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"Cytological Evaluation of Thyroid Lesion on The Basis Of Bethesda System"

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ABSTRACT :
Fine needle aspiration cytology (FNAC) has emerged as one of the well-established first-line diagnostic techniques in the evaluation of thyroid lesions as well as solitary thyroid nodule. Until 2007,various competing reporting systems using variable number of diagnostic criteria and diagnostic terminology, causing a discordance among clinician and pathologist. To address the variability in terminology and other issues related to thyroid FNA, the National Cancer Institute proposed the six tiered "Bethesda System for reporting of thyroid cytopathology". The current study is done to perform uniform reporting system for thyroid cytopathology based on Bethesda system and to reduce surgical procedure of those thyroid lesions, which can easily be treated medically. The present study was undertaken on fifty patients with clinically enlarged thyroid during a period of approximately two years who attended the Cytology section of Pathology Department, S.P. Medical College, Bikaner. All fine needle aspiration cytology (FNAC) diagnoses were classified according to the features given in the monograph of TBSRTC into nondiagnostic/unsatisfactory (ND/UNS), benign, atypia of undetermined significance/follicular lesion of undetermined significance (AUS/FLUS), follicular neoplasm/suspicious of a follicular neoplasm (FN/SFN), suspicious for malignancy (SFM), and malignant. The distribution of various categories from 50 evaluated thyroid nodules was as follows: 6% ND/UNS, 74% benign, 2% AUS/FLUS, 10% FN, 2 SFM, and 6% malignant. TBSRTC is an excellent reporting system for thyroid FNA. It also provides clear management guidelines to clinicians to go for follow-up FNA or surgery and also the extent of surgery.

KEY WORDS- Non diagnostic,Benign,Atypia of undetermined significance,Suspecious of follicular neoplasm,Suspecious of malignancy,Malignancy

Introduction

Thyroid Fine Needle Aspiration (FNA) is among the commonly performed cytological procedures and the single most effective tool in guiding management of a patient with a thyroid nodule. It reduces the rate of unnecessary thyroid surgery for patients with benign thyroid nodules and triages patients with thyroid cancer. However, terminology of reporting thyroid FNACs has varied markedly. Various reporting formats of thyroid FNACs have been used varying from two category schemes to six or more category schemes. While some of them tried to diagnose various lesions using histology-equivalent categories, other formats had categories like equivocal, inconclusive, indeterminate, atypical, suspicious, uncertain, malignancy suspicious, possibly neoplastic, possibly malignant, and probably malignant to report thyroid aspirates that fell between benign and malignant diagnostic categories[1].

To address the variability in terminology and other issues related to thyroid FNA, the National Cancer Institute proposed the six tiered "Bethesda System for reporting of thyroid cytopathology"{TBSRTC}. This system represents a major step toward standardization and reproducibility of Thyroid FNA reporting, clinical significance and predictive value of thyroid FNA. TBSRTC is based on extensive review of

published literature on thyroid cytology and thus can be considered an evidence based classification system. The Bethesda System for Reporting Thyroid Cytopathology recommends that each report begin with one of the six general diagnostic categories. Each of the categories has an implied cancer risk that links it to an appropriate clinical management.[2-4]

The Bethesda System for Reporting Thyroid Cytopathology: Recommended Diagnostic Categories.[5]

I. Nondiagnostic or Unsatisfactory

Cyst fluid only
Virtually acellular specimen
Other (obscuring blood, clotting artefact, etc.)

II. Benign

Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.)
Consistent with lymphocytic (Hashimoto) thyroiditis in the proper
clinical context
Consistent with granulomatous (sub acute) thyroiditis
Other

III. Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance

IV. Follicular Neoplasm or Suspicious for a Follicular Neoplasm

specify if Hürthle cell (oncocytic) type

V. Suspicious for Malignancy

Suspicious for papillary carcinoma
Suspicious for medullary carcinoma
Suspicious for metastatic carcinoma
Suspicious for lymphoma
Other

VI. Malignant

Papillary thyroid carcinoma
Poorly differentiated carcinoma
Medullary thyroid carcinoma
Undifferentiated (anaplastic) carcinoma
Squamous cell carcinoma
Carcinoma with mixed features (specify)
Metastatic carcinoma
Non-Hodgkin lymphoma

Each of the categories has an implied cancer risk that links it to a rational clinical management [4] as depicted in Table 1.

Diagnostic category	Risk of malignancy%	Management
Non diagnostic or unsatisfactory	1-4	Repeat FNA with Ultrasound guidance
Benign	0-3	Follow up
Atypia of undetermined significance	5-15	Repeat FNA
Follicular neoplasm or suspicious for follicular neoplasm	15-30	Lobectomy
Suspicious for malignancy	60- 75	Lobectomy or thyroidectomy
Malignant	97-99	Total thyroidectomy

Materials And Methods

The present prospective study was undertaken during a period of two years. In the study fine needle aspiration cytology was performed on fifty indoor and outdoor patients with signs and symptoms of various thyroid lesions. After taking detailed history and performing clinical examination, the patients were subjected to fine needle aspiration sampling .

The smears were prepared, stained by May-Grunewald-Giemsa stain and H&E stain and reported according to Bethesda system reporting of thyroid lesions.

S No.	Category
I	Nondiagnostic or unsatisfactory
II	Benign
III	Atypia of undetermined significance or Follicular lesion of undetermined significance
IV	Follicular Neoplasm / Suspicious for follicular Neoplasm

V	Suspicious for malignancy
VI	Malignancy

OBSERVATION AND RESULT

Table- 2
Age wise distribution of thyroid lesions in the present study

S. No.	Age (years)	No. of cases	Perncentage
1.	Childhood (0-10)	-	-
2.	Teen age(11-20)	2	4
3.	Adult (21-50)	34	68
4.	Old age(>50)	14	28
	Total	50	100

Table 2 shows that majority of the patients were adults (68%), 28 % were in the old age group, 4% were teenage group.

Table- 3
Sex wise distribution of thyroid lesions in the present study

Sex	No. of cases	Percentage
Male	8	16
Female	42	84
Total	50	100

The study revealed a female preponderance (84percent) against only sixteen percent patients being males. Male to Female ratio was 1: 5.25.

Table 4
Age wise incidence of the various categories according to Bethesda System

Category	Teen age	Adult	Old Age	Total	Percentage
I		2	1	3	6
II		26	9	37	74
III		1	-	1	2
IV		3	2	5	10
V		-	1	1	2
VI		2	1	3	6
Total		34	14	50	100

The study revealed that maximum lesions diagnosed were in the Benign category (category II) (37) constituting 74percent and affecting mostly the adults females. Of the three non-diagnostic/unsatisfactory smears, one case show cyst fluid with macrophages and two cases were revealed presence of blood only and in benign category,Out of a total of thirty seven cases 86.48 percent cases were sub categorized as Benign Follicular Nodules, 13.26 percent cases as lymphocytic thyroiditis. one case was diagnose as Category III (Atypia of undetermined significance or Follicular lesion of undetermined significance) and out of 5cases diagnosed as follicular neoplasm/suspicious of follicular neoplasm one was hurthle cell type .suspicious of malignancy was diagnosed in one patient and 2 out of the three malignant cases were diagnosed as papillary thyroid carcinoma and one case as anaplastic carcinoma.Out of the threee malignant cases, (66percent) were papillary carcinoma, and one cases were anaplastic carcinoma.

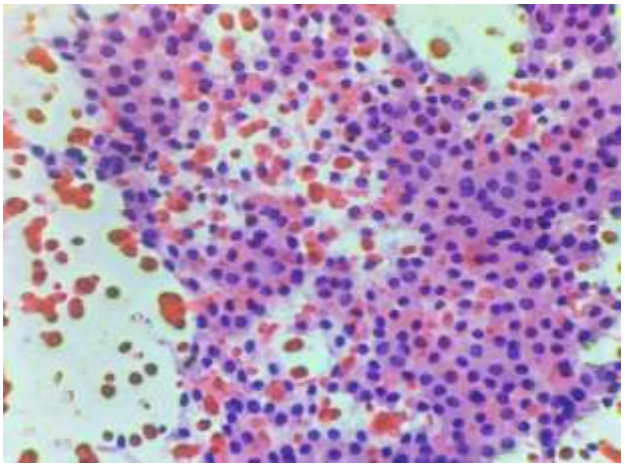

Fig.1 Benign Follicular Nodule-Showing Monolayer Sheet Of Uniform Follicular Cell.(H&E,40x)

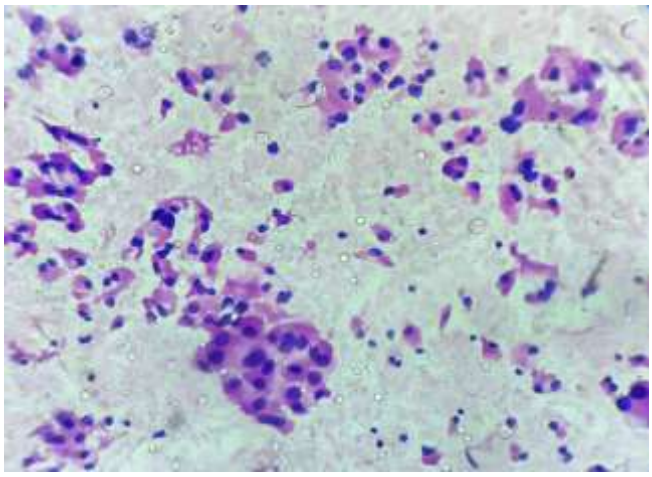

Fig 2 -Follicular Neoplasm Hurthle Cell Type/Suspicious Of Follicular Neoplasm Hurthle Cell Type – Smear Is Highly Cellular And Consists Of Exclusively Hurthle Cell Of Variable Size Arranged As Isolated Cell And In Crowded Group (Giemsa 40x)

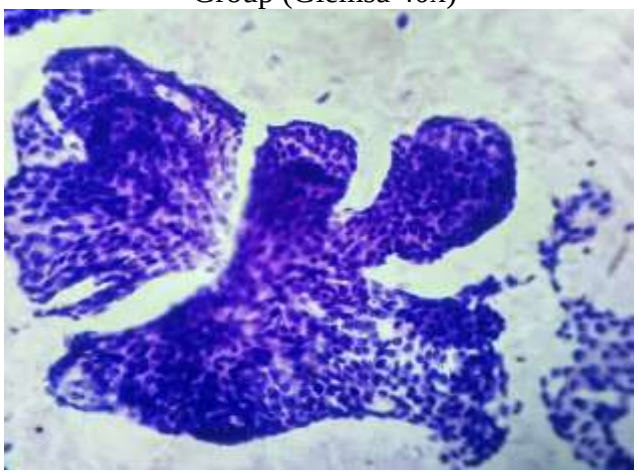

Fig 3- Malignancy (Papillary Thyroid Carcinoma) – Smear Shows High Cellularity With Papillae Formation (Giemsa 40x)

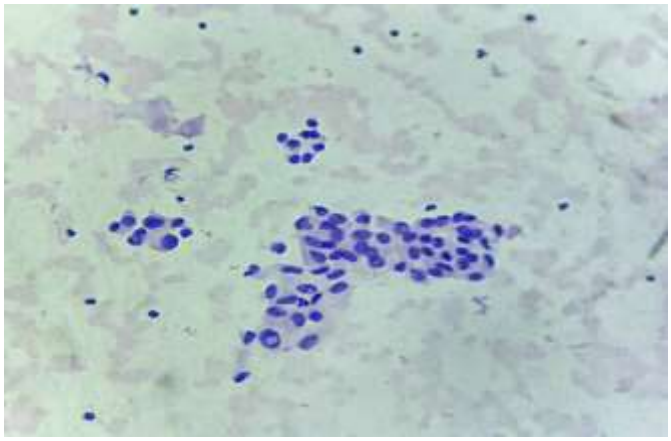

Fig4-Malignancy (Papillary Thyroid Carcinoma) – Smear Showing Intranuclear Cytoplasmic Inclusion, Inclusion Have Sharp Border And Cytoplasmic Staining(Giemsa 40x)

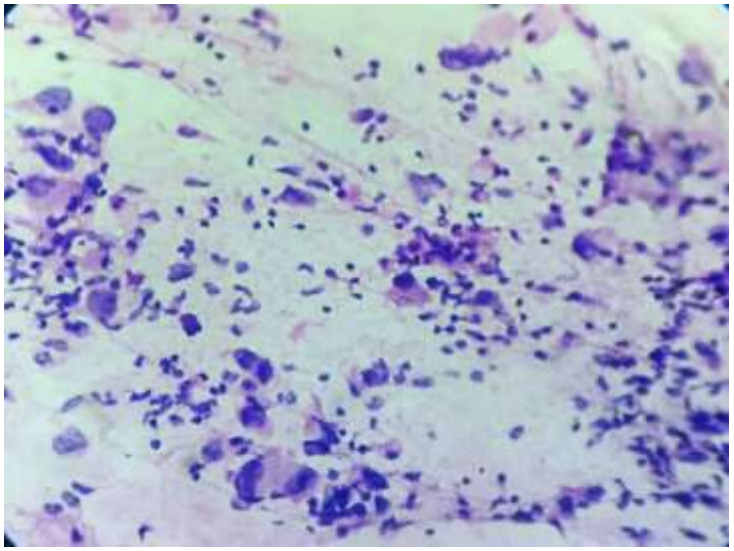

Fig 5-Malignancy (Anaplastic Carcinoma) – Smear Shows Large Malignant Cell With Marked Pleomorphism In A Background Of Abundant Inflammatory Cells Predominantly Neutrophil (Giemsa 40x)

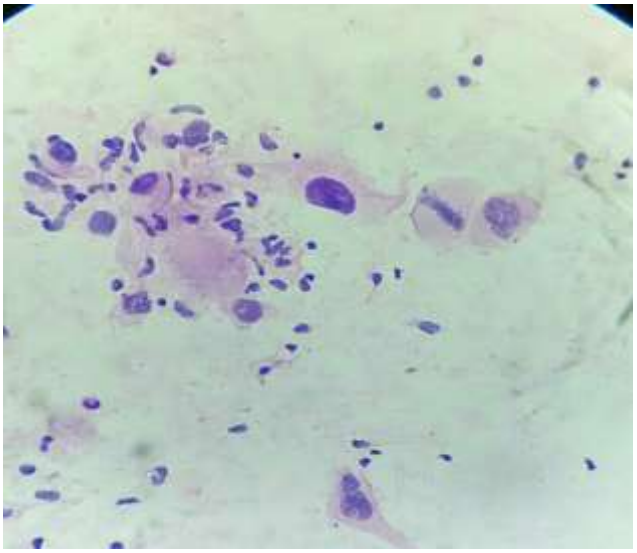

Fig6-Malignancy (Anaplastic Carcinoma) – Smear Shows Abnormal Mitotic Figure (Giemsa 40x)

Discussion

The present study was carried out on 50 patients who presented with clinically enlarged thyroid in the Cytology section of the Department of Pathology S.P. Medical College, Bikaner to perform a uniform reporting system for thyroid cytopathology based on Bethesda system and to compare our experience with that of the experts from other regions of the world.

Table 5 : Comparative incidence of the diagnostic categories in the various studies

Diagnostic Category	Yassa et al, 2007[6]	Yang et al, 2007 [7]	Nayar and Ivanovic, 2009[8]	Constantine et al, 2009[9]	Jo VY et al , 2010 [10]	Mondal et al, 2013 [11]	Present study, 2017
Nondiagnostic	7	10.4	5	11.1	18.6	1.2	6
Benign	66	64.6	64	73.8	59.0	87.5	74
AFLUS	4	3.2	18	3	3.4	1	2
FN/SFN	9	11.6	6	5.5	9.7	4.2	10
SM	9	2.6	2	1.3	2.3	1.4	2
Malignant	5	7.6	5	5.2	7	4.7	6

Three smears out of 50 on cytological examination (6 percent) were categorized as Nondiagnostic or Unsatisfactory (Category I). Similar findings were also observed by Nayar and Ivanovic (2009)[8], while the observations differed from the study of Yang et al (2007)[7], and Constantine et al (2009)[9] and Jo et al (2010)[10]. However, unsatisfactory rates as high as 30 percent have been reported by Amrikachi et al (2001)[12]. Several factors influence nondiagnostic rates for FNAC results, including operator skill, the nature of the thyroid nodules as nodule vascularity, criteria used to judge adequacy of the specimen, and the cystic component of the nodule (Gharib, 1997)[13]. Inadequate sampling at times may be because of sclerotic or calcified lesions and more commonly when there are large areas of cystic degeneration or necrosis.

Amongst the nondiagnostic category in the present study only one case out of three cases showed cyst fluid with histiocytes and in two cases only blood was aspirated.

It was surprising that aspirates classified as benign accounted for the majority of the thyroid FNAs in the present study (74 percent). The finding was consistent with study of Constantine et al (2009)[9] but contrary to Yang et al (2007)[7] and Yassa et al (2007)[6], Nayar and Ivanovic (2009)[8] and Jo et al (2010)[10], who observed a lower incidence of benignancy.

The Benign category comprised of a heterogeneous group of lesions such as benign follicular nodules, lymphocytic thyroiditis and subacute thyroiditis. Our study revealed 86.48 percent of benign follicular nodules, 13.52 percent of lymphocytic thyroiditis.

In the present study Atypia of undetermined significance or Follicular lesion of undetermined significance (AUS/FLUS) was diagnosed in 2 percent cases. The findings similar to the observations carried out by Constantine et al (2009)[9] and Mondal et al (2013)[11]. However, observations of several other studies conducted by Yang et al (2007)[7], Yassa et al (2007)[6], Nayar and Ivanovic (2009)[8] and Jo et al (2010)[10] were differed.

In our study 10 percent cases were diagnosed as Follicular Neoplasm/Suspicious for follicular neoplasm (FN/SFN), findings consistent with the study conducted by Jo et al (2010)[10], but dissimilar to findings of Yang et al (2007)[6], Yassa et al (2007)[6], Nayar and Ivanovic, (2009)[8] and Constantine et al (2009)[9] who observed the incidence around 11.6, 9, 6 and 5.5 percent respectively.

The present study revealed suspicion of malignancy in two percent of the cases, which was similar to the observations made by Nayar and Ivanovic (2009)[8], Constantine et al (2009)[9], Jo et al (2010)[10] and Mondal et al (2013) [11]but inconsistent with the studies conducted by Yang et al (2007)[7] and Yassa et al (2007)[6] which revealed 2.6 and 9 percent cases respectively.

6 percent cases were reported malignant in our study which is similar from the earlier studies conducted by Yang et al (2007)[7], Yassa et al (2007)[6], Constantine et al (2009)[9], Nayar and Ivanovic (2009)[8] and Jo et al (2010) [10]whereas dissimilar with Mondal et al (2013[11]).

Conclusions

This study is a prospective analysis of reporting of thyroid aspiration smears by TBSRTC using the Bethesda monograph. It was found that the monograph is succinctly written in an easy-to-read format and has useful color images which help in making the diagnosis. The clinicians are also benefitted because of the management plan it suggests.

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