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THE BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY: ITS PROS AND CONS.

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ABSTRACT

INTRODUCTION: Fine needle aspiration (FNA) is the primary diagnostic tool in initial evaluation of thyroid lesions. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) is considered standard reporting system for categorization of thyroid lesions in cytology. **AIMS/OBJECTIVES**: The objective of this study is to evaluate the thyroid cytology smear by TBSRTC; to study the distribution of thyroid lesions into various subcategories and to correlate with histopathology wherever available. **MATERIALS AND METHODS**: The study was conducted at pathology department of M.M.I.M.S.R, Mullana. It comprised of 195 fine needle aspirations of thyroid lesions spanning over a period of two years. The surgically resected specimens were available in 52 cases. **RESULTS**: The mean age of patients in the study was 40.5 with male to female ratio of 1:6.5. FNA results were recorded accordingly as per Bethesda criteria and subcategorized as: 0.5% ND/UNS, 90.8% benign, 0.5% AUS/FLUS, 5.6% FN, 0.5% SFM and 2.05% malignant cases. On histopathological correlation 100% concordance was found for Bethesda 5 and 6 categories. **CONCLUSION:** Our study endorsed the accuracy of TBSRTC in our institution and found it an excellent reporting system for initial work of the patients with thyroid swelling. TBSRTC is a uniform reporting system which facilitates effective communication between pathologist and clinician for the diagnosis of thyroid diseases.

KEYWORDS: Fine needle aspiration (FNA), TBSRTC.

INTRODUCTION

Fine needle aspiration (FNAC) is the primary diagnostic tool in initial evaluation of thyroid lesions. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) is considered standard reporting system for categorization of thyroid lesions in cytology. Fine-needle aspiration (FNA) of the thyroid gland has proven to be an important and widely accepted, cost-effective, uncomplicated secure and accurate method for triaging patients with thyroid nodules.[1] It has an essential role in the evaluation of euthyroid patients with a thyroid nodule as it reduces the rate of unnecessary thyroid surgery for patients with benign nodules and appropriately triages patients with thyroid cancer to appropriate surgery.[2] Given the high prevalence of nodules combined with the impracticality of surgically excising all nodules, FNA plays a vital role as a screening test.[3] Every patient with a palpable or incidental thyroid nodule is a candidate for FNA. A nodule that appears either iso- or hypo-functioning on radionuclide scan should be considered for FNA based on the US (ultrasound) findings.[4,5] However, despite its widespread use, thyroid FNA currently suffers from a reporting confusion: multiplicity of category names, descriptive reports without categories and variable surgical pathology terminology.[6] Lack of consistency in reporting thyroid FNA has led to wide variances in sensitivity and specificity calculations depending on what one considers to be true and false positives/negatives and resulted in confusion among clinicians on how to manage patients who do not have a clear-cut negative or positive thyroid FNA result.[7] This confusion in diagnostic terminology and clinician perception of its inconsistency was addressed in 2007 by the National Cancer Institute (NCI) Thyroid FNA of the Science Conference wherein the terminology and morphologic criteria for reporting thyroid FNA were concluded thus forming the framework for The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC).[8,9] The System improves the clarity of communication among cytopathologists and other health care providers, predicts the cancer risk and reduces unnecessary surgery for patients with benign nodules and appropriately triages patients with malignant nodules for timely clinical intervention.[10] It allows easy and reliable sharing of data from different laboratories for national and international collaboration and comparison by establishing a common language.

OBJECTIVES

The objective of this study was to evaluate the thyroid cytology smear by TBSRTC; to study the distribution of thyroid lesions into various subcategories and to correlate with histopathology wherever available.

MATERIALS AND METHODS

The study was conducted at pathology department of M.M.I.M.S.R, Mullana. It comprised of 195 fine needle aspirations of thyroid lesions spanning over a period of two years. The surgically resected specimens were available in 52 cases. Thyroid lesions were classified according to the TBSRTC 6-tier diagnostic categories as in Table 1.

Table. 1 The Bethesda System for Reporting Cytopathology: Recommended Diagnostic Categories.[11,8]

Diagnostic Category	Risk of malignancy	Usual Management
I. Nondiagnostic or unsatisfactory	-	Repeat FNA with ultrasound
Cyst fluid only		
Virtually acellular specimen		
Other (obscuring blood, clotting artifact, etc)		
II. Benign	0–3	Clinical follow-up
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. Atypia of undetermined significance/follicular lesion of undetermined significance	5–15	Repeat FNA
IV. Follicular neoplasm/"suspicious" for follicular neoplasm Specify if Hürthle cell type	15–30	Surgical lobectomy
V. Suspicious for malignancy	60–75	Near-total thyroidectomy or surgical lobectomy
Suspicious for papillary carcinoma		
Suspicious for medullay CA		
Suspicious for metastatic CA		
Suspicious for lymphoma		
VI. Malignant	97–99	Near-total thyroidectomy
Papillary thyroid carcinoma		
Poorly differentiated carcinoma		
Medullary thyroid carcinoma		
Undifferentiated (anaplastic) CA		
Squamous cell carcinoma		

- Non diagnostic(ND)/unsatisfactory(UNS); Smears were considered as non-diagnostic when a thyroid FNA sample failed to fulfill the recommended criteria for adequacy which are presence of a minimum of six groups of well-visualized (i.e., well-stained, undistorted, and unobstructed) follicular cells, with at least ten cells per group, preferably on a single slide, absence of colloid or only blood.[12] Aspirates diagnosed as cystic fluid were recorded as such but considered as non-diagnostic.
- Benign (BN); Lesions were classified into this category if they were diagnosed or reported as colloid nodule, multinodular goiter, lymphocytic or granulomatous thyroiditis as well as if the aspirate showed benign follicular cells only.
- Atypia of undetermined significance/follicular lesion of undetermined significance (AUS/FLUS); Lesions were classified into this category if they were diagnosed or reported as adequate with 'atypical cells/atypical follicular cells' accompanied by a comment stating that neoplasm could not be excluded and that a repeat FNA of the lesion was recommended.
- Follicular neoplasm/Suspicious for follicular neoplasm (SFN); Lesions were classified into this category if they were diagnosed or reported as having high follicular cellularity with predominant microfollicle formations, scant colloid. Lesions exhibiting Hurthle cells predominantly and

diagnosed as Suspicious for Hurthle cell neoplasm were also included.

- Suspicious for malignancy (SM); Lesions were classified into this category if they were diagnosed or reported as being suspicious for papillary, medullary or metastatic carcinoma or lymphoma. Smears in this category were mainly cellular with crowded cell groups exhibiting nuclear and cytoplasmic pleomorphism with some occasional single atypical cells. In the context of suspicious papillary carcinoma rare presence of nuclear enlargement, grooves, overlapping and/or pseudoinclusions along with thick colloid were considered suspicious.
- Malignant(MGT); Lesions were classified into this category if they were diagnosed as frankly malignant with type specification.

The study was conducted at pathology department of M.M.I.M.S.R, Mullana.

It comprised of 195 fine needle aspirations of thyroid lesions spanning over a period of two years. USG guidance was used in selective cases. A 22-23 gauge needle was used and smears were stained with H & E and MGG stains. The surgically resected specimens were available in 52 cases. The mean age of patients in the study was 40.5 with male to female ratio of 1:6.5. FNA results were recorded accordingly as per Bethesda criteria and subcategorized as: 0.5% ND/UNS, 90.8% benign, 0.5% AUS/FLUS, 5.6% FN, 0.5% SFM and 2.05% malignant cases as shown in Table 2. On histopathological correlation 100% concordance was found for Bethesda 5 and 6 categories.

OBSERVATIONS

TABLE. 2 Cytological diagnosis of 195 patients according to Bethesda system of reporting thyroid cytopathology

Bethesda category	Frequency	Percentage
Bethesda 1	1	0.5%
Bethesda 2	178	91.28%
Bethesda 3	1	0.5%
Bethesda 4	11	5.6%
Bethesda 5	0	0%
Bethesda 6	4	2.05%

Category 1 comprised of only one case and the cause of which was obscuring blood and overly thick smear (Figure1).
Category 2 comprised of 178 cases as shown in table 3.

TABLE. 3: Cytological diagnosis of category 2 cases

CYTOLOGICAL DIAGNOSIS	NO. OF CASES
Lymphocytic thyroiditis	07
Colloid goitre with cystic degeneration	105
Hashimotos thyroiditis	26
Cystic degeneration and hemmorhage in Hashimotos thyroiditis	01
Adenomatous nodule	17
Multinodular goitre	20
De Quervain thyroiditis	02

Out of 178 cases seven cases were diagnosed as lymphocytic thyroiditis (Figure 2a,2b), 105 cases were diagnosed as colloid goiter with cystic degeneration (Figure 3), 26 cases were diagnosed as Hashimotos thyroiditis. There was one rare case of cystic degeneration and hemorrhage seen in Hashimotos thyroiditis (Figure 4). 17 cases were diagnosed as adenomatous nodule, 20 cases with multinodular goiter, 2 cases were diagnosed with de-Quervain thyroiditis.

Cyto-histological concordance was achieved in all the cases except one case which was diagnosed on cytology as hashimotos thyroiditis and on histopathology it came out to be Non Hodgkins lymphoma (diffuse large B cell lymphoma) (figure 5a,5b).

Later on immunohistochemistry was performed which came out to be strongly positive for CD 20.

Category 3 comprised of only one case. Category 4 comprised of 11 cases (Figure 6). Category 5 comprised of zero case and category 6 comprised of 4 cases (Table 4) out of which 2 were diagnosed as papillary carcinoma of thyroid and 2 cases were diagnosed as medullary carcinoma of thyroid (Figure 7a, Figure 7b, Figure 8).

Table 4: Cytological diagnosis of category 6 cases

CYTOLOGICAL DIAGNOSIS	NO. OF CASES
Papillary carcinoma of thyroid	**02**
Medullary carcinoma of thyroid	**02**

In Table 5 and 6 we present the analytical comparison of the percentage distribution of FNA thyroid diagnostic categories of our study using TBSRTC with 3 other published studies and cytological/ histological correlation with benign and malignant cases.

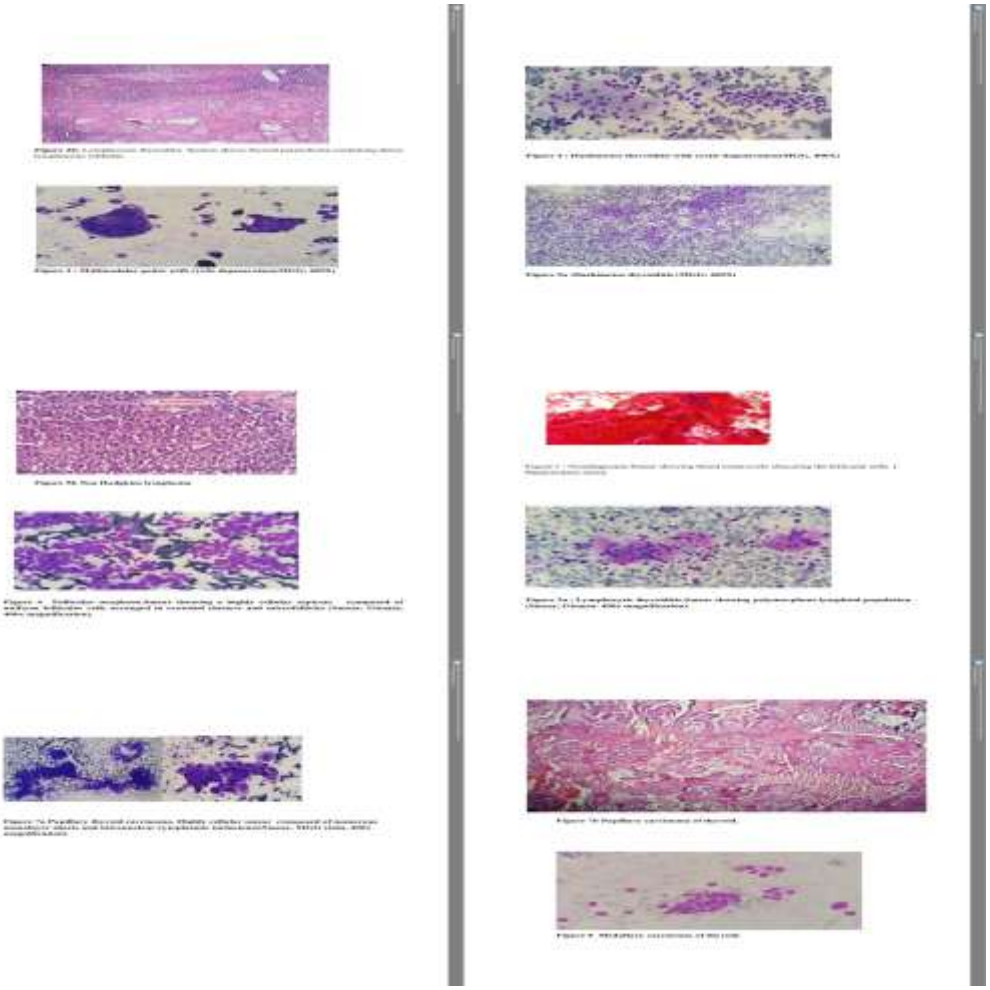
Table. 5 Comparison of percentage of distribution of FNA diagnosis among published studies.

Diagnostic criteria	Present study percentage	Her-Juing Wu H et al [13] 2011%	Jo VY et al [14] 2010%	Lee K et al [15] 2010%
ND/ UNS	0.5%	2.1%	16.6%	10%
BN	91.28%	39%	59.0%	67.7%
AUS/ AFLUS	0.5%	27.2%	3.4%	3.1%
SFN	5.6%	8.4%	9.7%	1.1%
SM	0%	2.6%	2.3%	5.1%
MGT	2.05%	2.7%	7.0%	13%

FNA: Fine Needle Aspiration, ND/UNS: non diagnostic/unsatisfactory, BN: benign, AUS: atypia of undetermined significance, AFLUS: Atypical follicular lesion of undetermined significance, SFN: suspicious for follicular neoplasm, SM: suspicious for malignancy, MGT: malignant.

Table 6 showing cytological/ histological correlation with benign and malignant cases.

Cytological diagnosis	No. of cases	Histological diagnosis	
		Benign	Malignant
ND/UNS	**01**	**01**	**0**
BENIGN	**178**	**177**	**01**
AUS/FLUS	**01**	**0**	**11**
FN/SFN	**11**	**0**	**11**
SM	**0**	**0**	**0**
MGT	**04**	**0**	**04**



DISCUSSION

Our study endorsed the accuracy of TBSRTC in our institution and found it an excellent reporting system for initial work of the patients with thyroid swelling. Thyroid enlargement, wheather diffuse or in the form of nodule, has to be investigated to rule out neoplasm. This avoids unnecessary surgeries and reduces burden on the health care system. FNAC is the first line of investigation along with other investigations like radioiodine scan, ultrasonography, hormonal assay and antibody levels.[11] However, most studies have reported high accuracy rates of FNAC in the diagnosis of neoplasm and thyroiditis.[16,17]

After the introduction of TBSRTC, it was rapidly adopted by most of the institutions.

Most of the studies conducted to date revealed a good accuracy of FNAC concordant with the results of our study, due to which it became prime investigation of choice for initial evaluation of patients with thyroid nodule. In the present study, most of the cases were seen in 4^{th} to 5^{th} decade of life with slight female predominance. Cytological-histological concordance was achieved in all cases except one case which on FNAC was diagnosed as Hashimotos thyroiditis but on histopathology came out to be Non- Hodgkins lymphoma (diffuse large B- cell lymphoma).

CONCLUSION

FNAC of the thyroid is simple preoperative diagnostic test compared with other diagnostic modalities. It is minimally invasive, safe outpatient procedure and can be repeated due to patient acceptance. FNAC was found to be well correlated to the clinical and other methods of assessment of thyroid swellings. Successful FNAC depends on certain contributing features such as experienced aspirator, skillful cytological interpretation, rational analysis based on clinical and cytological information in the context of an individual patient.

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