ORIGINAL ARTICLE

THE BETHESDA SYSTEM OF CYTOLOGICAL EVALUATION FOR THYROID NODULES

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ABSTRACT

Objectives: To assess the efficacy of the Bethesda System of Reporting Thyroid Cytology in evaluation of thyroid nodule according to guidelines.

Material and Methods: The study was conducted in the departments of histopathology, Khyber Medical College and Department of ENT, Khyber Teaching Hospital, Peshawar, Pakistan from January 2015 to March 2016. Study design was prospective, cross sectional. 110 patients were inducted who were referred from different hospitals and clinics. Fine needle aspiration of the thyroid nodule was done by the cytopathologist. The stained slides were evaluated according to guidelines proposed by The Bethesda System of Reporting.

Results: In the present study age range was from 18-72 years, mean age was 36.74 years. 87.3% were females and 12.7% were males. Majority of patients 52.7% were in age group of 31-50 years mostly presenting with benign lesion. According to Bethesda guidelines thyroid lesions were placed into six diagnostic categories, majority of patients 74.5% were in category 2.

Conclusion: Reporting thyroid cytology according to Bethesda guidelines has made it convenient and easy. It has standardized the cytology reports improving the communication between laboratories, surgeons, radiologists, cytopathologist and clinicians towards management of patient.

Key Words: Fine Needle, Aspiration, Bethesda System, Thyroid Cytopathology, Thyroid nodules.

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INTRODUCTION

Thyroid diseases are a common clinical problem globally with variable prevalence. Nodular lesion of thyroid are more common with higher incidence in iodine deficient areas. In the United States (US), 4- 6% of the adult population has nodular disease[1]. Five to 6.5% of nodular thyroid lesions are found to be neoplastic[2]. Thyroid cancer constitutes for 1.2% cases of all malignant tumors in Pakistan[3].

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Fine needle aspiration (FNA) is the most useful diagnostic technique and has vital role in the interpretation and evaluation of thyroid lesions[4]. It has significantly lowered the number of surgical procedures for benign disease[5,6]. There is marked variation in thyroid cytopathology reporting regarding terminology which is not beneficial to the clinician in management of such cases. To address these issues of thyroid FNA reports, the National Cancer Institute (NCI) hosted a state of the art conference in October 2007 in Bethesda Maryland titled "NCI Thyroid FNA State of the Science Conference"[7]. The conference concluded in formulating terminologies based on morphologic criteria, the Bethesda Thyroid Atlas Project and formulated a system named as The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC). TBSRTC is a system of six diagnostic categories of thyroid FNA cytology with an estimated risk of malignancy and clinical management guidlines[8]. This study wa done to assess the efficacy of TBSRTC in evaluation of thyroid nodule according to guidelines

and to study the cytological features of thyroid FNA and interpretation of the smears by TBSRTC

MATERIAL AND METHODS

A prospective cross sectional study of 110 cases of thyroid FNA was conducted in the Department of Histopathology Khyber Medical College, Peshawar, Pakistan. Males and females from age of 18-72 years were included and all were referred from out-patient department of ENT and Surgery, Khyber Teaching Hospital, Institute of Radiotherapy and Nuclear Medicine (IRNUM), private clinics and hospitals of Peshawar district. Complete clinical history, thyroid hormonal profile and imaging studies was asked for before FNA. The study was conducted from January 2015 to March 2016. FNAs were performed using 22G needle. Wet smears were fixed in 95% methanol and stained by Hematoxylin and Eosin stains (H&E). FNAs were reported by Histopathologist/Cytopathologist using TBSRTC along with the recommended clinical guidelines. There are six diagnostic categories of TBSRTC as shown in Table 1 along with estimated risk for cancer and further clinical management in Table 2. Statistical analysis of the data was done by using descriptive statistics such as mean, ratio etc.

RESULTS

A total of 110 patients referred from different clinics and hospitals who were candidates for FNA were included in the study, 96(87.3%) were females and 14(12.7%) were males with ages of 18 to 72 year, mean age was 36.74. Male to female ratio is 1:5.2. Age was categorized into three groups. Group I include patients from age 18-30 year. Group II from 31-50 year and group III from 51-72 year, Group I had 32 (29.1%) patients, group II had 58 (52.7%) patients and group III had 20 (18.2%) patients. Distribution of patients in different age categories with gender is shown in Table 3. Adequate specimen according toTBSRTC is at least six groups of ten cells each of thyroid follicular cells preferably on a single slide[9].

In present study there were 10.9% of cases in category 1 among which 53.8% were acellular and 41.6% had colloid with few macrophages. 74.5% thyroid nodules were benign and about 71% were follicular nodule. Thyroid nodule SFM were 5.5% mostly for papillary carcinoma. Malignant category had 7.3% patients, papillary carcinoma was the commonest malignancy accounting for 75% followed by medullary and anaplastic carcinoma. There were 8 patients who were placed in diagnostic category 6, six patients were from age group III and 2 were from age group II. Most of the patients belonging to diagnostic category 2 were from age group II, followed by I and III. In Category 5, only two patient's histopathology report was available which turned out to be papillary carcinoma. In Category 6, four histopathology reports were available which turned out to three papillary carcinoma and one anaplastic

Table 1: The Bethesda System for Reporting Thyroid Cytology with Estimated Risk of Malignancy[8]

Category	Morphological/cytological category	Subcategory	Estimated Risk of Malignancy %
1	Nondiagnostic (ND) Unsatisfactory (UNS)	Fluid only (cyst) Acellular aspirate Others (blood, artifact, etc.)	1-4
2	Benign	Consistent with a benign follicular nodule adenomatous nodule colloid nodule Consistent with lymphocytic (Hashimoto) thyroiditis Consistent with granulomatous thyroiditis Others	0-3
3	Atypia of undetermined significance (AUS) Follicular lesion of undetermined significance (FLUS)		5-15
4	Follicular neoplasm (FN)		15-30
5	Suspicious for follicular neoplasm (SFN)	Suspicious for Papillary carcinoma Suspicious for Medullary carcinoma Suspicious for metastatic carcinoma Suspicious for Lymphoma Others	60-75
6	Malignant	Papillary thyroid carcinoma poorly differentiated carcinoma Medullary carcinoma Undifferentiated (anaplastic) carcinoma Squamous cell carcinoma with mixed features Metastatic carcinoma Non-Hodgkin lymphoma Others	97-99

carcinoma. All the histopathology repots correlated with cytology reports. Distribution of patients with thyroid nodules in different categories and subcategories is shown in Table 4.

Table 2: Recommended guidelines for clinical management based on TBSRTC[8]

Cytological Category	Clinical Managment
ND/UNS	Repeat FNA preferably ultrasound guided
Benign	Clinical follow up
AUS/FLUS	Repeat FNA
FN/SFN	Partial thyroidectomy (lobectomy)
SFM	Partial/Near Total Thyroidectomy
Malignant	Near Total Thyroidectomy

Table 3; Distribution of patients in different age categories with gender

S. No.	Age Group	Age Range Years	No. of patients	Male/ Female
1	I	18-30	32	2/30
2	II	31-50	58	5/53
3	III	51-72	20	7/13
	Total		110	14/96

DISCUSSION

The results of our present study was compared with different studies on TBSSRTC. Distribution of different lesions in different diagnostic categories were compared. In present study, there were 10.8% cases in category 1 which is similar to the study by Yang et al[9] showing 10.4% in the same category. But other studies showed different results like by Laishram et al[10] 5.2%, Mondal et al 1.8%[11] and Jo et al 18.6%[12]. These differences could be the result of the person performing the FNA, the sample size and distribution of disease in different regions.

Majority of the cases in present study were in category 2, 74.5% nearly similar to studies by Yassa et al 59.9%[13], Yang et al 64.6%[9], Nayar and Ivanovic 64%[14]. Similar result is due to benign disease prevalence is high. In category 3, there were no patients and our result was similar to that of Laishram et.al. and Mondal et.al. but that of Nayar and Ivanovic showed 18% of cases. This difference could be because of small sample size. In the present study, low percentage was seen in category 4, 5, and 6 which is similar to those by Mondal et al[11] Jo et al[12] and Nayar and Ivanovic[14]. These similar results are because all cytopathologists had used TBSRTC for reporting thyroid FNA. Comparable results of present study was most probably due to that all these studies were carried in tertiary care hospitals with well trained and qualified cytopathologists using standard system for reporting thyroid FNA.

Table 4: Distribution of patients with thyroid nodules in different categories and subcategories

S. No	Diagnostic Category	Number of patients & % ages	Subcategory	Number of patients & % ages	Male/ Female
1	ND/UNS	12 (10.9)	Cyst fluid	5 (41.6%)	1/11
			Acellular aspirate	7 (58.3%)	
2	Benign	82 (74.5)	Follicular nodule	58 (70.7%)	
			Adenomatous nodule	27	9/73
			Colloid nodule	31	
			Hashimotos thyroiditis	16 (19.5%)	
			Granulomatous Thyroiditis	8 (9.75%)	
3	AUS/FLUS	0(0)			0/0
4	FN/SFN	2(1.8)			0/2
			Papillary carcinoma	5 (83.3%)	1/5
5	SFM	6(5.5)	Medullary carcinoma	1 (16.6%)	
6	Malignant	8(7.3)	Papillary carcinoma	6 (75)	3/5
			Medullary carcinoma	1 (12.5)	
			Anaplastic carcinoma	1(12.5)	
	Total	110(100)		110(100)	

Present study had few short coming regarding provision of complete clinical history, thyroid profile and imaging techniques. Histopathological reports were not available in most cases for proper correlation with FNA cytology reports. Follow up reports were also not available to determine the outcome of the major presentation of disease.

CONCLUSION

Reporting thyroid FNA following TBSRTC guidelines has made it convenient and easy to report thyroid FNA. It has standardized the cytology reports improving the communication between laboratories, surgeons, radiologists, cytopathologist and clinicians towards management of patient.

RECOMMENDATIONS

This system is reproducible. It can facilitate researchers towards new diagnostic and therapeutic biomarkers. Its time that standard guidelines laid by The Bethesda System is adopted by all the cytopathologists, providing a standard and uniform reports of nodular thyroid lesions for consistent management of the patients.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Ismail N: Main idea, concept
Khan AR: Data collection, critical review
Arif S: Typing & bibliography.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.