



## Study of Fine Needle Aspiration Cytology of Thyroid Lesion

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### Abstract

*Fine needle aspiration cytology (FNAC) has emerged as one of the well established first line diagnostic technique in the evaluation of various thyroid lesions as well as solitary thyroid nodule. But in the cytological diagnosis of borderline lesions, various diagnostic criteria have led to confusion and differences in reporting between cytopathologists and clinicians. To overcome this situation, the Bethesda System of Reporting Thyroid Cytopathology (TBSRTC) 2007 recommended by the National Cancer Institute put down six general diagnostic categories. Thyroid nodules are commonly encountered in clinical practice and more common in women, and the incidence increases with age, history of radiation and diet containing goitrogenic material.*

*The present study was conducted in the Department of Pathology, to evaluate the results of fine needle aspiration cytology (FNAC) in the diagnosis and management of thyroid lesions.*

**Keywords:** *Fine Needle Aspiration Cytology, Thyroid, Histopathological correlation, sensitivity, specificity.*

### Introduction

The unique gland among the endocrine organs is the thyroid gland. It is the first to develop in fetal life and the largest endocrine gland in the body.<sup>1</sup> One of the commonest lesions encountered in clinical practice nowadays are thyroid lesions. It is more common in women, and various studies have shown that the risk of malignancy in palpable thyroid nodules is 4-7%.<sup>2,3</sup> Thyroid nodules are seen more commonly in countries where dietary intake of iodine is low and is the most common endocrine disorder.<sup>3,4</sup> Fine needle

aspiration cytology of thyroid gland is now a well established and most common first line diagnostic test for evaluation of nodular and diffuse thyroid lesions with the main purpose of confirming benign lesions and thereby, reducing unnecessary surgery.<sup>3,4,5</sup> Fine needle aspiration cytology gives direct morphological information for preoperative evaluation of thyroid nodules.

Hence FNAC has become the dominant method in evaluation of thyroid nodules as it is safe, reliable, fast, minimally invasive and cost effective procedure with high specificity and sensitivity.<sup>6,7</sup>

### Aims & Objectives

1. To analyze and classify the cytomorphological features of thyroid lesions based on TBSRTC (The Bethesda system for Reporting Thyroid Cytopathology).
2. To correlate the thyroid cytology findings with its histopathological findings.

### Material & Methods

It is a cross sectional study done for 100 cases.

The Inclusion criteria includes all palpable thyroid lesions and USG guided palpable thyroid lesions .Exclusion criteria was limited to patients less than 18 years of age or swelling arising from the skin and surrounding structure of the thyroid gland and in hemorrhagic aspiration.

The present study of 100 cases with palpable thyroid lesions who were undergoing FNAC in the Department of Pathology,for a period of one and a half year after getting the ethical clearance from Institute Ethical Committe

Before the procedure, the patient was informed about the procedure with its advantages and simplicity; and consent was taken. After the clinical examination FNAC was done and the slides were immediately wet fixed in 95% alcohol for Papanicolau's stain. Air dried smears were prepared and stained with May-Grunwald-Giemsa

### Ethical consideration

The ethical approval for the study was obtained from the Institute Ethics committee.

Informed consent was taken from all the patients included for the study.

### Data entry and Analysis

The data was entered in Microsoft Excel and analyzed using Epi Data analysis V2.2.2.186 and Stata 12 software. The continuous variables like age, duration of illness and size of the lesion were expressed as Mean (standard deviation) or median (Inter quartile range) based on distribution of data. The categorical variables like age category,

gender, residential area, complaints, family history, number of lesions, presence of lymph nodes, appearance of FNAC fluid, cellularity of FNAC fluid, findings of FNAC, USG and cytopathological examination results were expressed in percentages. The association between age, duration of complaints, duration of illness, size of the lesion and histopathologic examination results were identified using Kruskal Wallis test. The association between sex, residential area, complaints (neck swelling, dysphagia,change in weight, change in voice, family history, number of lesions, presence of lymph nodes, findings of FNAC, cells in FNAC fluid (follicular, colloidal, Hurthle, lymphocytes, inflammatory cells, appearance of FNAC fluid, cellularity of FNAC fluid and histopathologic examination results was identified using Fishers exact test. The P value of less than 0.05 was considered for statistical significance. The histopathological diagnosis and USG findings were compared with the cytopathological diagnosis was to identify the sensitivity of the tests.

**Table 1** Gender distribution of study participants:

Gender	Number of participants	Frequency
Male	9	9
Female	91	91
Total	100	100

**Table 2:** Number of lesions among study participants:

Number of lesions	Number of participants	Frequency
Solitary	61	61
Diffuse	39	39
Total	100	100

**Table 3:** Appearance of FNA aspirate from the lesion of among study participants:

Appearance of FNA	Number of participants	Frequency
Colloid fluids	40	40
Hemorrhagic fluid	49	49
Mixed fluid	11	11
Total	100	100

**Table 4.** Cellularity of FNA from the lesion of among study participants:

Cellularity of FNA	Number of participants	Frequency
Scanty	16	16
Moderate	32	32
High	40	40
Blood	5	5
Not Cellular	7	7
Total	100	100

**Table 5:** Findings based on cytopathologic examination of lesion among study participants:

Findings based on cytopathological examination of the thyroid	Number of participants	Frequency
Malignant	1	1
Non Diagnostic	12	12
Benign	87	87
Adenomatoid goitre	5	4
Colloid goitre	50	50
Hashimoto thyroiditis	33	33
Total	100	100

**Table 6** Association between presence of Inflammatory cells in FNAC among the patients and Cytopathological diagnosis:

Cytopathologic al diagnosis	Inflammatory cells in FNAC – Absent		Inflammatory cells in FNAC – Present	
	Numbe r	Frequenc y	Numbe r	Frequenc y
Adenomatoid goitre	3	75	1	25
Colloid goitre	37	74	13	26
Hashimoto thyroiditis	2	6	30	94
Malignancy	1	100	0	0.0
non diagnostic	12	100	0	0.0

**Results**

A total of 100 cases of thyroid lesions in which FNAC was done. Out of which 48 cases were not followed by surgery. The age of the subjects ranged from 18 to 55 years. 91 cases were females and 9 were males- The male: female ratio is 9.1:1.

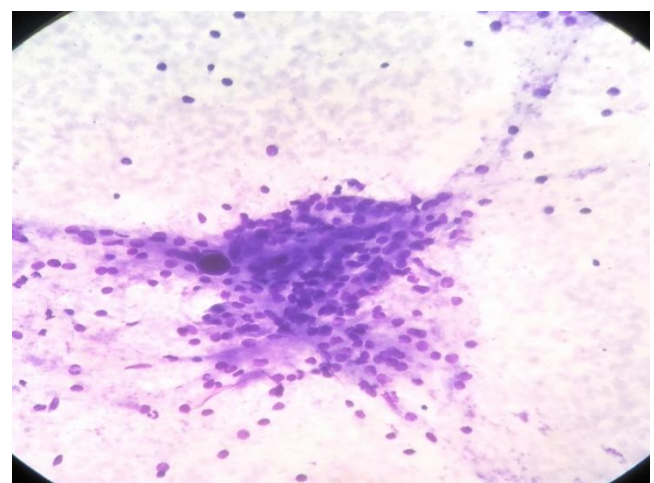
**Table** FNA diagnosis and category

FNA Diagnosis	Bethesda category	Number
Malignancy	Cat VI	1
Colloid goitre	Cat II	50
Hashimoto’s thyroiditis	Cat II	33
Adenomatoid goitre	Cat II	4
Non-diagnostic/Unsatisfactory	Cat I	12

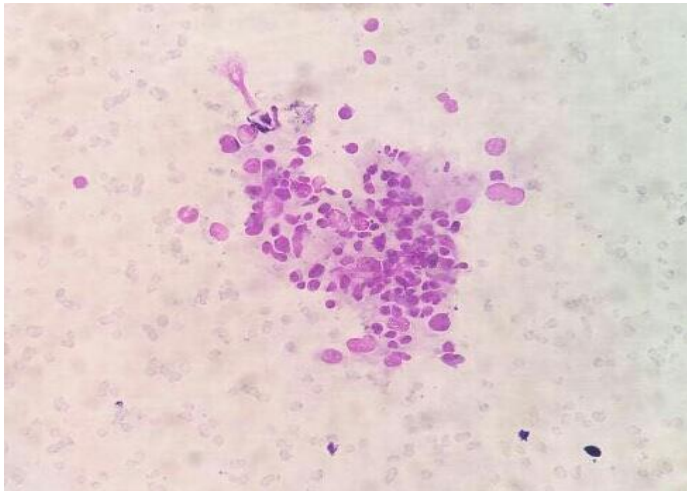
Among the 100 thyroid lesions diagnosed by FNAC, 50 were colloid goitre, 33 were Hashimoto thyroiditis, 4 were Adenomatoid goitre and 12 were reported as non- diagnostic aspirate and 1 case was reported as malignant.

**Correlation with Final Histopathological Diagnosis**

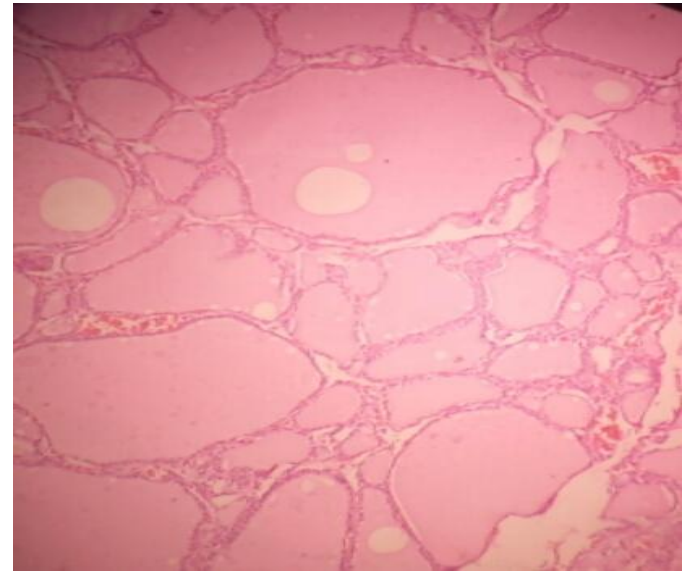
Out of the 50 cases of colloid goitre, 21 were confirmed by histopathology. From the 33 cases of Hashimoto’s thyroiditis, 20 were confirmed by histopathology. Among the diagnosed 4 cases of Adenomatoid goitre, 2 were confirmed histopathologically. The 1 case, which was diagnosed as malignancy during FNAC, was found to be malignant lesion in the final histopathology also. There were 12 cases in the category of nondiagnostic/unsatisfactory aspiration which showed colloid nodule in 9 cases on histopathological examination.



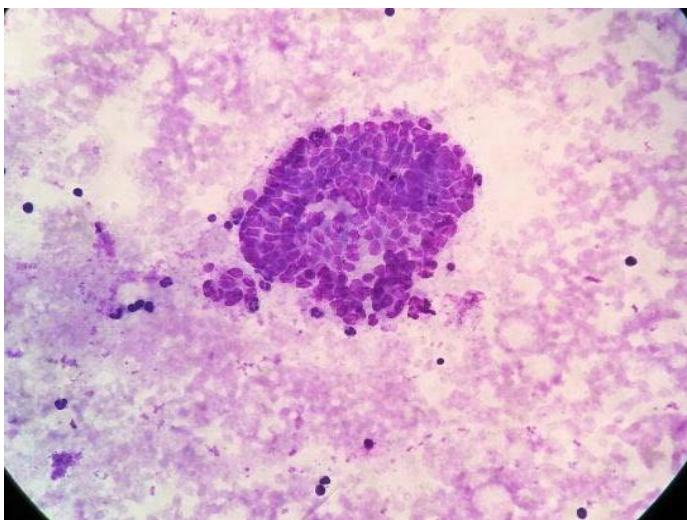
**Figure 1.** Cytological picture of colloid goiter, PAP, 40x



**Figure 2.** Cytological Picture of Hashimoto thyroiditis, PAP, 40x



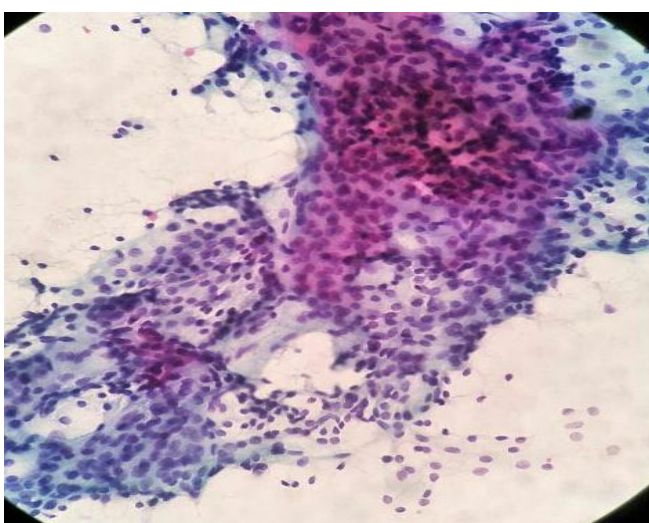
**Figure 5** Histopathological picture of Colloid goiter, H & E, 10x



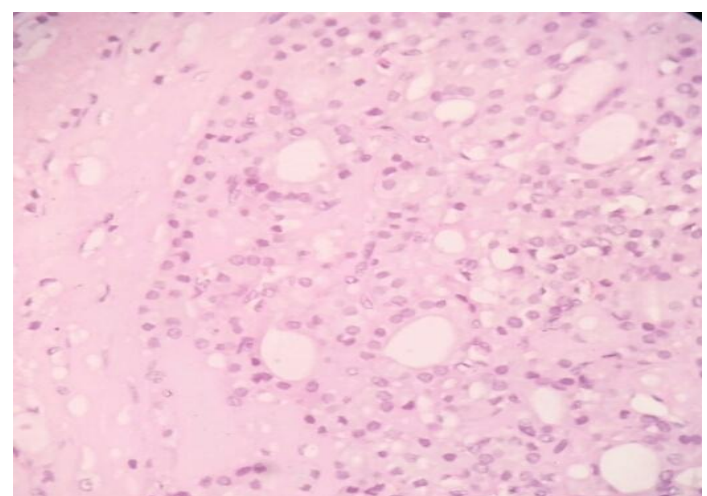
**Figure 3.** Cytological Picture of Adenomatoid goiter, PAP, 40x



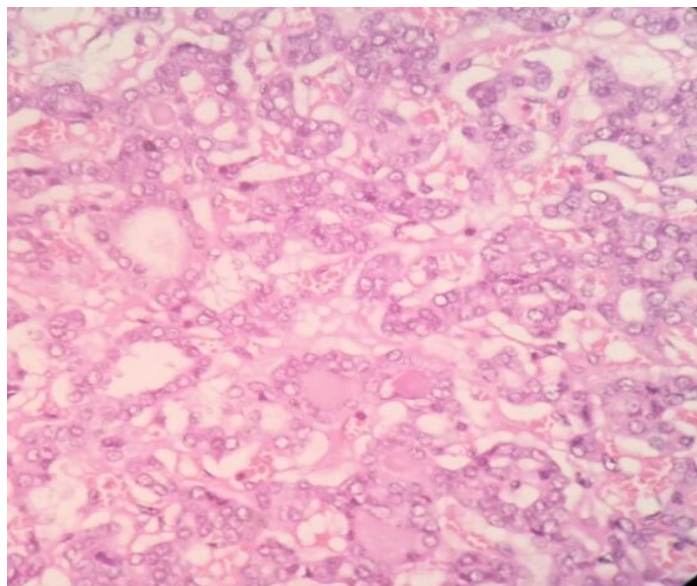
**Figure 6.** Histopathology picture of Colloid goiter, H & E, 40x



**Figure 4.** Cytological Picture of Anaplastic carcinoma, PAP, 10x



**Figure 7.** Histopathological picture of Follicular adenoma, H & E, 40x



**Figure 8** Histopathological picture of papillary carcinoma of thyroid –follicular variant, H & E, 40x

### Discussion

As per the review of literature the rate of ND/UNS ranges between 16 to upto 20%. In the present study, the 12 cases was non-diagnostic, among them 9 cases were diagnosed histopathologically as a colloid nodule. Palpable thyroid nodules are present in approximately 4–7% of adults and are more common in females with a F:M ratio of 4.2:1<sup>2,8</sup>

Nayar and Ivanovic analyzed 1150 thyroid FNA samples with calculated malignant risk as follows: Nondiagnostic, 9%; benign, 2%; indeterminate, 6%; follicular neoplasm, 14%; suspicious for malignancy, 53%; and malignant, 97%. They concluded that a 6-tier reporting system for thyroid FNAC was effective for determining which patients needed surgery versus follow up FNA and also guided clinician on the extent of surgery.<sup>13</sup>

Yang et al analyzed 4703 samples and were classified as unsatisfactory, 10.4%; benign, 64.6%; AUS, 3.2%; Follicular neoplasm, 11.6%; suspicious, 2.6%; malignant, 7.6%. They concluded that 6 diagnostic categories were beneficial for triaging patients for either clinical follow-up or surgical management.<sup>14</sup>

Any form of thyroid enlargement usually leads to a battery of investigations, mainly to rule out the possibility of a neoplasm. The routinely done investigations for an enlarged thyroid are ultrasound (US) examination, thyroid function tests, thyroid scan, and antibody levels and subsequently FNAC was done to segregate the patients requiring surgery and those who can be managed conservatively. As in the available literatures, the benign lesions represented the majority of cases.<sup>11</sup> No single diagnostic method helps in providing a definitive diagnosis of cancer thyroid. However, FNAC is still the procedure of choice, particularly if ultrasound is used as an ancillary technique for better sample collection. This holds true in cystic lesions. The interpretation errors can be reduced by obtaining aspirates from different portions of the lesion, using ultrasound-guided FNA procedure, advanced imaging techniques, immunologic analysis, electron microscopy and reviewing of slides by more than one cytopathologist. Both the cytopathologists should not be aware of each other's diagnosis thus making it a blinded method of quality control.<sup>12</sup>

In present study benign lesions constituted 82 cases. In the present study the sensitivity for cytological diagnosis of neoplasia was 96.7%, specificity 100% and diagnostic accuracy of 97.0%, thus showing a good positive correlation with histopathology.<sup>6,7</sup> Our results were comparable with the previous published data where FNAC of thyroid is reported to have sensitivity ranging from 40% to 100%, and a specificity of 45% to 100%.<sup>9</sup> Various Factors contribute to this wide range of sensitivity and specificity which includes adequacy of samples, technique of sample collection, the experience of the pathologist interpreting the smears, presence of overlapping cytological findings between some benign and malignant thyroid lesions and, duration of follow-up of the patient. FNAC has an overall accuracy rate of around 90-100% in the detection of thyroid malignancy.<sup>7</sup> The present study showed a rate of 100%. FPR are less

common and were not found in any patient in our study. This finding is consistent with the other reports that cited variable rates ranging from 0–9%. FPR are usually seen in cases of colloid nodule and nodular hyperplasia with numerous macropapillary structures, hashimoto thyroiditis, follicular or parathyroid or adenomas with atypia.

### Conclusion

Fine needle aspiration cytology is cost effective, simple procedure that has great patient acceptance and as an initial screening test provides the diagnosis with high degree of accuracy thereby limiting the number of surgeries in benign conditions of thyroid gland.

A negative diagnosis should be followed up with repeat ultrasound and FNA should be repeated in suspicious cases. Correlation of cytology and histopathology is an important quality assurance measure.

The TBSRTC proved to be very useful, and TBSRTC is now the most common classification worldwide for the reporting of thyroid FNA specimens.

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