

## Research Article

### ROLE OF FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) IN DIAGNOSIS AND MANAGEMENT OF THYROMEGALY

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#### ABSTRACT

The thyroid gland is unique among endocrine glands in that it is not only the first endocrine gland to appear in fetus but is also the largest of all endocrine glands. FNAC is the cornerstone of the evaluation of thyroid lesions. To study the role of fine needle aspiration cytology (FNAC) in the diagnosis and management of thyromegaly. The study population included indoor and outdoor patients of the surgery Department. USG neck was done to find out the value of USG in the diagnosis of thyromegaly. The accuracy of FNAC was calculated in comparison to the histopathology reports. The present study was carried out on 150 patients with thyromegaly attending surgical OPD between 1<sup>st</sup> November 2011 to 31<sup>st</sup> October 2013. The oldest patient was 74 years old and youngest was 08 years old. Mean age of these patients was 33 years. Out of 150 cases 100 were operated because of pressure symptoms, toxicity, cosmetic reasons or risk of malignancy on clinical or FNAC examination. The Majority of cases 48 showed nodular goitre on FNAC, 3 were showed thyroglossal cysts on FNAC. Fine needle aspiration cytology was found to be an easy, safe and depend- able preoperative diagnostic.

#### KEY WORDS

FNAC, USG, Thyromegaly.

#### INTRODUCTION

The first unequivocal description of the normal thyroid gland is to be found in the works of Thomas Wharton in 1656. The thyroid gland is unique among endocrine glands in that it is not only the first endocrine gland to appear in fetus but is also the largest of all endocrine glands (20 - 25 gms). Normal thyroid gland secretes hormones (T3 and T4) that influence a diversity of metabolic processes. Enlargement of thyroid gland may result from many causes, the usual ones being hyperthyroidism, nodular goitre, diffuse goitre, thyroiditis and neoplasms<sup>1</sup>.

Goitre related thyroid swelling observed in all the continents of the world especially in

mountainous areas with iodine deficiency. The prevalence of goitre found to be high in north western and Great Lakes areas of United States, mountainous areas of central and South America, areas of Central Europe especially Alps and Pyrenees, parts of Finland, Yugoslavia and Greece. Several areas of Africa, the Congo, of the Himalayas and of China are heavily affected<sup>2</sup>.

Nodular thyroid enlargements may be due to benign nodular goitre, toxic nodules and benign and malignant neoplasms. Many investigations are used to differentiate between benign and malignant lesions so as to avoid surgery in those who don't need it, Among these FNAC & USG are commonly used

in association with clinical features but there are drawbacks of each technique and final answer to problem is still elusive.

Thyroid nodules are four times more common in women than in men and in elderly person and can be caused by a variety of thyroid disorder<sup>3</sup>. After exposure to ionizing radiation, thyroid nodules develop at rate 2 % annually<sup>4</sup>. The role of surgeon is usually in the management of enlargement of substance of gland and such cases of hyper function of thyroid which do not respond to conservative management.

In cases of thyromegaly ,age is important because nodular thyroid disease is uncommon in childhood and its presence should be viewed with suspicion. There is a greater risk of malignancy in nodules developing over the age of 60. Ultra sound is an excellent tool for visualising nodules in the thyroid and can differentiate solid from cystic lesions, solitary nodules from multinodular goitre and diffuse enlargement.

FNAC is the cornerstone of the evaluation of thyroid lesions. Fine needle aspiration cytology (FNAC), promoted by the Karolinska Institute in Sweden for over 40 years.FNAC should be used as an initial diagnostic test before both thyroid scintigraphy and ultrasonography<sup>5</sup>. The location of the target lesion , careful searching for malignant cells and repeat FNAC are the key to successful diagnosis to plan a proper surgical management in thyroid mass <sup>6</sup>. Depending upon the skills of the cytopathologist performing and interpreting the FNAC<sup>7</sup>, sensitivity of 68-98% and specificity of 72-100% has been attributed.

The aim of our study was role of fine needle aspiration cytology (FNAC) in diagnosis and management of thyromegaly.

#### **MATERIALS AND METHODS**

The study population included indoor and outdoor patients of the surgeryDepartment .

A detailed clinical history, duration and presence or absence of various symptoms was noted and recorded in a proforma. The period of the study between 1<sup>st</sup> November 2011 to 31<sup>st</sup> October 2013.

USG neck was done to find out the value of USG in the diagnosis of thyromegaly. A B-mode scanner and 7.5 mhz transducer with sector probe was used. The thyroid swellings were classified on the basis of USG findings into various categories as follows:

1. Multinodular Goitre,
2. Colloid Goitre,
3. Thyroid Cyst,
4. Solitary Nodule,
5. Thyroid Carcinoma.

#### **METHOD OF FINE NEEDLE ASPIRATION CYTOLOGY:**

The patient placed in supine position with a shoulder rest to extend the neck. Skin over the site cleaned and draped. No anaesthetic was used. The mass fixed with thumb and index finger of the left hand with the needle (24 to 26 gauge) inserted into the mass. Patients were instructed not to swallow or to speak during the procedure, to prevent inadvertent slipping of the needle outside the mass. Piston of syringe retracted as the needle moved within the confines of the lesion. Throughout the manouvre, negative pressure maintained by keeping the piston retracted. When aspiration was completed suction was released on barrel and needle removed. This prevented the specimen from being drawn into the barrel of the syringe. The actual aspiration was performed in 1-2 seconds to prevent flooding of syringe with blood. The specimen was then fixed with absolute alcohol and stained with modified Papanicolaou and Haematoxylin and Eosin stains.

Out of 150 cases of goitres 100 were selected for surgery, 50 cases were not operated either because of conservative line of management

or because of being unfit or unwilling for surgery.

The accuracy of FNAC was calculated in comparison to the histopathology reports. When report for a lesion was negative both on FNAC and histopathology it was termed true negative. When FNAC report was positive for a lesion compared to a negative on histopathology it was false positive when FNAC report was negative for a lesion and histopathology was positive it was termed false negative.

## RESULTS

The present study was carried out on 150 patients with thyromegaly attending surgical

OPD between 1<sup>st</sup> November 2011 to 31<sup>st</sup> October 2013. A detailed history was taken and examination was done. The patients were investigated with ultrasound, fine needle aspiration cytology and histopathology.

### AGE AND SEX DISTRIBUTION :

Table NoL1 shows age and sex wise distribution of the cases. Out of a total of 150 patients, there were 29 males and 121 females giving an incidence of 19.33 % and 80.67 % respectively. Maximum number of patients were in the third and fourth decade of life (23.76% and 29.70% respectively). The oldest patient was 74 years old and youngest was 08 years old. Mean age of these patients was 33 years.

Age Range	Male	Female	Total	Percentage (%)
0-9 years	1(0.67%)	4(2.67%)	5	3.3 %
10-19 years	4(2.67%)	15(10%)	19	12.67 %
20-29 years	5(3.33%)	28(18.67%)	33	22 %
30-39 years	8(5.33%)	34(22.67%)	42	28 %
40-49 years	5(3.3%)	22(14.67%)	27	18 %
50 years and above	6(4%)	18(12%)	24	16 %
Total	29	121	150	100 %
Mean Age	47.65	45.05	45.85	
SD	15.84	15.16	15.37	
	%	19.33 %	80.67 %	100

**Table No: Age And Sex Distribution.**

### CLINICAL DIAGNOSIS DISTRIBUTION:

Table No:2 shows distribution of cases of thyromegaly. The most commonly seen condition was nodular goitre, 124 cases. Out of 124 cases 9 cases were colloid goitre. Solitary nodules accounted for 75 cases (50 %) in this category. including 7 cases (4.67 %) toxic, 40 cases were multinodular goitre including 18 toxic (12 %) and 22 non toxic (14.67 %); 10 cases (6.67 %) were of

parenchymatous goitre. Three cases each (2 %) were of primary diffuse toxic goitre and thyroglossal cyst. Four cases each (2.67 %) were of thyroid cyst and thyroiditis. Two cases (1.33 %) were of carcinoma.

Out of 150 cases 100 were operated because of pressure symptoms, toxicity, cosmetic reasons or risk of malignancy on clinical or FNAC examination.

Total : 150patients

Parenchymatous Goiter	Nodular Goiter (124)					Primary Diffuse Toxic goiter	Carcinoma	Cysts (7)		Thyroiditis
	Colloid Goiter	Solitary Nodule (75)		Multinodular Goiter (40)				Thyroid Cyst	Thyroglossal Cysts	
10	9	Toxic	Non Toxic	Toxic	Non Toxic	3	2	4	3	4
		7	68	18	22					
6.67 %	6 %	4.6%	45.33%	12 %	14.67%	2 %	1.33 %	2.67 %	2 %	2.67 %

**Table No :2 CLINICAL DIAGNOSIS DISTRIBUTION.**

**COMPARISON OF CLINICAL DIAGNOSIS WITH ULTRASOUND (USG)** :Results of USG as compared with clinical diagnosis are shown in Table No:3 . Out of 57 patients of solitary nodules clinically, 13 were reported as multinodular on USG, while out of 35 patients who were clinically multinodular goitre, 4 Total : 100 patients

were diagnosed to be colloid goitre and 5 had solitary nodules. Out of 2 thyroglossal cysts clinically, on USG one was a solid nodule where as other was confirmed as a cyst. In rest of the patients sonography diagnosis was compatible with clinical diagnosis.

CLINICAL DIAGNOSIS	USG DIAGNOSIS						
	Colloidgoiter	Multinodular Goiter	Solitary Nodule	Adenoma	Thyroid cyst	Thyroglossal cyst	
Colloid Goiter	2	-	-	-	-	-	-
Multinodular Goiter	35	4	26	5	-	-	-
Solitary Nodule	57	-	13	36	7	-	1
Grave's Disease	2	-	2	-	-	-	-
Thyroid (Haemorrhagic) Cyst	2	-	-	1	-	1	-
Thyroglossal Cyst	2	-	-	1	-	1	-
Hashimoto's Thyroiditis	-	-	-	-	-	-	-
Total	100	6	41	43	7	2	1

**TableNo:3CLINICAL DIAGNOSIS -VS- USG DIAGNOSIS.**

**RELATIONSHIP OF CLINICAL DIAGNOSIS WITH F.N.A.C. DIAGNOSIS :**

Table No :4shows comparison of clinical diagnosis with FNAC diagnosis. Out of 59 patients of solitary nodules clinically, 48 showed nodular goitre on FNAC, while specimen was inadequate for reporting in 8 patients. Two patient showed atypical adenoma and one patient showed Hashimoto’s thyroiditis. Of the 31 patients of multinodular goitre two patient each was reported as follicular carcinoma and

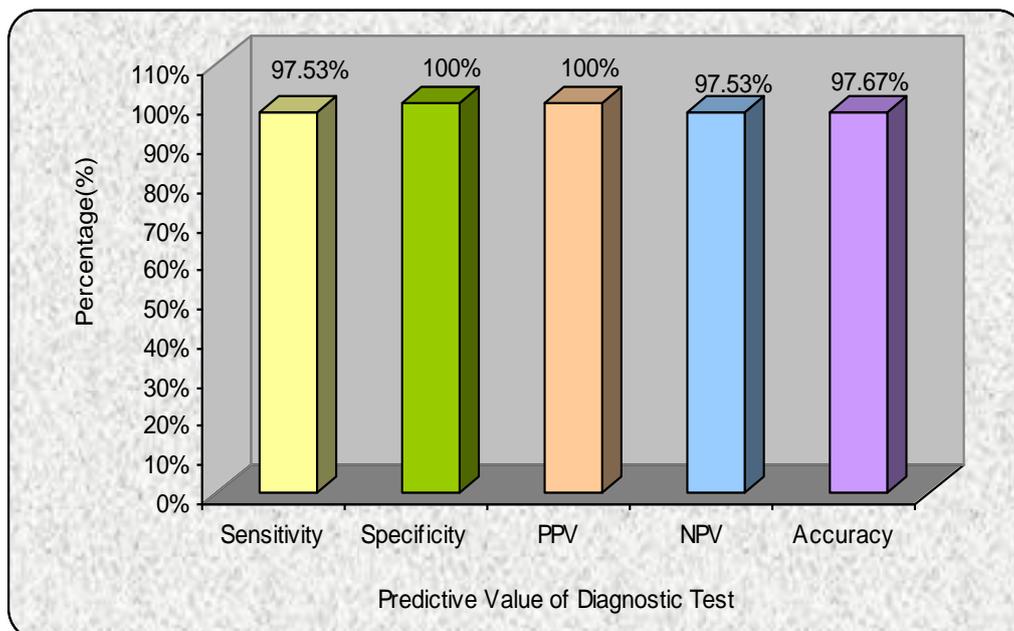
Hashimoto’s thyroiditis and report was inconclusive in 3 patients, In rest of the 24 patients clinical diagnosis was compatible with FNAC. The two cases of primary toxicosis were reported as nodular goitre on FNAC. Two cases of colloid goitre were confirmed as same by FNAC. Of three cases of thyroglossal cyst one was reported as colloid nodule and in the other two, the report was inconclusive. Out of three cases of thyroid cyst, two were reported as colloidgoiter and one had an inconclusive FNAC report.

CLINICAL DIAGNOSIS	FNAC DIAGNOSIS								
	Colloid/ Nodular	Follicular Adenoma	Follicular Carcinoma	Atypical Adenoma	Papillary Carcinoma	Hashimoto’s thyroiditis	Inadequate/ Inconclusive		
Colloid	2	-	-	-	-	-	-		
Multinodular	31	-	2	-	-	2	3		
Primary Toxic	2	-	-	-	-	-	-		
Solitary Nodule	59	-	-	2	-	1	8		
Thyroglossal Cyst	3	-	-	-	-	-	2		
Thyroid (Haemorrhagic) cyst	3	-	-	-	-	-	1		
<b>Total</b>	<b>100</b>	<b>79</b>	<b>2</b>	<b>2</b>	<b>-</b>	<b>3</b>	<b>14</b>		

**Table No :4CLINICAL DIAGNOSIS -vs- FNAC DIAGNOSIS.**

**EVALUATION OF F.N.A.C:**Graph No: 1 shows the evaluation of accuracy of FNAC on comparison of FNAC results with histopathology results. There were 05 true positive, 79 true negative. 00 false positive

and 02 false negative cases in the reporting of colloid/nodular goitre. This gives a calculation of sensitivity of 97.53 % specificity of 100 % and accuracy of 97.67 %. The positive predictive value was 100 % and the negative predictive value was 97.53 %.



**Graph No: 1 EVALUATION OF F.N.A.C.**

## DISCUSSION

In the present study of 150 cases of thyromegaly there were 80.67 % females and 19.33 % males giving a ratio of 4.17 :1 for females to males. This ratio is similar to the ratio reported by P K Bagga et al<sup>8</sup> 7.69:1, ArunSengupta et al<sup>9</sup> 3.81:1 Khageshwar et al<sup>10</sup> 2.30:1 and Abed et al<sup>11</sup> :1. There is a wide variation in female to male ratio in various studies which ranged from 2.3 :1 upto 11.5 :1 in Indian studies and in foreign studies from 2.07 : 1 upto 11.5 :1. The wide variation in the ratio appears to be due to the patients being taken up for surgery selectively on the basis of risk of malignancy. In the present study the maximum incidence of thyroid swellings was seen in the age group of 30-39 years (28 %). This observation is in agreement with the observation made by Fennet al<sup>12</sup>, Cherry et al<sup>13</sup> & NR et al<sup>14</sup> who had 35.67 %, 24 % and 34 % respectively in this age group.

Mean age was 45.85 years in the present study which is comparable to Dwarkanathan et al<sup>15</sup> 45 years, Abed et al<sup>11</sup> 40.21 and Pinki Pandey et al<sup>16</sup> with 39.0 years. The mean age reported by Klemietai<sup>17</sup> 50 years, is high

as compared to the present study. This is due to the fact that in these Western studies only those patients who had thyroid swelling suspected to be malignant were taken up for surgery compared to the present study where all patients were included.

The histopathological distribution of various lesions in the present study had 77 % colloid nodular goitre, 3 % adenomas, 9 % carcinoma, Hashimoto's thyroiditis 7 %, Thyroglossal cyst 2 % and others 2 %. This was similar to ArunSengupta et al<sup>18</sup> who observed colloid nodular goitre 72.47 %, adenoma 7.30 % and carcinoma 11.80 % and N R et al<sup>14</sup> who observed colloid nodular goitre 74 %, adenoma 2 % and carcinoma 24 % The lesser incidence of colloid nodular goitre and higher incidence of adenoma and malignancy in some other Indian series and Western Series is due to fact that they included only solitary thyroid nodules in the study and operated mainly in cases where malignancy was suspected.

In the present study the FNAC was found to have an accuracy of 97.67 % which is comparable to Afroze et al<sup>19</sup> with 94.50 %

accuracy; Bagga et al <sup>8</sup> with 96.20 % accuracy; Altavilla et al <sup>20</sup> with 95.09 %; Suresh Kumar et al <sup>21</sup> with 97.70 % accuracy and N R et al <sup>14</sup> with 94 % accuracy. As compared to foreign studies the present study had a sensitivity of 97.53 %, specificity 100 %, accuracy 97.67 % .The positive and negative predictive values were 100 % and 97.53 % respectively. This was found to be comparable to other indian studies e.g. Bagga et al <sup>8</sup> with a sensitivity 66 %, specificity 100 %, accuracy 96.20 % and the positive and negative predictive values were 100 % and 97.53 % respectively ; Attavilla et al <sup>20</sup> who had a sensitivity of 71.43 %, specificity 100 % and accuracy of 95.09 % and the positive and negative predictive values were 100 % and 94.40 % respectively ; Suresh Kumar et al <sup>21</sup> who had a sensitivity of 77 %, specificity 100 % and accuracy of 97.70 % and the positive and negative predictive values were 100 % and 97.56 % respectively and N R et al <sup>14</sup> who had a sensitivity of 91.66 %, specificity 97.29 % and accuracy of 94 % and the positive and negative predictive values were 91.66 % and 9.29 % respectively The percentage of inadequate smears/inconclusive FNAC results was 14 % in present series comparable to Altavilla et al <sup>20</sup> with 16.11 % . Thus most of the studies had FNAC results similar to the present study.

### CONCLUSIONS

The thyroid swellings are most common in the 3rd and 4th decade of life, but may present at the extremes of age also. The ratio of males to females was 1:4.2 The duration of goitre ranged from 15 days to 20 years with maximum patients in 0-1 years group . Among other clinical features most common were exhaustion on strain, dysphagia and palpitation .Maximum patients had a clinically solitary nodule followed by multinodular goitre.

Ultra sonography was found to be helpful in assessing the nodularity in goiters.Fine needle

aspiration cytology was found to be an easy, safe and depend- able preoperative diagnostic aid with a sensitivity of 97.53 %, specificity 100 %, accuracy 97.67 %, positive predictive value 100 % and negative predictive value of 97.53 %. Complication rate of this procedure was found to be zero. Complication rates of surgery were low with only minor complications (wound infection) in 6 %.

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