malignancy thus avoiding unwanted surgeries.

Limitations

The sample size in the study is small. Histopathology is the gold standard for cytology. In our study the total histopathological follow up was less. Better follow up will help in finding interpretation errors.

Conflict of Interest: Nil

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