

Efficacy of fine needle aspiration cytology in diagnosis of common diseases of thyroid using histopathology as gold standard

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Abstract

Background: FNAC is one of the most common and the very first investigation done in the most of the thyroid swellings, due to its many advantages. FNAC has good amount of accuracy up to 97% in the preoperative diagnosis of various neck lesions. **Aim:** To evaluate efficacy of fine needle aspiration cytology in diagnosis of common diseases of thyroid using histopathology as gold standard. **Material and Methods:** A total 54 patients of either sex presented with the neck swelling were screened for thyroid swellings. FNAC was done followed by correlation with histopathology diagnosis. **Results:** For the FNAC of the papillary carcinoma, the sensitivity was 75%, specificity was 100%, PPV was 100%, NPV was 98%. For pleomorphic adenoma the sensitivity was 100%, specificity 97.7%, PPV 91% and NPV was 100%. For goiter the sensitivity was 81.8%, specificity was 100%, PPV was 100% and NPV was 95.5%. **Conclusion:** FNA cytology is a sensitive, specific, and accurate initial diagnostic test and should be considered as a first line investigation in evaluation of thyroid swellings. Despite of high positive predictive value, there are certain pitfalls. A benign FNAC diagnosis should be viewed with caution as false negative results do occur.

Key Words: Thyroid swellings, fine needle aspiration cytology, histopathology, positive predictive value.

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INTRODUCTION

Thyroid nodule is a common problem and can be detected in up to 60% of people who undergo thyroid ultrasound.^{1,2} Most nodules are benign, but they are usually the first sign of thyroid cancer.^{1,3} FNAC is one of the most common and the very first investigation done in the most of the thyroid swellings, due to its many advantages. FNAC has good amount of accuracy up to 97% in the preoperative diagnosis of various neck

lesions.⁴ It is however, not without limitations; accuracy is lower in suspicious cytology and in follicular neoplasms. It does not give the same architectural detail as histology but it can provide cells from the entire lesion as many passes through the lesion can be made while aspirating.⁵ This study was conducted to evaluate efficacy of fine needle aspiration cytology in diagnosis of common diseases of thyroid using histopathology as gold standard.

MATERIAL AND METHODS

All the patient attending the department of ENT with complaint of neck swelling or complication of neck swelling, over a period of 12 months were screened for thyroid swellings. The study was conducted in the Department of ENT and Department of Pathology of a tertiary care hospital after taking permission from protocol review committee and institutional ethical committee.

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Inclusion criteria

- Patients with complaints of thyroid swelling

Exclusion criteria

- Patients with other than thyroid swellings
- Patients with cardiovascular instability.
- Patient with bleeding diathesis or deranged coagulation profile.
- Patient with advanced staged carcinoma of neck, have previously diagnosed and treated.
- Patient with carotid body tumors.
- Patients not willing to participate in the study.

Methodology

Patient was explained about the complete study procedure. After taking written informed consent, detailed history and clinical examination of patient was elicited with special emphasis on neck swelling problem. A thorough systemic examination was done to rule out any other systemic disease. After cleaning the part with antiseptic by using a needle of 23 G, the swelling was held firmly with the left hand and inserted the needle in

the different direction while aspirating the material. The same was done under ultrasound guided FNAC. After this slide was prepared and stained with HandE and submitted to the cytotechnologist for screening. Process was repeated if there was insufficient sample on the slide. When multiple swellings were palpable then the procedure was performed on the largest one. The patients undergoing surgical procedure for the removal or simply for the biopsy were included in the present study. After making the provisional diagnosis from FNAC and various other radiological methods, post-operative histopathological examination was done to confirm and treat the patient as well. We sent the specimen for the histopathology.

Statistical analysis

The data were recorded on a predesigned proforma and analyzed statistically. It was analyzed using EpiInfo version-6 software. The sensitivity, specificity and predictive values of the test were calculated.

RESULTS

A total 54 patients of either sex presented with the neck swelling were screened for thyroid swellings. Most of the swelling was arising from the thyroid tissue 19 (35%).

Table 1: FNAC diagnosis

S.N.	Diagnosis on FNAC	No. of cases	Percentage
1	Papillary carcinoma of thyroid	03	5.6
2	Medullary carcinoma of thyroid	01	1.9
3	Follicular adenoma of thyroid	03	5.6
8	Lymphocytic thyroiditis	01	1.9
9	Benign cyst	02	3.7
11	Adenomatous goiter, MNG, colloidal goiter, cystic nodule of thyroid	09	16.7
12	Others	35	64.6

Most of the swelling was from goiter about (16.7%), followed by papillary carcinoma of thyroid, follicular adenoma of thyroid, constituting (5.6%) each.

Table 2: Histopathology diagnosis

S.N.	Diagnosis on Histopathology	No. of cases	Percentage
1	Papillary carcinoma of thyroid	04	7.4
2	Medullary carcinoma of thyroid	01	1.85
3	Follicular adenoma of thyroid	02	3.70
8	Benign cyst	03	5.55
10	Adenomatous goiter, MNG, colloidal goiter, cystic nodule of thyroid	11	20.37
11	Others	33	61.43

In the current study, the pleomorphic adenoma, and goiter constitute the maximum number about (20%). Papillary carcinoma of the thyroid constitute (7%). The histopathology was inconclusive in the (6%) of the cases. (6%) was benign cyst, follicular adenoma of thyroid, in (4%) of the cases. Medullary carcinoma of thyroid, constituted about (2%) respectively. 100% correlation was found in follicular and medullary neoplasm of thyroid. 82% correlation was found in the goiter, 75% correlation was found in the papillary carcinoma of thyroid.

Table 3: Positive predictive value of papillary carcinoma of thyroid

FNAC	Histopathology		Total
	Positive	Negative	
Positive	3	0	3
Negative	1	50	51
Total	4	50	54

(Sensitivity=75%; Specificity=100%; PPV=100%; NPV=98%; Chi-square value =39.70)

Table 4: Positive predictive value of goiter

FNAC	Histopathology		
	Positive	Negative	Total
Positive	9	0	9
Negative	2	43	45
Total	11	43	54

(Sensitivity=81.8%; Specificity=100%; PPV=100%; NPV=95.5%; Chi-square value =42.21)

DISCUSSION

The diagnostic accuracy of FNAC for thyroid swellings in this series was 96.05%. FNAC of the thyroid swellings is reported to have a sensitivity range of 65-98% and a specificity of 72 - 100%.⁶ In this study 31 out of 32 cases of colloid goiter diagnosed by FNAC corroborated with histopathology result. 4 out of 6 follicular adenoma of thyroid diagnosed by FNAC correlated correctly with their histopathological results where as two cases were diagnosed to be follicular carcinoma by histopathological study. Five cases of papillary carcinoma of thyroid were diagnosed correctly by FNAC. This was comparable with the present study as the diagnostic accuracy for the thyroid on an average is 89%. Three out of 4 papillary carcinoma, 1 out of 1 medullary carcinoma and 2 out of 2 follicular carcinoma and 9 out of 11 goiter case was diagnosed on FNA. The average diagnostic accuracy of the FNA in the diagnosing the thyroid disorder is 89%. There were total 3 follicular adenoma cases, in which 2 cases reported after histopathology to be follicular carcinoma and one was misdiagnosed as papillary carcinoma. In the present study, the sensitivity of the papillary carcinoma of thyroid was 75% and specificity was 100%. Positive predictive value was 100%, negative predictive value was 98%. For goiter the sensitivity was 81.8%, specificity was 100%, positive predictive value was 100% and negative predictive value was 95.5%. This data was correlated with Rajbhandari M *et al*⁷ in which the overall sensitivity and specificity of FNAC were 86% and 97% respectively. The overall accuracy of FNAC in their study was 87.4%. There was similar study findings by Bukhari MH *et al*⁸ on FNA of solitary thyroid nodule diagnostic cytopathology, their overall sensitivity of FNAC was found to be 78.5%, specificity as (96.8%), and accuracy as 93.4%, while positive predictive value (PPV) was 84.6% and negative predictive value (NPV) was 95%. Purnima M *et al*⁹ study of FNAC in head and neck lesion of paediatric group and found most frequent swelling in the head and neck in the age group of 10-15 years, followed by the age group of 5-10 years than the age group of 0-5 years. Lesions in the cervical lymph nodes constituted 81% of the head and neck lesions, followed by those in the skin and subcutaneous tissues [3

cases (3.2%)], the thyroid [4 cases (4.3%)] and the salivary gland [1 case (1%)]. 88.17% cases of head and neck lesions in children were diagnosed as benign on their smears and 11.83% cases were diagnosed as malignant. Whereas, 23% were malignant as in our study and the age group was not limited to the paediatric group. And out of the malignant the FNA has detected 11 cases (91.6%) to be malignant. Tatomirovic Z *et al*¹⁰ has conducted a study on FNAC in the diagnosis of head and neck masses: accuracy and diagnostic problems, and they concluded that most common findings were reactive lymphoid hyperplasia (28.5%), metastatic carcinoma (22.7%) and lymphoma (13.4%). Sixty-four (12.6%) FNA specimens were inadequate for diagnosis. The overall accuracy rate of FNA cytology, whether malignant or benign, was 91.89%, while the diagnostic accuracy for the exact type of tumor was 87.16%. Popat V *et al*¹¹ conducted histopathological correlation of neck lesions in 103 cases. They found that thyroid constitute the maximum lesions (31.06%). Goiter (diffuse and multinodular) constituted the highest percentage (24%). Thus, FNAC diagnosis of malignancy is highly significant and such patients should be subjected to surgery. A benign FNAC diagnosis should be viewed with caution as false negative results do occur.

CONCLUSION

FNAC is a quick, convenient, inexpensive, easy to carry out in the office and should be considered as a first line investigation in evaluation of thyroid swellings. Despite of high positive predictive value, there are certain pitfalls due to the misleading diagnostic yields and have to be done only on the basis of adequate cellularity and in conjunction with the clinical history of the patient.

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