

# Cyto-Histopathological Correlation of Thyroid Lesions in a Tertiary Care Centre

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## Abstract

A discernible lump in front of the neck is the most common presenting complaint of the patients with thyroid disease. A simple, safer, economical and rapid diagnostic tool that would facilitate early detection and management of thyroid lesions particularly the malignant ones has greatly acclaimed the application of cytological techniques. This is cross-sectional study conducted in a tertiary hospital, Wayanad, Kerala for over a period of one year. In this study out of 400 cases, 361 (90.25 %) cases were females and 39 (9.75%) cases were males setting up the male female ratio of 1:10.8. Age of the patients ranged from 16 to 78 years. Out of 400 cases, 335 cases (84.38%) were non-neoplastic and 62 cases (15.62%) were neoplastic lesions.

## Introduction:

Diseases affecting the thyroid gland are frequently encountered in clinical practice, though majority of these diseases are non-neoplastic, the neoplastic lesions contribute significant proportion. The main idea behind screening of thyroid lesion is finding the neoplastic lesions and differentiating the benign ones from malignant. A long standing goal of researchers has been to develop a diagnostic tool that would facilitate early detection and management of thyroid lesions especially the malignancies. [1]

A discernible lump in front of the neck is the most common presenting complaint of the patients. The swollen gland can compress the adjacent structures and lead to cause magnitude of symptoms related to hormonal imbalance, additionally it also carries potential risk of malignancy. The diseases of thyroid are prevalent more among females and there are no age predilections [2]. Among all the thyroid lesions only 5% are malignant which require definite surgical intervention [3].

In the current scenario, various diagnostic modalities including Ultrasonogram (USG), Radionucleotide scan, Fine Needle Aspiration Cytology (FNAC) and thyroid function tests are in vogue for the early diagnosis and detection of thyroid lesions. A simple, safer, economical and rapid diagnostic tool that would facilitate early detection and management of thyroid lesions particularly the malignant ones has greatly acclaimed the application of cytological techniques. Currently FNAC technique has been established, identified and acknowledged as vital diagnostic

procedures in the initial evaluation of thyroid lesions. The implementation of the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) has literally revolutionized thyroid FNAC. It became the first line diagnostic tool by introducing a standardized category based reporting and thereby reducing the toll of thyroid surgeries [4,5].

Application of FNAC in the preoperative evaluation of thyroid lesion has been widely accepted as one of its most successful implementations. Since FNAC procedure is cost effective, time saving, minimally invasive and carries high diagnostic accuracy rates, it is considered as a vital diagnostic tool in the evaluation of thyroid lesions.[6]

Acknowledging the significance of FNAC in pre-operative diagnosis of thyroid lesion, the current study was undertaken to classify thyroid swellings according to TBSRTC and to evaluate the diagnostic efficacy of FNAC by correlating with gold-standard histopathological diagnosis of surgically removed nodules

### **Materials and Methods:**

The study was a cross-sectional study conducted in a tertiary hospital, Wayanad, Kerala for over a period of one year from August 2016 to July 2017. Patients presented with palpable thyroid swellings were referred to the department of pathology for performing FNAC. Institutional ethical committee approval was obtained and a total of 400 patients with palpable thyroid swelling were evaluated. Patients who underwent FNAC followed by histopathology were included in the study. Short clinical history was elicited from all patients and other findings including USG, biochemical parameters were recorded from hospital registry.

A total of 400 cases was included. FNAC was performed in all cases and a cytological diagnosis was established followed by histopathological examination. FNAC procedure was carried out using a 23-24 gauge needle; the aspirate was smeared on clean dried glass slides and immediately fixed with alcohol, few slides were air dried. Staining was performed using routine Haematoxylin & Eosin (H&E) and Papanicolaou (Pap) stains. Air dried smears were stained using May-Grünwald Giemsa (MGG) *Stain*. Cytological diagnosis was done based on TBSRTC.

Excision biopsies of thyroid were fixed in 10% formalin and paraffin blocks were prepared after routine histopathology processing techniques. From each block about 3-4  $\mu$ m sections were cut and stained with H&E. The slides were examined under microscope and the findings were recorded.

## Statistical analysis

Statistical analysis was performed by using IBM Statistical Package for the Social Sciences (SPSS) Software version 21. Statistical methods including Pearson Chi-square test and Fischer Exact test were performed to assess the relationship between different variables. P value < 0.05 was based on 95% confidence interval.

## RESULTS

In this study out of 400 cases, 361 (90.25 %) cases were females and 39 (9.75%) cases were males setting up the male female ratio of 1:10.8. Age of the patients ranged from 16 to 78 years with a mean age of 44.28 (SD±12.59).

About 45.75% (183 Cases) of thyroid lesion were presented in the age group of 41 to 60years and 41.25% (165 Cases) were found between age group of 21-40 years. Incidence was low in second (1.75%, 7 cases) and seventh (11.25%, 45 cases) decades of life. Cytological examination unveiled positive malignant rates of 15.38% among males and 10.52% among females. The mean age of malignancy among males was 42.33 (SD±11.29) and 44.76 (SD±14.71) for females.

Preoperative cytological diagnosis was compared with postoperative histopathological findings. The cytology results were categorized as per recent TBSRT into Benign (category II), Follicular neoplasm (FN)/suspicious of follicular neoplasm (SFN) (category IV), Suspicious of malignancy (SM) (Category V) and malignant category (category VI). In this study 335 cases (84.38%) of non-neoplastic lesions including 326 cases of colloid goitre, eight cases of thyroiditis and a single case of thyroglossal cyst were classified under category II. Among the 62 cases (15.62%) of neoplastic lesions, 27 cases were diagnosed as follicular neoplasm (Categories IV) and 35 cases were diagnosed as carcinomas by FNAC (Categories V & VI). Aspirates labelled as non - diagnostic/unsatisfactory (category I) and Atypia of undetermined significance or follicular lesions of undetermined significance (Category III) were not included in the calculation.

Of the 326 cases of colloid goitre, 321cases (98.37%) showed positive correlation with histopathology, two cases were diagnosed as thyroiditis, two cases turned out to be follicular adenoma and one case was proved to be papillary thyroid carcinoma. The accuracy rate of FNAC in diagnosing colloid goitre was found to be 98.24%. [Tab/Fig 1]

Histopathological examination of all the 27 cases of FN/SFN showed follicular adenoma in 16 cases, follicular carcinoma in five cases, follicular variant of papillary carcinoma in four cases and adenomatoid goitre in two cases. Among the nine cases diagnosed as suspicious of malignancy

(SM) by FNAC, histopathological examination confirmed papillary thyroid carcinoma in six cases, follicular carcinoma in two cases, and follicular adenoma in one case.

All the 26 cases diagnosed as malignant lesions by FNAC were found to be malignant on histopathology. The sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and accuracy of FNAC in diagnosing neoplastic lesions were shown in [Tab/fig 2]. Pearson chisquare test and fischer exact test showed high level of significance ( $p < .001$ ) between the two methods in diagnosing neoplastic lesions.

Cytological diagnosis was unsatisfactory/non diagnostic in three cases which were found to be colloid goitre (one case) and thyroiditis (two cases) on histopathology.

## Discussion

Neoplasm of the thyroid produces an evident lump in front of the neck. A dominant nodule in the thyroid is more likely to be neoplastic rather than diffuse and symmetrical enlargement. Thyroid nodules are seen in 7 -10% of adults and are more prevalent among females. Majority of these lesions are benign and only  $< 5\%$  is malignant. Prompt and accurate diagnosis of these lesions will help the surgeon to decide the appropriate management. [7,8,9]

FNAC plays a vital role in the initial evaluation of thyroid swelling. It carries good sensitivity and specificity with high diagnostic accuracy. The prime factor which influences the diagnostic accuracy of FNAC is the sample adequacy, which depends mainly on sampling technique and skill. A sample is considered as inadequate if the smears are obscured by haemorrhage or presence of very few follicle cells. In this study smears from 3 cases (0.75%) were found inadequate/non diagnostic which is highly compatible with the other international studies which showed that the rate of non-diagnostic test can go up to 10% [10,11,12,13].

In the present study eight cases of thyroiditis diagnosed by FNAC out of which one case turned out to be colloid goitre with secondary lymphoid aggregates on histopathology, this was considered as false positive thyroiditis by FNAC. Colloid goitre with significant lymphoid collections might mislead to the diagnosis of thyroiditis on cytology. Hence forth if significant numbers of lymphocytes were seen on smears, USG and biochemical correlations were suggested, if necessary repeated aspiration should be carried out to lower the incidence of false positive cases.

Diagnosis of follicular adenoma, follicular carcinoma and follicular variant of papillary carcinoma by aspiration cytology technique is always a challenge [14]. Though there is uncertainty in the diagnosis of follicular lesions the accuracy rate depends on the competency of pathologist. In our study 6 cases (22.22%) diagnosed as FN/SFN by FNAC were turned out to be malignant lesions

on histopathology. The finding is accordant with the studies done by Baloch ZW et al and Faquin WC et al, which emphasized that about 30% of follicular neoplasm proved to be malignant on histopathology [15,16].

False positivity and false negativity is a major setback of FNAC. In our study we found that there was only one case (2.86%) of false positive malignancy on FNAC. The sensitivity, specificity, PPV, NPV and accuracy of FNAC in diagnosing malignancy was found to be 79%, 94.74%, 97.14%, 66.67%, and 83.87%. Studies done by Kini et al [17] and pinky pandey et al [18] have documented the sensitivity range from 52-98% and specificity range from 72-100%. Haberal AN et al had shown that rate of PPV and NPV can range 50-90% and 63-95% respectively [19]. The present study showed good congruence with the above studies.

False negative rate reveals the proportion of neoplastic lesions which were not diagnosed by FNAC. Several studies demonstrated the false negative rates ranging from less than one percentage to ten percentages [19, 20]. False negativity rate detected in our study was found to be about 0.75% (3 Cases). Two cases of follicular adenomas were diagnosed as adenomatoid goitre and one case of papillary thyroid carcinoma was diagnosed as colloid goitre with cystic changes by FNAC. However in case of cystic nodule adequate sampling should be done to lower the rates of false negativity. In our study it was found that there was significant increased toll of malignancy among male cases, many other published studies also showed similar findings [21,22,23].

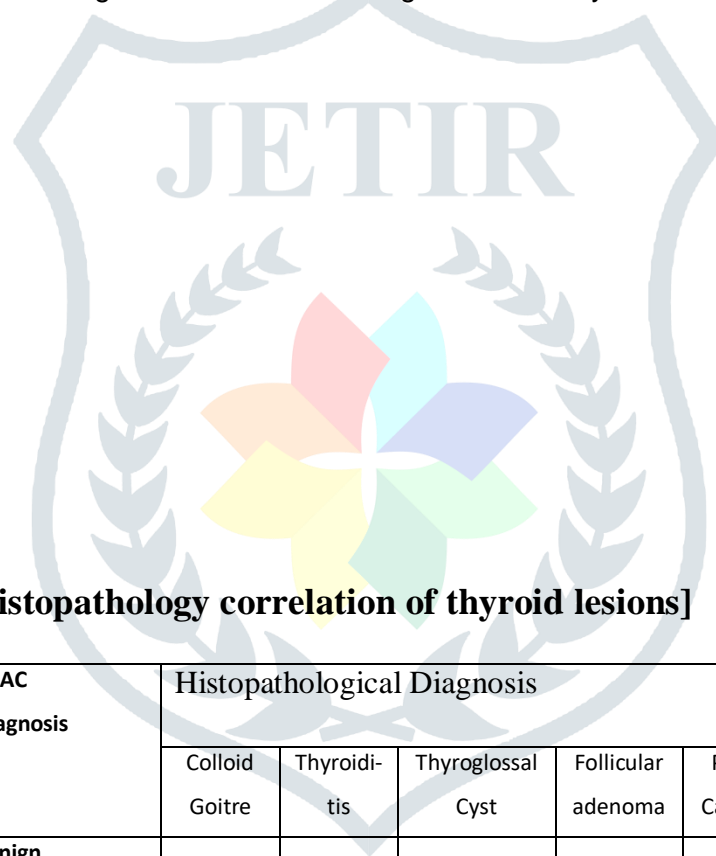
## Conclusion

FNAC is an excellent diagnostic tool in the management of thyroid lesions since it provides rapid diagnosis with high accuracy rate. It showed high sensitivity and specificity in diagnosing malignant thyroid lesions. False positive diagnosis rate can be minimized by correlation with usg findings and by taking repeated representative samples.

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## Tables

**Table 1: [FNAC & Histopathology correlation of thyroid lesions]**

FNAC Diagnosis	Histopathological Diagnosis						
	Colloid Goitre	Thyroiditis	Thyroglossal Cyst	Follicular adenoma	Papillary Carcinoma	Follicular Carcinoma	TOTAL
<b>Benign</b>							
Colloid Goitre	321	2	0	2	1	0	326
Thyroiditis	1	7	0	0	0	0	8
Thyroglossal Cyst	0	0	1	0	0	0	1
Non Diagnostic	1	2	0	0	0	0	3
FN/SFN	2	0	0	16	4	5	27
SM	0	0	0	1	6	2	9
<b>Malignant</b>							
Papillary CA	0	0	0	0	26	0	26
	325	11	1	19	37	7	<b>400</b>

\*FN/SFN: Follicular neoplasm/suspicious of follicular neoplasm, \*SM: Suspicious of malignancy, \*CA: Carcinoma

**Table 2: [Statistical indices of FNAC in diagnosing Neoplastic thyroid lesions]**

Statistical indices of FNAC	Neoplastic Thyroid Lesions
Sensitivity	95.24%
Specificity	99.4 %
PPV	96.77%
NPV	99.1%
Accuracy	98.74%

\*PPV: Positive Predictive Value, NPV: Negative Predictive value

