

Fine Needle Aspiration Cytology Study of Thyroid Lesions

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Abstract

Background: There is some “grey zone” in thyroid cytology where the diagnostic efficacy declines sharply rendering it difficult to categorize the lesions resulting in discrepancy. So, a study was conducted to determine the accuracy of FNAC in diagnosis of thyroid lesions and to assess the correlation between preoperative cytological diagnosis and post operative histopathological diagnosis. It was observed that FNAC is reliable, safe and accurate method as a first line of evaluation in thyroid swelling before the surgery. *Aim:* To highlight probable causes of error in the cases showing discrepancy between cytological and histological diagnoses. *Materials and Methods:* A retrospective and prospective study was conducted from June 2013 to July 2015 in Pathology department of our hospital. Patient data were collected and details of their thyroid lesion, including clinicopathological features and FNAC findings were recorded. The cytology reports were compared with the histopathological diagnosis. *Results:* A total of 136 cases of thyroid lesions were aspirated. 131 cases are adequate for reporting. Remaining 5 cases were sample inadequate. Out of 131 cases, 40 cases were available for histopathological correlation. Age group of 31-40 yrs are most effected group with thyroid disorders Adenomatous Goiter is the most common thyroid lesion in study. Statistical analysis of our data shows the diagnostic accuracy of FNAC to be 97%. FNA showed a sensitivity and a specificity of 100%. *Conclusions:* FNAC is a rapid, efficient, cost-effective, relatively painless procedure with a high diagnostic accuracy. Hence, it is a valuable tool in the diagnosis and management of patients.

Keywords: Cyto-Histopathological Correlation; Fine Needle Aspiration Cytology; Thyroid Lesions.

Introduction

FNAC of thyroid lesions is a safe, simple, cost-effective and accurate method for management of palpable thyroid lesions. Published data suggest that FNA has an overall accuracy rate around 95% in the detection of thyroid malignancy. Fine needle aspiration cytology (FNAC) of the thyroid gland is now a well-established, first-line diagnostic test for the evaluation of diffuse thyroid lesions as well as of thyroid nodules with the main purpose of confirming benign lesions and thereby, reducing unnecessary surgery[1]. Although there is a large body of world

literature claiming the accuracy and usefulness of thyroid cytology, there is also evidence showing possible limitations and pitfalls of this procedure [2,3]. Different imaging techniques are now used for preoperative diagnosis of thyroid nodules like radionuclide scanning, high-resolution ultrasonography etc. However, FNAC is still regarded as the single most accurate and cost-effective procedure, particularly if ultrasound is used as a guide for better sample collection [4], especially for cystic lesions [5].

However success of FNAC is dependent on several important contributing factors are Sampling techniques, Skill of the physician performing the aspiration, Specimen adequacy, Staining methods, Experience of the pathologist interpreting the aspirate and Overlapping cytological features between some benign and malignant thyroid lesions.

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Aspirations were done without any guidance in this study. Aspiration cytology of thyroid lesions and wherever possible, the histology samples was extensively examined to evaluate the role of FNAC for the diagnosis of thyroid lesions and scrutinized the cases showing any discrepancy in cytohistological findings with the aim of establishing possible causes of the errors. Present study is done to highlight probable causes of error in the cases showing discrepancy between cytological and histological diagnoses.

Material and Methods

Present study is Prospective study of done for a period of 1 yr from July 2014 - August 2015. Cases of thyroid lesions presenting to clinical departments of MediCiti Institute of Medical Sciences (MIMS), Ghanpur, Medchal referred to Department of Pathology.

The cases with a nonneoplastic or benign FNA diagnosis in which patients are kept under follow up without surgical intervention based on the clinical, radiological and aspiration cytology findings were excluded. The cases with FNA diagnosis from our center and underwent surgery from outside centers or cases with FNA diagnosis from outside centers and underwent surgery in our center were excluded.

Direct FNA was done by palpation method. Ultrasound guided FNA was done in small nodules which were difficult to palpate, cystic nodules and nodules located posteriorly in the thyroid gland. Smears were fixed in 95% alcohol solution and papanicolaou staining done. The smears were

evaluated and diagnosis assigned according to the Bethesda system as nondiagnostic/unsatisfactory, benign, atypia of undetermined significance/follicular lesion of undetermined significance, follicular neoplasm/suspicious for a follicular neoplasm, suspicious of malignancy and malignant. In the first three categories, surgery was done in cases with suspicious ultrasonographic findings, in cases with rapidly enlarging thyroid lesions and in cases with large lesions which caused discomfort to the patients. The ultrasonographic features such as hypoechogenicity, irregular nodule borders, microcalcifications, and abnormalities of vasculature favor malignant nature of the lesions.

After the FNA diagnosis, the patients underwent surgery. The tissues were fixed in formalin. The relevant areas were sampled and processed in automated tissue processing units. Histopathological examination of the Hematoxylin and eosin stained sections were done.

Fine needle aspiration cytology diagnoses were compared with the histopathology in each case. The cases with diagnostic discrepancy were reviewed and the causes of misdiagnosis were analyzed.

Results

A total of 136 cases of thyroid lesions were aspirated 131 cases are adequate for reporting. Remaining 5 cases were sample inadequate. Out of 131 cases, 40 cases were available for histopathological correlation.

Age group of 31-40 yrs are most effected group with thyroid disorders.

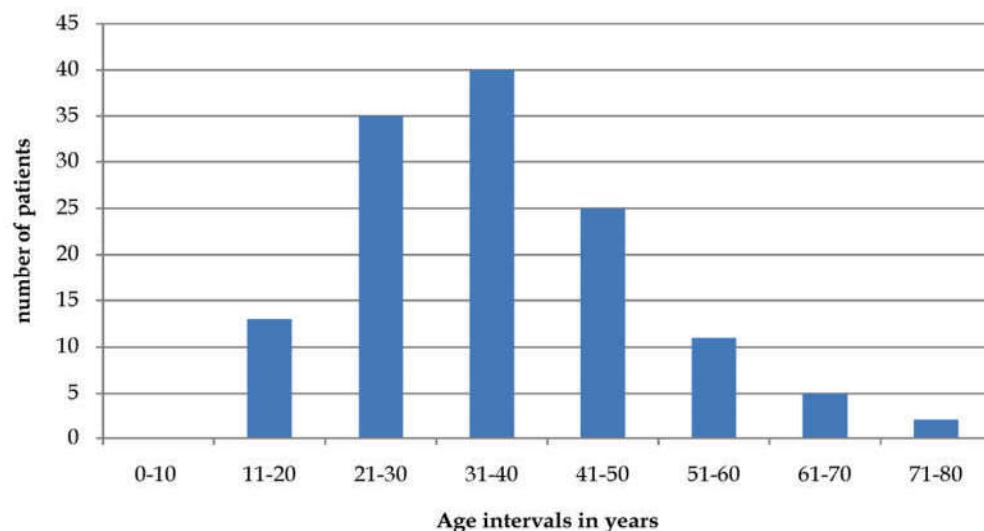


Fig. 1: Age Distribution

Table 1: Distribution of thyroid lesions on FNAC

FNAC Diagnosis	Number of Patients	Percentage
Non Neoplastic		
Hashimoto's Thyroiditis	34	25.9
Adenomatous goiter	64	48
Thyroglossal Cyst	1	0.8
Neoplastic		
Follicular Carcinoma	26	19.8
Papillary Carcinoma	6	4.5
Anaplastic Carcinoma	1	0.8
Total	131	

Adenomatous Goiter is the most common thyroid lesion in study

Table 2: Cytohistologic correlation of thyroid lesions

FNAC diagnosis	Histopathological diagnosis					
	Hashimoto's Thyroiditis	Adenomatous Goiter	Thyroglossal Cyst	Follicular Carcinoma	Papillary Carcinoma	Anaplastic Carcinoma
Hashimoto's Thyroiditis	2	=	=	=	=	=
Adenomatous goiter	2	15	-	1	-	-
Thyroglossal Cyst	-	-	1	-	-	-
Follicular Carcinoma	-	1	-	6	2	-
Papillary Carcinoma	-	-	-	-	6	-
Anaplastic Carcinoma	-	-	-	-	-	1

Surgery was performed in 40 patients. shows cyto-histological correlation in these cases. Statistical analysis of our data shows the diagnostic accuracy of FNAC to be 97%. FNA showed a sensitivity and a specificity of 100%.

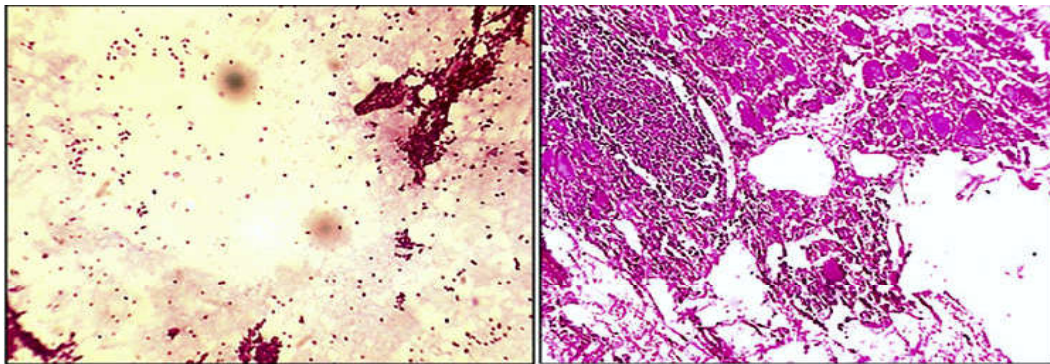


Fig. 1: Cytological two cases misdiagnosed as adenomatous goiter histopathologically diagnosed as Hashimotos thyroiditis.

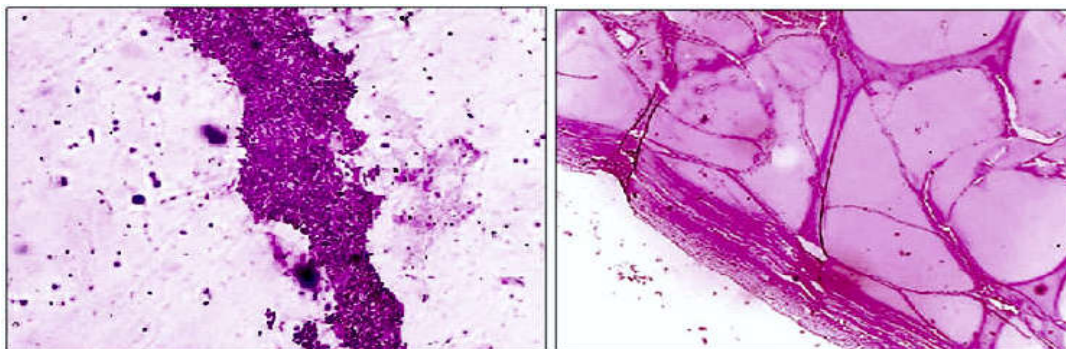


Fig. 2: Cytological one case misdiagnosed as adenomatous goiter histopathologically diagnosed as Follicular adenoma

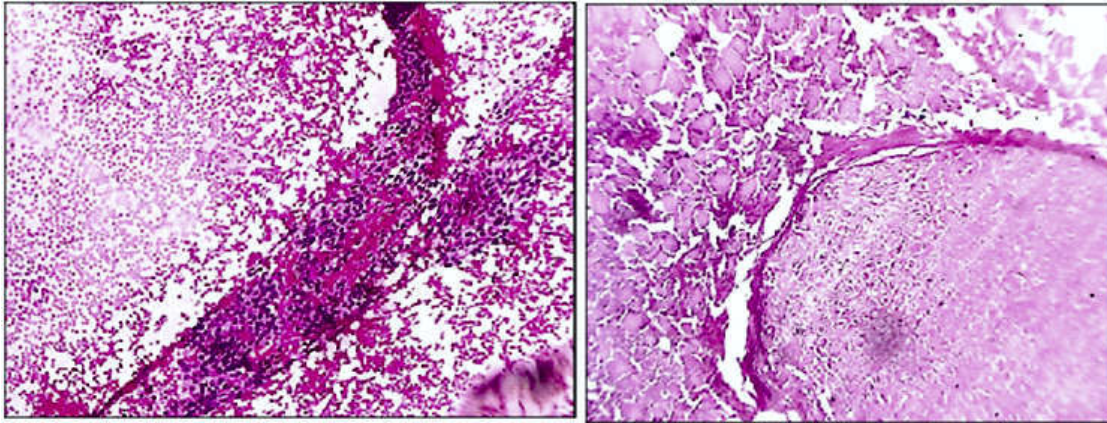


Fig. 3: Cytological one case misdiagnosed as Follicular adenoma histopathologically diagnosed as adenomatous goiter.

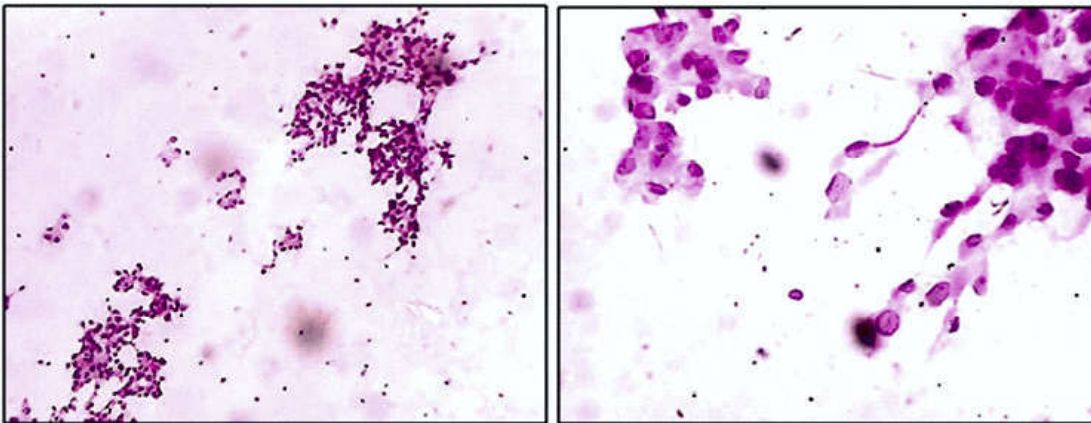


Fig. 4: Cytological two cases misdiagnosed as Follicular neoplasm histopathologically diagnosed as Follicular variant of papillary carcinoma

Discussion

An adequate cytological smear of the thyroid should contain five to six groups of well-preserved follicular cells, with each group containing ten or more cells [6]. Five cases in our study group could not be reported because of inadequate sampling. Comparable experiences have been reported by others [7].

As reported in other literatures, age and gender were associated factors of thyroid lesions [8]. In the present study male to female ratio is 1:4 with female predominance and most commonly observed in 3 to 4th decade.

A total of 136 cases of thyroid lesions were aspirated. 131 cases are adequate for reporting. Out of 131 cases, 40 cases were available for histopathological correlation. FNAC of the thyroid is widely used as it is safe, rapid, inexpensive, and reliable in the diagnosis of thyroid nodules [9]. The sensitivity of the thyroid FNAC ranges from 80 to 98% and its specificity from

58 to 100% [10-13]. In our study, the sensitivity was 97% and specificity 100%. The inadequacy rate in this study was 5.06%. Previous studies have shown the percentage of inadequate material to vary between 0 and 25% [14,15]. Various studies have shown the role of US guidance which can detect circumscribed lesions as small as 1 mm in diameter [16,17]. In addition, in mixed, solid-cystic lesions or difficult-to-palpate lesions, US-guided aspiration technique is clearly superior to palpation-guided aspiration [18].

Cytological two cases misdiagnosed as adenomatous goiter histopathologically diagnosed as Hashimoto's thyroiditis. In these two cases details like thyroid status of the patients not available, aspirations were bloodmixed, stained smears show thyroid follicles of varying sizes with occasional Hurthle cells and lymphocytes against the background of bloodmixed colloid. Folliculitis not observed. Multiple aspiration from different sites with proper clinical details and meticulous observation for Hurthle cells and lymphocytes needed to avoid this

pitfall.

Cytological one case misdiagnosed as adenomatous goiter histopathologically diagnosed as Follicular adenoma. Cytological differentiation between follicular neoplasms and nodular goiters is often very difficult [1,3]. Aspirations in these cases were probably done over colloid-rich macrofollicular areas of the neoplasm [1]. Cytological smears show thyroid follicles and sheets against the background of abundant colloid. Careful clinical and radiological evaluation especially in solitary thyroid nodule and meticulous microscopic observation to look for cytological features like increased cellularity with nuclear crowding and overlapping, scant colloid are needed to avoid this pitfall.

Cytological one case misdiagnosed as Follicular adenoma histopathologically diagnosed as adenomatous goiter. In this, clusters of follicular cells arranged in clumps with scanty colloid with the diagnosis of a follicular neoplasm of the thyroid. The histology though, showed features of a nodular colloid goiter. Aspiration was probably done from the hypercellular areas of colloid nodules which led to over diagnosis. As already discussed, cytological distinction between these two conditions is often difficult. A possible remedy is multiple aspirations from different parts of the swelling that could demonstrate hypocellular, polymorphic, and colloid-rich areas. Demonstration of monolayered sheets of epithelial cells representing macrofollicles and degenerative changes would suggest the possibility of nonneoplastic lesions [19]. Cytological two cases misdiagnosed as Follicular neoplasm histopathologically diagnosed as Follicular variant of papillary carcinoma. The presence of follicular structure led to misinterpretation, as has been encountered by others [20]. A possible remedial measure could be to repeat aspirations from different parts which could unravel the typical nuclear features of a papillary carcinoma. Recent studies now stress that even focal presence of papillary nuclear features in a follicular pattern should be dealt with caution. Of FNAC should be fully realized as cytological differentiation between follicular neoplasm and nodular goiter is often difficult. When evaluating Follicular Neoplasm careful search for nuclear features is recommended so as to rule out Follicular variant of Papillary Carcinoma. Recent studies now stress that even focal presence of papillary nuclear features in a follicular pattern should be dealt with caution.

In this study errors in diagnosis was mainly because of improper aspiration technique, lack of relevant clinical details, improper staining methods or stains used. Accuracy can be improved by proper evaluation

of clinical details, adequate aspiration, along with Hematoxylin and Eosin stain, one nuclear staining like pap stain are recommended.

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