

Original Research Article

Reporting of thyroid fine needle aspiration cytology with the use of the Bethesda System (TBS) of 150 cases

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is very simple, rapid, cost effective diagnostic test to evaluate thyroid swelling. The Bethesda system for reporting thyroid cytopathology gives guidelines which remains the same while reporting the thyroid FNAC. There are six diagnostic categories of lesions: (I) Non-diagnostic/Unsatisfactory, (II) Benign, (III) Atypical follicular lesion of undetermined significance (AFLUS), (IV) Suspicious for follicular neoplasm (SFN), (V) Suspicious for malignancy (SM), (VI) Malignant.

Methods: The study was carried out in Department of Pathology, Government Medical College affiliated with a Government hospital, Gujarat. It includes 150 patients, coming to the outpatient departments with a complaint of thyroid swelling from January 2017 to December 2017. The patients age ranges from 7 years to 75 years (Male-20, Female-130). The procedure was done with the patient in a supine position without a pillow. Patients were instructed not to speak or swallow during the procedure to avoid movement of the gland. The reporting was done with the current Bethesda nomenclature.

Results: There were 150 cases of thyroid FNAC, 3 cases (2 %) were non-diagnostic (TBS-I), 133 cases (88.7 %) were benign (TBS-II), 6 cases (4 %) were atypical follicular lesion of undetermined significance (AFLUS) (TBS-III), 5 cases (3.4 %) were suspicious for follicular neoplasm (TBS-IV), 2 cases (1.3 %) were suspicious for malignancy (TBS-V), and 1 case (0.6 %) was malignancy (TBS-VI).

Conclusions: The Bethesda system is very useful standardized system for reporting thyroid cytopathology, improving communication between cyto-pathologists and clinicians, inter-laboratory agreement, leading to more consistent management approaches.

Keywords: Bethesda, FNAC, Hashimoto, Thyroid, TBS

INTRODUCTION

Fine needle aspiration cytology (FNAC) is very simple, rapid, cost effective diagnostic test to evaluate thyroid swelling.¹ FNAC has got very important role in distinguishing between neoplastic and non-neoplastic lesions of the thyroid, important to plan the medical or surgical management.²⁻⁴ Large goiters, obstructing adjacent organs or disfiguring cosmetically may require

surgical intervention, regardless of cytological findings.⁵ The Solitary Thyroid Nodule (STN) as well as cancer of thyroid are common problems in females.^{6,7} There was lack of a standardized reporting system and because of using different terminologies there was a lot of confusion in the management. In the year 2007, The National Cancer Institute (NCI), Bethesda, Maryland, United States proposed the system, "The Bethesda System" for reporting thyroid cytopathology.⁸ There are certain

adequacy criteria for it: (i) 5-6 groups of well-preserved follicular epithelial cells with 10 or more cells per group (ii) 6 groups of follicular epithelial cells on at least 2 of 6 slides. (iii) 10 large clusters of follicular epithelial cells with more than 20 cells per group. (iv) Specimens with abundant colloid but few follicular cells are considered benign colloid nodules. (v) Specimens consisting of macrophages and cyst contents only are considered non-diagnostic. (vi) A non-diagnostic rate greater than 20% may represent a technical procurement problem. (vii) Any sample containing atypical cells should not be considered non-diagnostic.^{2,9-11}

Table 1: The Bethesda system for reporting thyroid cytopathology: recommended diagnostic categories.¹¹

The Bethesda system reporting categories	
I	Nondiagnostic or unsatisfactory
	Cyst fluid only
	Virtually acellular specimen
	Other (obscuring blood, clotting artifact, etc.)
II	Benign
	Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc)
	Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context
	Consistent with granulomatous (subacute) thyroiditis
III	Other
	Atypia of undetermined significance or follicular lesion of undetermined significance
	Follicular neoplasm or suspicious for a follicular neoplasm
IV	Specify if Hürthle cell (oncocytic) type
	Suspicious for malignancy
V	Suspicious for papillary carcinoma
	Suspicious for medullary carcinoma
	Suspicious for metastatic carcinoma
	Suspicious for lymphoma
	Other
VI	Malignant
	Papillary thyroid carcinoma
	Poorly differentiated carcinoma
	Medullary thyroid carcinoma
	Undifferentiated (anaplastic) carcinoma
	Squamous cell carcinoma
	Carcinoma with mixed features
	Metastatic carcinoma
Non-Hodgkin lymphoma	

According to The Bethesda system (TBS), there are six diagnostic categories of lesions (Table-1): (I) Non-diagnostic/Unsatisfactory, (II) Benign, (III) Atypical follicular lesion of undetermined significance (AFLUS), (IV) Suspicious for follicular neoplasm (SFN), (V) Suspicious for malignancy (SM), (VI) Malignant.^{2,11} In colloid Goiter, the aspirates consist of amber colored

colloid. Cystic lesions constitute 10% to 30% of all thyroid nodules, contains mainly blood and clusters of well-preserved follicular cells. Thyroiditis comprises an acute suppurative thyroiditis as well as lymphocytic thyroiditis or Hashimoto's disease. Hashimoto thyroiditis is due to an autoimmune disease, anti-microsomal and anti-thyroid antibodies are elevated.¹²

The aspiration smears show lymphocytes and Hurthle cells. Atypical follicular lesion of undetermined significance (AFLUS) (TBS-III)- some features of atypia but could not be categorized definitely into either of the benign, SFN, SM, or malignancy; cytological features are moderate to high cellularity, scant or absent colloid, with predominantly micro-follicular or trabecular configuration of follicular cells. Suspicious for malignancy (SM) (TBS-V), features are suggestive of, but not definitive of, papillary carcinoma, medullary carcinoma, or lymphoma. Suspicious for follicular neoplasm (TBS- IV)- cytological findings are cellular aspirates with little, thick, colloid, i.e. a high cell to colloid ratio, cells groups arranged in micro-follicles with central colloid, cytological features are nuclear crowding, increased nuclear size, nuclear membrane irregularity and irregular chromatin distribution. Malignant (TBS- VI) includes medullary carcinoma, papillary carcinoma, anaplastic carcinoma, lymphoma.¹³ Papillary carcinoma- cytological features are cells with intranuclear inclusions, nuclear grooves, dense blue-grey cytoplasm, psammoma bodies, multinucleate histiocytes, 'Chewing-gum' colloid.⁵ Medullary carcinoma- cytological findings are dispersed cellular aspirate, cells are large with abundant cytoplasm, hyperchromatic, often eccentric nuclei with prominent nucleoli, cytoplasmic is granular, amyloid and calcitonin positivity. Lymphoma- there are predominantly non-Hodgkin lymphomas (NHL). In most cases a background of autoimmune thyroiditis can be seen.¹³

METHODS

The study was conducted in the department of pathology, Government Medical College, affiliated with Government hospital, Gujarat. The inclusive criteria of present study were patients coming to various outpatient departments with complaint of thyroid swelling in a period of 1 year (from January 2017 to December 2017). Total 150 cases with thyroid swelling have been studied. Swelling which does not move with deglutition were excluded from the study (non-thyroid swelling). categories were noted. Informed consent was obtained in all cases. The procedure was done with the patient in a supine position without a pillow. The direction of the needle was tangential to the trachea.¹⁴ Patients were instructed not to speak or swallow during the procedure to avoid movement of the gland. Following size needle were used for procedure- 23, 25 or 27 Gauge attached to 10ml disposable plastic syringe. The procedure of FNAC was performed without ultrasonic guidance in majority of cases. Ultrasound guidance restricted to cases where it was required for lesion localization. The operator was

instructed not to use ultrasound gel to prevent contamination of the sample. Larger nodules were aspirated in different areas.¹³ The smears were prepared and were fixed in ethyl alcohol. Smears were stained by Leishman's stain, May Grunwald Giemsa stain and Papanicolaou stain. All cytology smears were reviewed by three different cytopathologists and were classified as per Bethesda classification.

RESULTS

There were 150 cases of thyroid FNAC, during a period from January 2017 to December 2017. The patient age ranged from 7 to 75 years (n=150) (Male-20, Female-130). Maximum incidence was observed in the age group of 21 to 40 years (Table 2).

Table: 2 Age-sex wise distribution of cases (n=150).

Age group	Male (%)	Female (%)	Total no. of cases (%)
1-20	3 (2)	17 (11.3)	20 (13.4)
21-40	10(6.7)	66 (44)	76 (50.7)
41-60	6 (4)	38 (25.4)	44 (29.3)
61-80	1 (0.6)	9 (6)	10 (6.6)
Total	20 (13.3)	130 (86.7)	150 (100)

Table: 3 Distribution of cases reported as Bethesda category (n=150).

Bethesda category	Male no. (%)	Female no. (%)	Total no. of cases (%)
I Non-diagnostic/un satisfactory	1 (0.7)	2 (1.3)	3 (2)
II Benign	120 (80)	13 (8.7)	133 (88.7)
III AUS/FLUS	4 (2.6)	2 (1.3)	6 (3.9)
IV FN/SFN	4 (2.6)	1 (0.7)	5 (3.3)
V Suspicious of malignancy	1 (0.7)	1 (0.7)	2 (1.4)
VI Malignant	0 (0)	1 (0.7)	1 (0.7)
Total	130 (86.6)	20 (13.4)	150 (100)

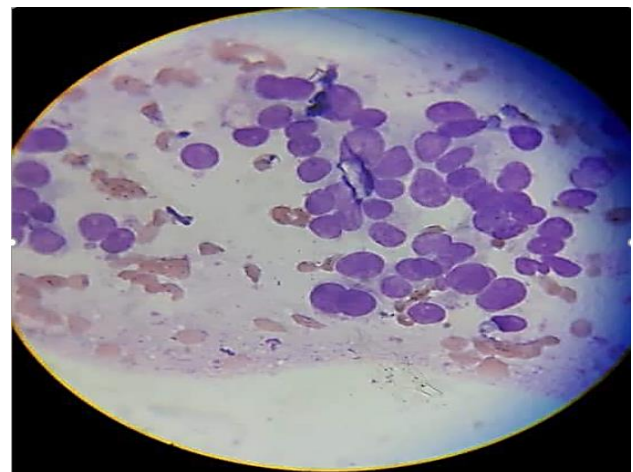
The cases were reported with use of The Bethesda system. Out of 150 cases, 3 cases (2%) were non-diagnostic (TBS-I), 133 cases (88.7%) were benign (TBS-II) category, 6 cases (3.9%) were Atypical follicular lesion of undetermined significance (AFLUS) (TBS-III), 5 cases (3.3%) were Suspicious for Follicular neoplasm (TBS-IV), 2 cases (1.4%) were Suspicious for malignancy (TBS-V), and 1 case (0.7%) was malignant (TBS-VI) (Table 3).

In TBS-1 category there were 3 cases, the reason for non-diagnosis in those cases were due to inadequate cellularity. In TBS category-II, there were total 133 cases. Out of 133, 91 (60.7%) cases of Benign colloid

nodule, 12 (8%) cases of Benign cystic colloid nodule, 19 (12.7%) cases of Hashimoto thyroiditis, 4 (2.7%) cases of hyperplastic colloid goiter, 7 (4.7 %) cases of lymphocytic thyroiditis (Table 4).

Table 4: Cases diagnosed as Bethesda category II.

Cases - Benign (TBS II)	Male (%)	Female (%)	Total no. of cases (%)
Colloid goiter (category II) benign colloid nodule	5 (3.34)	86 (57.4)	91 (60.7)
Colloid goiter (category II) benign cystic colloid nodule	4 (2.67)	8 (5.3)	12 (8)
Hashimoto thyroiditis	3 (2)	16 (10.6)	19 (12.7)
Hyperplastic colloid goiter (category II)	0 (0)	4 (2.7)	4 (2.7)
Lymphocytic thyroiditis	1 (0.67)	6 (4)	7 (4.7)
Total	13 (8.7)	120 (80)	133 (88.7)



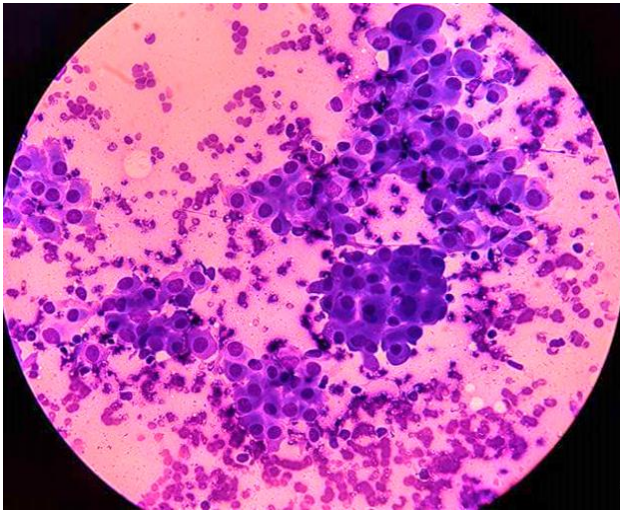
Thyroid epithelial cells arranged in sheets, clusters and scattered singly. Cells show moderate pleomorphism, round/oval with high N:C ratio, irregular nuclear membrane, coarse chromatin, few cells show prominent intranuclear inclusion

Figure 1: Suspicious of papillary carcinoma thyroid (TBS-V) (Giemsa stain 40 X).

In TBS category-III (Atypia of Undetermined Significance/Atypical Follicular Lesion of Undetermined Significance), there were total 6 cases. In TBS category-IV (Follicular Neoplasm/Suspicious of Follicular Neoplasm), there were total 5 cases.

In TBS category-V, there was 1 case of suspicious of medullary thyroid carcinoma and 1 case of suspicious of papillary thyroid carcinoma (Figure 1). In TBS category-

VI, there was 1 case of medullary thyroid carcinoma (Figure 2) (Table 5).



Thyroid epithelial cells arranged in sheets, clusters and scattered singly. Cells show moderate pleomorphism, round to oval with irregular nuclear membrane, large eccentric, hyperchromatic nuclei with abundant cytoplasm

Figure 2: Medullary carcinoma thyroid (TBS-VI) (Giemsa stain 40 X).

Table 5: Cases diagnosed as Bethesda category III, IV, V, and VI.

TBS Category	Cases	Male	Female	Total no. of cases
TBS Cat. III	AUS/FLUS	2	4	6
TBS Cat. IV	FN/SFN	1	4	5
TBS Cat. V	Suspicious of medullary thyroid carcinoma	1	0	1
	Suspicious of papillary thyroid carcinoma	0	1	1
TBS Cat. VI	Medullary carcinoma	1	0	1
Total		5	9	14

DISCUSSION

In authors’ institute, previously (before year- 2015) reporting was done without Bethesda system and we noted that many of the descriptions, terminology and diagnosis were vague and difficult to be understood by many clinicians.

But with use of the standardized nomenclature of the Bethesda system, it seemed more simplified and systematic. Authors compared the results obtained in

present study with the studies of Nayar et al, and Mondal SK et al.^{15,16} (Table 6).

Table 6: Comparison of the percentages (%) of distribution of the FNAC diagnosis of present study with other studies.

Diagnostic category	Present study (%)	Nayar et al, ¹⁵ (%)	Mondal SK et al. ¹⁶ (%)
I Non-diagnostic/un-satisfactory	2.0	5.0	1.2
II Benign	88.7	64.0	87.5
III AUS/FLUS	3.9	18.0	1.0
IV FN/SFN	3.3	6.0	4.2
V Suspicious of malignancy	1.4	2.0	1.4
VI Malignant	0.7	5.0	4.7
Total	100	100	100

Results were comparable with present study. In present study predominant diagnosis were Benign lesion (88.7 %); which was comparable with the frequency of benign lesions in study Nayar et al, (64%) and Mondal SK et al, (87.5%) studies; first reason for the large number of cases in the benign category in present study may be due to the reason that authors’ institute, despite being a tertiary care center, not only caters to the needs of patients on a referral basis, but also patients come here directly without referral.

A second reason was that authors’ institute is of government set up and the diagnostic service (FNAC) is easily accessible to the economically backward sections of the society for whom the test is performed free of cost. The incidence of non-diagnostic category was 2% in present study, while in Nayar et al, it was 5% and in Mondal SK et al, it was 1.2% (Table 6).

The reason for the lower percentage in the non-diagnostic category is due to the fact that, cyto-pathologist himself/herself performs the procedure of FNAC in present study, and so a better quality and adequate aspirate can be ensured. These probably have led to a more specific cytological diagnosis. In present study the clinical, biochemical, and histo-pathological correlation could not be possible.

CONCLUSION

The Bethesda system is very useful for a standardized system of reporting thyroid cytopathology, improving communication between cytopathologists and clinicians, and inter-laboratory agreement, leading to more consistent management approaches. The high malignancy risk for the SM (TBS-V) and malignancy (TBS-VI) categories reflects the importance of these categories in the six-tier Bethesda system.

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