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Utilisation of Bethesda system for reporting thyroid cytopathology: A study of 250 cases

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Abstract

Background: FNAC is a useful tool for initial diagnostic work up of thyroid nodule prior to both ultrasound and scintigraphy due to its diagnostic usefulness and cost-effectiveness. It is also useful if a suspicion of cancer exists. It has reduced the need of imaging and surgery and has increased the yield of cancer in patients who come for surgery. Terminology of reporting thyroid FNACs varied markedly from two category schemes to six or more category schemes making it difficult for clinicians to interpret the reports and hindered the sharing of clinically meaningful data among multiple institutions. To address this problem, the National Cancer Institute proposed a new system, named 'the Bethesda system for reporting thyroid cytopathology' (TBSRTC) in a conference organized in Bethesda. This system also described the risks of malignancy in each category and their recommended clinical management.

Aim: To classify the thyroid lesions according to Bethesda system for reporting thyroid cytopathology and to find out the pathological spectrum of different thyroid lesions

Material and methods: After taking approval from the institutional ethical committee and informed consent, this study was conducted on 250 cases at Department of Pathology SN Medical College, Jodhpur on patients aged between 10 to 70 years of any gender presenting with thyroid swelling. FNAC was performed and diagnosis given as per Bethesda classification.

Results: Out of the total 250 cases studied 10 cases (4%) were Non Diagnostic/ Unsatisfactory, 220 cases (88%) were Benign, 5 cases (2%) were AUS, 4 cases (1.6%) were SFN/FN, 2 cases (0.8%) were Suspicious for malignancy and 9 cases (3.6%) were Malignant.

Conclusion: TBSRTC provides uniform reporting system for thyroid FNA and as it has high specificity, it facilitates effective communication among health care providers.

Keywords: thyroid, FNAC, TBSRTC, Bethesda

1. Introduction

Thyroid nodules are common clinical findings and have a reported prevalence of 4–7% of adult population. The problem in clinical practise is to distinguish thyroid nodule with cancers reliably from many benign nodules [1]. It is preferred to operate only on those patients with suspicion of cancer, thereby avoiding unnecessary complications.

Fine needle aspiration cytology (FNAC) is the study of cells obtained by fine needle under vacuum. Fine needle aspiration cytology (FNAC) is the cornerstone of the investigation [2], and it is the diagnostic procedure for the nodule after primary thyroid disease is ruled out with normal thyroid function test. FNAC is valuable in differentiating inflammatory from neoplastic thyroid lesions in which patients can be followed clinically & treated medically [3]. FNAC has avoided prolonged hospital stay and expenditure since diagnosis can be obtained within minutes rather than days. Due to its simplicity, low cost, and absence of major complications, it is the initial investigation in the management of thyroid disease [4]. However, due to the lack of a standardized system of reporting, pathologists have been using different terminologies and diagnostic criteria, thereby creating confusion amongst referring clinicians in the interpretation of the cytopathology report, ultimately hindering a definitive clinical management [5, 6]. To overcome this issue, multiple organizations have proposed diagnostic guidelines for reporting thyroid FNAC results, including the Papanicolaou Society of Cytopathology Task Force and the American Thyroid Association, although none have been universally accepted [7, 8].

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In the year 2007, the National Cancer Institute (NCI), Bethesda, Maryland, United States, organized the NCI Thyroid Fine Needle Aspiration State-of-the-Science Conference, and an initiative was undertaken to publish an atlas and guidelines using a standardized nomenclature for the interpretation of thyroid fine needle aspirates (FNAs), known as the Bethesda system for reporting thyroid cytopathology [9]. The atlas describes six diagnostic categories of lesions: Non-diagnostic/unsatisfactory, benign, atypical follicular lesion of undetermined significance (AFLUS), “suspicious” for follicular neoplasm (SFN), suspicious for malignancy (SM), and malignant. The six diagnostic categories of the Bethesda system have individual implied risks of malignancy that influence management paradigms [10]. This study was undertaken to study the cytology of palpable thyroid lesions to minimize surgical intervention and to elucidate the usefulness of the Bethesda system in reporting thyroid FNAs.

2. Aims and Objectives

Our aim was to classify the thyroid lesions according to Bethesda system for reporting thyroid cytopathology and to find out the pathological spectrum of different thyroid lesions.

3. Material and Methods

After taking approval from the institutional ethical committee and informed consent from the patients, this study was conducted on 250 cases at MDM and MGH Central Lab under Department of Pathology SN Medical College, Jodhpur on patients of any gender presenting with thyroid swelling aged between 10 to 70 years.

Patients with history of any type of thyroid surgery (lobectomy or total thyroidectomy) were excluded from the study.

3.1 Data Collection

Informed consent from all the patients presenting with thyroid lesions in the OPD and fulfilling the inclusion criteria was taken. All the patients were recorded for their demographic features, that is, age, sex, and address (for followup). History of present illness with regard to symptoms and duration was recorded. They were examined for the signs related to the solitary thyroid swelling. All routine investigations were performed. Patients with thyroid nodules were enrolled after fulfilling these criteria and FNAC was done.

3.2 Procedure of aspiration

After brief explanation about the procedure, the patient was placed in supine or sitting position with extended neck, so as to make the thyroid swelling appear prominent. The swelling was immobilized and fixed with one hand felt for site of aspiration. Then with the other hand, swelling was aspirated using (23/24) gauge disposable needles using standard procedures moving back and forth inside the swelling under aseptic precautions. The aspirated contents of the needle were expelled onto glass slides. Four slide smears were made for each case and air dried smears were fixed in methanol. All the slides were stained with May-Grunwald’s Giemsa stain. The results were categorized according to the recent Bethesda classification into insufficient for diagnosis (unsatisfactory), benign, atypical follicular lesion of undetermined significance, follicular neoplasm, suspicious for malignancy, and malignant. Aspirates with insufficient cellularity or poor quality smear due to delayed or inadequate fixation were considered “unsatisfactory”.

4. Results

The present study shows that thyroid lesions are uniformly distributed according to age but are more common in 2nd and 3rd decade of life. The mean age was found to be 39.8±16.7 years. Thyroid lesions are more common in females. 84% of cases were females and 16% were males with a female to male ratio of 5.25:1.

Out of the total 250 cases studied 10 cases (4%) were Non Diagnostic/ Unsatisfactory, 220 cases (88%) were Benign, 5 cases (2%) were AUS, 4 cases (1.6%) were SFN/FN, 2 cases (0.8%) were Suspicious for malignancy and 9 cases (3.6%) were Malignant.

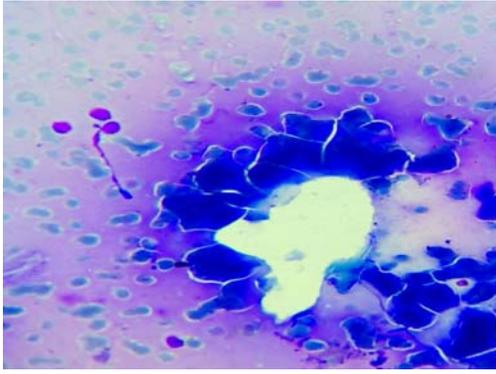
Table 1: Distribution of FNAC cases in the Bethesda categories

S.N	Diagnostic Category (TBSRTC)	Number of cases of each category	%
1	Non Diagnostic/ Unsatisfactory	10	4
2	Benign	220	88
3	Atypia of Undetermined Significance	5	2
4	SFN/FN	4	1.6
5	Suspicious for malignancy	2	0.8
6	Malignant	9	3.6
	Total	250	

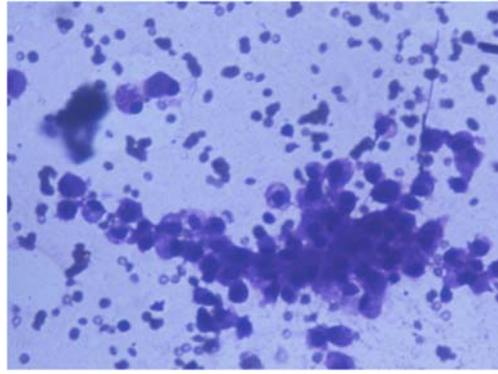
Table 2: Details of distribution of FNAC cases in the study (n=250)

S.N	Diagnostic Category	Number of cases of each category	%
1	Non Diagnostic	10	4
2	Benign		
	Colloid nodule	27	10.8
	Colloid Goitre	89	35.6
	Cyst	41	16.4
	Adenomatoid Nodule	16	6.4
	Hashimoto’s Thyroiditis	40	16
	Granulomatous Thyroiditis	3	1.2
	Grave’s Disease	2	0.8
3	Atypia of Undetermined Significance	5	2
4	SFN/FN	4	1.6
	SFN	03	1.2
	FN	1	0.4
5	Suspicious for malignancy (Suspicious for PCT)	2	0.8
6	Malignant	9	3.6
	Papillary carcinoma of thyroid	5	2
	Medullary carcinoma of thyroid	3	1.2
	Anaplastic Carcinoma	01	0.4
	Total	250	

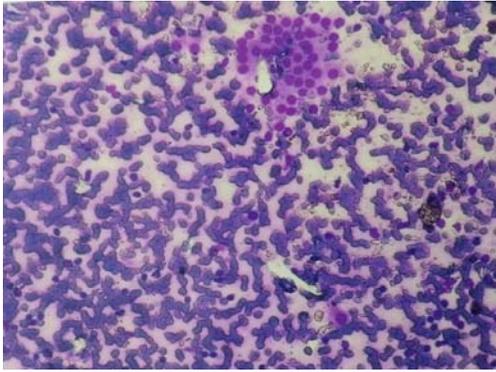
In our study (Table2), only 9 (3.6%) FNA cases were malignant in which majority (5) were papillary carcinomas, 3 were medullary carcinoma and one was anaplastic carcinoma. 2 (0.8%) were suspicious for malignancy while 4 (1.6%) were reported to be suspicious for follicular neoplasm. 5 (2%) were atypia of undetermined significance whereas 10 cases (4%) were classified as non-diagnostic. Majority of cases were benign (88%) in which major proportion was of colloid goitre (89 cases) followed by colloid cyst (41 cases) and hashimoto’s thyroiditis (40 cases). Others lesions were colloid nodule, adenomatous nodule, graves’ disease, granulomatous thyroiditis, etc



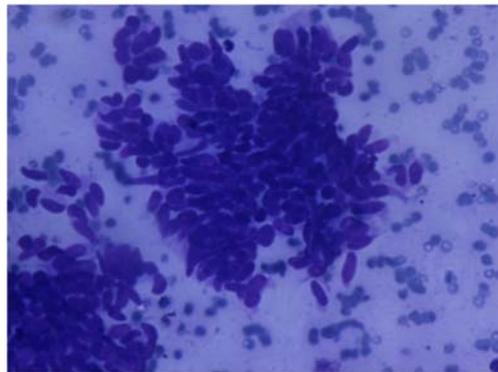
Colloid goitre (Bethesda Category II): Cytological smear showing thick colloid with cracking artefacts and few follicular cells. (MGG 40X)



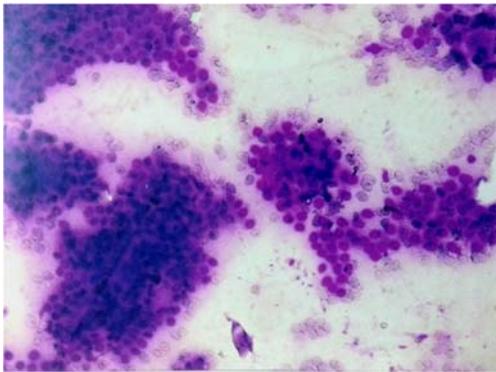
Malignant (Bethesda category VI) – Medullary carcinoma of thyroid, smear showing cluster and isolated, plasmacytoid follicular cell (MGG 40X)



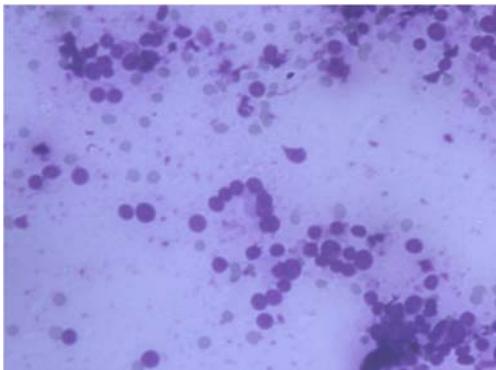
Lymphocytic Thyroiditis (Bethesda Category II): Cytological smear showing mainly lymphoid cells with clusters of follicular epithelial cell (MGG 20X)



Malignant (Bethesda category VI) – Papillary Carcinoma Thyroid (Tall Cell Variant) smear showing papillae with elongated (columnar) follicular cells (MGG 40X)



Follicular Neoplasm (Bethesda category IV): Cytological smear showing syncytial multilayered cell clusters of variable size (MGG 20X)



SFN (Bethesda category IV) – Smear showing few microfollicles (MGG 40x)

5. Discussion

The present study was conducted at pathology department of Dr. S.N. Medical College and associated groups of hospitals, Jodhpur. A total number of 250 cases of palpable lesions of thyroid were studied. FNAC was performed after proper consent and results were categorised according to Bethesda system.

In present study, the patients were in age ranging from 10-70 years. The mean age was found to be 39.8 ± 16.7 years. Most patients (59 cases) were in the age group ranging from 31-40 yrs. This was similar to the studies by authors such as Verma AK *et al.* [11] who also found most patients range from age group 31 to 40 yrs with mean age 37 yrs. Handa U *et al.* [12] also found the mean age 32.70 ± 11.85 years. Sinna EA *et al.* [13] found the mean age to be 44 years.

There was female preponderance as 210 patients (84%) were females and 40 patients (16%) were males. This was in concordance with the studies of other authors like Verma AK *et al.*, Tepeoglu M *et al.* and Sinna EA *et al.* [11, 14, 13] who also reported prevalence of thyroid lesions in female population as 80.9%, 78.7% and 83.8% respectively.

The female to male ratio in our study was found to be 5.25:1. Sinna EA *et al.* [13] also noted the ratio to be 5.2:1. Verma AK *et al.* [11] found the ratio to be 4.2:1.

In our study, most of the lesions (220 cases out of 250) were found to be benign (88%). Among these, the most common lesion reported was colloid goitre which was reported in 89 cases. This was followed by thyroid cyst and hashimoto's thyroiditis, which were reported in 41 cases and 40 cases respectively. Other benign lesions were adenomatoid nodule, granulomatous thyroiditis, grave's disease. Handa U *et al.* [12]

also found the colloid goitre to be the most common benign lesion (57.6%) similar to our present study. They found the next common lesion to be thyroiditis (27.4%).

Our study was in concordance with the study by Mondal SK *et al.* [15] who also reported the benign category to be about 87.5%. Mehra P *et al.* [16] also found the benign category to be the most common category (80%). Theoharis CGA *et al.* [17] also reported the benign category as largest (73.8%). Tepeoglu M *et al.* and Jo VY *et al.* [14, 18] found the benign category to be 68.3% and 59% respectively.

The reason for the number of cases in the benign category being higher can be attributed to the fact that, our institute, despite being a tertiary care centre, not only caters to the needs of patients on a referral basis, but also patients come here directly without referral. So a large population, representative of the general population, is encountered in our institute. Therefore, the proportion of benign cases that is a lot higher in the general population, is reflected proportionately in our study.

Out of the total 250 cases studied, 10 cases (4%) were Non Diagnostic/ Unsatisfactory (Bethesda category 1) in our study. This was similar to Sinna EA *et al.* and Mehra P *et al.* [13, 16] who found 7.1% and 7.2% cases belonging to category I. Mondal SK *et al.* [15] found these to be only 1.2% as they performed the FNA under USG guidance. The precise aspiration under ultra sound guidance reduces the incidence of unsatisfactory aspirate. Lower incidence as compared to the studies by authors like Jo VY *et al.* [18] (18.6%) or Tepeoglu M *et al.* [14] (12%) can be due the fact that the cytopathologist himself performs the procedure of FNAC in our institute, leading to a better quality and adequate aspirate, thereby allowing a more specific cytological diagnosis.

We found 5 cases (2%) in Bethesda category 3, i.e., Atypia of Undetermined Significance. This was similar to be the studies of Jo VY *et al.*, Theoharis CGA *et al.* and Mondal SK *et al.* [18, 17, 15] who found these cases to be 3.4%, 3% and 1% respectively. The general category AUS/FLUS is reserved for specimens that contained cells (follicular, lymphoid, or other) with architectural and/or nuclear atypia that is not sufficient to be classified as suspicious for a follicular neoplasm or suspicious for malignancy. The atypia is more marked than can be ascribed confidently to benign changes. The recommended management for an initial AUS/FLUS interpretation is the clinical correlation and, for most cases, a repeat FNA at an appropriate interval which usually results in a more definitive interpretation; only about 20–25% of nodules are repeatedly AUS.

In present study, 4 cases (1.6%) belonged to Follicular neoplasm or suspicious for follicular neoplasm (FN/SFN) and 2 cases (0.8%) were Suspicious for malignancy. Theoharis CGA *et al.* and Mondal SK *et al.* [17, 15] also found 1.3% and 1.4% cases to be suspicious for malignancy. The recommended treatment for both these categories is surgery.

In our study, only 9 (3.6%) FNA cases were malignant in which majority (5 cases) were papillary carcinomas, 3 were medullary carcinoma and one was anaplastic carcinoma. This was similar to Theoharis CGA *et al.* and Mondal SK *et al.* [17, 15] who reported the malignant cases to be 5.2% and 4.7% respectively. Sinna EA *et al.* and Tepeoglu M *et al.* [13, 14] also found the papillary carcinoma to be most frequent malignant lesion (72.4%).

Among these 9 cases, 8 were females while only 1 case was male. This may be due to the fact that thyroid lesions overall are also more common in females. 4 patients were above 60 years of age. This complies with the fact that thyroid

malignancies are generally more common in later decades of life.

A malignant thyroid FNAC diagnosis is expected to account for 4–8% of all thyroid FNACs [17, 18], but much higher and lower results have been reported in the literature [19, 20] However, the ‘malignant’ category consists mostly of papillary thyroid carcinoma (PTC) cases [17-20]. The risk of malignancy is 97–99% and the recommended management in Bethesda is total thyroidectomy in this category.

Thyroid lesions are generally non neoplastic. In our study, 216 cases out of 250 were assigned as non-neoplastic. Only 34 cases were reported to be neoplastic. This was similar to the study by Handa U [12] *et al.* who also found majority of the cases (381 cases) to be non-neoplastic and only 31 cases to be neoplastic.

Thus, the present study supports the Bethesda System for Reporting Thyroid Cyto-pathology and the results are quite comparable with other studies conducted worldwide.

6. Conclusion

TBSRTC provides uniform reporting system for thyroid FNA and as it has high specificity, it facilitates effective communication among cytopathologists, endocrinologists, surgeons, radiologists and other health care providers.

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