

Comparison of the Bethesda System with Papanicolaou Method for Reporting Thyroid Fine Needle Aspirates

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Abstract: *Fine needle aspiration cytology (FNAC) is the first line diagnostic test for evaluating thyroid nodules. It is a simple, rapid and cost effective test that can effectively distinguish between neoplastic and non-neoplastic lesions of the thyroid. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) system is being adopted by many pathologists the world over. Aim: To classify all thyroid FNAs using The Bethesda System for Reporting Thyroid Cytopathology. Method: Prospective study was carried over period of 2 year from Aug 2015 to July 2017. A total of 110 patients underwent FNAC of the thyroid. The smears were prepared using conventional method and stained with Leishman-Giemsa and Papanicolaou stains. The cytological features were evaluated and reporting was done using standard reporting format suggested by the Papanicolaou society of cytology and also according to "The Bethesda system for reporting thyroid cytology" at two different times. Results: Of the 110 cases, 74 cases were reported as colloid goitre with or without cystic change, 22 cases as thyroiditis, 4 cases as benign follicular lesion, 2 cases as hyperplastic nodule, 1 case each as benign adenomatous goitre, adenomatous follicular hyperplasia with colloid goitre, multinodular goitre, colloid goitre with hyperthyroidism, adenomatous hyperplasia with goitre, 4 cases as suspicious for follicular neoplasms by Papanicolaou method. 7 cases were reported as category I, 82 cases as category II, 1 case as category III, 5 cases as category IV by TBSRTC. No cases were found in category V and VI. Conclusion: TBSRTC is a superior method as compared to the conventional Papanicolaou method for reporting thyroid cytology.*

Keywords: FNACs, Papanicolaou method, TBSRTC.

1. Introduction

Fine needle aspiration cytology (FNAC) is the first line diagnostic test for evaluating thyroid nodules. It is a simple, rapid and cost effective test that can effectively distinguish between neoplastic and non-neoplastic lesions of the thyroid. It has proven a highly effective screening tool in evaluation of thyroid nodules and also in diagnosing and managing patients with palpable thyroid swellings. It can effectively triage patients with neoplastic thyroid nodules as to who require surgery and who do not.

However, due to lack of a standardized system of reporting, pathologists have been using different terminologies and diagnostic criteria. This creates confusion amongst referring clinicians in the interpretation of the cytopathology report and hinders a definitive clinical management^[1, 2]. To overcome this issue, various organizations have proposed diagnostic guidelines for reporting thyroid FNAC results including the Papanicolaou Society of Cytopathology Task Force and American Thyroid Association. None have been universally accepted^[3, 4].

In the year 2007, NCI, Bethesda, Maryland, United States organized the Thyroid Fine Needle Aspiration State of science Conference and an initiative was undertaken to publish an atlas and guidelines using a standardized nomenclature for interpretation of thyroid fine needle aspirates (FNAs), known as The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)^[5]. This system is being adopted by many pathologists the world over.

2. Aim and Objectives

- 1) To classify all thyroid FNAs using The Bethesda System for Reporting Thyroid Cytopathology.
- 2) To analyse the cytological features using TBSRTC monograph. To compare TBSRTC with the existing standard reporting format suggested by the Papanicolaou society of cytology.

3. Material and Methods

This observational prospective study was carried over a period of 2 years from August 2015 to July 2017 at a tertiary care centre, Pune. A total of 110 patients underwent thyroid FNAC. Patients with palpable thyroid lesions undergoing FNAC with or without subsequent surgery were included in the study. Relevant clinical history, local examination, findings of USG, findings of thyroid function tests were collected. Pre FNAC requirements as recommended by committee of the NCI State of the Science Conference, Bethesda, were followed.^[6] FNAC was done with or without USG guidance. The smears were prepared using conventional method and were stained with Leishman-Giemsa and Papanicolaou stains. The cytological features were evaluated and the reporting was done according to TBSRTC and the previously used Papanicolaou method at two different times.^[7]

Pre FNAC requirements^[6] are usual required data for laboratory submission, location of the nodule, size of the thyroid nodule, history of hyper/hypothyroidism, autoimmune thyroiditis or the test for antithyroid antibody, history of Grave disease, history of radiation therapy, personal history of cancer, family history of thyroid disease.

4. Results

A total of 110 cases who underwent thyroid FNAC were reported by Papanicolaou method and TBSRTC at different time. The distribution of cases according to PAP method is shown in table 1. Out of 110 cases, maximum cases were seen in colloid goitre 38 (34.7%) followed by colloid goitre with cystic change 36 (32.8%) groups.

Table 1: Distribution of cases according to Papanicolaou method

S. No	Diagnosis offered	No. of cases
1	Colloid goitre	38 (34.7%)
2	Colloid goitre with cystic change	36 (32.8%)
3	Lymphocytic thyroiditis	15 (13.6%)

4	Benign follicular lesion	4 (3.6%)
5	Hyperplastic nodule	2 (1.8%)
6	Granulomatous thyroiditis	3 (2.7%)
7	Hashimoto thyroiditis	3 (2.7%)
8	Suspicious for follicular neoplasm	4 (3.6%)
9	Hashimoto thyroiditis with colloid goitre	1 (0.9%)
10	Benign adenomatous goitre	1 (0.9%)
11	Colloid goitre with hyperthyroidism	1 (0.9%)
12	Adenomatous follicular hyperplasia with goitre	1 (0.9%)
13	Multinodular goitre	1 (0.9%)
Total		110 (100%)

There was no case where inadequacy of material obtained for cytology was mentioned. It is seen from table above that thirteen different morphologic terms were used for reporting of thyroid FNACs.

Table 2: Distribution of cases according to TBSRTC

Categories	Subcategories	No. of cases	Total no. of cases in each category
Category I	Non diagnostic, Cyst fluid only	06	07 (6.4%)
	Non diagnostic, Obscuring blood	01	
Category II	Benign follicular lesion	80	97 (88.2%)
	Lymphocytic thyroiditis	15	
	Granulomatous thyroiditis	02	
Category III	Atypia of undetermined significance or follicular lesion of undetermined significance (AFLUS)		01 (0.9%)
Category IV	Follicular neoplasm or suspicious for a follicular neoplasm (SFN)		05 (4.5%)
Category V	Suspicious for malignancy (SM)		00 (0%)
Category VI	Malignant		00 (0%)
Total			110

The distribution of cases and sub categorization of cases by TBSRTC are shown in table 2. Out of 110 cases, maximum

cases were seen in category II 97(88.2%). No cases were found in category IV and V.

Table 3: Comparison of TBSRTC with PAP method

TBSRTC	Category I	Category II	Category III	Category IV	Category V	Category VI
Pap method						
Colloid goitre	03	35	0	0	0	0
Colloid goitre with cystic change	04	32	0	0	0	0
Lymphocytic thyroiditis	0	15	0	0	0	0
Benign follicular lesion	0	04	0	0	0	0
Hyperplastic nodule	0	2	0	0	0	0
Granulomatous thyroiditis	0	2	1	0	0	0
Hashimoto thyroiditis	0	3	0	0	0	0
Suspicious for follicular neoplasm	0	0	0	4	0	0
Hashimoto thyroiditis with colloid goitre	0	1	0	0	0	0
Benign adenomatous goiter	0	1	0	0	0	0
Colloid goitre with hyperthyroidism	0	1	0	0	0	0
Adenomatous papillary hyperplasia in nodular goitre	0	0	0	1	0	0
MNG	0	1	0	0	0	0
Total	07	97	1	5	0	0

Comparison of TBSRTC with PAP method was also done which is shown in table 3. Out of 110 cases, only 1 case was not concordant with PAP method and TBSRTC.

5. Discussion

Table 4: Comparison of FNAC diagnosis of the present study with other studies

Authors	Al-Shraim et al ^[8]	Payal Mehra et al ^[9]	Yassa et al ^[10]	Yang et al ^[11]	Present study
Category I	6.2	7.2	7	1.4	6.4
Category II	57.3	88	66	64.6	88.2
Category III	13.6	4.9	4	3.2	0.9
Category IV	16.1	2.2	9	11.6	4.5
Category V	1.5	3.6	9	2.6	0
Category VI	5.3	2.2	5	7.6	0

The frequency of various categories under TBSRTC system were studied and compared with other studies of PayalMehra et al ^[9], Yassa et al ^[10], Yang et al ^[11]. In the present study category I comprising of 6.4% which was concordant with the other studies. Category II comprising 88.2% was concordant with the study done by PayalMehra et al. Category III comprising 0.9% was non concordant with any other studies. Category IV comprising 4.5% cases was also non concordant with any other studies. No cases were found in category V and VI.

In the study done by Jayaram G et al ^[12], they found out that HT was more common amongst the Indian women. In the present study 2.7% of all the cases had HT and all cases were seen amongst the females. This is fairly comparable with the previous study showing female predilection in the cases of HT.

The TBSRTC category II includes 3 subcategories of BFN, LT and GT. However benign categories of PAP system comprise 11 categories with significant risk of subjective errors of interpretation. The utility of classifying into these categories is also not clinically significant as it contributes little to further management of these patients. The TBSRTC system thus appears to be an improvement of this with subdivision into limited clinically significant categories related also to thyroid functional status as shown in this study in thyroiditis.

Lawrence Q et al (2012), reviewed the article about analysis of Bethesda system for reporting thyroid cytology and concluded that it provides standard reporting nomenclature and risk assessments allowing for the management of patients with thyroid nodules by clinicians. ^[13]

Bhagat VM et al. (2014), evaluated the results of 160 thyroid FNAC which were reported as per TBSRTC and concluded that it is a vital guide for accurate management of thyroid lesions. Classifying the lesions in six categories and following the guidelines given by The Bethesda USA meetings solves all problems regarding the management of thyroid lesions and leaves no confusion. It plays a big role in establishing the uniform communications between the managing medical personnel. ^[14]

Santosh Kumar Mondal et al. (2016), did a retrospective study of 1020 FNACs of thyroid lesions and concluded that the Bethesda system allows standardization in reporting, improves perceptions of diagnostic terminology between cytopathologists and clinicians, and leads to more consistent management approaches. ^[15]

M. Mamatha et al. (2015), evaluated 240 FNACs of thyroid lesions by conventional and TBSRTC. Results shows high sensitivity of TBSRTC compared to conventional method. ^[16]

6. Conclusion

TBSRTC clearly defines the criteria for adequacy of material for examination. This is essential to minimise the chances of missing the actual lesion. TBSRTC defines clearly the aim of cytological examination of thyroid as triaging patients into those who need medical management

and those who need surgical manage. It therefore clubs many non neoplastic thyroid conditions into category II. This helps in minimising confusion in the minds of clinicians who interpret the FNAC reports.

References

- [1] Redman R, Yoder BJ, Massoll NA. Perceptions of diagnostic terminology and cytopathologic reporting of fine-needle aspiration biopsies of thyroid nodules: a survey of clinicians and pathologists. *Thyroid*. 2006 Oct 1; 16 (10):1003-8.
- [2] Lewis CM, Chang KP, Pitman M, Faquin WC, Randolph GW. Thyroid fine-needle aspiration biopsy: variability in reporting. *Thyroid*. 2009 Jul 1; 19 (7):717-23.
- [3] Suen KC, Abdul-Karim FW, Kaminsky DB, Layfield LJ, Miller TR, Spires SE, Stanley DE. Guidelines of the Papanicolaou society of cytopathology for fine-needle aspiration procedure and reporting: The Papanicolaou Society of Cytopathology Task Force on Standards of Practice. *Modern Pathology*. 1997 Jul; 10 (7):739-47.
- [4] Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ et al. Management guidelines for patients with thyroid nodules and differentiated thyroid cancer: The American Thyroid Association Guidelines Taskforce. *Thyroid*. 2006 Feb 1; 16(2):109-42.
- [5] Baloch ZW, LiVolsi VA, Asa SL, Rosai J, Merino MJ, Randolph G et al. Diagnostic terminology and morphologic criteria for cytologic diagnosis of thyroid lesions: a synopsis of the National Cancer Institute Thyroid Fine-Needle Aspiration State of the Science Conference. *Diagnostic cytopathology*. 2008 Jun 1; 36(6):425-37.
- [6] Cibas ES, Alexander EK, Benson CB, De Agustín PP, Doherty GM, Faquin WC et al. Indications for thyroid FNA and pre-FNA requirements: A synopsis of the National Cancer Institute Thyroid Fine-Needle Aspiration State of the Science Conference. *Diagnostic cytopathology*. 2008 Jun 1; 36(6):390-9.
- [7] Ali SZ, Cibas ES. *The Bethesda system for reporting thyroid cytopathology. Definitions, criteria and explanatory notes* New York: Springer; 2010.
- [8] Al-Shraim MM, Kaood OM, Hussein MR, Al-Ahmary AM, Al Shehri GY, Jastania RA et al. Assessment of malignancy rate in thyroid nodules according to the Bethesda system of fine-needle aspiration. Report from a tertiary center in the Southwestern region of Saudi Arabia. *Saudi medical journal*. 2012; 33(2):167-71.
- [9] Mehra P, Verma AK. Thyroid cytopathology reporting by the Bethesda system: a two-year prospective study in an academic institution. *Pathology research international*. 2015 Jan 22; 2015.
- [10] Yassa L, Cibas ES, Benson CB, Frates MC, Doubilet PM, Gawande AA et al. Long-term assessment of a multidisciplinary approach to thyroid nodule diagnostic evaluation. *Cancer Cytopathology*. 2007 Dec 25; 111(6):508-16.
- [11] Yang J, Schnadig V, Logrono R, Wasserman PG. Fine-needle aspiration of thyroid nodules: A study of 4703 patients with histologic and clinical correlations. *Cancer Cytopathology*. 2007 Oct 25; 111(5):306-15.

- [12] Jayaram G, Iyengar KR, Sthaneshwar P, Hayati JN. Hashimoto thyroiditis-A Malaysian perspective. Journal of cytology. 2007 Jul 1; 24(3):119.
- [13] Wong LQ, Baloch ZW. Analysis of the Bethesda system for reporting thyroid cytopathology and similar precursor thyroid cytopathology reporting schemes. Advances in anatomic pathology. 2012 Sep 1; 19(5):313-9.
- [14] Bhagat VM, Tailor HJ, Kaptan KB, Baladawa V. Diagnostic Role of the Bethesda System for Reporting Thyroid Lesions: Effective Tool for Managing Thyroid Lesions. Global Journal of Medical Research. 2014 Aug 3; 14(1).
- [15] Santosh Kumar Mondal, Simanti Sinha, BijanBasak, Dipanwita Nag Roy, Swapan Kumar Sinha. The Bethesda system for reporting thyroid fine needleaspirates: A cytologic study with histologic follow-up. Journal of Cytology 2013;30(2).
- [16] Mamatha M, Sekhar S Chandra, Rani H Sandhya, Anil S Sandhya, Vandana G. A comparative study between conventional system and the Bethesda system applied for reporting thyroid cytopathology. International Archives of Integrated Medicine. 2015 Mar; 2(3): 87-95.