

Original research article

Role of Fine Needle Aspiration Cytology in Diagnosis of Thyroid lesion: a retrospective study

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Abstract**Aim:** to evaluate the role of Fine Needle Aspiration Cytology in Diagnosis of Thyroid lesion.**Materials and Methods:** This retrospective study was carried out in the Department of Pathology, Jawaharlal Nehru Medical College and Hospital Bhagalpur, Bihar, India from July 2018 to July 2019. Total 200 patients' of solitary thyroid nodule fulfilling inclusion criteria were included in the study. Sensitivity, specificity, positive predictive value and negative predictive value were calculated for fine needle aspiration cytology taking histopathologic examination as gold standard. **Results:** There were 120 females and 80 males, with female: male ratio of 1.5: 1. The age of the patients was ranged from 14-71 years with mean age of 43.69±S.D 12.49 years. Most of the patients belong to 30-40 years. The main complaints of these patients were neck swelling (100%), vocal cord palsy 15(7.5%), breathing difficulty 11(5.5%) and Dysphagia 9(4.5). The size of the thyroid nodule ranged from 2 - 6.9 cm with mean 4.51 +/- S.D 1.89 cm. In this study FNAC of solitary thyroid nodule revealed that 104 cases (52%) were nodular goitre, 32 cases (16%) benign cyst among benign lesions while 33 cases (16.5%) were follicular carcinoma, 17 cases (8.5) papillary carcinoma and 3 cases were suspicious of neoplasm. **Conclusion:** FNAC has key role in diagnosis of solitary thyroid nodule because it is safe, minimally invasive and cost effective diagnostic tool.**Keywords:** Fine needle aspiration cytology, Histopathology, Solitary thyroid nodule

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Introduction

Fine-needle aspiration cytology (FNAC) is a well established technique for preoperative investigation of thyroid nodule.¹ It is considered the gold standard diagnostic test in the evaluation of thyroid nodule.² 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.³ 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.⁴

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.⁵ In the preoperative decision making of the thyroid swelling, FNAC is becoming a more vital tool when comparing the advantages of preoperative FNAC of thyroid swelling with the postoperative histopathology to reach a consensus protocol as a simple procedure for diagnosis and optimal management of thyroid diseases.⁵ 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.⁶

FNAC is widely recognized as the gold standard initial diagnosis tool in the differential diagnosis of thyroid nodules.⁷ Virtually any disease of thyroid can be presented as a nodule and it is not usually possible to

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distinguish between benign and malignant thyroid nodule by any noninvasive procedure.⁸ 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.⁹ The main goal of evaluating these nodules by FNAC is to identify nodules with malignant potential and get prompt management of them, considering the limitations of open biopsy and advantages of FNAC.

Materials and Methods

This retrospective study was carried out in the Department of Pathology, Jawaharlal Nehru Medical College and Hospital Bhagalpur, Bihar, India from July 2018 to July 2019. The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance.

Inclusion criteria

- Both male and female patients.
- All age groups.3. Solitary thyroid nodule.

Exclusion criteria:

- Non-thyroidal neck masses.
- Diffuse goiter.
- Multinodular goiter.

Methodology

The diagnostic criterion for solitary thyroid nodule was the triple assessment including clinical, radiological and tissue diagnoses. Mucosal lining of upper aerodigestive tract was examined and systemic examination was also carried out. Routine investigations were performed in all cases. Ultrasonography, radioiodine scan, thyroid function tests, computed tomography, MRI and endoscopy were done when indicated. Fine needle aspiration cytology was performed in all cases by the same cytopathologist. Thyroid surgery was performed and specimens were examined by the same histopathologist. Sensitivity, specificity, positive predictive value and negative predictive value were calculated for fine needle aspiration cytology taking histopathology examination as gold standard.

Statistical analysis

The recorded data was compiled entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations.

Results

Table 1 demographic profile of patients

Variables	N=200	Percentage
Gender		
Female	120	60
Male	80	40
Age		
Below 20	4	2
20-30	10	5
30-40	84	42
40-50	68	34
50-60	26	13
Above 60	8	4

Table 2: Clinical features of patients (n=200)

Symptom/ Sign	Number	Percentage
Neck Swelling	200	100%
Vocal Cord Palsy	15	7.5%
Difficult Breathing	11	5.5%
Dysphasia	9	4.5%
Hoarseness	4	2%
Weight Loss	4	2%

Table 3: FNAC of thyroid nodule (n=200)

Diagnosis on FNAC		Patients		
		N	Total	% Age
Non-neoplastic lesions	Nodular goitre	104	145	72.5
	Benign cyst	32		
	Lymphocytic thyroiditis	9		
Neoplastic lesions	Follicular carcinoma	33	55	27.5
	Papillary carcinoma	17		
	Hurthle cell lesion	2		
	Suspicious of neoplasm	3		
Total patients			200	100%

Table 4: Histopathology of thyroid nodule

Diagnosis on Histopathology		Patients		
		N	Total	% Age
Non-neoplastic lesions	Solitary colloid nodule	100	139	69.5
	Benign thyroid cyst	30		
	Chronic Lymphocytic thyroiditis	8		
	Hashimoto's thyroiditis	1		
Neoplastic lesions	Follicular adenoma	35	61	31.5
	Colloid adenoma	11		
	Hurthle cell	2		
	Adenoma Follicular	4		
	Carcinoma Papillary carcinoma	9		
Total patients			200	100%

Table 5: Table of frequency of diseases in this study (n=200).

Gold standard test (BIOPSY)			
Test result (FNAC)	Disease	No disease	Total
Positive	97	20	117
Negative	11	72	83
Total	108	92	N=200

Table 6: Diagnostic yield of FNAC in diagnosis of solitary thyroid nodule (n=82).

FNAC	Sensitivity	Specificity	PPV	NPV
	89.81%	78.26%	82.90%	86.74%

Discussion

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 lesions¹⁰. 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 nodule is more common in females than males. In this study there were 120 females and 80 males, with female: male ratio of 1.5: 1, which is comparable to the studies conducted nationally and internationally.¹¹ In this study most of the patients belong to 30-40 years followed by 40-50 years which is in accordance to the study of Bukhari and colleagues.¹² In this study the FNAC finding was as follows: 145 cases (72.5%) had non neoplastic lesions which in accordance to study of Korah¹³ reporting benign lesions 69%, while in some of the studies benign lesions were found in 50% cases.¹⁴ Nodular goitre was the most common finding among the benign lesions 104(52%) which agrees with studies of Gupta¹⁵ revealed 39 cases (52%) as colloid nodular goitre and Saddique¹⁶ reported thirty cases (50%) as nodular goiter. The next common FNAC finding among benign lesions was benign cyst in 32 cases (16%) which is at variance from study of Abu-Salem having thyroid cysts in 43 cases (8.3%).¹⁷ The malignant diseases in this study were 27.5% which is comparable to the study of Gupta¹⁵ having malignant lesion 26% and Baloch study having malignant lesions 29% (n-110).¹⁸ Among the malignant diseases follicular carcinoma was on top accounting 33(16.5%) which is different from study of Pai where malignancy was found in 15 cases (23%).¹⁹ On histopathology non neoplastic lesions were 69.5% and neoplastic lesions were 31.5% while in Mehmood²⁰ study histopathology revealed non neoplastic lesions 79.49% and neoplastic lesions 20.51%. Among the neoplastic lesions on histopathology follicular adenoma was found in 35 patients (17.5%) while in Tabaqchali²¹ study follicular adenoma was found in 60 patients (25.10%). On FNAC 17 cases (8.5%) were diagnosed as malignant and on histopathology they were confirmed benign nodular goitre and 3 cases was suspicious on FNAC and was confirmed as Hashimoto's thyroiditis on histopathology which is comparable to the study of Gharib²² who reported a false-negative rate of 1% to 11%, a false-positive rate of 1% to 8%. In this study the diagnostic yield of FNAC for solitary thyroid nodule

including sensitivity, specificity, PPV and NPV were 89.81%, 78.26%, 82.90% and 86.74% respectively. In the literature the diagnostic yield of FNAC has different values ranging from 50% to 95%. Kumar revealed sensitivity and specificity of 77% and 100% respectively.²³ In Moosa study the yield of FNAC was as follows: sensitivity 77.7%, specificity 98.9%, positive predictive value 87.5% and negative predictive value 97.8%.²⁴ Similarly Abu-Salem studied specificity of 99% and a sensitivity of 93%.¹⁷ Tariq reported sensitivity 75%, specificity 97.6%, PPV 85.71% and NPV 95.34%.²⁵ Saddique showed in his study sensitivity of 75%, specificity of 95.83%, positive predictive value of 81.81% and negative predictive value of 93.81%.¹⁶ Likewise Alam reported sensitivity of 100% and specificity of 95.12%.²⁶ My results are lesser than the study of Korah¹³ who reported 88%, 98%, 100% and 100%, for sensitivity, negative predictive value (NPV), specificity and positive predictive value (PPV) respectively. The outcome of FNAC in Mehmood study showed sensitivity 79.17% and specificity 91.40%.²⁰ In my study the accuracy of FNAC was 82.92% which is comparable to the studies of Bukhari¹² having accuracy 87% and Pai accuracy 89%.¹⁹ However accuracy of my study is greater than Gupta study revealed accuracy of 13.3%.¹⁵

Conclusion

FNAC has key rule in diagnosis of solitary thyroid nodule because it is safe, minimally invasive and cost effective diagnostic tool for preoperative assessment of patients with thyroid nodule to help the surgeon in management of these nodules

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