



FNAC and Histopathological Correlation of Thyroid Lesions

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ABSTRACT

Thyroid enlargement is a common ailment through out the world. There is a known predominance among females with increased incidence with age. Though thyroid enlargement is largely benign it is always essential to rule out the possibility of malignant etiology. Though there are various modalities to screen for malignant nature like ultrasonography and nuclear imaging, FNAC is by far the most easily available and cost effective alternative. Hence we intend to assess the sensitivity and effectiveness of screening FNAC by comparison with postoperative histopathology reports. This study was conducted at Sree Balaji Medical college in Chennai, India between May 2009 to Jan 2012 and involved 80 patients referred from surgery OPD with suspected thyroid swelling. Result: After comparison of FNAC with respective HPE reports FNAC was found to be 88% sensitive, 100% specific and 98% accurate; with a positive predictive value of 100% and negative predictive value of 97%.

KEYWORDS : FNAC histopathology correlation thyroid lesions.

INTRODUCTION

Thyroid swelling is a common complaint in this part of country. This condition affects individuals belonging to any age group and is seen in both the sexes with a striking female preponderance.

Fine needle aspiration cytology is a diagnostic method in which cells and tissue fluid are extracted from tissue masses using a syringe and fine needle and subjected to examination¹.

Fine needle aspiration cytology (FNAC) is now accepted as a cost-effective, minimally invasive, low-complication non-operative diagnosis for most of the thyroid lesions and is highly successful in triaging patients with thyroid swelling into operative and non-operative groups. The location of the target lesion, careful searching for malignant cells and repeat FNAC is the key to successful diagnosis to plan a proper surgical management in thyroid mass.^{2,3}

The distinction of the benign and malignant thyroid nodules is fundamental, as malignancy necessitates surgery, while strict patient follow-up is necessary in the case of a benign mass. FNAC is considered to be the "gold standard" in the selection of patients for surgery.

All the patients presenting with thyroid swelling for the first time can undergo fine needle aspiration cytology as first line diagnostic test as^{2,4}

AIMS AND OBJECTIVE

The aims and objectives of this study are:

- To evaluate the cytomorphology of thyroid gland by fine needle aspiration cytology, and correlate with histopathological diagnosis.
- To determine the accuracy, sensitivity and specificity of aspiration cytology.

MATERIALS AND METHODS

During the study period May 2009 – January 2012, eighty patients presenting with complaints of thyroid swelling in whom fine needle aspiration cytology was carried out only fifty who underwent surgical excision were included in the study. These patients were referred from the surgery OPD of Sree Balaji Medical College and hospital, to the pathology department. A detailed history with regards to clinical presentation, onset, rate of growth and duration of swelling, history of pressure effects, toxic symptoms, personal history, contributory family history and menstrual history was taken.

The procedure was explained to the patients in their own language so as to make him/her comfortable, avoid anxiety and to gain the confidence of the patient.

The patient lies supine with neck hyperextended by placing a pillow under the shoulder. Cleaning of the skin with cotton swab dipped in spirit till the subsequent swab appears clean.

The needle is introduced through the skin into the lesion, the plunger of the syringe is retracted, upto the 2-3 ml marking on the syringe to

create adequate vacuum, while the needle is guided in a straight line through the lesion. With the piston of the syringe in vacuum position, the needle is rapidly moved back and forth for 4-5 times in the same plane, merely to hold the tissue against the sharp cutting edge of the needle which scrapes or cuts softer tissue components along the track as the needle advances through the tissue. If drops of blood appear in the syringe tip, the procedure is stopped. For cystic lesions, the contents must be aspirated fully and palpated again for any residual swelling, which was again aspirated.

Photomicrograph was taken using Olympus microscope with built in camera.

The results of fine needle aspiration were compared to the histologic diagnosis. Each fine needle aspiration report was then classified as being either true positive, true negative, false positive, false negative (Table 2). If the fine needle aspiration was read as "follicular neoplasm" and the final pathology was either follicular adenoma or follicular carcinoma, then the fine needle aspiration was classified as true positive. Sensitivity, specificity and accuracy for fine needle aspiration were then determined.

OBSERVATIONS

Out of 80 cases, 50 smears having HPE were studied of which 82% were non-neoplastic and 18% malignant neoplasms

Non-neoplastic lesions were common in the age group of 30-39 years (Table 1) with female predominance (M:F- 1:5). Among these, nodular goitre formed the major group 60% followed by thyroiditis 22% (Fig. 1).

Fig. No.1
Distribution of thyroid lesions among 50 cases in current study



Table No.1
AGE & SEX DISTRIBUTION OF THYROID LESIONS

Age (years)	Male	Female
<19	0	1
20-29	2	10
30-39	5	13
40-49	2	10
50-59	-	2
60-69	-	5
Total	9	41
Total	Male + Female = 50	

Neoplastic lesions were common in the age group 20-29 years with mild female predominance. Among these 10% were follicular neoplasms. Papillary carcinoma was the next common malignant neoplasm (6%), followed by medullary carcinoma. A case of follicular carcinoma was categorized as follicular neoplasm on fine needle aspiration cytology. Of the five cases diagnosed as follicular neoplasm on cytology, four were follicular adenomas and one was follicular carcinoma.

Of the three cases of papillary carcinoma on cytology, two were confirmed on histopathology, remaining were nodular colloid goitre with cystic degeneration.

A case of medullary carcinoma on cytology was subsequently confirmed by histopathology.

Sensitivity has been defined as the ability of a test to identify correctly all those who have the disease that is "true positive" (TP). Specificity is defined as the ability of a test to identify correctly those who do not

have the disease, that is, "True Negative" (TN).

Table No. 2
CYTOLOGICAL AND HISTOPATHOLOGICAL CORRELATION

	CYTOLOGICAL DIAGNOSIS	DIAGNOSIS	NO. OF CASES
TP	Malignant Lesions	Confirmed as Malignant lesions cases	8 cases
TN	Benign lesions	Diagnosed as benign lesions	41 cases
FP	Diagnosed as Malignant lesions	Diagnosed as benign lesions	0 cases
FN	Diagnosed as benign lesions	Diagnosed as malignant lesions	1 cases

After comparison of FNAC with respective HPE reports FNAC was found to be 88% sensitive, 100% specific and 98% accurate; with a positive predictive value of 100% and negative predictive value of 97%.

Table 3: Age and sex distribution of each thyroid lesions

Age (years)	Nodular Goitre		Thyroiditis		Follicular neoplasm		Papillary carcinoma		Medullary carcinoma	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<19	0	1	-	-	-	-	-	-	-	-
20-29	1	7	-	1	-	1	2	1	-	-
30-39	2	7	-	6	2	1	-	-	-	-
40-49	2	5	-	3	-	1	-	-	-	1
50-59	0	2	-	0	-	-	-	-	-	-
60-69	0	3	-	1	-	-	-	-	-	0
Total	5	25	0	11	2	3	2	1	0	1
Total (Male + female)	30		11		5		3		1	

DISCUSSION

Enlargement of thyroid is a common problem encountered. This may be due to non-neoplastic or neoplastic lesions. Among non-neoplastic lesions are included nodular goitre and thyroiditis. Neoplastic lesions include benign neoplasms like adenomas and malignant lesions like different types of carcinomas. Solitary thyroid nodule is a common clinical problem accounting for 5-10 % of population^{3,8}. The majority of these nodules are non-neoplastic lesions or benign neoplasms. The incidence of cancer in solitary lesion is less than 5%⁹. An incidence of 60% and 75% of non-neoplastic lesions has been reported in earlier studies^{10, 2}. In the present study, 41 (82%) were diagnosed as non-neoplastic lesions (Fig. 1 & Table 3) and in this category; nodular goitre formed the major group (60%), followed by thyroiditis (22%). A study conducted by Altavilla et al documented total of 66.91% aspirates as benign¹¹. In the present study 30(60%) cases of nodular goitre were encountered. Hence, the present study is keeping in accordance with International standards.

The aspirates in one cases which were diagnosed on cytology as nodular goitre with cystic degeneration consisted of straw colored fluid with evidence of old hemorrhage- foamy macrophages with rhomboid crystals against background of abundant colloid were subsequently confirmed on histopathology as papillary carcinoma, accounting to 2% of false negative diagnosis.

Cystic papillary carcinoma is the commonest cause of false negative reports^{5,12}. In a series of 66 consecutive cases of papillary carcinoma, cystic change was seen in 16.6% cases, cytology in these cases showed only degenerative foam cells with papillary cell groups obscured, intranuclear inclusions and psammoma bodies absent¹³.

The cytological diagnosis of thyroiditis was made on 11 (22%) cases. We had 100% correlation between cytological and histopathological results. Hence indicating that FNAC is an excellent method for studying thyroiditis where it is the diagnostic method of choice.

The reported incidence of neoplastic lesions varied from 2% to 19% by various workers^{14, 15,16}. Of the 50 cases in our study, 9 (16%) cases were diagnosed as neoplastic on cytology. Among which follicular neoplasm comprised 5 (55.5%), papillary carcinoma 3 (33.3%) and medul-

lary carcinoma 1(11.1%).

In present study 5 cases were diagnosed as follicular neoplasm on cytology. On histopathological examination four cases were follicular adenoma and one follicular carcinoma. Discrepancies exist in differentiating cellular benign follicular neoplasm from their malignant counterparts, which is not solely an FNA problem^{3, 17,31}. Among pathologists, agreement on the histological diagnosis of follicular carcinoma was only 26%¹⁸. Hence one cannot expect to achieve perfect correlation with histological diagnosis if the histological diagnosis by itself is unreliable^{3, 7,14,15,16,17,19,20,21}. It was suggested that these lesions be classified under one broad heading of Follicular Neoplasm^{22, 23,31}.

All the diagnostic criteria for papillary carcinoma on cytology may not be seen in each case. Nuclear grooving, when seen in abundance can be considered a reliable criterion for diagnosis of papillary carcinoma^{24, 25}. However nuclear grooves were observed in 70% of non-papillary neoplasms like follicular carcinoma and medullary carcinoma and in 56% of non-neoplastic conditions like hyperplastic nodule, colloid nodule, chronic lymphocytic thyroiditis, though fewer in number and indistinct besides papillary carcinoma^{26, 27}. Psammoma bodies may be seen in benign process, such as nodular goitre, lymphocytic thyroiditis and in reactive hyperplasia of thyroid epithelium. However finding of psammoma bodies, warrant surgical removal of the gland²⁸.

In the present series of the three cases of papillary carcinoma on cytology, two were confirmed on histopathology, remaining were nodular colloid goitre with cystic degeneration. Hence diagnostic accuracy of fine needle aspiration for papillary carcinoma was 66.6%.

Kini et al⁶ reports the diagnostic accuracy of fine needle aspiration for papillary carcinoma as 94%²⁹.

The aspirates from medullary carcinoma thyroid show a wide spectrum of cytologic changes that corresponds to the varied histologic patterns as described by Kini³⁰. In our study we had one case of Medullary carcinoma diagnosed on cytology, which was subsequently correlated histologically as the same.

In the present series, false negative rate was 2%, which is in accord-

ance with most previous studies. The false positive rates in published series by various workers^{2, 3,4,7,11, 32, 33, 34, 35, 36, 37} shows range from 0% to 17%. In the present study false positive rate was 0%, this is in consonance with previous studies.

SUMMARY

The accuracy, sensitivity, specificity, predictive values, false positivity and false negativity of fine needle aspiration cytology as diagnostic test in present series are in keeping with in the International standards.

Fine needle aspiration cytology is the most cost effective, minimally invasive, least traumatizing procedure for the diagnosis of thyroid lesions, and planning of treatment strategy.

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