

Research Article

Association of Acceptability of the Bethesda System for Thyroid Fine Needle Aspiration Cytology Reporting and Professional Experience of a Cytopathologist

Santosh Kumar Sharma^{1,2}, Praveen Prakash¹, Roshina Naeem¹, Aarzoo Jahan¹, Sompal Singh¹

¹Department of Pathology, Hindu Rao Hospital and New Delhi Municipal Corporation Medical College, Delhi, India.

²Department of Life Science (SBSR), Sharda University, Greater Noida, Uttar Pradesh, India.

DOI: <https://doi.org/10.24321/2454.8642.202006>

I N F O

Corresponding Author:

Sompal Singh, Department of Pathology, Hindu Rao Hospital and New Delhi Municipal Corporation Medical College, Delhi, India.

E-mail Id:

sompal151074@gmail.com

Orcid Id:

<https://orcid.org/0000-0002-7766-4708>

How to cite this article:

Sharma SK, Prakash P, Naeem R, Jahan A, Singh S. Association of Acceptability of the Bethesda System for Thyroid Fine Needle Aspiration Cytology Reporting and Professional Experience of a Cytopathologist. Rec Adv Path Lab Med. 2020;6(1&2):11-15.

Date of Submission: 2020-05-20

Date of Acceptance: 2020-06-22

A B S T R A C T

Background: Fine needle aspiration cytology is commonly employed as the initial screening test for thyroid swellings. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) in 2007 gave a uniform reporting system which aided the clinician in further management of patients. Since its inception, TBSRTC is progressively gaining acceptance among cytopathologists. In this study, we aimed to assess the acceptability of TBSRTC and to find the association between the acceptability of TBSRTC reporting and the experience of the cytopathologist.

Material Methods: Details of thyroid FNAC reporting for 12 months (Jan 2019 to Dec 2019) were analysed. Age, gender, side of swelling as well as experience of cytopathologist (\leq or $>$ 3 years) was noted. The proportion of cases reported according to TBSRTC was calculated. The association between the experience of the consultant and cytopathology reporting using TBSRTC was calculated using the Chi-square test.

Results: A total of 225 cases were reported over a period of 12 months. All the consultants used TBSRTC for reporting thyroid cytopathology however to a variable extent. Out of 70 cases reported by experienced consultants, 2.9% were not reported by TBSRTC. Consultants with 3 years or less experience reported 155 cases, out of which 17.42% were conventional. There was a statistically significant association ($p=0.005$) between reporting according to TBS and the experience of the consultant.

Conclusion: Cytopathologists report thyroid FNA using TBSRTC, however junior consultants may not be reporting all the cases according to TBSRTC. This may be due to a lack of experience in order to commit a case to a particular category of TBSRTC.

Keywords: The Bethesda system, Thyroid, Fine Needle Aspiration Cytology

Introduction

Thyroid swellings are clinically significant. In India, about 42 million people suffer from thyroid diseases.¹ Although the majority of them are diffuse and non-neoplastic not requiring surgery, about 5% of all nodular swellings of the thyroid are documented as malignant.² Clinical assessment of thyroid lesions by means of physical examination, thyroid scans and ultrasonography alone is not completely reliable.³ Thyroid surgeries can be associated with side effects like lifelong thyroid hormone dependence, hypoparathyroidism and immediate operative risks involved.⁴ Hence, in all cases, surgical options should not be undertaken without a cytological diagnosis. Fine Needle Aspiration Cytology (FNAC) of the thyroid is one of the most effective tools for guiding the initial management of patients with thyroid swelling. It has been reported that the diagnostic sensitivity of FNAC of a thyroid nodule is 89 to 98% and specificity is 92%.⁵ A lack of consistent use of terminology by cytopathologists affected the sensitivity and specificity of FNAC. It is documented that the cytological criteria used to evaluate indeterminate FNAs and the terminology used to classify lesions vary among pathologists and institutions.⁶ This variation is overcome by the introduction of "The Bethesda System for Reporting Thyroid Cytopathology" (TBSRTC) and this improved the communication between pathologists and clinicians.⁷ The introduction of the six-tiered classification of TBSRTC in 2007, provided the opportunity to establish a uniform reporting system for thyroid fine needle aspiration and attempted to standardize international terminology to categorize morphological criteria in fine needle aspirations from patients with thyroid nodules.⁸ It has been reported that TBSRTC has reduced unnecessary surgeries of non-neoplastic nodules.⁹

A literature search revealed the variable extent of implementation of TBSRTC in various studies around the world.⁷ There are reports of increasing acceptability of TBSRTC. Kannan S et al⁸ reported the implementation and utilization of TBSRTC from India. The present study assessed the implementation of TBSRTC in a tertiary care medical college hospital. This study aims to assess the association between the acceptability of TBSRTC of thyroid FNAC reporting and the experience of cytopathologists.

Materials and Methods

The present study is a retrospective study. Records of the cytopathology section of a tertiary care medical college hospital were retrieved for the period of 12 months (January 2019 to December 2019). Details of reporting of thyroid FNAC were noted. The following details were included in the study: age of the patient, gender of the patient,

side (whether left-sided thyroid swelling, midline thyroid swelling or right-sided thyroid swelling), experience (in years) of a consultant who reported the case and final cytological diagnosis.

Statistical Analysis

The mean age was calculated, male to female ratio was estimated. The experience of consultants who have reported thyroid FNAC was divided into more than 3 years ("experienced consultant") and less than or equal to 3 years ("other consultant"). The proportion of thyroid FNAC cases reported according to TBSRTC was calculated. The Association between the experience of the consultant and reporting using the TBSRTC was calculated using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

Results

There were 225 cases of thyroid FNAC done over a period of 12 months. The age of the patient ranged from 2 years to 98 years with a mean age of 38.5 years (SD = 15 years). Male to female ratio of the patient was 1:6.5. Most of the patients presented with midline neck swelling (198 cases, 88%) followed by right-sided thyroid swelling (19 cases, 8.4%). Only 3.6% of cases, presented with left-sided thyroid swelling. The summary of the diagnosis rendered in the cases is shown in Table 1. Out of 225 cases, 196 cases (87.1%) have been reported according to TBSRTC for thyroid cytology reporting. Twenty-nine cases had conventional reporting. The details of cytology reports of these 29 cases are tabulated in Table 2. None of these 29 cases was malignant.

Table 1. Summary of Final Diagnosis of Reported Cases

Reporting Style	TBS Category	Numbers (% of 196)	Total (% of 225)
According to TBS	Category I	46 (23.5%)	196 (87.1%)
	Category II	122 (62.2%)	
	Category III	20 (10.2%)	
	Category IV	1 (0.5%)	
	Category V	7 (3.6%)	
Not according to TBS		29	29 (12.9%)

Table 2. Summary of Cases not Reported According to TBSRTC

Cytological Diagnosis	Number of Cases
Cystic lesion	7
Blood only aspirate, no opinion	6
Colloid goitre with cystic change	5
Auto immune thyroid disease	4
Benign follicular cells / benign thyroid lesion	3
Inflammatory changes/ lesion	2
Granulomatous thyroiditis	1
Nodular colloid goitre	1

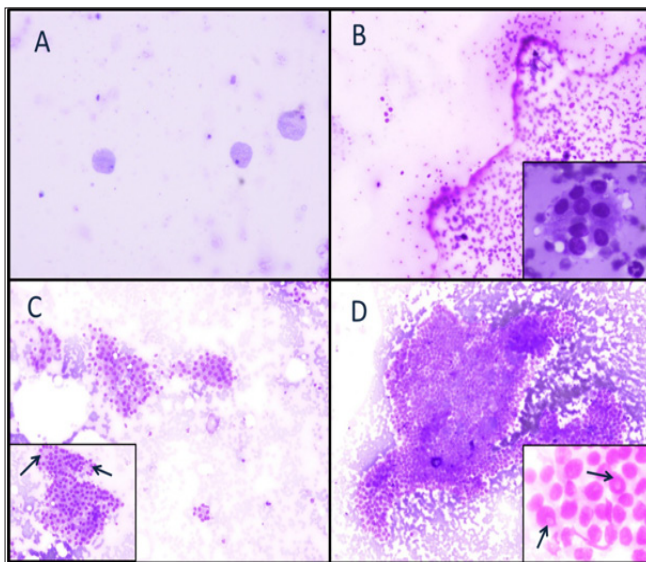


Figure 1. Photomicrograph of a Case Diagnosed as Cyst Fluid only (TBS I, MGG, 40X) Showing only Cystic Macrophage (MGG, 40X). B. Case Diagnosed as Colloid Goitre (TBS II) Showing Few Small Clusters of the Follicular Cell (Inset) and Colloid in the Background (MGG, 40X). C. Case Diagnosed as Follicular Neoplasm Showing a Cluster of Follicular Cells Arranged in a Microfollicular Pattern (Inset, Arrow) with an Absence of Colloid (MGG, 40X). D. Case of Papillary Carcinoma Thyroid Showing Large Monolayer Cluster. The Inset Shows the Presence of Nuclear Inclusion (arrow, MGG, 40X)

Out of 7 consultants, 2 consultants have more than 3 years of experience in cytology reporting. Out of 225 cases, 70 cases were reported by an experienced consultant and 155 cases were reported by other consultants. All the consultants used TBSRTC for reporting thyroid cytopathology however to a variable extent. Out of 70 cases, reported by experienced consultants only 2 cases (2.9%) were not reported by the TBS system. As compared to 27 cases (17.42%) out of 155

cases, which were not reported according to TBS by other consultants. There was a statistically significant association ($p=0.005$) between reporting according to TBS and the experience of the consultant.

Discussion

The initial screening test for thyroid nodules is fine needle aspiration cytology. Reporting thyroid cytopathology requires coordination between pathologists, radiologists and physicians.⁹ The Bethesda System for Reporting Thyroid Cytopathology was introduced in 2007 to standardize the terminology used in reporting thyroid cytology. There are six categories for thyroid cytology reporting under the Bethesda system which are- nondiagnostic, benign, atypia of undetermined significance (AUS)/ Follicular Lesion of Undetermined Significance (FLUS), follicular neoplasm/ Suspicious for Follicular Neoplasm (SFN), suspicious for malignancy, and malignant.⁹ The advantage of this categorization is that each category has an implied risk of malignancy that guides the physician in further patient management. In the original publication of TBSRTC in the year 2018, the risk of malignancy reported for category I is 5%-10%, category II is 0%-3%, category III is 10%-30%, category IV is 25%-40%, category V 50%-75% and category VI is 97%-99% respectively.¹⁰

According to the meta-analysis done by Bongiovanni M et al,¹¹ FNAs placed in category I ranged from 1.8% to 23.6% with an overall value of 12.9%, and the risk of malignancy was 16.8%. In Category II the cases ranged from 39% to 73.8% with an overall value of 59.3% and a cumulative malignancy rate of 3.7%. In category III the cases ranged from 3% to 27.2% with an overall value of 9.6% and an overall rate of malignancy of 15.9%. In category IV, cases ranged from 1.2% to 25.3% with an overall value of 10.1%, with a risk of malignancy of 26.1%. In category V, cases ranged from 1.4% to 6.3% with an overall value of 2.7%. The mean risk of malignancy in this category was 75.2%. In category VI cases ranged from 2% to 16.2% with an overall value of 5.4% and a risk of malignancy of 98.6%.

Although all the cases of our institution during the study period were not reported according to TBSRTC, the proportion of cases which were reported according to TBSRTC in various categories are consistent with the findings of the meta-analysis by Bongiovanni M et al.¹¹

Globally, many healthcare institutes are increasingly adopting the Bethesda system in order to provide their physicians with reports that are clear and comprehensible.¹¹ The practice of doing FNAC for the diagnosis of thyroid swellings is prevalent all over India in private as well as government institutes. However, after a search of English literature published in India, we found that the use of conventional reporting (non-TBSRTC) of thyroid

cytopathology by using variably tiered classification systems ranging between two to five categories was prevalent until the recent past.^{12,14} The use of TBSRTC as a format for reporting of thyroid cytopathology has gained acceptance and implementation a short time ago.^{15,16}

Few studies have been published from India evaluating the accuracy of TBSRTC. A study done by Patnaik K et al¹⁷ showed that overall sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracies of TBSRTC were 83.87%, 89.58%, 56.52%, 97.18%, and 88.79%, respectively.

Since reporting of thyroid cytopathology using TBSRTC has not been universally practised in India, recent studies are available in the literature which applied TBSRTC on retrospective data validating its diagnostic reproducibility and reported risk of malignancy.^{18,19}

Although the advantages of using TBSRTC are unquestionable, there are studies raising a few concerns with respect to TBSRTC.²⁰ First of all, there is variability in the reported risk of malignancy. This may be because of heterogeneity in demographic profile, irregular use of clinical and radiological selection criteria and diagnostic criteria for cytology and histopathology of thyroid lesions. More ROM in most studies has been estimated from a retrospective study.²⁰

Although it has been reported that TBSRTC has reduced the confusion in reporting as well as differences in the thought process among cytopathologists and clinicians. However, TBSRTC has in it, grey zones including borderline lesions.²¹ For example, heterogeneity of the AUS category may result in variability in AUS rates among various institutions. The present study assessed the implementation of TBSRTC in a tertiary care medical college hospital and found that about 12.9% of cases have not been reported according to TBSRTC. On analysing the detail of cases which were not reported according to TBSRTC, it was found that none of the cases was of the borderline category (gray zone) of TBSRTC. Moreover, there was a significant statistical association between the experience of the consultant and not reporting thyroid cytology according to TBSRTC.

In conclusion, thyroid cytology reporting using TBSRTC has gained acceptance tremendously in recent times. Experienced cytopathologists are more comfortable and at ease with the categorization of cases according to the six-tiered TBSRTC. In comparison, less experienced cytopathologists may not be reporting all the cases according to TBSRTC. This may be due to less experience to commit a case to a particular category of TBSRTC.

Acknowledgements

Author's Contribution

Santosh Kumar Sharma - Literature Search, Writing of Manuscript

Praveen Prakash - Literature Search, ProofReading

Roshina Naeem - Literature Search

Aarzo Jahan - Literature Search

Sompal Singh - Study Design, Statistics and Guidance in writing of the manuscript.

Source of Funding: None

Conflict of Interest: None

References

1. Unnikrishnan AG, Menon UV. Thyroid disorders in India. An epidemiological perspective. *Indian J Endocrinol Metab.* 2011;15:S78-81.
2. Sukumaran R, Kattoor J, Pillai KR, Ramadas PT, Nayak N, Somanathan T. Fine needle aspiration cytology of thyroid lesions and its correlation with histopathology in a series of 248 patients. *Indian J Surg Oncol.* 2014; 5:237-41.
3. Kumar M, Potekar R, Yelikar BR, Patil V, Karigoudar M, Pande P. Diagnostic accuracy of frozen section in comparison with fine needle aspiration cytology in thyroid lesions: A prospective study. *Iran J Pathol.* 2013;8(4):219-26.
4. Sukumaran R, Kattoor J, Pillai KR, Ramadas PT, Nayak N, Somanathan T. Fine Needle Aspiration Cytology of Thyroid Lesions and its Correlation with Histopathology in a Series of 248 Patients. *Indian J Surg Oncol.* 2014;5(3):237-41.
5. Ucler R, Uslugulları CA, Tam AA, Ozdemir D, Balkan F, Yalcın S. The diagnostic accuracy of ultrasound-guided fine-needle aspiration biopsy for thyroid nodules three centimeters or larger in size. *Diagn Cytopathol.* 2015;43(8):622-8.
6. Williams MD, Suliburk JW, Staerke GA, Busaidy NL, Clayman GL, Evans DB. Clinical significance of distinguishing between follicular lesion and follicular neoplasm in thyroid fine-needle aspiration biopsy. *Ann Surg Oncol.* 2009;16(11):3146-53.
7. Zarif HA, Ghandurah SE, Al-Garni MA, Binmahfooz SK, Alsaywid BS, Satti MB. Thyroid nodules cytopathology applying the Bethesda system with histopathological correlation. *Saudi J Med Sci.* 2018;6(3):143-8.
8. Kannan S, Raju N, Kekatpure V, Chandrasekhar NH, Pillai V, Keshavamurthy AR. Improving Bethesda reporting in

- thyroid cytology. A team effort goes a long way and still miles to go. *Indian J Endocr Metab.* 2017;21(2):277-81.
9. Ali SZ, Cibas ES. *The Bethesda System of Reporting Thyroid Cytopathology. Definitions, Criteria and Explanatory Notes.* New York Springer. 2007.
 10. Alshaikh S, Harb Z, Aljufairi E, Almahari SA. Classification of thyroid fine-needle aspiration cytology into Bethesda categories. An institutional experience and review of the literature. *Cytojournal.* 2018;15:4.
 11. Bongiovanni M, Spitale A, Faquin WC, Mazzucchelli L, Baloch ZW. The Bethesda System for Reporting Thyroid Cytopathology a meta-analysis. *Acta Cytol.* 2012;56(4):333-339.
 12. Babu SB, Raju R, Radhakrishnan S. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of thyroid swellings. *Int Surg J.* 2016;3:1437-41.
 13. Aramani SS, Gururajaprasad C. A cytohistopathological correlation of thyroid lesions with critical evaluation of discordant cases an experience at a tertiary care hospital. *Ann Pathol Lab Med.* 2017;4:A243-248.
 14. Sunder KS, Khan MI. Role of fine needle aspiration cytology (FNAC) in diagnosis of thyroid lesions. *J Contemp Med Dent.* 2017;5:30-4.
 15. Garg S, Naik LP, Kothari KS, Fernandes GC, Agnihotri MA, Gokhale JC. Evaluation of thyroid nodules classified as Bethesda category III on FNAC. *J Cytol.* 2017;34:5-9.
 16. Kannan S, Raju N, Kekatpure V. Improving Bethesda reporting in thyroid cytology a team effort goes a long way and still miles to go. *Indian J Endocrinol Metab.* 2017;21:277-81.
 17. Patnaik K, Dasnayak G, Kar A, Swain S, Sarangi C R. Implementation of the Bethesda system of reporting thyroid cytopathology in a referral centre. *Oncl J India.* 2020;4(1):13-18.
 18. Awasthi P, Goel G, Khurana U, Joshi D, Majumdar K, Kapoor N. Reproducibility of "The Bethesda System for Reporting Thyroid Cytopathology:" A Retrospective Analysis of 107 Patients. *J Cytol.* 2018;35(1):33-36.
 19. Pathak P, Srivastava R, Singh N, Arora VK, Bhatia A. Implementation of the bethesda system for reporting thyroid cytopathology. Interobserver concordance and reclassification of previously inconclusive aspirates. *Diagn Cytopathol.* 2014;42(11):944-949.
 20. Baloch Z, LiVolsi VA. The Bethesda System for Reporting Thyroid Cytology (TBSRTC). From look-backs to look-ahead [published online ahead of print, 2020;30]. *Diagn Cytopathol.* 2020;10.1002/dc.24385. doi:10.1002/dc.24385.
 21. Dhume V, Kavishwar V. Impact of. Bethesda System of Reporting for Thyroid Cytopathology. *Int. J Otorhinolaryngol Clin.* 2014;6(1):1522.