Research Paper

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Diagnostic Accuracy of Fine Needle Aspiration Cytology (FNAC) versus Histopathology in Thyroid lesions.

Medical Science

KEYWORDS : Fine needle aspiration cytology, Histopathology, Thyroid, Comparison

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ABSTRACT

Background: Fine needle aspiration cytology (FNAC) is minimally invasive, cost effective and considered gold standard test for the diagnosis of thyroid nodules. Aims and objectives: An aim of our study was to co-relate the pre-operative FNAC findings with histopathology of post-operative specimens and diagnostic pitfalls of the FNAC.

Methods and materials: A retrospective study of 137 cases was done at pathology department; B J Medical college Ahmedabad from January-2012 to November 2013. The cases for which both cytological and histological diagnosis were available was selected. Fine needle aspiration results were compared with histological diagnosis following thyroid operation.

Observation and Results: Cytological diagnosis showed benign lesion in 105 patients (76.6%) and malignant in 12 patients (8.7%). Histopathological findings showed benign lesion in 119 specimen (86.8%) and malignant in 18 patients (13.1%). Sensitivity, specificity and accuracy of our study to diagnose malignant lesions were 75%, 98.3% and 94.5% respectively.

Conclusion: FNAC has evolved as an accurate, sensitive and specific tool for the initial screening of thyroid patients and reduced the need of un- necessary surgeries. However histopathological diagnosis is more confirmatory.

Introduction

Fine needle aspiration cytology (FNAC), is minimally invasive, cost effective method, causes less discomfort to the patient even with repetition. It has been applied routinely as a useful method to diagnose thyroid lesions and to differentiate between benign and malignant thyroid nodules. FNAC has allowed a dramatic decrease in unnecessary surgeries with thyroid nodular disease. However histopathological diagnosis is confirmatory for thyroid lesions. Purpose of our study is to find the diagnostic accuracy of FNAC in thyroid lesions & compare it with histopathological diagnosis. To understand the diagnostic pitfalls of the Fine needle aspiration cytology.

Methods and Materials

A retrospective study of 137 cases was done at department of pathology; B. J. Medical College Ahmedabad from January-2012 to November-2013. The cases for which both cytological and histological diagnosis were available was selected. Recurrent malignancy cases were excluded from our study. Anaplastic carcinoma cases were excluded. For the FNAC procedure, after taking consent of Patient, appropriate site was cleaned with spirit swab, then with the help of 22 gauge needle and 10 cc disposable syringe, aspiration was done from the different locations of the lesion. Smear was prepared on glass slide and fix immediately in 95% methanol for 20 minutes. Keep some smear air dried for Giemsa stain. Labelling of slide done. Keep 2 to 3 slides for special stain. Staining of wet smear done with Haematoxylin –Eosine and Papanicolua's stain. Air dried smear stain by MGG stain. Mount the slides. After FNAC all the patients were subjected to surgery. Thyroidectomy specimen was evaluated for Histopathological examination. Specimen was processed in automated tissue processing unit and staining was performed with Haematoxylin – Eosin stain.

Observations and Results.

Out of 137 cases 117(85.4%) were females and 20(14.5%) were males. Female: Male ratio is of 5.8:1. The age ranged from 18-65 years. The maximum numbers of cases were between 35-50 years. Cytological diagnosis showed benign lesion in 105 patients (76.6%), indeterminate in 20 patients (14.5%), and malignant in 12 patients (8.7%). Histopathological diagnosis showed benign lesion in 119 specimen (86.8%), malignant in 18 patients (13.1%). Table 1 showing Cytological and histopathological diagnosis of Benign lesions.

DIAGNOSIS	HISTOPATHOLOGICAL DIAGNOSIS	CYTOLOGICAL DIAGNOSIS
Simple colloid goiter	25	20
Goiter with cystic changes	19	24
Benign follicular lesion of thyroid	60	50
Autoimmune thyroiditis	14	10
Tuberculosis	1	1

In histopathological study benign follicular lesion include 19 nodular goiter,20 adenomatous hyperplasia and 21 follicular adenoma.

Table 2 showing cytological histopathological diagnosis of malignant lesions.

Diagnosis	Histopathological diagnosis	Cytological diagnosis
Papillary carcinoma	5	3
Follicular carcinoma	5	4
Papillary carcinoma of follicular variant	6	4
Anaplastic insular cell carcinoma	1	1

An indeterminate lesion includes Follicular neoplasm (13), Suspicious for malignancy (4), Hemorrhagic aspirate or inadequate sample (3).

True positive = 18 (malignant cases on histopathological studies),True negative = 119 (benign cases on histopathological studies),False positive = 2 (malignant on FNAC but not on histopathological diagnoses),False negative = 6 (benign on FNAC diagnoses but malignant on histopathological study).

Sensitivity = True positive / True positive + False negative x 100

Specificity = True negative / True negative + False positive x 100

Accuracy = (True positive + True negative) / (True positive + False positive +True negative + False negative) x 100.

Sensitivity = 18/18+6 X100 % = 75%

Specificity = 119/119+2 X100 %= 98.3%

Accuracy = 137/137+2+6 X 100 %= 94.5%

Discussion

FNAC is the gold standard initial investigation in diagnosis of thryroid swellings.(1) Accuracy of FNAC analysis approaches 95% in the differentiation of the benign nodule from the malignant nodule of thyroid gland.(2) In our study maximum age group was between 35- 50 years, and Femal:Male ratio was 5.8:1. In our study False Positive cases were 2 which includes, Papillary Carcinoma, Follicular Carcinoma, on histopathological analysis they were diagnosed as papillary hyperplasia in nodular goitre, Adenomatous hyperplasia of thyroid gland respectively.

Table 3 showing Comparison of false negative cases with final diagnosis.

Cytological diagnosis	Histopathological diagnosis
Colloid goiter with cystic changes	Papillary microcarcinoma
Colloid goiter with cystic changes	Papillary microcarcinoma
Lymphocytic thyroiditis	Low grade NHLwith hashimoto's thyroiditis
Benign follicular lesion	Papillary carcinoma-follicular variant
Benign follicular lesion	Papillary carcinoma-follicular variant
Hashimoto's thyroiditis	Hurthle cell carcinoma

It is difficult to differentiate follicular/Hürthle cell adenoma from carcinoma on cytological assessment because cytology cannot evaluate the criteria of vascular or capsular invasion or of intrathyroid spread. Multiple aspirations from different parts of the lesion could give a clear picture of cytological features, reduce over interpretation and help in proper diagnosis. Aspiration done from the hyper cellular area, which leads to over diagnosis. Aspiration done from the necrotic area, which leads to underdiagnosis. Ultrasound-guided FNAC results in better sample acquisition, especially in patients with small thyroid nodules, solid-cystic lesions and difficult to palpate lesions. Therefore in case of difficulty, a repeat guided aspirate with multiple aspirations from various parts of the lesions, correlation with USG findings and awareness of the standard pitfalls will facilitate the correct cytological diagnosis.

Table 4 Comparisons of results of present study with previous studies.

Study	Year	No. of patients	Sensitivity	Specificity	Accuracy
Al-sayer et.al[3]	1985	70	86	93	92
Cusick et.al[4]	1990	283	76	58	69
Bouvet et.al[5]	1992	78	93.5	75	79.6
Afroze et.al[6]	2002	170	61.9	99.3	94.5
Kohm et.al[7]	2003	207	78.4	98.2	84.4
Kessler et.al[8]	2005	170	79	98.5	87
Present study	2014	137	75	98.3	94.5

Caraway et al (9) concluded that certain follicular adenomas may display cytologic features mimicking papillary carcinoma and showed sensitivity of 93% and specificity of 97%, and aspirates of hurthle cell adenomas cannot be differentiated from hurthle cell carcinomas. The study by Ergete et al (10) revealed the sensitivity and specificity of FNAC to be 67% and 84.7% respectively, FNAC was non-diagnostic in 0.87% of cases, suspicious in 2% of cases and were diagnostic in 97% of cases, and it was concluded that FNAC was useful as the initial diagnostic test in the evaluation of thyroid nodules. In present study sensitivity is 75% which is comparable to cusick, kohm and Kessler study which was 76%,78.4% and 79%respectively.specificity is 98.3% which is comparable to afroze, kohm and Kessler study which was 99.3%,98.2% and 98.5% respectively. Accuracy is 94.5% which is comparable to al-sayer, afroze study which was 92%, 94.5% respectively.

Conclusion

In this study FNAC has evolved as an accurate, specific & sensitive tool for the initial screening of thyroid patients & reduced the need of unnecessary surgeries. A benign FNAC diagnosis should be viewed with caution as false negative results do occur and these patients should be followed up and any clinical suspicion of malignancy even in the presence of benign FNAC requires surgery. However Histopathological study is more confirmatory.

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