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Bethesda System for Reporting Thyroid Cytopathology: A Study at A Tertiary Care Referral Center In South India.

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Abstract: *Thyroid lesions are one of the common conditions encountered in clinical practice. Thyroid nodules are very frequent, with a number of studies showing an annual incidence rate of 4–8%. In thyroid the various pathological processes includes hyperplasia, benign and malignant neoplasms. Differentiating the benign and malignant lesions are important in the management of the patients. To compare conventional & Bethesda system of reporting in Thyroid lesions (TBSRTC) and study prospectively the diagnostic utility of TBSRTC at our institution and report the malignancy risk for FNA of thyroid lesions. The study was under taken in the department of Pathology,Osmania General Hospital, Afzalgunj, Hyderabad, During the period of June 2011to May2013.The study comprises of 535 patients who presented with the history of swelling of thyroid which were referred from the department of Surgery, Medicine, E.N.T. etc. The procedure was explained in detail to the patient in their own language and consent was taken conventional FNAC was done in all patients after the procedure was explained to them and by employing imaging guidance where ever necessary. The Bethesda system is very useful for a standardized system of reporting thyroid cytopathology, improving communication between cyto-pathologists and clinicians, and inter-laboratory agreement, leading to more consistent management approaches.*

Key Words: *Thyroid diseases, Bethesda system, Fine needle aspiration*.

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I. Introduction

According to epidemiological and clinical studies thyroid nodules are commonly encountered in clinical exams, palpable in 5% of the population on thyroid examination
and detectable in nearly 60% of those subjected to thyroid ultrasound. While the majority of the nodules are benign (non-cancerous), they are normally the first indicators of thyroid cancer; therefore, further investigations are required to identify the cancerous nodule (1), (2).

One of the most widely used diagnostic tools is fine-needle aspiration (FNA) cytology with ultrasound imaging to determine the necessity for the surgical excision of a thyroid nodule. Today, molecular genetic biomarker analyses are employed to increase the diagnostic accuracy of the FNA biopsies, and can at times drastically change clinical decision procedures as they become more commonly available and better assessed. FNA cytology (FNAC) continues to remain the
initial investigation mode for malignancy in patients with thyroid nodules and the election of patients for thyroid surgery (3). This minimally invasive and useful method is highly effective in identifying a large percentage of thyroid nodules as benign and eliminating unnecessary surgery for patients with benign disease (4). However, because a standardized reporting system is still unavailable, pathologists have been employing varying terminologies and diagnostic criteria, thus causing misunderstanding among the referring clinicians while interpreting cytopathology reports, resulting in nondefinitive clinical management (5), (6), (7).

In 2007, the National Cancer Institute (NCI) established guidelines employing a standardized nomenclature to interpret thyroid FNAs called the Bethesda System for Reporting Thyroid Cytopathology (BSRTC) which is now accepted as the proposed diagnostic categories for thyroid cancer (8). This study attempts to stratify the malignancy risks in thyroid nodules in a tertiary care referral center South India utilizing the Bethesda system.

II. Materials & Methods

The study was under taken in the department of Pathology, Osmania General Hospital, Afzalgunj, Hyderabad, During the period of June 2011to May2013.The study comprises of 535 patients who presented with the history of swelling of thyroid which were referred from the department of Surgery, Medicine, E.N.T. etc. The procedure was explained in detail to the patient in their own language and consent was taken conventional FNAC was done in all patients after the procedure was explained to them and by employing imaging guidance

where ever necessary. All the cytologic smears were reported based on The Bethesda system and divided in to 6 major categories. Recommended cases were then followed up. The results were compiled and compared with the literature.

III. Results

Table 01: Distribution of various lesions in each Bethesda category

CATEGORY	**TOTAL NO OF CASES**	**LESION**	**NO. OF INDIVIDUAL LESION**
I	13(2.42%)		13
II	482 (90.9%)	Hashimoto's Thyroiditis	182
		Benign follicular nodule	146
		Goitre	95
		Nodular hyperplasia of thyroid	43
		Colloid cyst	11
		Grave's disease	03
		Acute supppurative thyroiditis	01
III	06 (1.12%)		06
IV	20 (3.73%)	Follicular neoplasm	20
		Suspicious of follicular Neoplasm	
V	03(0.51%)	Suspicious of papillary carcinoma	03
VI	11(2.5%)	Papillary carcinoma	11

Table 2: Conventional Reporting of Thyroid lesions

Category	Lesions	No. of cases	Percentage (%)
Non diagnostic		13	2.42%
Cystic lesions	Colloid cyst	11	2.05%
Goitre	Nodular Goitre	17	3.17%
	Colloid goitre	82	15.3%
	Colloid nodule	29	5.4%
	Goitre	06	1.2%
	Diffuse goitre	05	0.9%
	Adenomatoid Goitre	36	6.7%
	Nodular goitre	61	11.4%
	MNG	04	0.8%
	NHT	43	8.3%
	SCG	02	0.3%
Autoimmune Thyroiditis	Hashimoto's Thyroiditis	182	34.1%
	Acute suppurative Thyroiditis	01	0.18%
	Grave's Disease	03	0.5%
Follicular Neoplsam	FN	17	3.2%
Hurthle Cell Neoplasm	HN	03	0.5%
Atypia	Follicular cells with atypia	06	1.15%
Suspicious carcinomas	Suspicious of PTC carcinoma	03	0.56%
Maligant	PTC	09	1.68%
	MTC	02	0.3%

Table 3: Comparaision of conventional vs Bethesda System of cytodiagnosis of Thyroid Lesion.

Conventional reporting		CATEGORY	TOTAL NO OF CASES	LESION	NO. OF INDIVIDUAL LESION
Nondiagnostic 13		**I**	**13(2.42%)**		13
Non-neoplastic		**II**	**482(90.9%)**	Hashimoto's Thyroiditis	182
Hashimoto's Thyroiditis	182				
Benign follicular nodule	146			Benign follicular nodule	146

				Goitre	95
Nodular hyperplasia of thyroid	43			Nodular hyperplasia of thyroid	43
Colloid cyst	11				
Grave's disease	03			Colloid cyst	11
				Grave's disease	03
				Acute supppurative thyroiditis	01
Neoplastic lesions		III	06(1.12%)		06
Benign	FN **20**				
		IV	20 (3.73%)	Follicular neoplasm	20
Suspicious of carcinoma				Suspicious of follicular Neoplasm	
Suspicious of papillary carcinoma	**3**	V	03 (0.51%)	Suspicious of papillary carcinoma	03
Malignant					
Papillary carcinoma	11	VI	11 (2.5%)	Papillary carcinoma	11

IV. Discussion

FNAC is a safe, simple and inexpensive technique and plays an important role in the diagnosis of thyroid lesions and is extremely useful in the management of majority of the thyroid lesions. The current state of art for FNA thyroid is characterized by numerous competing reporting systems using diagnostic terminology and variable number of diagnostic criteria, thereby causing a discordance amongst clinicians and pathologists.

The present study was undertaken to report thyroid fine needle aspirates using The Bethesda system (TBSRTC) to bring out the uniformity in terminology used in the reporting of the thyroid cytopathology, to review the distribution of cases in various diagnostic categories in Bethesda system so as to evaluate the risk of malignancy, and thereby improving the clinical management and outcome of the patients of thyroid lesions.

The atlas describes six diagnostic categories of lesions: Non diagnostic/unsatisfactory, benign, atypical follicular lesion of undetermined significance (AFLUS), "suspicious" for follicular neoplasm (SFN), suspicious for malignancy (SM), and malignant (9). The six diagnostic categories of the Bethesda system have individual implied risks of malignancy that influence management paradigms (9). We compared the results obtained in our study with the studies of Sanotsh kumaret al, & Theoharis et al. In Table 4 and Table5.

Table 4: Comparison of the percentages of distribution of fine needle aspiration of present study with other studies.

Diagnostic category	Present study	Sanotshkumar et al	Theoharis et al
Non-diagnostic	2.42	1.2	9.3
Benign	90.1	87.5	73.5
AFLUS	1.12	1.0	3.6
SFN	3.73	4.2	6.7
SM	0.51	1.4	1.6
Malignant	2.5	4.7	5.9

Table 5: Comparison of the percentages of follow – up malignancy of present study with other studies.

Diagnostic category	Present study	Sanotshkumar et al	Theoharis et al
Non-diagnostic	0	0	32
Benign	4.0	4.5	10
AFLUS	-	20	48
SFN	20	30.6	34
SM	67	75	87
Malignant	100	97.8	100

It was seen that the distribution of cases as per the six-tier Bethesda system in our study differed from that in the above mentioned studies, with the percentage of cases in the benign category being higher and that in the suspicious of malignancy, non-diagnostic and AFLUS categories being lower. The malignancy risk for the different categories in our study, as seen by follow-up HPE, has corroborated well with the implied risks mentioned in the Bethesda System and also with the studies of santosh *et al*., Theoharis *et al*., though few differences have been noted. The malignancy risk for the non-diagnostic category is 0% as compared to the higher rate in the Theoharis et al. Secondly, the malignancy risk for the AFLUS category is 0% as compared to 20% in the study of **Santosh et al** and 34 % in the study **Theoharis et al**. This can be explained by the fact that, in our study, we have a smaller denominator population for the AFLUS categories, as a result of which the malignancy risk of the non-diagnostic category with other studies and malignancy risk of the AFLUS category with the study of Santosh and Theoharis (10). Cannot be accurately compared.

V. Conclusion

The Bethesda system is very useful for a standardized system of reporting thyroid cytopathology, improving communication between cyto-pathologists and clinicians, and inter-laboratory agreement, leading to more consistent management approaches. 18 The high malignancy risk for the AFLUS, SM, and malignancy categories reflects the importance of these categories in the six-tier Bethesda system. TBSRTC is an evidence based standard classification system with good reproducaibality. FNAC of thyroid lesion is a safe, simple, cost effective and accurate method for the diagnosis of the thyroid lesions. FNAC classifies non-neoplastic and neoplastic lesions.

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