STUDY OF CYTOPATHOLOGICAL CHANGES IN THYROID BY THE BETHESDA SYSTEM

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ABSTRACT

AIM

To show that Bethesda system is useful in reporting cytopathological changes in thyroid.

MATERIALS AND METHODS

This is a prospective study of cases referred to Balaji Diagnostics and Research Centre & Shadan Institute of Medical sciences-Hyderabad for FNAC during March 2012 to February 2014.

RESULTS

This study consisted of 200 cases. Benign category was the largest (85%) followed by ND/UNS category (6%), malignant and SFM category constituted 2% and 3% making a total of 5%, AUS/FLUS constituted 3% cases and FN/SFN had 1%. In ND/UNS category, all cases came under subcategory cyst fluid only. There was no case in other subcategories. In benign category, 140 cases had consistency with benign follicular nodule, 26 cases had consistency with lymphocytic thyroiditis, 2 each were having consistency with granulomatous thyroiditis. AUS/FLUS had constituted only 3% of 200 cases and FN/SFN had constituted only 1% of 200 cases. Under SFM category, 4 cases were suspicious of papillary carcinoma, 1 each suspicious of lymphoma and other related diseases. Under malignant category, papillary thyroid carcinoma constituted 3 cases and 1 case of medullary carcinoma.

CONCLUSION

Bethesda is an excellent reporting system for thyroid FNA. It also provides clear management guidelines to clinicians to go for followup FNA or surgery and also the extent of surgery.

KEYWORDS

Thyroid nodules, Bethesda system, Fine needle aspiration cytology.

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INTRODUCTION: In up to 60% of the general population, thyroid nodules are common and can be detected by ultrasound. World Wide, fine needle aspiration cytology (FNAC) of thyroid occupies an extremely important role. This minimally invasive and cost-effective technique is extremely useful in identifying a substantial proportion of thyroid nodules as benign and reducing unnecessary surgery for patients with benign disease.[1] For the initial evaluation of patients with thyroid nodules, thyroid fine needle aspiration (FNA) has proven to be a rapid, cost effective, safe and reliable method of investigation. Moreover, this procedure is the most appropriate diagnostic tool to distinguish between patients that require clinical management or surgical excision. The increasing prevalence of thyroid cancer and improvements in the technology and resolution of ultrasound machines have led to an increasing number of cytological diagnostic procedures. A conference with one of the objectives being to standardise the diagnostic terminology for the reporting of thyroid cytopathology results was held in Bethesda, MD in 2007.

The recommendations resulting from this conference led to the formation of The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC). However, terminology of reporting thyroid FNACs has varied markedly. Various reporting formats of thyroid FNACs have been used varying from two category schemes to six or more category schemes. While some of them tried to diagnose various lesions using histology-equivalent categories, other formats had categories like equivocal, inconclusive, indeterminate, atypical, suspicious, uncertain, malignancy suspicious, possibly neoplastic, possibly malignant, and probably malignant to report thyroid aspirates that fell between benign and malignant diagnostic categories. It made it difficult for clinicians to interpret the reports.[2]

To address terminology and other issues related to thyroid FNACs, the National Cancer Institute (NCI) hosted "The NCI Thyroid Fine Needle Aspiration State of the Science Conference" at Bethesda, Maryland. There were six committees which dealt with different areas regarding thyroid cytology. Committee IV dealt with diagnostic terminology and morphologic criteria for cytological diagnosis of thyroid lesions. Its recommendations were widely published. Subsequently a monograph "The Bethesda System for Reporting Thyroid Cytopathology" (TBSRTC)

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which includes definitions, diagnostic/morphologic criteria, explanatory notes, and a brief management plan for each diagnostic category was published.[3]

TBSRTC is a six-category scheme of thyroid cytopathology reporting. Each category has an implied cancer risk, which ranges from 0% to 3% for the "Benign" category to virtually 100% for the "Malignant" category. It uses three categories, AUS/FLUS, SFN/Hürthle cell neoplasm, and SFM, to report thyroid aspirates that fall between benign and malignant. As a function of these risk associations, each category is linked to evidence based clinical management guidelines.

MATERIALS AND METHODS: This is a prospective study of all the cases referred to Balaji Diagnostics and Research centre Shamshabad- HYDERABAD for FNAC during March 2012 to February 2014. Table 1 shows the Bethesda system for reporting thyroid cytopathology: recommended diagnostic categories, implied risk of malignancy and recommended clinical management.

Diagnostic Category	Risk of Malignancy (%)	Usual Management
1. Non-diagnostic or Unsatisfactory (ND/UNS) Cyst Fluid only Virtually acellular specimen Other (Obscuring blood, Clotting artefact etc.)	0-3	Repeat FNA with ultrasound guidance
2. Benign Consistent with a benign follicular nodule, lymphocytic thyroiditis, granulomatous thyroiditis.	0-3	Clinical follow up
3. Atypia of undetermined significance or follicular lesion of undetermined significance (AUS/FLUS)	5-15	Repeat FNA
4. Follicular Neoplasm or suspicious for follicular neoplasm (FN/SFN)	15-30	Surgical Lobectomy
5. Suspicious for malignancy (SFM)	60-75	Near total thyroidectomy or surgical lobectomy
6. Malignant	97-99	Near total thyroidectomy

Table 1

RESULTS: This study consisted of 200 cases. Benign category was the largest (85%) followed by ND/UNS category (6%), Malignant and SFM category constituted 2% and 3% making a total of 5%, AUS/FLUS constituted 3% cases and FN/SFN had 1%. Table 2 shows number of cases in various diagnostic categories and subcategories in Bethesda system for reporting thyroid cytopathology.

Diagnostic Category	No. of Cases	Total Number of Cases in Each Category
1. Non-diagnostic or Unsatisfactory (ND/UNS) Cyst Fluid only Virtually acellular specimen Other (obscuring blood, clotting artefact etc.)	 12 0 0	12(6%)
2. Benign Consistent with a benign follicular nodule lymphocytic thyroiditis granulomatous thyroiditis Other	140 26 2 2	170(85%)
3. Atypia of undetermined significance or follicular lesion of undetermined significance(AUS/FLUS)	6	6(3%)
4. Follicular Neoplasm or suspicious for follicular neoplasm (FN/SFN)	2	2(1%)
5. Suspicious for malignancy(SFM) Papillary carcinoma Medullary carcinoma Metastatic carcinoma Lymphoma Other	 4 0 0 1 1	6(3%)
6. Malignant Papillary thyroid carcinoma Poorly differentiated carcinoma	 3 0	4(2%)

Medullary thyroid carcinoma Anaplastic carcinoma, Squamous cell carcinoma, carcinoma with mixed features, metastatic carcinoma, non-Hodgkin lymphoma, other	1 0	
Total		**200(100)**
Table 2		

Table 2 shows that in ND/UNS category, all cases came under subcategory cyst fluid only. There was no case in other subcategories. In benign category, 140 cases had consistency with benign follicular nodule, 26 cases had consistency with lymphocytic thyroiditis, 2 each were having consistency with granulomatous thyroiditis. AUS/FLUS had constituted only 3% of 200 cases and FN/SFN had constituted only 1% of 200 cases. Under SFM category, 4 cases were suspicious of papillary carcinoma 1 each was suspicious of lymphoma and other related diseases. Under malignant category, papillary thyroid carcinoma constituted 3 cases and 1 case of medullary carcinoma.

Category	Female: Male Ratio	Common Age Group
Non diagnostic /Unsatisfactory	11:1	22-30
Benign	15:1	22-30
AUS/FLUS	9:1	35-40
FN/SFN	4:1	55-70
Suspicious of malignancy	5:1	22-30
Malignant	1:1	65-70
Table 3: Shows the Age and Sex Distribution		

DISCUSSION: Few studies have been reported on Bethesda system of reporting cytopathological changes in thyroid. Payal Mehra et al[4] in their study conducted a prospective study of 225 fine needle aspirations (FNA) of thyroid nodules. All fine needle aspiration cytology (FNAC) diagnoses were classified according to the features given in the monograph of TBSRTC into non-diagnostic/unsatisfactory (ND/UNS), benign, atypia of undetermined significance/follicular lesion of undetermined significance (AUS/FLUS), follicular neoplasm/suspicious of a follicular neoplasm (FN/SFN), suspicious for malignancy (SFM), and malignant. Cytohistological correlation was done, when surgical material was available. Results: The distribution of various categories from 225 evaluated thyroid nodules was as follows: 7.2% ND/UNS, 80.0% benign, 4.9% AUS/FLUS, 2.2% FN, 3.5% SFM, and 2.2% malignant. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated. Conclusions: TBSRTC is an excellent reporting system for thyroid FNA. It also provides clear management guidelines to clinicians to go for followup FNA or surgery and also the extent of surgery. A study was conducted by I.V. Renuka et al,[5] it was a prospective study of 564 cases of thyroid FNAs done in the department of pathology over a period of 17 months, (August 2009 to December 2010). This study concluded that TBSRTC reduces inter-observer variability in reporting. It improves communication between the pathologist and surgeon by way of indicating cancer risk in each category and providing guidelines in surgical management and allows easy and reliable sharing of data between different laboratories. Dr Shagufta Tahir Mufti et al[6] study was a retrospective study identifying 250 thyroid FNAs performed among Saudi patients between Jan 2005–Dec 2010 was undertaken.

Cytology specimen data was collected through a computerised search of our cytopathology archives. The results were among the 250 thyroid FNAs, 84 were followed by surgical resection. The overall surgical yield of malignancy was 23.8%. The malignancy rate for the 6 categories was as follows: Non-diagnostic: 20%; benign: 3.1%; atypia of undetermined significance: 50%; suspicious for follicular neoplasm: 20%; suspicious for malignancy: 80%; malignant: 100%. This study concluded that retrospective classification of FNAs of thyroid lesions among Saudi patients using TBSRTC at KAAUH, Jeddah, Saudi Arabia, validates the diagnostic reproducibility of this system and yields similar results for risk of malignancy as reported by others. However, the associated rates found for non-diagnostic cases (20%) raises the possibility of malignancy risk in this category and validate the past observations that sample inadequacy is a common cause of false negative thyroid FNAs.

Santhosh Kumar Mondal et al[7] conducted a retrospective study between April 2009 and March 2012, classified them using the Bethesda system, found out the distribution of cases in each Bethesda category, and calculated the malignancy risk for each category by follow-up histopathology. The results were of the 1020 FNAs, 1.2% were non-diagnostic, 87.5% were benign, 1% were atypical follicular lesion of undetermined significance (AFLUS), 4.2% were suspicious for follicular neoplasm (SFN), 1.4% were suspicious for malignancy (SM), and 4.7% malignant. Of 69 cases originally interpreted as non-diagnostic, 12 remained non-diagnostic after re-aspiration. In 323 cases, data of followup histopathologic examination (HPE) were available.

Rates of malignancy reported on followup HPE were non-diagnostic 0%, benign 4.5%, AFLUS 20%, SFN 30.6%, SM 75%, and malignant 97.8%. This study concluded that the distribution of cases in the Bethesda categories differed from some studies, with the number of benign cases being higher and the number of non-diagnostic and AFLUS cases being lower. The malignancy risk for each category correlated well with other studies. The Bethesda system, thus, allows standardisation in reporting, improves perceptions of diagnostic terminology between

cytopathologists and clinicians, and leads to more consistent management approaches.

CONCLUSION: Bethesda is an excellent reporting system for thyroid FNA. It also provides clear management guidelines to clinicians to go for followup FNA or surgery and also the extent of surgery.

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