The Bethesda System for Reporting Thyroid Cytopathology

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Abstract

Background - *FNAC has become the most prominent, and the easiest way, to morphologically evaluate lesions of the thyroid and may be the procedure of choice in the preoperative evaluation of thyroid nodules. In the past, ambiguous and inconsistent diagnostic criteria and terminology have hampered sample interpretation and patient management. The TBSRTC will have effect in transforming, unifying, and improving the reporting of thyroid FNA results*

Aims – *The aim of our study to evolve uniform reporting system for thyroid cytopathology, facilitate effective cytological & histological correlation, reduce the unnecessary surgical management of thyroid lesions, which can easily be treated medically.*

Materials and Methods – *FNAC was performed on two hundred patients diagnosed with thyroid lesion during a period of two years (2010-2012). The smears were prepared, stained by May-Grunewald-Giemsa stain and reported according to Bethesda system reporting of thyroid lesions. The cytological diagnosis was compared with histopathological diagnosis, wherever possible to find out the diagnostic accuracy.*

Results - *The statistical analysis in the present study revealed sensitivity of 95.24 percent, specificity of 78.72 percent, positive predictive value of 66.66 percent, negative predictive value of 97.37 percent and diagnostic accuracy of 83.82 percent. Sensitivity and specificity of pre-Bethesda reporting system was 75 percent and 97.95 percent respectively. Positive predictive value was 85.71 percent, negative predictive value was 95.92 percent and diagnostic accuracy was 94.64 percent.*

Conclusion - *After analyzing the results of the present study, it was concluded that the Bethesda System for Reporting Thyroid Cytopathology represents a reliable and valid reporting system for thyroid cytology.*

Key words – *FNAC – Fine Needle Aspiration Cytology, TBSRTC – The Bethesda System Reporting of Thyroid Cytopathology.*

INTRODUCTION

Thyroid nodules are commonly encountered in clinical practice. FNAC offers non-operative diagnosis for most of thyroid lesions. When done correctly, the sensitivity and specificity of thyroid aspirates for detecting malignancy is very high. Unfortunately, clinicians are sometimes confused by the terminology used in thyroid cytopathology reports. One way to mitigate confusion is for all pathologists to use the same diagnostic criteria and terminology. Standardized terminology for thyroid cytopathology reports has recently been proposed.[1]

The Bethesda System for reporting thyroid cytopathology recently proposed by the National Cancer Institute Thyroid Fine Needle Aspiration State of the Science Conference, (Bethesda USA, 2007) provides the reader with a unified approach to diagnosing and reporting thyroid FNA interpretations. It serves as a reference guide not just for pathologists, but also endocrinologists, surgeons, and radiologists.[2]

It recommends that each report begins with a general diagnostic category because each category has an implied risk of malignancy and also classifies indeterminate thyroid nodules into more detailed categories and provides clinicians with useful information for management.[2]

Hence the present study was conducted to establish a precise diagnostic efficacy of FNAC in thyroid lesions according to the Bethesda System of reporting.

MATERIAL & METHODS

The present study was undertaken during a period of two years and conducted on patients with thyroid lesions who attended the Cytology section of Pathology Department, RNT Medical College, Udaipur.

After taking detailed history and performing clinical examination, the patients were subjected to fine needle aspiration sampling as per procedure detailed by Martin and Ellis (1930).[3]

Fine needle sampling was performed with the patients in either supine or sitting position with the neck hyper-extended. The patient was asked not to swallow, talk, or move during the procedure.The thyroid gland was palpated from the front of the patient and the swelling was fixed with one hand after cleaning the skin overlying the lesion with spirit swab. A syringe with needle (22 or 23 gauze) was used.

FNAC was done in each case. Five or six smears were prepared. The smears were air dried and then stained by May-Grunwald-Giemsa stain. Diagnosis of cytological smears was done on the basis of the newly proposed Bethesda System of Reporting Thyroid Cytopathology (BSRTC). The smears were categorized as follows:

1. Non- diagnostic or unsatisfactory
2. Benign
3. Atypia of undetermined significance /follicular lesion of undetermined significance
4. Follicular neoplasm/suspicious for follicular neoplasm
5. Suspicious for malignancy
6. Malignant

A thyroid FNA sample was considered adequate for evaluation if it contains 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.[4]

RESULTS

Cytological study was carried out on two hundred cases with sign and symptoms of various thyroid lesions. Majority of the patients were adults (68.5 percent) and the study revealed a female preponderance (81.5 percent) withmale to female ratio was 1: 4.4

The lesions were categorized in the six categories of Bethesda system reporting of thyroid. (Table 1) Histopathological correlation was available in only fifty nine cases. (Table – 2)

Cytologically diagnosed cases according to the Pre Bethesda system of reporting were categorized as Non-diagnostic, Benign, Suspicious for malignancy and Malignant. (Table 3)

Out of 175 benign cases diagnosed cytologically only 47 cases were followed up, amongst which 45 were confirmed benign on histopathology. Out of the eight cases diagnosed malignant cytologically, follow up of only six was done and five were confirmed histopathologically. On follow up of four of the nine cytologically suspicious cases of malignancy, three were confirmed malignant on histopathology.

On comparison of the Pre-Bethesda versus Bethesda system of reporting Thyroid FNAC it was observed that the Bethesda reporting system was more sensitive with a higher negative predictive value. (Table – 4)

Table – 1 Cytological reporting of Thyroid Lesions by Bethesda system withimplied risk of malignancy and recommended clinical management (Ali and Cibas, 2010)

S No.	Category	No.	%	Risk of malignancy (%)	Usual management
I	Nondiagnostic or unsatisfactory	8	4		
II	Benign	155	77.5	0–3	Repeat FNA with ultrasound guidance
III	Atypia of undetermined significance or Follicular lesion of undetermined significance	7	3.5	~5–15	Clinical follow-up
IV	Follicular Neoplasm / Suspicious for follicular Neoplasm	23	11.5	15–30	Repeat FNA
V	Suspicious for malignancy	2	1	60–75	Surgical lobectomy
VI	Malignancy	5	2.5	97–99	Near total Thyroidectomy or total Thyroidectomy.

Table – 2 Correlation of cytopathological and histopathological diagnosis

Histopathological diagnosis	Cytopathological diagnosis								
	ND/US	BFN	HT	SAT	AUS/FLUS	FN/SFN	SFPC	PTC	AC
Lymphocytic thyroiditis	-	1	4	-	-	-	-	-	-
Subacute thyroiditis	-	1	-	1	-	-	-	-	-
Chronic non-specific thyroiditis	-	2	1	-	-	1	-	-	-
Goiter/Colloid Adenoma	-	18	-	-	-	-	-	-	-
Microfollicular/ Follicular Adenoma	-	5	-	-	-	7	-	-	-
Hurthle cell adenoma	-	2	-	-	1	2	-	-	-
Follicular carcinoma	-	1	-	-	2	3	-	-	-
Papillary carcinoma	1	-	-	-	-	-	1	2	-
Anaplastic carcinoma	-	-	-	-	-	-	-	-	1
Thyroglossal cyst	1	1	-	-	-	-	-	-	-

ND/US- Non Diagnostic/Unsatisfactory, BFN- Benign Follicular Nodule, HT- Hashimoto's Thyroiditis, SAT- Sub Acute Thyroiditis, AUS/FLUS- Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance, FN/SFN- Follicular Neoplasm/Suspicious for Follicular Neoplasm, SFPC- Suspicious for Papillary Carcinoma, PTC- Papillary Thyroid Carcinoma, AC- Anaplastic Carcinoma.

Table – 3 Cytological reporting of Thyroid Lesions by Pre-Bethesda system

S.No.	Diagnosis	No. of cases	Percentage
1.	Non-diagnostic	8	4
2.	Benign	175	87.5
3.	Suspicious for malignancy	9	4.5
4.	Malignant	8	4
	Total	200	100

Table – 4 Comparison of Pre-Bethesda and Bethesda statistical analysis

Statistical Data	Pre-Bethesda	Bethesda
True Positive	6	20
True Negative	47	37
False Positive	1	10
False Negative	2	1
Sensitivity	75 percent	**95.24 percent**
Specificity	97.95 percent	78.72 percent

Positive Predictive Value	85.71 percent	66.66 percent
Negative Predictive Value	95.92 percent	**97.37 percent**
Diagnostic Accuracy	94.64 percent	83.82 percent

DISCUSSION

Fine needle aspiration cytology of the thyroid gland has radically changed the management of patients with thyroid disease. FNAC is widely accepted as the most accurate, sensitive, specific, and cost-effective diagnostic procedure in the preoperative assessment of thyroid nodules.

The Bethesda System for Reporting Thyroid Cytopathology is a standardized reporting system for classifying thyroid fine-needle aspiration results comprising of 6 diagnostic categories with unique risks of malignancy and recommendations for clinical management.

The 6 diagnostic categories are well defined, morphologically distinct and ensure a better cytohistologic correlation and inter-observer reproducibility for better and more meaningful exchange of data across national and international boundaries for optimum patient care and basic and translational research[5]

Several factors influence nondiagnostic rates for FNAC results, including operator skill, the nature of the thyroid nodules as nodule vascularity, criteria used to judge adequacy of the specimen, and the cystic component of the nodule.[6]

Inadequate sampling at times may be because of sclerotic or calcified lesions and more commonly when there are large areas of cystic degeneration or necrosis

The cause of detection/diagnosis failure of papillary carcinoma was possibly the presence of small minute foci of a papillary thyroid carcinoma which was missed during aspiration.[7]

Cytological differentiation between follicular neoplasms and nodular goiters is often very difficult. Aspirations in these cases were probably done over colloid-rich macrofollicular areas of the neoplasm.[8] As possible remedial measures, cytological features like increased cellularity with nuclear crowding and overlapping, repetitive uniform cell patterns, syncytial clusters, microfollicular structures, scanty, or no colloid may be helpful in distinguishing follicular neoplasms from nodular goiters.

Marked cellularity of the smear is another problem inherent in thyroid FNA cytology. Increased cellularity of the smear and loss of cohesion may be present in hyperplastic/ adenomatous goiter, adenoma, or in carcinoma. It is difficult to differentiate follicular/ Hurthle cell adenoma from carcinoma on cytological assessment because cytology cannot evaluate the criteria of vascular or capsular invasion or of intrathyroid spread.[9]

Bethesda system can classify indeterminate thyroid nodules into more detailed categories and provides clinician with useful information for management.[10]

As is evidenced by the high sensitivity and high NPV, TBSRTC has proven to be an effective and robust thyroid FNA classification scheme to guide the clinical management of patients with thyroid nodules. The findings of other studies show a growing trend i.e. that many institutions both nationally and worldwide are adopting this reporting system in order to provide their clinicians with cytopathology reports that are clear and comprehensible and permitting better comparisons and performance evaluations .

The present study was thus undertaken with the aim that the recently proposed classification system may be much better for reporting thyroid FNAs as each diagnostic category conveys specific risks of malignancy, which offers guidance for patient management.

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