Annals of Medicine and Medical Sciences (AMMS)
Volume 04, 2025, *Page No.: 620 to 624*
Available at: *http://ammspub.com*

Original Article

OPEN ACCESS

Cytomorphological Spectrum of Thyroid Lesions: A Single Teaching Institute Experience

Dr. Guttikonda Yamini Priya *[1], Dr. Mithila Bahuleyan [1], Dr. V. Anuradha [2]

[1]Assistant Professor, Department of Pathology, Bhaskar Medical College, Hyderabad, Telangana, India.
[2]Associate Professor, Department of Pathology, Bhaskar Medical College, Hyderabad, Telangana, India.

*Corresponding author: Dr. Guttikonda Yamini Priya, MD; *mini1612@gmail.com*

Abstract

Introduction: Thyroid is a butterfly shaped endocrine gland situated in front of the neck. It secretes the hormones T3 and T4, playing a prime role in the metabolism of our body. The prevalence of Thyroid swellings in general population is 4-5 %. Due to the accessible location of the gland, it is easy to perform FNAC which acts as a quick screening as well as a diagnostic tool. Presently, the Bethesda system for reporting thyroid cytopathology is used which was established in year 2007. ***Methods:*** Retrospective, Cross-sectional, Descriptive Study with All patients with clinically palpable thyroid swelling irrespective of age and sex and excluding Any other swelling in the neck done at single institute. ***Results:*** A total of 160 thyroid cases were collected during the study period of Jan 2021 to June 2023. 147 were females and only 13 males. Female to Male ratio- 11.3:1. The common presentation for almost all age groups was swelling in the anterior aspect of neck moving with deglutition. Out of 160 cases, 2 cases were placed in category I, 142 cases in Category II, 13 cases in category IV, 1 case in category V and 2 cases in category VI. Amongst the 160 cases, only 30 underwent surgical resection and the diagnosis of 27 cases was same as that given by FNAC. ***Conclusion:*** FNAC is a simple and easy diagnostic tool for Thyroid swellings. most common of them all being colloid goitre. Surgery is not the main stay of treatment for benign lesions. Bethesda reporting system is a universally accepted system that helps in establishing an easy communication between the pathologist and the surgeon. As all other systems even Bethesda reporting system has shortcomings like it doesn't take into consideration the age, sex and the sonography findings. But the positives outweigh the negatives and hence this is a widely accepted reporting system.

Keywords: ***FNAC, Thyroid lesions, Bethesda system.***

Introduction

Thyroid is a butterfly shaped endocrine gland situated in front of the neck. It secretes the hormones T3 and T4, playing a prime role in the metabolism of our body. Nearly 42 million people are seen to be suffering from the thyroid diseases [1]. The prevalence of Thyroid swellings in general population is 4-5 % [2]. Thyroid abnormalities vary vastly from developmental, inflammatory, hyperplastic to malignant. Due to the accessible location of the gland, it is easy to perform FNAC which acts as a quick screening as well as a diagnostic tool. FNAC for thyroid lesions was first reported by Martin & Ellis at New York Memorial Hospital in 1930 [3,4]. According to the American Thyroid Association and National Comprehensive Cancer Network Guidelines, FNAC should be used as an initial diagnostic test because of its superior diagnostic reliability and cost effectiveness [3,5].

Presently, the Bethesda system for reporting thyroid cytopathology is used which was established in year 2007. It introduced uniformity in the reporting of thyroid FNACs and encouraged the use of standard terminologies aiding in an easy communication between the pathologist and the surgeon. There are six diagnostic categories namely, non-diagnostic/Unsatisfactory, Atypia/Follicular lesion of undetermined significance, Follicular Neoplasm/Suspicious of Follicular neoplasm, Suspicious of malignancy and Malignancy. Each category has an implied risk of malignancy [2].

The present study was conducted to study the cytomorphological spectrum of thyroid lesions, compare with the thyroid status and categorize them according to the Bethesda system. We also tried to compare the cytology reports with histopathological diagnosis wherever possible.

Materials & Methods

This is a cross- sectional, descriptive (observational) study carried out during the period of Jan 2021 to June 2023 in the department of Pathology of Bhaskar Medical College, Hyderabad. All the patients with clinically palpable thyroid swelling irrespective of age and sex were included in the study, while patients with any other swelling were excluded. Patient details were retrieved from the departmental records including the status of the thyroid function tests and evaluated. Stained smears were retrieved from the department, thereafter checked for adequacy and reported as per the Bethesda system of Thyroid reporting.

IRB/IEC- Notified as it is a retrospective case analysis and letter obtained for publication.

Type of Study: Retrospective, Cross-sectional, Descriptive Study

Received: June 08, 2025; **Revised:** July 05, 2025; **Accepted:** July 08, 2025

Inclusion criteria: All patients with clinically palpable thyroid swelling irrespective of age and sex

Exclusion Criteria: Any other swelling in the neck

Result

A total of 160 thyroid cases were collected during the study period of Jan 2021 to June 2023, out of which 147 were females and only 13 males. The male to female ratio was 1:11.3. The age at the time of presentation was quite diverse, ranging from as low as 12yrs to 80yrs. The age distribution in bar charts is represented in figure 1. Almost all the individuals presented with anterior neck swelling except 7 patients who presented in addition with pain, cold intolerance and hoarseness. There were 51 cases who presented with solitary nodule and rest of all were diffuse in nature. The details are described in table 1 - Spectrum of lesions & categorization according to Bethesda Category and table 2 describes Categorization of cases according to Thyroid status.

Further, all the cases were categorized according to the Bethesda Category. Majority of the cases belonged to Category II i.e. Benign Follicular lesion that constituted about 88.8%. Amongst Category II the most common lesion was Colloid goitre followed by Lymphocytic Thyroiditis. Cytologically, cases of Colloid goitre were composed of sheets of benign follicular cell, macrophages and colloid in varying proportion. Cases of lymphocytic thyroiditis were mostly composed of sheets of follicular epithelial cells with impinging lymphocytes and Hurthle cells.

Two of the cases even after repeated aspiration only revealed hemorrhage and were placed in category I- Inadequate to opine.

A total of 13 cases belonged to Bethesda category IV, out of which 13 cases were Follicular Neoplasm and only 1 case was of Hurthle cell Neoplasm. Cytological aspirates were hypercellular with cells predominantly arranged in microfollicular pattern. On the other hand, Hurthle cell neoplasm aspirates comprised of exclusive Hurthle cells devoid of lymphocytes and colloid.

Only 2 cases of Papillary thyroid carcinoma were encountered with cells arranged in papillary architecture and individual cells showing intranuclear inclusions and grooving.

The cases were in addition divided according to the thyroid status, most of the cases in Bethesda category II, IV, V and VI were euthyroid with normal TSH, T3 and T4 levels. Only 39 cases presented hypothyroidism, out of which 36 cases were of Lymphocytic Thyroiditis.

Amongst the 160 cases, only 30 underwent surgical resection and the diagnosis of 27 cases was same as that given by FNAC. In view of the histopathologically proved cases, the overall diagnostic accuracy of FNAC was found out to be 90%. Table 3 describes Cytology and histopathology correlation- which we did post operatively.

Few of the interesting cases which posed clinical challenges were described with figures like Colloid Goiter (Figure 2) : Smears showing cyst macrophages against a background of thin colloid (H & E, 40x) which was hard in consistency and confused with anaplastic carcinoma clinically. A clinically suspected neoplasm turning out to be Lymphocytic Thyroiditis (Figure 3) : Smears showing hurthle cells against a background of lymphocytes (H & E, 20x). One more interesting finding was age inappropriate Hurthle cell Neoplasm: Cellular smears showing Hurthle cells (H & E, 20x) described in figure 4.

Table 1: Spectrum of lesions & categorization according to Bethesda Category

Diagnosis	Number of cases	Bethesda category	Percentage
Inadequate to opine	2	I	1.2%
Colloid Goitre	72	II	88.8%
Lymphocytic Thyroiditis	59		
Colloid Cyst	8		
Benign Follicular Lesion	3		
Follicular Neoplasm	12	IV	8.2%
Hurthle Cell Neoplasm	1		
Suspicious of Malignancy	1	V	0.6%
Papillary Thyroid Carcinoma	2	VI	1.2%

Table 2: Categorization of cases according to Thyroid status

Bethesda Category	Hypothyroid	Euthyroid	Hyperthyroid
II	39	99	4
IV	0	13	0
V	0	1	0
VI	0	2	0

Table 3: Cytology and histopathology correlation

Bethesda Category	Cytological Diagnosis	Histopathological Diagnosis	Accuracy
II	22	25	88%
IV	6	3	50%
VI	2	2	100%

Table 4: Comparison of percentage of cases of each category with different studies.

Category	Jaiswal YP *et al*[13]	Dhameecha M P *et al*[7]	Yasmeen *et al*[14]	Our Study
I	6.19%	10%	0.68%	1.2%
II	71.74%	82%	88%	88.2%
III	6.66%	1.25%	3.4%	0
IV	7.14%	5.75%	4.5%	8.2%

V	3.33%	0.25%	1.4%	0.6%
VI	5.23%	0.75%	5.1%	1.2%

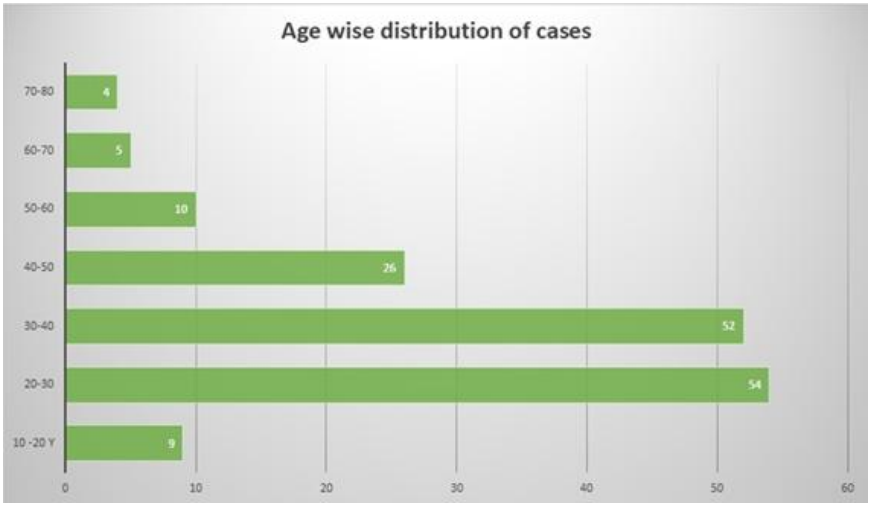

Fig 1: Age wise distribution of the Thyroid lesions

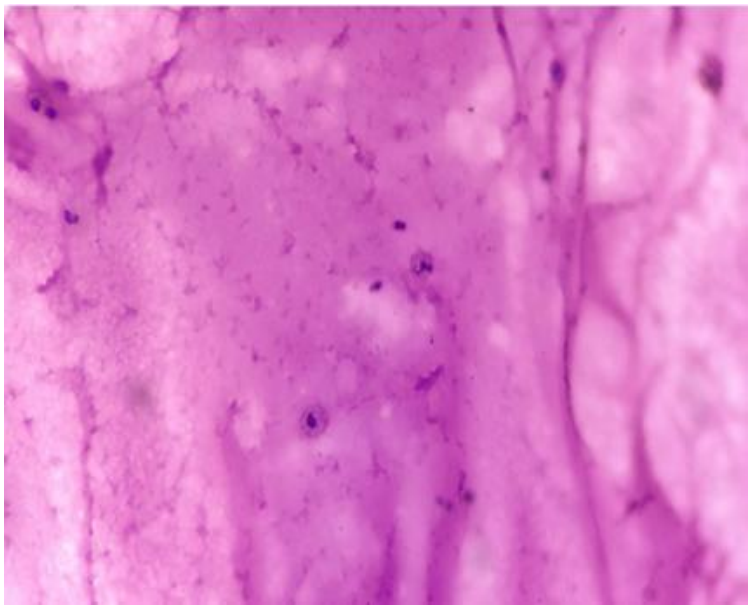

Fig 2: Colloid Goitre: Smears showing cyst macrophages against a background of thin colloid (H & E, 40x)

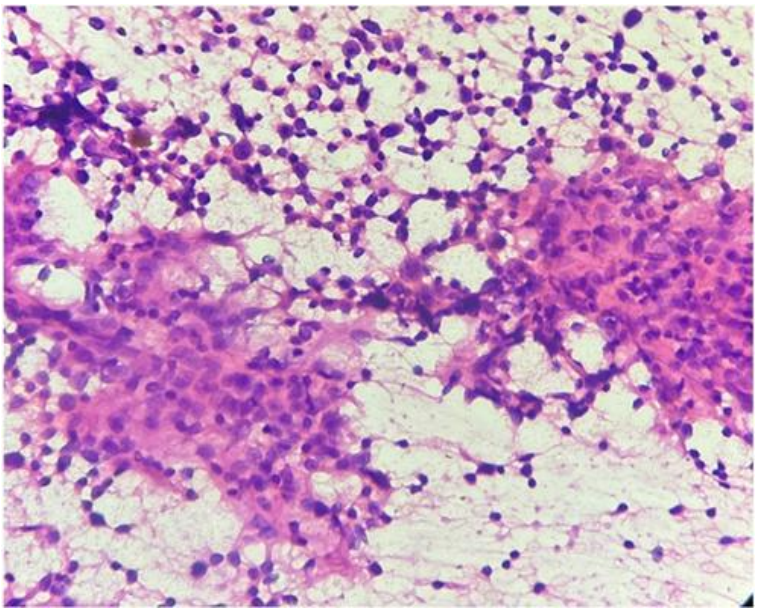

Fig 3: Lymphocytic Thyroiditis: Smears showing hurthle cells against a background of lymphocytes (H & E, 20x)

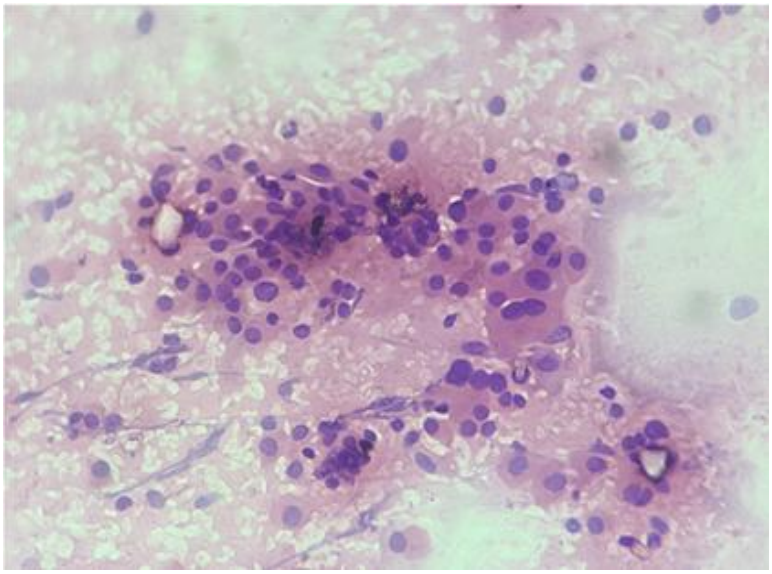

Fig 4 Hurthle cell Neoplasm: Cellular smears showing Hurthle cells (H & E,20x)

Discussion

Present study is an institutional clinical and pathological study giving an overview of 160 FNAC cases of thyroid swellings. We tried to put forth the results of our study and comparison with various studies wherever possible.

Thyroid swellings are common conditions encountered clinically with a prominent female predilection. There exist a wide variety of investigations for evaluating thyroid disorders. Most common of them all being FNAC.

In our institute, thyroid FNACs were quite routinely performed. As indicated in the literature, females out numbered the males with a ratio of 11.3:1 which was similar to the findings of Dhamecha M. P. *et al.*(8.9:1) [7], Devi M R *et al.*(16.9:1)[1], Hirachand S *et al.*(12.3:1)[8] and Jain *et al.* (12.8:1)[9]. Further, thyroid lesions were commonly seen in the age groups of 20 to 30 years closely followed by 30-40 years. These mimicked the findings of Kashyap *et al.*[10], Nandekar *et al.*[2] and Bamanikar *et al.*[11]. The most common lesion encountered in these age groups was a benign lesion-Colloid Goitre. Malignancies were seen to occur in the older age group of above 60 years.

The common presentation for almost all age groups was swelling in the anterior aspect of neck moving with deglutition complementing the studies of Kashyap *et al.*[10] and Mangashetty S S *et al.*[12].

Upon categorization of the thyroid FNAC results according to the Bethesda category it was observed that, Category 2- Benign follicular lesions were the most prevalent constituting about 88.8% of the cases followed by category 4. Almost all the studies potrayed similar results. We compared our study with other published literature, details of which are in table 4.

Smears not sufficing the adequacy criteria of minimum 6 clusters of thyroid follicular cells or with immense amount of hemorrhage obscuring the cytological details were considered inadequate. Since we in our institution have the provision of performing a guided FNAC, we had very minimal cases of non-diagnostic aspirates.

Category II comprised of colloid Goitre, Lymphocytic thyroiditis, Colloid cyst and Benign Follicular lesion. Colloid Goitre was the most commonly encountered disease of the thyroid which was in concordance with the studies of Nandedkar *et al.*[2], Reeta Devi *et al.*[1], Jain D *et al.*[15], Kumar *et al.*[16] and Khadatkar A S *et al.*[17]. This was followed by autoimmune disease Lymphocytic Thyroiditis mostly affecting females.

Smears showing follicular cells predominantly arranged in a micro acinar pattern devoid of colloid or exclusive Hurthle cell aspirates were placed in category IV. However, differentiation between a follicular adenoma and carcinoma was not possible and poses as one of the major drawbacks of the FNAC.

We came across only a single case of Bethesda category V and no case of category III *at all*.

Only two cases of malignancy of papillary type were reported, both of which were seen in elderly age group with one of the cases associated with metastasis to the cervical lymphnode.

Further on evaluating the thyroid function tests of all the cases, it was observed that almost 72% of the cases were Euthyroid which were similar to the findings of Vaishali *et al.*[18].

Out of the total 160 cases, only 30 cases were operated and there specimens were received in the Histopathology section. The diagnosis of 27 cases were same as that of FNACs while 3 of the cases showed discordance with no effect on the patient outcome. One was categorized as Hurthle cell neoplasm on cytology which on histopathology showed thyroid follicular cells showing prominent hurthle cell change while the intervening stroma showed lymphocytic infiltrate and hence was reported as Hashimoto's Thyroiditis. While the other two cases were given the diagnosis of Follicular neoplasms on FNAC and turned out to be Multinodular Goitre upon excision. Taking into consideration the fact that there is presence of significant overlap between the category II and Category IV lesions in cytology, this couldn't have been avoided. The overall diagnostic accuracy of FNAC in our study was 90% which was comparable to the studies of Reetika Sharma *et al.* [19] (90%) and Manoj Gupta *et al.*[20] (88.8%).

Conclusion

To conclude, FNAC is a simple and easy diagnostic tool for Thyroid swellings because of its accessibility. Majority of the swellings are benign, most common of them all being colloid goitre. Surgery is not the main stay of treatment for benign lesions. Only a small fraction of cases with compression symptoms and malignancies are operated surgically, rest all are managed medically. FNAC helps in avoiding a large number of unnecessary procedures and Bethesda reporting system helps in establishing an easy communication between the pathologist and the surgeon. It not only helps the

surgeon in the estimating the malignancy risk of each category but also in deciding the preferred procedure. As all other systems, even Bethesda reporting system has shortcomings, like it doesn't take into consideration the age, sex and the sonography findings. But the positives outweigh the negatives and hence this is a universally accepted reporting system.

Declarations

Conflicts of Interest

None

Acknowledgments

None

Funding

None

References

[1] Devi MR, Sarangthem B, Keerthivasan. Study of spectrum of benign thyroid lesions on FNAC at Tertiary Care Centre. International Journal of Medical and Biomedical Studies. 2020;4(1). doi:10.32553/ijmbs.v4i1.903.

[2] Nandekar 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. International Journal of Appllied and Basic Medical Research. 2018;8(2):76-82.

[3] Taher Omer J. Fine needle aspiration cytology (FNAC) in thyroid gland lesions, how accurate is it? A correlation with histopathology. Diyala Journal of Medicine. 2020;19(1):95–102. doi:10.26505/djm.19015270219.

[4] Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg.1930;92:169-81.

[5] H. Thyroid: Fine Needle Aspiration (FNA) and cytology. Thyroid2003;13:80-6.

[6] Ali, S. z. and Baloch, Z.W. (2017) 'chapter 1- Overview of Diagnostic Terminology and Reporting', in The Bethesda System for reporting thyroid cytopathology: Definitions, criteria, and explanatory notes. 2nd edn. Springer International Publishing, pp. 3.

[7] P. Dhamecha Dr M, Y. Swami Dr S, G. Valand Dr Arvind. FNAC study of thyroid lesions using the bethesda system. Tropical Journal of Pathology and Microbiology. 2018;4(1):101–8. doi:10.17511/jopm.2018.i01.18

[8] Hirachand S, Mahajan M, Lakhey M, Thapa R, Kafle S. Accuracy of fine needle aspiration cytology in diagnosis of thyroid swelling. Journal of Pathology of Nepal. 2013;3(6):433–6. doi:10.3126/jpn.v3i6.8988

[9] Jain Dr D, Jain DrN. Evaluation of thyroid swelling by fine needle aspiration cytology: A single institute experience in Uttrakhand Region of northern India. IOSR Journal of Dental and Medical Sciences. 2017;16(05):32-4. doi:10.9790/0853-1605073234

[10] Shalini Kashyap, Anil Kumar Gupta. CYTOMORPHOLOGICAL assessment of Fnac findings of thyroid swellings. Asian Journal of Medical Research. 2020;9(1). doi:10.47009/ajmr.2020.9.1.pt5

[11] Bamanikar S, Bamanikar A, Jadhav S, Jadhav P, Kumar H, Soraisham P. Cyto-histology and clinical correlation of thyroid gland lesions: A 3-year study in a tertiary hospital. Clinical Cancer Investigation Journal. 2014;3(3):208. doi:10.4103/2278-0513.132112

[12] Mangshetty SS, Jewargikar R, ASK. Fine Needle Aspiration Cytology of 220 Thyroid Lesions Histopathological Correlation. Int J Res Health Sci [Internet].2014Jan31;2(1):243-53.

[13] Jaiswal YP, Chawhan S. The spectrum of thyroid lesions on fine needle aspiration cytology. International Journal of Research in Medical Sciences. 2020;8(2):630. doi:10.18203/2320-6012.ijrms20200247

[14] Yasmeen K, Arsalla M, Richa DP, Erbaz M, Vinod G, Archana K et.al. Classification of thyroid FNA smears into Bethesda categories and their correlation with thyroid function tests. Sch J App Med Sci 2016; 4: 916-23.

[15] Jain, Dr. Deepika & Jain, Dr. Navneet. (2017). Evaluation of Thyroid Swelling by Fine Needle Aspiration Cytology: A Single Institute Experience in Uttrakhand Region of Northern India. IOSR Journal of Dental and Medical Sciences. 16.32-34.10.9790/0853-1605073234.

[16] Kumar, Abhay & Bhadouriya, Sunil & Narain, Prem &Chauhan, Jitendra & Bharti, Bhartendu & Singh, Jaypal. (2017). Comparative study of FNAC and histopathology of thyroid swellings, diagnostic accuracy and role in its management. International journal of Otorhinolaryngology and Head and NeckSurgery.10.18203/issn.2454-5929.ijohns20174183.

[17] Khadatkar, Ashwini & Dhume, Varsha & Kavishwar, Vikas. (2017). Cytological Evaluation of various thyroid lesions based on Bethesda system for reporting thyroid lesions. Int J Res Med Sci .10.18203/2320-6012.ijrms20170901.

[18] Jain V, Agrawal V, Kalra R, Tripathi SK. Cytomorphological features of thyroid lesions and its correlation with thyroid function tests. Medica Innovatica. 2021 Jul-Dec;10(2):55–8.

[19] Reetika Sharma, *et al*.: Diagnostic accuracy of FNAC of thyroid gland lesions: Journal of Cancer Research and Therapeutics- Volume 13 - Issue 3 - July-September 2017.

[20] Manoj Gupta, Savita Gupta, and Ved Bhushan Gupta. Journal of Thyroid Research Volume 2010, Article ID 379051, 5 pagesdoi:10.4061/2010/379051.