

## A Hospital Based Retrospective Assessment of the Role of FNAC in Diagnosis of Thyroid Lesions

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### Abstract

**Aim:** The aim of this study was to determine the role of FNAC in detection of thyroid swelling and to correlate the finding with tissue biopsy.

**Methods:** This was a retrospective study carried out at Department of pathology, Jawahar Lal Nehru Medical College, Bhagalpur, Bihar, India over a period of one year. 100 patients of all age group and both sexes who underwent FNAC for thyroid swelling were evaluated. Out of 100 patients, histopathological diagnosis was available in 20 patients.

**Results:** FNAC was performed on thyroid swelling of 100 patients, which included 80 (80%) females and 20 (20%) males with M:F ratio of 1:4. The FNAC results revealed 86 cases (86 %) as non-neoplastic and 14 cases (14%) as neoplastic. Out of 100 patients, histopathological diagnosis was available in 20 patients. The sensitivity, specificity, false positive rate, false negative rate and diagnostic accuracy of FNAC for detection of malignant lesions was calculated. Significant agreement was observed between FNAC and histopathology results as indicated by kappa (0.69) and p value (0.001).

**Conclusion:** FNAC is rapid, simple, safe and cost-effective diagnostic modality in the investigation of thyroid disease with high sensitivity, specificity and accuracy. It can be used as initial investigation for the diagnosis of thyroid disease. FNAC diagnosis of malignancy is significant and such patients should be subjected to surgery whereas unnecessary surgery can be avoided in benign lesions.

**Keywords:** Fine needle aspiration; Thyroid; Neoplasm; Histopathology

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### Introduction

Frequency of thyroid disease is common in Pakistan and solitary thyroid nodule presents a significant diagnostic dilemma for the treating surgeon. [1] Thyroid nodule occurs in 4-7% of the population. [2] Malignant tumors of thyroid gland represent less than 0.5% of all cancers. [3] Although solitary thyroid nodules are common in females, they are more likely to be malignant in males. [4] Different

imaging techniques are now used for pre-operative diagnosis of solitary thyroid nodule like radio nucleotide scanning, high resolution ultrasonography etc. but fine needle aspiration cytology is regarded as the single and most cost-effective procedure. [5] Fine needle aspiration cytology of malignant thyroid nodules reported to have sensitivity and specificity

ranges from 65-98% and 72-100% respectively. [6]

Fine-needle aspiration cytology (FNAC) is a well-established technique for preoperative investigation of thyroid nodule. [3] It is considered the gold standard diagnostic test in the evaluation of thyroid nodule. [7] FNAC can provide an equivocal benign diagnosis in 60% of patients with benign nodules, and its potential to reduce the number of necessary surgeries is significant. [8] The prevalence range of thyroid nodule is 4–10% in the adult and 0.2–1.2% in children. The most clinically diagnosed thyroid nodules are neoplastic, only 5–30% are malignant and require surgical intervention. [9] The main goal of evaluating nodules by FNAC is to identify nodules with malignant potential and getting prompt management of them considering the limitation of open biopsy and advantages of FNAC. [10] With the increase in the use of imaging over the past decades, the number of incidentally discovered nodules is rising, and this image is used for guidance of FNAC. [11] FNAC is widely recognized as the gold standard initial diagnosis tool in the differential diagnosis of thyroid nodules. [12]

Thyroid nodules may cause hypothyroidism, hyperthyroidism, cosmetic issues, and problems in other organs such as compression, and they also have the potential for malignancy. [13] Therefore, the accurate evaluation of thyroid nodules is crucial. In recent years, the role of fine-needle aspiration cytology (FNAC) is increasing regarding the management methods as well as its role in detection of malignancy potentials of thyroid nodules. No single diagnostic methods used for the definitive diagnosis

of thyroid cancers, such as radiographs, US, scintigraphy and suppression therapy, is effective enough to make a benign/malignant differentiation alone. FNAC has been used since the 1950s, and is one of the effective methods in the diagnosis of thyroid nodules. [14]

The aim of this study was to determine the role of FNAC in detection of thyroid swelling and to correlate the finding with tissue biopsy.

### Materials and Methods

This was a retrospective study carried out at Department of pathology, Jawahar Lal Nehru Medical College, Bhagalpur, Bihar, India over a period of one year. 100 patients of all age group and both sexes who underwent FNAC for thyroid swelling were evaluated. Out of 100 patients, histopathological diagnosis was available in 20 patients.

The data was collected from computer database. The original fine needle aspiration slides stained with Wright and Papanicolaou (PAP) stains and histopathology slides stained with Hematoxylin and eosin (HE) were reviewed. Unsatisfactory slides were excluded from the study. FNAC and histology results were classified as nonneoplastic and neoplastic. Pre-operative FNAC results were compared with final histological diagnosis in 20 patients.

The sensitivity, specificity, accuracy, false positive rate (FPR) and false negative rate (FNR) of FNAC for detection of malignant lesions was calculated. Data analysis was carried out using the Statistical Package for Social Science (SPSS, version 17) for Windows.

### Results

**Table 1: FNAC findings of 100 patients**

FNAC diagnosis	N%
<b>Non neoplastic</b>	
Goiter	64 (64%)

Benign cyst	14 (14%)
DeQuervains (Subacute) thyroiditis	4 (4%)
Lymphocytic thyroiditis	3 (3%)
Hashimoto thyroiditis	1 (1%)
<b>Neoplastic</b>	
Papillary carcinoma	10 (10%)
Follicular neoplasm	3 (3%)
Anaplastic carcinoma	1 (1%)
Total	100

FNAC was performed on thyroid swelling of 100 patients, which included 80 (80%) females and 20 (20%) males with M:F ratio of 1:4. The FNAC results revealed 86 cases (86 %) as non-neoplastic and 14 cases (14%) as neoplastic.

**Table 2: Results of 20 patients of FNAC with histopathological correlation**

FNAC results	Histopathologic findings		Total
	Neoplastic	Non-neoplastic	
Neoplastic	6	2	8
Non- Neoplastic	2	10	12
Total	8	12	20

Out of 100 patients, histopathological diagnosis was available in 20 patients.

**Table 3: Statistical analysis for detection of malignant lesions**

Sensitivity	85.7%
Specificity	92.3 %
FPR	7.69%
FNR	14.28%
Accuracy	90 %

The sensitivity, specificity, false positive rate, false negative rate and diagnostic accuracy of FNAC for detection of malignant lesions were calculated. Significant agreement was observed between FNAC and histopathology results as indicated by kappa (0.69) and p value (0.001).

### Discussion

Fine needle aspiration cytology of thyroid gland is now a well-established, first line diagnostic test for the evaluation of diffuse thyroid lesion as well as of solitary thyroid nodule with main purpose of confirming benign lesion and by reducing unnecessary surgery. [15] Virtually any disease of thyroid can be presented as a nodule and it is not usually possible to distinguish between benign and malignant thyroid

nodule by any non-invasive procedure. [16] Use of FNAC for Thyroid enjoys unmatched popularity as it is predominantly related to the cosmetic complication and technical difficulties of thyroid surgery and relatively small number of true neoplasms in patients with thyroid nodules. [17] FNAC-based detection of solitary thyroid lesions remains challenging, in spite of tireless efforts to establish cytologic and clinical criteria for diagnosing follicular neoplasms and distinguishing between benign and malignant lesions. [18] Nonetheless, it is widely accepted that presently, FNAC is the best and most reliable diagnostic tool for use in the preoperative management of patients with such lesions.

Thyroid enlargement, whether diffuse or nodular, leads to a battery of

investigations, mainly to rule out the possibility of a neoplasm or thyroiditis. FNAC is the first line of investigation and other investigations like ultrasonography, thyroid function test, thyroid scan and antibody levels are done subsequently for appropriate management. [19] The sensitivity of thyroid FNAC ranges from 78-92 % and its specificity from 74-99%. [20-22] In our study the sensitivity was 85.7% and specificity 92.3%. This shows that FNAC is more specific than sensitive in detecting thyroid malignancy. The diagnostic accuracy for cytologic diagnosis was 90% which is comparable with other studies. [23-25]

False negative FNA cytology results occurred in 1 case (14.38%) of our patients. This case was diagnosed as adenomatous goiter in FNAC. On histopathological examination it was diagnosed as follicular carcinoma. The high cellularity of the lesion could have led to misdiagnosis in FNAC. This is consistent with reports in the literature that suggest a false negative rate of 3%-26%. In our study one case was diagnosed as follicular neoplasm which on histological examination was colloid goiter. The false positive rate in our study is 7.69% which agreed with other studies, in which the incidence of false positive FNA cytology results ranged from 7% to 16% . [11,26-28] This may be due to sampling error and cytological interpretation. [29]

### Conclusion

FNAC is rapid, simple, safe and cost-effective diagnostic modality in the investigation of thyroid disease with high sensitivity, specificity and accuracy. It can be used as initial investigation for the diagnosis of thyroid disease. FNAC diagnosis of malignancy is significant and such patients should be subjected to surgery whereas unnecessary surgery can be avoided in benign lesions.

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