



UNDERSTANDING THE BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY AND IT'S IMPLICATION

Pathology

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ABSTRACT

Background: Thyroid fine needle aspiration cytology (FNAC) serves as a crucial diagnostic method for thyroid conditions. The Bethesda system for Reporting Thyroid Cytopathology (TBSRTC) is a clear, six-category framework for reporting thyroid fine needle aspiration (FNA) that is recognized globally as a standard guideline for institutions, helping to reduce unnecessary surgeries. **Material and Methods:** The study was carried out in the pathology department of Assam Medical College and Hospital located in Dibrugarh, Assam. In total, 203 cases were assessed from August 2024 to July 2025. The aim of the study is to categorize thyroid lesions as benign, malignant, atypical, and suspicious for malignancy by analyzing the various cytological patterns seen by FNAC. The interpretations of the assessed cases are as follows: Nondiagnostic/unsatisfactory - 5.9%, benign - 68.4%, atypia of undetermined significance - 8.8%, follicular neoplasm (FN) or suspicious for FN - 7.3%, suspicious for malignancy - 5.4%, and malignant - 3.9%. **Conclusion:** The findings of a FNA based on The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) provide a structured and methodical way to handle these thyroid swelling. Its standardized naming system improved thyroid FNAC reporting by promoting communication and consistency between cytopathologists and clinicians, which may result in more uniform patient care management.

KEYWORDS

INTRODUCTION

Thyroid nodules are prevalent and can be various benign and malignant lesions of the thyroid that appear as nodules. At our advanced care facility, we lack the capability for IHC and other specialized testing. Additionally, most patients belong to lower socioeconomic classes and cannot afford extensive testing in private labs. Consequently, our research focuses on the cytological diagnosis of thyroid lesions using the Bethesda system and its correlation with histopathology. The Bethesda system for reporting thyroid lesions on FNAC seeks to standardize the reports. It connects clinicians and pathologists, aiding surgeons in making suitable therapeutic decisions.(1,2)

In practice, a fine-needle aspiration is performed on the thyroid nodule, and subsequently, the pathologist classifies the sample into one of the Bethesda categories depending on the cytological features of that nodule. Every category correlates with a distinct cancer risk and is consequently tied to a particular medical guideline. These suggestions may involve repeat FNA, monitoring the nodule actively, molecular testing, or surgery for either partial or complete thyroid removal.(3)

The 2023 3rd Edition of The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) presents streamlined, single-term categories (e.g., "non-diagnostic," "benign," "malignant"), revised malignancy probabilities, and conformity with the 2022 WHO classification. It includes enhanced molecular testing for indeterminate nodules and presents improved, evidence-based management protocols for better, personalized care.(4–6). The aim of the study is to classify thyroid lesions into benign, malignant, atypical, and suspicious for malignancy by examining the different cytological patterns observed through FNAC.

METHODS AND MATERIALS

The study took place in the Pathology Department at Assam Medical College and Hospital, Dibrugarh, Assam, India, spanning from August 2024 to July 2025. A total of 203 patients with thyroid swelling were referred from different departments for FNAs. Each patient underwent a comprehensive examination, and the thyroid's motion during swallowing was observed. The FNA procedure was performed following a thorough explanation of the risks and benefits in their native language, along with obtaining written consent.

Papanicolaou and May-Grünwald-Giemsa (MGG) stains were used to stain the produced smears, and the Bethesda System for Reporting

Thyroid Cytopathology was used to classify the results. The lesions were classified into six categories as unsatisfactory/non-diagnostic , benign , atypia of undetermined significance (AUS) ,follicular neoplasm,suspicious for malignancy and malignant.

OBSERVATIONS AND RESULTS

The study included a total of 203 cases. There is a predominance of females with a female: male ratio of 7.4:1 and the most frequently observed age group is 31–40 years. The age range was from 15 to 87 years, with an average age of 53 years. The age group most frequently affected by thyroid lesions was the 30s to 40s. [Table 1].

Category wise distribution of aspirates was Non diagnostic (ND) 12(5.9%), Benign (BN) 139(68.5%), Atypia of Undetermined significance 18(8.9%), Follicular Neoplasm/Suspicious for Follicular Neoplasm 15(7.4%)Suspicious for Malignancy 11(5.4%) and Malignant category 8(3.9%).

The distribution of the 203cases into the six categories is shown in [Table 2]. Benign cases constitute the largest category with 68.4%, of which benign follicular nodule was the most common lesion. Among the malignant group, papillary carcinoma thyroid was the most common lesion with 4 cases along with 2 cases of Medullary Thyroid Carcinoma and 2 cases of Anaplastic Thyroid Carcinoma.

Table 1: Age Distribution of the cases

Age Group (Years)	Female	Male	Total	Percentage
≤ 20	13	1	14	6.89
21-30	40	3	43	21.18
31-40	52	4	56	27.59
41-50	35	8	43	21.18
51-60	22	4	26	12.82
61-70	13	2	15	7.38
71-80	4	1	5	2.47
81-90	0	1	1	0.49
Total	179	24	203	100

Table 2: Distribution of cases as per TBSRTC

SL	Cytological Category	Subcategory	Number of Cases	Total Number Of Cases In Each Category(%)

1	Non-Diagnostic/unsatisfactory (ND/UNS)	Cyst Fluid Only Virtually acellular Specimen Other (Obscuring blood, Clotting Artifacts, etc)	08 03 1	12(5.9)
2	Benign	Consistent with benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.)	109	
				139(68.5)
		Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context	18	
		Consistent with granulomatous (subacute) thyroiditis	7	
		Other	5	
3	Atypia of undetermined significance/ follicular lesion of undetermined significance (AUS/FLUS)	18	18(8.9)	
4	Follicular neoplasm/suspicious for a follicular neoplasm (FN/SFN)	15	15(7.4)	
5	Suspicious for malignancy (SFM)	Suspicious for papillary carcinoma	8	
		Suspicious for medullary carcinoma		
		Suspicious for metastatic carcinoma	3	11(5.4)
		Suspicious for lymphoma	0	
		Other	0	
6	Malignant	Papillary thyroid carcinoma	3	
		High grade follicular cell derived non anaplastic thyroid carcinoma	2	
		Medullary thyroid carcinoma	2	
		Undifferentiated (anaplastic) carcinoma	1	
		Squamous cell carcinoma	0	8(3.9)
		Carcinoma with mixed features	0	
		Metastatic carcinoma	0	
		Non-Hodgkin lymphoma	0	
	Total		203	

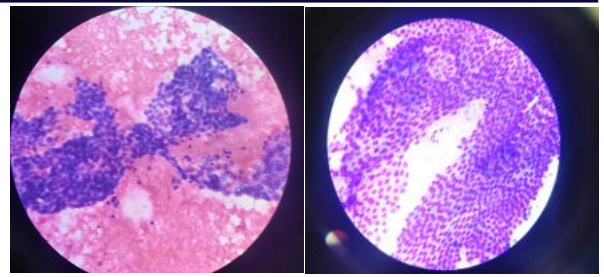


Figure 1-Papillary Thyroid Carcinoma

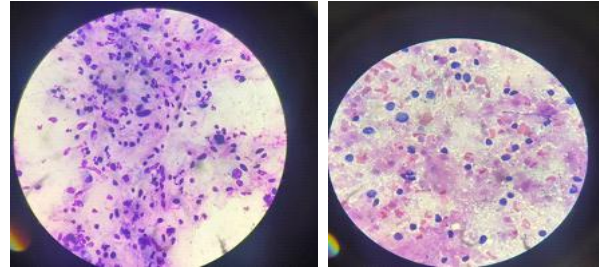


Figure 2- High grade follicular cell derived non anaplastic thyroid carcinoma

DISCUSSION

Payel Mehra et al reported a two year study of Thyroid FNA demonstrating the use of TBSRTC in 225 cases. The largest category was benign (80%), with the ND/UNS category following at 7.2%. The malignant and SFM categories made up 2.2% and 3.6%, respectively, resulting in a combined total of 5.7%. AUS/FLUS represented 4.9% of cases, whereas FN/SFN accounted for 2.2% of cases(7)

Rekha Rani et al conducted a one year study on north Indian population in which a total of 133 FNAC procedures were conducted throughout the study timeframe. There were 86 female cases and 47 male cases, resulting in a male to female ratio of 1:1.83. Of the patients, 9 had nodules classified as Bethesda category-I, 74 as Bethesda category-II, 11 as Bethesda category-III, 8 as Bethesda category-IV, 9 as Bethesda category-V, and 22 as Bethesda category-VI. Among 133 patients, only 36 had surgery; within these 36 cases, 4 were categorized as Bethesda category IV, 9 as Bethesda category V, and 22 as Bethesda category VI based on cytology(8)

The Bethesda system serves as a valuable standardized approach for reporting thyroid cytopathology, enhancing communication between cytopathologists and clinicians, as well as promoting inter-laboratory consistency, resulting in more uniform management strategies. Another aspect that supports the adoption of this system is that the classification correlates directly with the malignancy risk in each category, which consequently guides the recommended clinical management for that category, thereby genuinely reflecting the clinico-pathological relationship in its essence. The correlation between FNAC and histopathology is essential prior to initiating treatment.(9)

In this study, most patients were in their thirties, aligning with findings from other researchers as stated above. It was observed that women were more impacted than men with maximum number of cases reported as benign, supporting results from similar past studies. A limitation of this research is the absence of histological correlation with the cytological results.

CONCLUSION

Fine-needle aspiration (FNA) serves as a crucial diagnostic method for assessing patients who have thyroid nodules. It is an easy, minimally invasive, affordable, time-efficient, and dependable preoperative outpatient diagnostic procedure for thyroid nodules. Successful FNAC relies on multiple factors, such as a skilled aspirator, minimal sample error, precise cytological interpretation, and logical evaluation of clinical and cytological information for every patient. While reporting terminologies have traditionally been inconsistent and unclear, findings from a FNA based on The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) offer a standardized and systematic framework for handling these nodules. Its standardized naming system enhanced thyroid FNAC reporting by offering clearer communication and consistency between laboratories among

cytopathologists and clinicians, potentially resulting in more consistent management strategies for the patients.

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