

REVIEW ARTICLE

ACCURACY OF FINE NEEDLE ASPIRATION CYTOLOGY OF THYROID SWELLINGS

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ABSTRACT: BACKGROUND: Fine needle aspiration cytology (FNAC) is widely considered as the diagnostic technique of choice in the assessment of thyroid swellings. **AIMS:** The aim of this study is to determine the diagnostic precisions of FNAC of thyroid swellings performed and compare with other regions. **SETTING AND DESIGN:** The retrospective study of FNAC of thyroid swellings performed in the Department of Pathology Sri Devaraj Urs medical college, Kolar, during the period January 2000 to December 2004. The FNAC findings were correlated with the histopathological diagnosis. **MATERIALS AND METHODS:** One hundred twenty seven patients who had undergone FNAC during the study period were retrieved and information about age, sex, FNAC and Histopathological diagnoses were reviewed. The cytological results were classified as inadequate, benign, suspicious, and malignant. The histopathology diagnosis was classified as non-neoplastic and neoplastic. **RESULTS:** A total of 127 FNACs of thyroid lesions were done during the study period. The results of the FNA cytological diagnosis showed that two (1.6%) of the patients had FNAs, which were inadequate for cytological assessment, 114(90.6%) patients had benign lesions, 8 (6.8%) had lesions that were suspicious for malignancy, and three (1.4%) had malignant neoplasms. The correlation of the FNAC findings with the histopathological diagnosis, showed that our FNAC diagnostic accuracy rate was 96.3%, with a sensitivity of 65%, and specificity of 99.9%. **CONCLUSIONS:** The results of our study are comparable with the other data and demonstrate that FNA cytology is a sensitive, specific and accurate initial diagnostic test for thyroid swellings.

KEYWORDS: Fine needle aspiration cytology, histopathology, cytology.

INTRODUCTION: Fine Needle Aspiration Cytology is a primary diagnosis of thyroid mass. Clinicians have available, a variety of tests giving anatomical and functional information about the thyroid gland. FNAC, by giving direct morphological information has supplanted most other tests for preoperative evaluation of thyroid nodules. As FNAC distinguishes between benign and malignant lesions quite effectively, it is the preoperative screening method of choice worldwide. Its use in recent years has resulted in a significant decrease in the number of surgeries being performed, while increasing the yield of malignant lesions of patients who have undergone surgery. Due to its simplicity, low cost, and absence of major complications, it is the initial investigation in the management of thyroid disease in the hospital. This study is aimed at determining the diagnostic precision of FNAC of thyroid swellings performed and compare with other regions.

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MATERIALS AND METHODS: The study is used to determine the cytological pattern of thyroid swellings, in addition to the utility and accuracy of FNAC as an initial diagnostic method in the investigation of thyroid swellings. One hundred twenty seven FNAs were performed with diffuse or nodular thyroid enlargement in the Pathology Department during the period between January 2000 and December 2004. One hundred twenty seven patients who had undergone FNAC during the study period were retrieved and information about the age, sex, FNAC, and histopathological diagnoses were extracted and the corresponding slides were reviewed.

FNAC procedure was performed without local anaesthesia with the help of the non-aspiration technique, using 23-25 gauge needles. Both air dried and wet fixed smears were made from the aspirated material, stained with May Grunwald Giemsa and Hematoxylin and Eosin stains, respectively and examined under a light microscope.

The cytology results were categorized into four groups - inadequate, benign, suspicious, and malignant. The histopathology diagnosis was classified as non-neoplastic or neoplastic. Sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of FNAC, relative to the final histological diagnoses were analyzed.

A total of one hundred twenty seven patients underwent FNAC of thyroid swellings in the Pathology Department within the study period. Out of these, one hundred eleven were female patients, while fourteen were males. Age of the patients ranged from six to seventy-five years.

The FNA cytology results were compared with the corresponding histological diagnoses.

Lesions	Frequency	Percentage
Inadequate	02	1.6
Benign	114	90.6
Suspicious	08	6.8
Malignant	03	1.4

Table 1: Diagnoses in 127 thyroid swellings on FNAC

The distribution of benign, suspicious, and malignant cases on cytology was as shown in (Table 2).

Benign Lesions (114)	Frequency	Percentage
Colloid goiter	84	74.1
Hashimoto Thyroiditis	23	20.3
Hyperplastic goiter	04	3.9
Subacute Thyroiditis	02	1.3
Suspicious Lesions (08)		
Follicular Neoplasm	05	64.6
Hurthle Cell Neoplasm	03	35.4
Manilgnant Lesions (03)		
Papillary Carcinoma	02	75
Medullary Carcinima	01	25

Table 2: Distribution of benign, suspicious and malignant cases on cytology

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Thyroid FNAC results, grouped malignant (positive results) versus the rest of the diagnoses (negative results) were compared with the results of the final histological study of the excised specimen in order to calculate the values of the test (Table 3). Unsatisfactory / inadequate aspirates and suspicious lesion groups that gave no definite opinion were excluded from the calculations

	FNAC	Histopathology	Histopathology
		Benign	Malignant
Inadequate	02	00	02
Benign	25	24	01
Suspicious	04	02	02
Malignant	03	00	03

Table 3: Correlation between FNAC and Histopathology (34)

Analysis of the results yielded a sensitivity of 65%, specificity of 99.9%, positive predictive value of 99.9%, and negative predictive value of 95%, with a diagnostic accuracy of 95.2%.

DISCUSSION: Fine needle aspiration cytology of the thyroid gland has radically changed the management of patients with thyroid disease. It is widely accepted as the most accurate, sensitive, specific, and cost-effective diagnostic procedure in the preoperative assessment of thyroid nodules. The accuracy of the FNAC analysis approaches 95% in the differentiation of the benign nodules from the malignant nodules of the thyroid gland.^[1] FNAC of the thyroid swellings is reported to have a sensitivity range of 65 - 98% and a specificity of 72 - 100%.^[2] In our study, the analysis of the data revealed sensitivity of 65% and specificity of 99.9%. The results are comparable with the other data from different regions. Kumar et al. in their study on 89 patients with enlarged thyroid gland reported a sensitivity of 77%, specificity of 100%, and diagnostic accuracy of 97.7%.^[3] Similarly, a study conducted by Nggada et al. in a teaching hospital in Nigeria reported a sensitivity of 88.9%, specificity of 96.1%, and diagnostic accuracy of 94.2%.^[4] Our study and the view of other experts suggest that FNAC is more specific than sensitive in detecting thyroid malignancy and therefore its use, as a initial diagnostic test.

The false negative FNAC results may occur because of sampling error or misinterpretation of cytology and are of great concern because they indicate the potential to miss a malignant lesion.^[5] Most authorities are of the opinion that the true false negative rate is below 5%, even if all patients with thyroid FNAC have a histopathological examination.^[6] In the present study, false negative FNA has occurred in one out of twenty-five (4%) patients with benign diagnosis. This is consistent with reports in the literature that suggest a false negative rate of 2-7%.^{[7], [8]}

The false positive rate indicated that a patient with a malignant FNAC result was found on histological examination to have a benign lesion. False positive rate results were uncommon and it was 0% in our study, which was consistent with other reports that cite FPR results ranging from 0 - 8%.^{[7], [8]} In the present study, the positive predictive value was 99.9%, negative predictive value was 95%, with a diagnostic accuracy of 95.2%, which was similar to the experience of others.^{[9],[10]}

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Cytologically these are categorized into Inadequate, Benign, Suspicious, and Malignant. This division is very helpful to clinicians in the management. As most of the benign conditions can be managed medically, it saves the patient unnecessary surgeries. In this study only 34 out of a total of 252 cases underwent surgery for a cytologically suspicious / malignant diagnosis.

Among the suspicious group three out of four cases (50%) were diagnosed as malignant on histopathology, in our study. This was mainly due to the limitation of thyroid cytology to distinguish follicular adenoma from follicular carcinoma. The diagnosis required a detailed histopathological examination for vascular and capsular invasion. As the incidence of malignancy in suspicious lesions was high, surgical removal of the nodules should be considered strongly in these cases. Mundasad et al. also concluded in their study that suspicious and intermediate results prove to be an area of uncertainty, often resolved by diagnostic surgical resection.^[11]

FNA of four patients (1.6%) yielded inadequate samples, which again correspond to studies in which inadequate sampling has been reported, from 1-5%.^[12] The advent of ultrasound guided FNA has improved sample acquisition from patients with small thyroid nodules, which are difficult or impossible to detect on physical examination. Borget et al. did an assessment of the cost of FNAC as a diagnostic tool in patients with thyroid nodules and concluded that in future, routine ultrasound guidance and on-site assessment of cytopathological adequacy would help reduce costs.^[13]

A negative FNA should never exclude malignancy if there is a strong clinical suspicion. Pitfalls in FNAC of the thyroid as mentioned by Shaha (2000)^[14] are: Adequacy of specimens, Accuracy of specimens, accuracy of cytopathological interpretation, Cysts, Follicular lesions, Hurthle cell lesions, and Lymphocytic lesions.

The cytopathologists should be aware of the potential diagnostic pitfalls and the interpretational errors that can be reduced further, if the aspirates are obtained from different portions of the nodule with use of other modalities.

CONCLUSION: The results comparable with the other data and demonstrate that FNA cytology is a sensitive, specific, and accurate initial diagnostic test for the preoperative evaluation of patients with thyroid swellings. The correlation of cytological and histopathological diagnoses is an important quality assurance method. It is a minimally invasive, safe, easily performed OPD procedure. The clinicians should be encouraged to use FNAC as the initial modality in the evaluation of thyroid swellings.

REFERENCES:

1. Gharib H. Fine-needle aspiration biopsy of thyroid nodules: advantages, limitations and effects. *Mayo Clin Proc* 1994; 69: 44-9.
2. Hamburger JI. Diagnosis of thyroid nodules by fine needle biopsy: Use and abuse. *J Clin Endocrinol Metab* 1994; 79: 335-9.
3. Kumar S, Aqil S, Dahar A. Role of fine needle aspiration cytology in thyroid diseases. *J Surg Pak* 2008; 13: 22-5.
4. Nggada HA, Musa AB, Gali BM, Khalil MI. Fine needle aspiration cytology of thyroid nodule(s): A Nigerian tertiary hospital experience. *Internet J Pathol* 2006; 5.

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5. Hall TL, Layfield LJ, Philippe A, Rosenthal DL. Source of diagnostic error in the fine needle aspiration of the thyroid. *Cancer* 1989; 63: 718-25.
6. Gharib H. Fine needle aspiration biopsy of thyroid: An appraisal. *Ann Int Med* 1993; 118: 282-9.
7. Layfield LJ, Reichman A, Bottles K, Giuliano A. Clinical determinants for the management of thyroid nodules by fine needle aspiration cytology. *Arch Otolaryngol Head Neck Surgery* 1992; 118: 717-21.
8. Liel Y, Ariad S, Barchana M. Long term follow up of patients with initially benign thyroid fine needle aspiration. *Thyroid* 2001; 11: 775-8.
9. Anderson JB, Webb AJ. Fine Needle Aspiration Biopsy of the cancer. *Br J Surg* 1987; 74: 292-6.
10. Leonard N, Mekher DH. To operate or not to operate, the value of fine needle aspiration cytology in the assessment of thyroid swellings. *J Clin Pathol* 1997; 50: 941-3.
11. Mundasad B, Mcallister I, Carson J, Pyper P. Accuracy of fine needle aspiration cytology in diagnosis of thyroid swellings. *Internet J Endocrinol* 2006; 2.
12. Sclabas GM, Staerkel GA, Shapiro SE, Fornage BD, Sherman SI, Vassilopoulos-Sellin R, et al. Fine Needle Aspiration of thyroid and correlation with histopathology in a contemporary series of 240 patients. *Am J Surgery* 2003; 186: 702-10.
13. Borget I, Vielh P, Leboulleux S, Allyn M, Iacobelli S, Schlumberger M, et al. Assessment of the cost of fine needle aspiration cytology as a diagnostic tool in patients with thyroid nodules. *Am J Clin Pathol* 2008; 129: 763-71.
14. Shaha AR. Controversies in the management of thyroid nodule. *Laryngoscope* 2000; 110: 183-93.

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