

A Study on Cytology of Thyroid Lesions Categorised Under the Bethesda System

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Abstract

Introduction: Fine needle aspiration cytology(FNAC), is an initial investigation in evaluation of thyroid lesions. Due to lack of standardized system for reporting thyroid cytology in 2007, "The Bethesda System for Reporting Thyroid Cytopathology(TBSRTC)" was introduced. It is a six tier system.

Aim: To classify thyroid FNACs based on "The Bethesda system for reporting thyroid cytopathology."

Objectives : To analyse thyroid cytology through TBSRTC and analyse the distribution of lesions in various categories.

Materials and methods : The study is a cross sectional study done in Department of Pathology, Coimbatore Medical College from July 2015 to June 2016.

Observation and Results:

- A total of 143 cases were studied, 108 patients were females and 35 males.
- Age of patients ranged from 9 to 80 years. Majority in 31- 40 years.
- Adequacy rate was 96 %.
- 119 cases were non – neoplastic, 19 cases were neoplastic, and 5 cases –unsatisfactory (Category I).
- Category II (Benign) had maximum number of cases (119), majority was colloid goiter (70 cases).
- No cases in the category III (Atypia of undetermined significance).
- Category IV (Follicular neoplasm or suspicious of follicular neoplasm) - 13 cases.
- Category V (Suspicious of malignancy) - 3 cases
- Category VI (Malignant) had 3 cases of Papillary carcinoma.

Conclusion : The Bethesda system of reporting cytopathology is a standardised system which is universally acceptable and reproducible. It also describes about the malignancy chance in each category and suggests management protocol for the patients in each category thereby guiding the treating clinician in treatment and followup of the patients.

Key Words: The Bethesda system, Thyroid, FNAC

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I. Introduction

Fine needle aspiration cytology (FNAC), is considered one of the initial diagnostic investigation and easily available screening test in the evaluation of thyroid lesions. To overcome the lack of standardized system for reporting thyroid lesions in cytology, in year 2007, the National Cancer Institute (NCI) in Bethesda, came up with a uniform nomenclature in the interpretation of the thyroid fine needle aspirates, known as "The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)". This atlas describes six diagnostic categories of lesions. Non diagnostic/Unsatisfactory is category I, Benign is category II, Atypical Follicular Lesion of Undetermined Significance(AFLUS) is categorised as category III, Suspicious for Follicular Neoplasm comes under category IV, Suspicious for malignancy is classified as category V and malignant lesions come under category VI. Every diagnostic category has its own risk of malignancy, thereby influencing the management protocol.¹

AIM: To analyse thyroid cytology through The Bethesda System for reporting thyroid cytopathology and to analyse the distribution of lesions under various diagnostic categories and subtypes .

II. Materials and Method

The study is a cross sectional study done in our institution. Ethical committee clearance and written informed consent from each patient obtained. After eliciting detailed clinical history, the site is cleansed with spirit and fine needle aspiration was done using 21 to 26 gauge needle and 20ml syringe.² Aspirate obtained is immediately spread on to a clean glass slide . One slide is air-dried for May Grunwald Giemsa stain and other slide fixed in isopropyl alcohol for 15 minutes. After Alcohol fixation smears are stained with Papanicolaou stain. The smears are examined and cytological diagnosis is made and categorized according to The Bethesda system of reporting thyroid cytopathology.

III. Statistical Analysis

All the data were entered into Microsoft Excel 2010. Statistical analysis performed using SPSS version 20.0 (statistical package for social sciences). Results were interpreted using tables, bar diagrams and pie charts. Descriptive statistics like mean, median, standard deviation, and range were also calculated

IV. Observation And Results

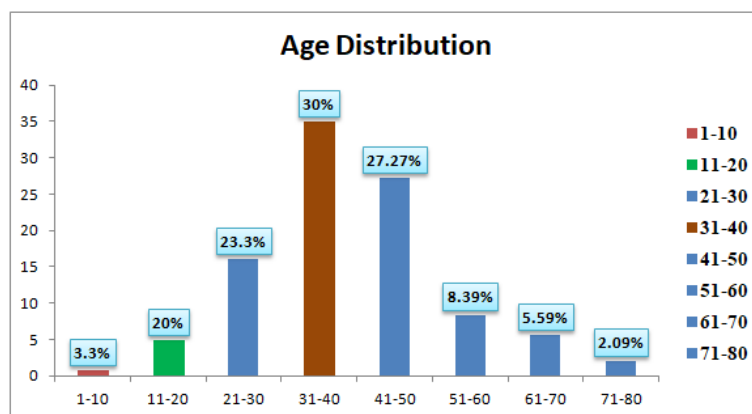
Total number of cases studied were 143.

Age :

Out of 143 patients studied age of patients ranged between 9 years and 80 years.

Major proportion of the patients (35%) belonged to age group of 31-40 years

Chart 1 : Percentage distribution of the sample according to age



Sex:

Out of the 143 patients with thyroid lesions 108 were females and 35 were males . Female to male ratio is 3:1. The youngest patient was 9 years old female child and the eldest was 80 year old female.

Adequacy rate :

Out of 143 FNACs, five aspirates were inadequate for cytological evaluation, hence they were labeled as unsatisfactory smears. They were categorized into category I of The Bethesda system. The unsatisfactory smears had less than six clusters of follicular cells containing less than ten cells per cluster in a single smear.³ The adequacy rate in our institution was 96% , the reason behind this high adequacy rate is we repeat FNAs in inadequate aspirates and if necessary FNAs are performed with ultrasound guidance.

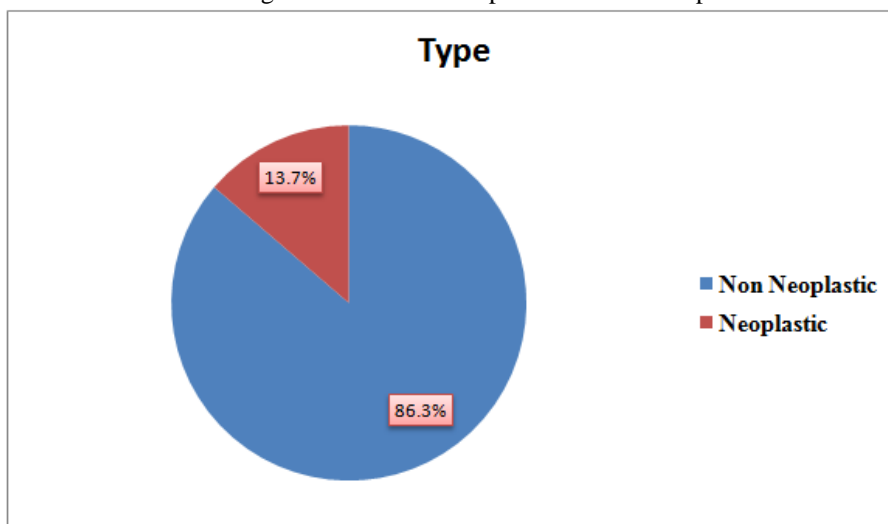
Distribution of lesions:

The Fine needle aspiration smears which were adequate for evaluation were categorized into non neoplastic and neoplastic lesions.

The non neoplastic lesions included colloid goitre, colloid goitre with cystic degeneration, hyperplastic nodule, and Hashimoto's thyroiditis. They come under category II of The Bethesda system. The non neoplastic lesions constituted the major proportion 86%.⁴

The neoplastic lesions comprise of “Atypia of undetermined significance”, “Follicular neoplasm or suspicious for follicular neoplasm and follicular neoplasm suspicious of Hurthle cell type”, “suspicious of papillary carcinoma”, and “malignancy”.

Chart 2 : Percentage distribution of neoplastic and non neoplastic lesions



The Bethesda system of reporting thyroid cytopathology : categories

Among 143 cases, non neoplastic category II lesions were the major proportion constituting 83%, category I unsatisfactory smears were 5%, category III were 0%, next highest percentage of cases were in category IV with 9%, category V and category VI had 2% of cases each.⁵

TABLE-1: Distribution of patients according to The Bethesda system (N=143)

Categories	Number	Percent (%)
Category I	5	3.49
Category II	119	83.21
Category III	0	0
Category IV	13	9.09
Category V	3	2.09
Category VI	3	2.09
TOTAL	143	100

Category II : Benign

The major proportion of cases were in the category II consisting of 119 cases. Among them colloid goitre was maximum with 70 cases, next was colloid goitre with cystic degeneration 40 cases, hyperplastic nodule 5 cases and 4 cases of hashimoto’s thyroiditis seen in our study.

TABLE-2: Distribution of patients according to Category II (N=119)

Categories	Number	Percent (%)
Colloid goitre	70	58.8
Colloid goitre with cystic degeneration	40	33.6
Hashimotos’ Thyroiditis	4	3.36
Hyperplastic nodule	5	4.20
TOTAL	119	100

Colloid goitre/ colloid goitre with degeneration

Among Colloid goitre patients, majority of them belonged to the age group of 31-40 years and 41- 50 years. Microscopic features:

Smears showed scant to moderate cellularity. Smears had follicular cells arranged in microfollicles and monolayered sheets . Follicular cells had regular round nuclei with fragile gray blue cytoplasm. . (Figure 1a) Occasionally many bare nuclei and Hurthle cells were seen. Background showed abundant colloid which

appeared green to pink with Papanicolaou stain and blue violet with MGG stain. Colloid showed pavement like appearance.⁶

Cases with fluid aspirate from cysts showing cyst macrophages and hemosiderin laden macrophages were reported as colloid goitre with cystic degeneration. (Figure 1b)

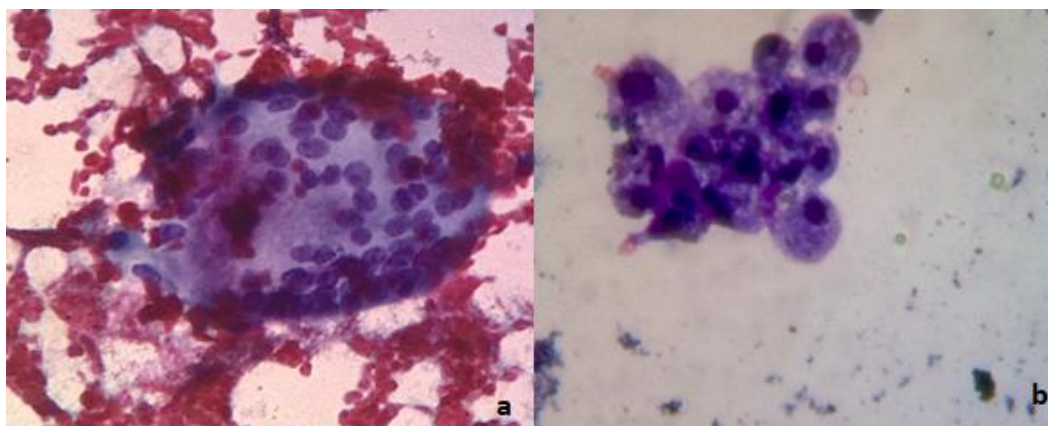


Figure 1 a : Benign thyroid follicle (40 X pap atain). **Figure 1 b :** Cyst macrophages in cystic degeneration of colloid goitre (40 X MGG stain)

Hashimoto's thyroiditis :

Four cases of hashimoto's thyroiditis was diagnosed in cytology in our study. All the four cases were female and were in third decade.

Microscopic features :

Smears showed moderate cellularity. Follicular cells were arranged in microfollicles and monolayered sheets. Many lymphoid cells were seen impinging on the follicular cells. Polymorphic population of lymphoid cells were seen in the background including plasma cells. Hurthle cells were seen singly scattered or arranged in clusters. Hurthle cells have distinct cell border, abundant finely granular cytoplasm and large nuclei . Some hurthle cells showed nuclear atypia and prominent nucleoli.⁶(Figure2)

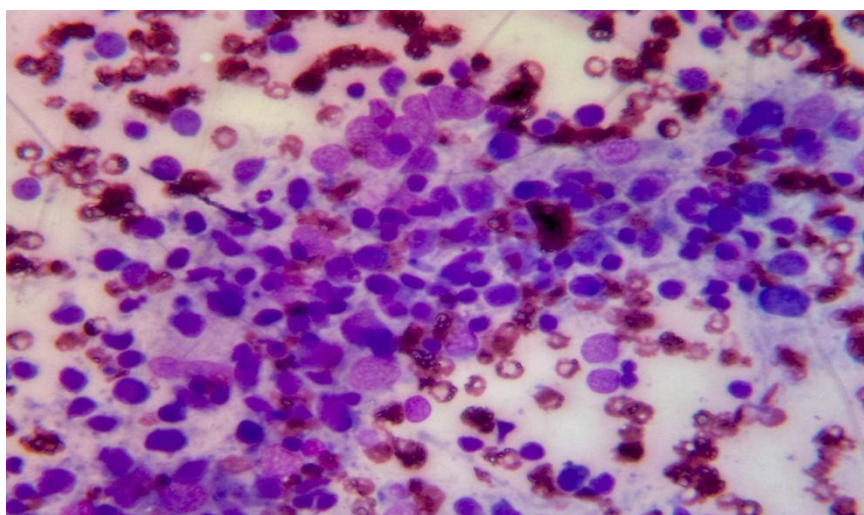


Figure 2 : Lymphocytes impinging on thyroid follicle cells. (40 X MGG stain)

Neoplastic lesions of the thyroid gland:

Neoplastic lesions of thyroid according to the Bethesda system comprises of lesions from category III to category VI.

Category III: Atypia of undetermined significance

In our study no cases were diagnosed in this category

Category IV: “Follicular neoplasm/ Hurthle cell neoplasm, suspicious for follicular neoplasm/ Hurthle cell neoplasm”:

There were thirteen cases in this category. The patients of this category had a wide range of age, from 20 years to 70 years. Eight patients were females and remaining five were males.

Microscopy features :

Smears had moderate to marked cellularity. Smears had many uniform sized microfollicle clusters in a background of scant colloid. Follicular cells had large round nuclei with inconspicuous nucleoli and scant amount of cytoplasm. Nuclear overlapping and syncytial aggregates were occasionally seen.

Category V: Suspicious for malignancy

In present study there were three cases in this category

Microscopic features :

Smears had moderate to high cellularity. Follicular cells were arranged in macrofollicles predominantly, admixed among the benign looking follicular cells with some follicular cells having nuclear enlargement and mild nuclear palor. Occasionally nuclear grooves, irregular nuclear membrane and nuclear molding and overlapping were seen.

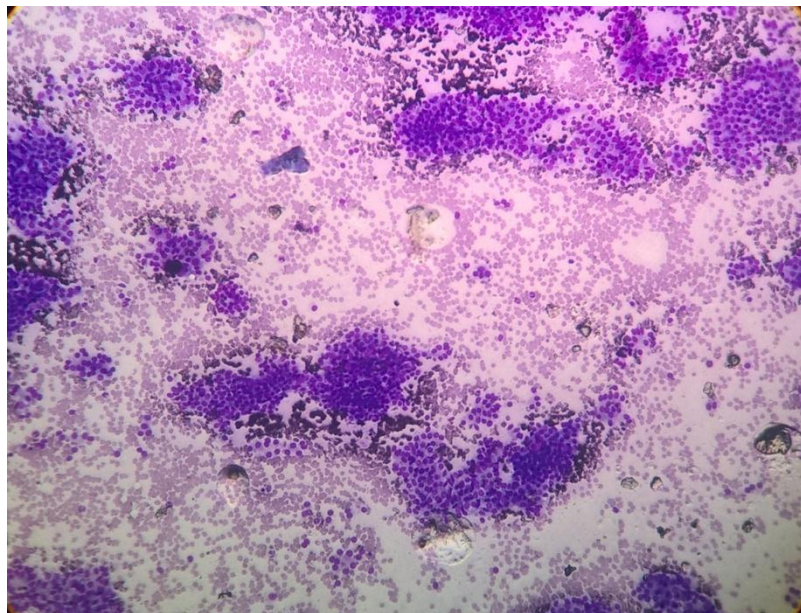


Figure 3 : Highly cellular smear suspicious of malignancy (10 X MGG stain)

Category VI : Malignant

Cytologically 3 cases were diagnosed as Papillary carcinoma in our study.

Microscopic features :

Smears studied were highly cellular. They showed many papillae with or without fibrovascular cores formed by follicular cells. Papillae had anatomical bordering. Follicular cells had large nuclei with irregular nuclear membrane, powdery chromatin. Nuclear overlapping and crowding were noted. Some nuclei showed intranuclear cytoplasmic inclusions and longitudinal grooves.⁷

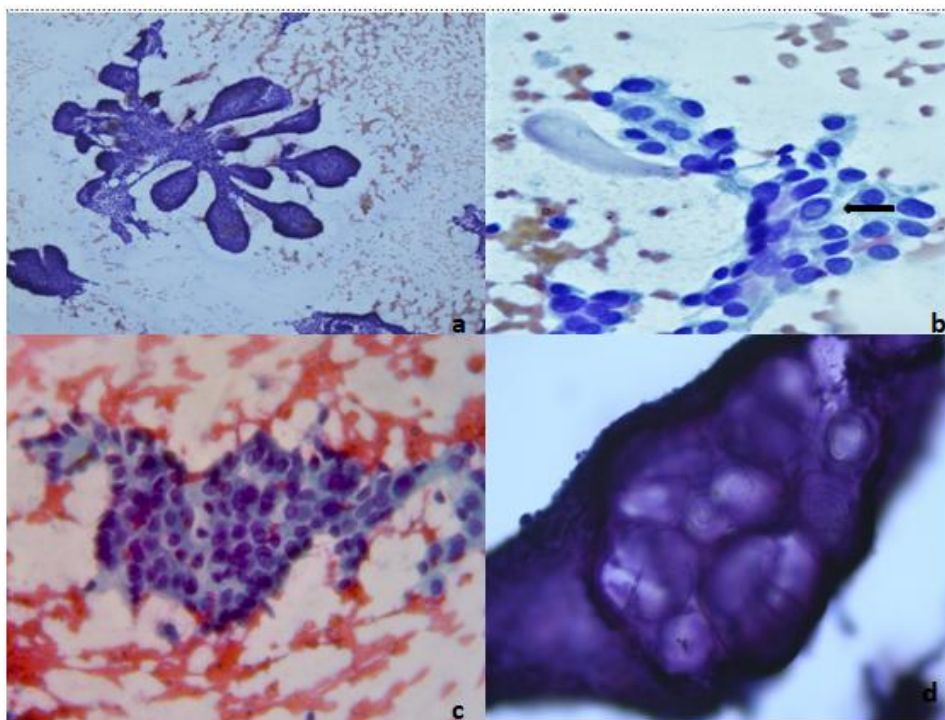


Figure 4 a : Numerous Papillae (10 X Pap stain). **Figure 4 b :** Intranuclear inclusion (arrow)40 X Pap stain.
Figure 4 c : Anatomical bordering with nuclear grooves (40 X Pap stain)
Figure 4 d: Psammoma body (100 X Pap stain)

V. Discussion

In this study thyroid fine needle aspirations were categorized according to the Bethesda system, a six tier category. The study period was from July 2015 to June 2016. During the study period, a total of 143 cases of thyroid fine needle aspirations were collected and categorized according to “The Bethesda System for Reporting Thyroid Cytopathology”. The salient features of the present study include :

- A total of 143 cases were studied, out of which 108 patients were females and 35 were males.
- Age group of these patients ranged from 9 years to 80 years with a mean age of 32.7 years. Majority of the patients were in the age group of 31- 40 years.
- An adequacy rate of 96 % was obtained in the study.
- Out of 143 cases, 119 cases were non – neoplastic, 19 cases were neoplastic, and 5 cases were unsatisfactory for evaluation.
- The benign category (category II) had the maximum number of cases(119 cases), out of which colloid goiter was the predominant diagnosis(70 cases).
- There were no cases in the category III.
- Category IV had 13 cases, Category V had 3 cases, Category VI had 3 cases of Papillary carcinoma.

VI. Conclusion

Thyroid swellings are still an enigma to the surgeon and the pathologist. As a screening test before surgery, FNAC still needs to be followed as a routine procedure for successful patient management.⁸

Adequacy rate of the present study is 96% . This can be further enhanced by further imaging technique like ultrasound .⁹

Category I and II in the non neoplastic category of the Bethesda system have more accurate categorization index. Similarly category V and VI had precision in the diagnosis. This indicates that there are clearcut distinctions between the two ends of the spectrum of non neoplastic and neoplastic lesions. Category IV lesions fall under grey zone and there is need of further clarity for diagnostic categorization in this grey zone. It could be further refined by applying more advanced immunocytochemical and molecular genetic analysis to these patients falling in the grey zone. Further studies involving larger sample size and histopathological correlation with specialized techniques is the need of the hour for patients with thyroid swelling.¹⁰

Conflict of interests: Nil.

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