



“STUDY OF THYROID CYTOLOGICAL SMEARS FOR REPORTING THYROID CYTOPATHOLOGY USING THE BETHESDA SYSTEM”

Pathology

Dr. Sumit Chahal	Junior Resident, Department of Pathology, Muzaffarnagar Medical College, Muzaffarnagar, U.P
Dr. Rajnish Kumar	Professor, Department of Pathology, Muzaffarnagar Medical College, Muzaffarnagar, U.P
Dr. Anupam Varsaney	Professor & Head, Department of Pathology, Muzaffarnagar Medical College, Muzaffarnagar, U.P.
Dr. Dhruv Kundu	Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, Uttarakhand.

ABSTRACT

Introduction: Diseases of thyroid gland are one of the most common endocrine disorders affecting the population throughout the world. FNAC is the best known diagnostic test in the evaluation of a thyroid nodule, and other tests like ultrasound and nuclear scan should be used in conjunction with FNAC. The present study was carried out to categorize the thyroid cases in six diagnostic categories according to The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC-II) and to find their correlation with the histological findings. **Aim & objective:** To classify the thyroid fine needle aspiration smears on cytology based on TBSRTC- II and correlation of cytological diagnosis with histopathological diagnosis. **Methodology:** A hospital based observational study was conducted among 150 patients who presented with anterior neck swelling moving on deglutition coming to Muzaffarnagar Medical College, Muzaffarnagar. Data was analysed using suitable statistical tests. **Result:** Mean age of patients in the present study was 36.1 years, 84.7% females and 15.3% males with female to male ratio of 5.5:1 were present in the study. Most common diagnostic category was Category II (N=119, 79.30%). Cytological findings were consistent with histopathological diagnosis in 14 cases (77.80%). **Conclusion:** Thyroid FNAC is very useful to diagnose the patients coming with thyroid swelling. It helps to differentiate among benign, inflammatory and malignant conditions of thyroid. TBSRTC II is used most commonly to differentiate the thyroid lesions in six categories. This uniform standardized system also helps in the management of thyroid lesions by helping the surgeons to decide the treatment and further follow up of the patient.

KEYWORDS

Thyroid, The Bethesda System, FNAC, TBSRTC.

INTRODUCTION:

Diseases of thyroid gland are one of the most common endocrine disorders affecting the population throughout the world. It has been estimated that almost 42 million people of India have thyroid dysfunction.^[1] The early diagnosis and treatment remains cornerstone of management.^[2] A multitude of diagnostic tests like ultrasound, thyroid nuclear scan and fine needle aspiration cytology (FNAC) is available to the clinician for evaluation of thyroid nodule. FNAC is the best known gold standard diagnostic test in the evaluation of a thyroid nodule, and other tests like ultrasound and nuclear scan should be used in conjunction with FNAC.^[3] Role of thyroid cytology is two-fold: Therapeutic and diagnostic.^[4] Thyroid swellings considered for FNC include diffuse, firm, palpable, solitary nodules, nodules associated with suspicious clinical or ultra-sonographic features, dominant nodules in a multi-nodular goitre, recurrent cystic nodules, and nodules associated with palpable lymph nodes.^[5]

In 2007, The Bethesda System for Reporting Thyroid Cytology (TBSRTC) was proposed at the National Cancer Institute, Bethesda, Maryland and was published in January 2010 and guidelines were formulated for standardization of nomenclature which were used for interpretation of cytological smears.^[6] The 2017 revision reaffirms that every thyroid FNA report should begin with one of six diagnostic categories (I) non-diagnostic or unsatisfactory (II) benign (III) atypia of undetermined significance (AUS) (IV) follicular neoplasm or suspicious for a follicular neoplasm (V) suspicious for malignancy and (VI) malignant.^[7] As per TBSRTC II, each diagnostic category is associated with an implied risk of malignancy (ROM) and a recommendation for clinical management. Therefore, TBSRTC can not only aid clinicians in the treatment of the thyroid nodules of their patients, but also provide a uniform diagnostic terminology for pathologists to communicate relatively more effectively with clinicians and to share data between different laboratories easily.^[7]

AIM & OBJECTIVES:

AIM

To classify the thyroid fine needle aspiration smears on cytology based on The Bethesda System for Reporting Thyroid Cytopathology- II.

OBJECTIVES

1. Reporting of thyroid cytology smears using TBSRTC- II.

2. Correlation of cytological diagnosis with histopathological diagnosis.

MATERIAL AND METHODS:

Study Design:

Hospital based observational study.

Study Area:

Department of Pathology, Muzaffarnagar Medical College & Hospital, Muzaffarnagar.

Study Population:

All patients who presented with anterior neck swelling moving on deglutition coming to Muzaffarnagar Medical College, Muzaffarnagar.

Sample Size: 150 samples of thyroid swelling.

Study Duration:

18 months (12 months for data collection and 6 months for data compilation).

Study Method:

- Patients presented with thyroid swelling in the Department of Surgery and ENT, advised for cytological examination were included in the study.
- A brief clinical history was taken from the patient or by the attendant and thorough physical examination of the thyroid swelling was done.
- Proper consent was taken.
- Non- guided (Palpation) and USG- guided FNAC was done.

Inclusion Criteria:

Palpable as well as USG guided thyroid swellings falling within the specified period of time.

Exclusion Criteria:

Tumour of vascular origin/ pulsatile swelling and patients having history of bleeding/coagulative disorders.

Consent and Ethics:

Ethical approval was taken from the Institutional Ethics Committee of Muzaffarnagar Medical College, Muzaffarnagar. All the patients were informed about the purpose of the study and consent for the same was taken.

OBSERVATION AND RESULTS:

Observations were expressed in the form of tables and figures. Results were analyzed using suitable statistical techniques.

RESULTS:

Mean age of patients in the present study was 36.1 years. Age range of the patients in the present study was 13 years to 70 years. Maximum number of thyroid cases were present in the third decade (30%) followed by fourth decade (26.7%) accounting for total 56.7 % cases in 3rd and 4th decade and least number of thyroid cases (0.67%) were present in the eighth decade as only one patient was in this decade. (Table 1)

One hundred twenty seven females (84.7%) and 23 males (15.3%) with female to male ratio of 5.5:1 were present in the study. The youngest patient was 13 years female and the eldest one was 70 years female. (Figure 1) Out of total 150 cases of thyroid swellings, aspirates were satisfactory in 139/150 cases (92.60%) and rest 11 cases (7.4%) were unsatisfactory (Category I). Most common diagnostic category was Category II (N=119, 79.30%). Category III, IV and V forms the indeterminate categories with 3.3%, 4% and 2% cases respectively, occupying total 9.3% cases. Ratio of category III (AUS) and category V (Malignant) was 1:1.2. (Table 2)

Correlation of cytological diagnosis was done with histopathological diagnosis. Out of 150 cytological examinations of thyroid swellings, biopsy specimen was received in eighteen cases and cytohistological correlation was done. Cytological findings were consistent with histopathological diagnosis in 14 cases (77.80%) and were inconsistent in rest 04 cases (22.20%). (Table 3, Figure 2)

DISCUSSION:

The present study showed that the mean age of thyroid patients in the present study was 36.1 years. It was similar to the study done by Nandekar et al, 2018 (37.6 years) and Gupta et al, 2010 (38.7 years).^[8,3] In studies done by Acharya et al, 2020, Anand et al, 2020, Zhu et al, 2020, Al Dawish MA et al, 2014 and Singh et al, 2011; mean age was 51, 41.78, 46.7, 46.3 and 57.5 respectively^[9,10,11,12,13]; the mean age of the participants was higher than the present study which can be due to various reasons like different sample size and different study population. In the present study, Male to Female ratio was 1: 5.5, which was similar to study done by Acharya et al in 2020 which was 1:5.3.^[9]

In the studies done by Nandekar et al 2018, Al Dawish MA et al 2014 and Singh et al 2011, male to female ratio was comparable to the current study i.e' 1:4.2, 1:4.6 and 1:4.7 respectively.^[8,12,13] In a study conducted by Anand et al in 2020, male to female ratio was 1: 6.3, which was higher than the present study.^[10] All studies showed that the number of females were more than the number of males which showed that the thyroid swellings are much more in females than males. The number of cases in present study according to TBSRTC II in Category I, II, III, IV, V and VI was 7.4%, 79.3%, 3.3%, 4%, 2% and 4% respectively. These findings were consistent with studies done by Anand et al, 2020, Nandekar et al, 2018, Al Dawish MA et al, 2017 and Mehra et al, 2015.^[10,8,12,14]

CONCLUSION:

Thyroid FNAC is very useful to diagnose the patients coming with thyroid swelling. It helps to differentiate the cases of thyroid swelling among benign, inflammatory and malignant conditions of thyroid. Benign thyroid lesions were more common (79.3%) than malignant thyroid lesions (04%). Some cases of thyroid lesions were non-diagnostic (7.4%) also because of low cellularity and obscuring blood. Sometimes, it can also be due to poor technique of FNAC. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC), II is used most commonly to differentiate the thyroid lesions in six categories. This system also helps in the management of thyroid lesions by helping the surgeons to decide the treatment and further follow up of the patient. It can be concluded that thyroid FNAC is a good diagnostic modality for routine diagnosis of thyroid swellings because of its easy procedure and low cost. We also conclude that TBSRTC II is the best and easiest way of categorizing the thyroid lesions for their effective management.

Table 1: Age wise distribution of patients with thyroid swelling: (N=150)

Age Group (in years)	No. of cases	Percentage (%)
10-19	12	08
20-29	45	30
30-39	40	26.70
40-49	30	20
50-59	14	9.33
60-69	08	5.30
70-79	01	0.67
Total	150	100

Table 2: Distribution of different cytologic categories of thyroid swellings according to TBSRTC II: (N=150)

Category according to TBSRTC II	No. of cases	Percentage (%)
Category I - Non diagnostic or Unsatisfactory	11	7.4
Category II – Benign	119	79.3
Category III - Atypia of Undetermined Significance	05	3.3
Category IV - Follicular neoplasm or Suspicious for Follicular Neoplasm	06	4
Category V - Suspicious for Malignancy	03	2
Category VI – Malignant	06	4
Total	150	100

Table 3: Correlation of cytological diagnosis with histopathological diagnosis: (N= 18)

Cytology		Histopathological Diagnosis	
Category	Number of cases	Consistent	Inconsistent
C1	01	-	01
C2	12	10	02
C3	NA	NA	NA
C4	01	01	-
C5	01	-	01
C6	03	03	-
Total	18	14	04

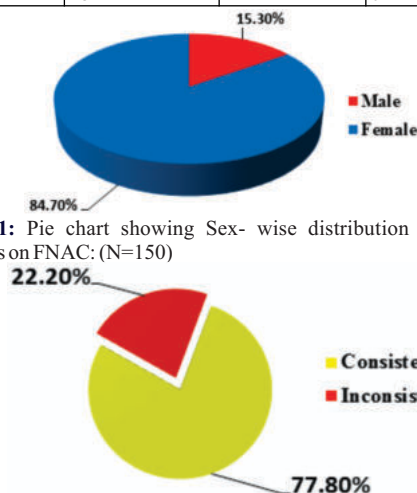


Figure 1: Pie chart showing Sex- wise distribution of thyroid swellings on FNAC: (N=150)

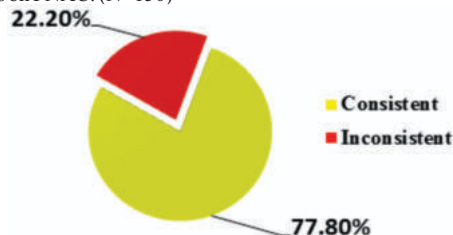


Figure 2: Pie chart showing distribution of consistent and inconsistent Histopathological finding in thyroid cases:

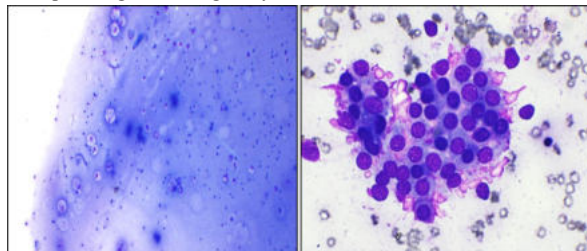


Image 2: Photomicrograph of Category II (Lymphocytic thyroiditis with toxic changes) showing clusters of Hurtle cells surrounded by fire flare over haemorrhagic background colloid. (MGG, 400X)

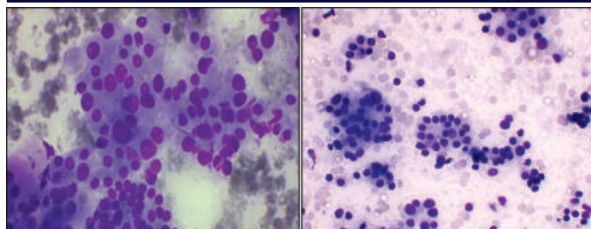
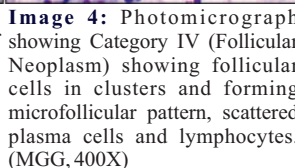


Image 3: Photomicrograph showing Category III (Atypia of Undetermined Significance) Neoplasm) showing fair number of thyroid cells in clusters and forming follicular cells revealing cytologic microfollicular pattern, scattered atypia along with hurthle cell changes. (MGG, 100X)



(MGG, 400X)

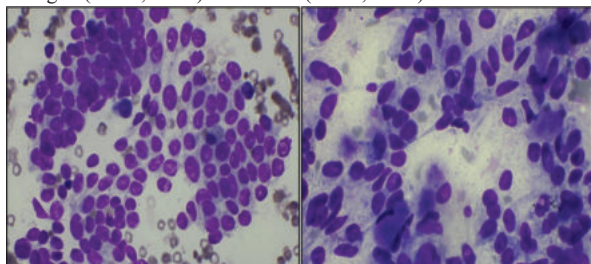
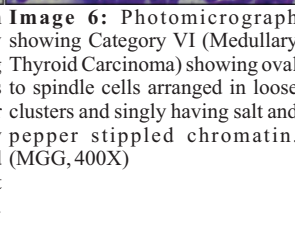


Image 5: Photomicrograph showing Category VI (Papillary Thyroid Carcinoma) showing oval thyroid follicular cells in sheets and clusters revealing nuclear overlapping, granular powdery pepper stippled chromatin, nuclear grooving and intranuclear inclusions against haemorrhagic background. (MGG, 400X)



REFERENCES:

- 1) Jain G, Marwaha TS, Khurana A, Dhoat PS. Prevalence of Thyroid disorders in Patients of type 2 Diabetes Mellitus. International Journal of Medical and Dental Sciences. 2013;2(2):153-61.
- 2) Unnikrishnan AG, Menon UV. Thyroid disorders in India: An epidemiological perspective. Indian J Endocr Metab 2011;15:78-81.
- 3) Gupta M, Gupta S, Gupta VB. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. Journal of Thyroid Research. 2010 Apr 18;2010:379051.
- 4) Grace MK. Role of fine needle aspiration cytology in the diagnosis of thyroid lesions. J R Soc Med 1998;91 Suppl 33:28-32.
- 5) Gulia S, Chaudhury M, Sitaramam E, Reddy K. Diagnostic accuracy of fine needle aspiration cytology in the diagnosis of thyroid lesions. Internet J Pathol 2010;13:101-5.
- 6) Ali SZ, Cibas ES. The Bethesda system for reporting thyroid cytopathology: definitions, criteria and explanatory notes. Berlin: Springer, 2010.
- 7) Cibas ES, Ali SZ. The 2017 Bethesda system for reporting thyroid cytopathology. Thyroid 2017;27: 1341-6.
- 8) Nandedkar SS, Dixit M, Malukani K, Varma AV, Gambhir S. Evaluation of thyroid lesions by fine-needle aspiration cytology according to Bethesda system and its histopathological correlation. Int J App Basic Med Res 2018;8:76-82.
- 9) Acharya A, Varkey LC, Menezes L, Knoll-Rajaratnam J, Lalwani T, Ruducha J, Dutta R, Bernson J, Acharya et al. Respond. Am J Public Health. 2015 Jul;105(7).
- 10) Anand B, Ramdas A, Ambrose MM, Kumar NP. The Bethesda System for Reporting Thyroid Cytopathology: A Cytohistological Study. J Thyroid Res. 2020 Apr 16;2020:8095378.
- 11) Zhu Y, Song Y, Xu G, Fan Z, Ren W. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC): A report of 2,781 cases in a Chinese population. Chin J Cancer Res 2020;32(2):140-8.
- 12) Al Dawish MA, Robert AA, Muna A, Eyad A, Al Ghamdi A, Al Hajeri K, Thabet MA, Braham R. Bethesda System for Reporting Thyroid Cytopathology: A three-year study at a tertiary care referral center in Saudi Arabia. World J Clin Oncol. 2017 Apr 10;8(2):151-7.
- 13) Singh RS, Wang HH. Eliminating the "Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance" category from the Bethesda System for Reporting Thyroid Cytopathology. Am J Clin Pathol. 2011 Dec;136(6):896-902.
- 14) Mehra P, Verma AK. Thyroid cytopathology reporting by the Bethesda system: a two-year prospective study in an academic institution. Pathol Res Int. 2015.