

A Comparative Study of Fine Needle Aspiration Cytology and Ultrasound in the Diagnosis of Thyroid Lesions: A Prospective Analysis of 250 Cases

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Abstract

Background: The incidence of clinically evident thyroid nodules is 4-5% in the general population. Fine needle aspiration cytology of thyroid can be used as diagnostic test along with ultrasonography for evaluation of thyroid lesions. *Aims and Objective:* To study cytological profile of thyroid lesions and correlate the results with Ultrasonography findings and clinical features. *Material and Methods:* This prospective study was carried out in department of pathology on 250 patients with thyroid swelling who came from surgical departments from the period of October 2016 to October 2017 at Narayana medical college and hospital, Nellore. Results of FNAC were correlated with those of USG reports and clinical features of the patient. *Results:* Out of 250 cases, 227 [90.8%] cases were benign, 8 [3.2%] cases were malignant on FNAC. About 220 cases (88%) were females and (12%) were males (male to female ratio 1:733). On USG 68% cases were diagnosed as benign and 2.8% cases were malignant. Out of which on cytology 90.8% were benign & 3.2% cases were malignant. On FNAC Multinodular goitre (47.2%), colloid goitre(6%), Thyroiditis((34%), diagnosed. Follicular neoplasm (4%), suspicious of malignancy 5 cases(2%) diagnosed under indeterminate category on FNAC. On USG nodular goitre (52.4%), colloid goitre(5.6%), Thyroiditis 73 cases(29.2%), Follicular adenoma 16 cases (6.4%) and malignancy 7 cases (2.8%). Thyroglossal cyst (2.8%), Graves disease (0.68%) diagnosed on FNAC and USG as well. *Conclusion:* Ultra sound and Fine needle aspiration cytology are advocated as first line examination for the assessment of thyroid lesions along with clinical examination and helps to come to the proper diagnosis

Keywords: Fine Needle Aspiration Cytology; Ultrasonography; Thyroid Lesions; Benign; Malignant.

Introduction

The Thyroid gland is the largest unique endocrine gland and which is amenable to direct physical examination because of its superficial location [1]. Thyroid lesions are a common clinical problem in women and in areas of iodine deficiency. The majority of thyroid nodules are asymptomatic and malignancy represents about 5% of palpable nodules. Different

tests have been employed to separate benign from malignant nodules [2]. Thyroid nodular lesions are common clinical problem. 4-7% of the adult population have palpable nodule. Most common thyroid lesions are benign whereas thyroid malignant lesions are rare [3]. Fine needle aspiration cytology of thyroid is the sensitive, specific most accurate diagnostic tool for diagnosis of different thyroid lesions. It is frequently used in all thyroid lesions for exclusion of cancers and in the initial management of patients. Fine needle aspiration cytology is minimally invasive, low cost procedure with minimal complications [4,5]. Fine needle aspiration cytology is considered as first line investigation in the diagnosis of thyroid lesions [6]. Sensitivity and specificity of Fine needle aspiration cytology is up to 94% and 98% for diagnosis of

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malignant lesions, and 90% accuracy rate in identification of malignancy excluding follicular lesion [7]. The incidence of malignancy in thyroid nodules ranges between 10% to 30% depending on the selected surgical indications. Ultrasonography is highly sensitive and easily accessible diagnostic modality [8]. The present study is to evaluate thyroid lesion by Fine needle aspiration cytology in combination with ultrasonography and clinical features.

Material and Methods

This prospective study was carried out in department of pathology on 250 patients with thyroid swelling who came from departments of General surgery, ENT and Endocrine from the period of October 2016 to October 2017 at Narayana medical college and hospital, Nellore Andhrapradesh. Fine needle aspiration cytology of patient was performed at department of pathology and results of Fine needle aspiration cytology were correlated with those of Ultrasonography reports and clinical features of the patient

Inclusion Criteria

1. Age 10 to 75 years with thyroid swellings
2. Cooperative patients and willing for Fine needle aspiration cytology or Ultrasonography,

Exclusion Criteria

1. Un cooperative patients, not willing for Fine needle aspiration cytology or Ultrasonography

All patients clinical details were recorded like age, sex, clinical presentation, signs related to thyroid swelling. All routine investigations and serum T3,T4 and TSH levels were performed by Radioimmunoassay(RIA)(Normal range of T3, 2.5-5.8Pmol/L, T4, 11.5-23.0 pmol/L and TSH, 0.2-4.0ml/l). Patients with thyroid swelling underwent Ultrasonography of thyroid gland and then Fine needle aspiration cytology was performed. Smears were prepared, stained with haematoxylin & eosin stain and cytological findings and diagnosis were recorded. The result of thyroid Ultrasonography and Fine needle aspiration cytology were compared. All the data was analyzed with SpSS version 17. The results of thyroid Ultrasonography and Fine needle aspiration cytology diagnosis were calculated and P value estimated.

Results

In the present study 250 patients with thyroid swelling was investigated with Fine needle aspiration cytology and USG thyroid region. The age of patients ranged from 15 to 75 years mean age 36.04 ± 14.23 years. In the present study maximum number of cases was between 28-37 years of age (34.4%) followed by 38-47 years of age(33.2%). About 220 cases (88%) of females and 30(12%) were males (male to female ratio 1:733) (Table 1). Regarding thyroid function tests, 184 patients (73.6%) were euthyroid, 10patients (4%) were hyper thyroid and 56 patients (22.4%)were hypo thyroid (Table 1). Out of 250 patients, 227 patients (90.8%) were of benign FNAC (Multinodular goiter118

Table 1: Demographic, clinical and laboratory characteristics of cases [n=250]

Sex	No	Percentage [%]
Male	30	12
Female	220	88
Age		
15-25	29	11.6
26-35	86	34.4
36-45	83	33.2
46-55	48	19.2
56-65	30	12
66-75	14	5.6
Clinical signs/Symptoms		
Swelling in front of neck	250	100
Dyspnea	10	4
pain	15	6
Dysphagia	30	12
Hoarseness of voice	12	5
Thyroid Function tests		
Euthyroid	184	73.6
Hyperthyroid	10	4
Hypothyroid	56	22.4

Table 2: Distribution of cases depending on FNAC diagnosis [n=250]

Thyroid lesions	No	Percentage
Benign	227	90.8
Malignant	8	3.2
Benign		
Multinodular goitre	118	47.2
Colloid goitre	15	6
Thyroglossal cyst	7	2.4
Graves disease	2	0.68
Hashimotos thyroiditis	73	24.8
Lymphocytic thyroiditis	12	4.8
Indeterminate		
Follicular neoplasm	10	4
Suspicious of malignancy	5	2
Malignant		
papillary carcinoma	8	3.2

Table 3: Distribution of cases depending on USG diagnosis

Thyroid lesions	USG Diagnosis	No	Percentage
Benign	-	170	68
Malignant	-	7	2.8
Benign	Multinodular goitre	131	52.4
-	Colloid goitre	14	5.6
-	Thyroglossal cyst	7	2.8
-	Graves disease	2	0.68
-	Follicular adenoma	16	6.4
Inflamatory	Thyroiditis	73	29.2%
Malignant	Papillary carcinoma	7	2.8

Table 4: Results of present study in comparision with other studies

Thyroid lesions	Sanjay Kothari et al [13]		Chavan U S et al[11]		Present study	
	FNAC	USG	FNAC	USG	FNAC	USG
Benign	66%	84%	60%	79%	90.8%	68%
Malignant	4%	6%	1.4%	7.8%	3.2%	2.8%
Multinodular goitre	4%	30%	2.2%	32%	47.2%	52.4%
colloid goitre	18%	16%	62%	27%	6%	5.6%
Thyroiditis	8%	10%	14%	10.4%	34%	29.2%
Thyroglossal cyst	4%	4%	3.6%	4.3%	2.8%	2.8%
Graves disease	2%	2%	0.7%	0.9%	0.68%	0.68%

Table 5: Showing statistical association of FNAC categories and USG categories of lesion [N=250]

Thyroid Lesions	FNAC	USG	P Value
Benign	227(90.8%)	170 (68%)	0.76
Malignant	8(3.2%)	7(2.8%)	0.77
Multinodular goitre	118(47.2%)	131(52.4%)	0.22
Colloid goitre	15(6%)	14(5.6%)	0.77
Thyroglossal cyst	7(2.8%)	7(2.8%)	0.98
Graves disease	2(0.68%)	2(0.68%)	0.99
Thyroiditis	85(34%)	73(29.2%)	0.21
Papillary carcinoma	8(3.2%)	7(2.8%)	0.77

cases (47.2%), Colloid goiter 15 cases (6%), Hashimotos thyroiditis 73(29.2%), Lymphocytic thyroiditis 12 cases (4.8%) Thyroglossal cyst 7 cases (2.8%), Graves disease 2 cases (0.68%)) (Table 2). About 15 cases (6%) were of indeterminate including Follicular neoplasm 10 cases (4%), suspicious for malignancy 5 cases (2%) and 8 cases (3.2%) were malignant (Papillary carcinoma) (Table 2). Swelling in front of neck (100%) was the most common clinical sign observed. Ultrasonography examination was done in all 250 cases. About 68% cases were diagnosed as benign. Multinodular goiter 131 cases (52.4%) being the most common (Table 3) followed by Thyroiditis 73 cases (29.2%), follicular adenoma 16 cases (6.4%), colloid goiter 14 cases (5.6%), 7 cases Thyroglossal cyst (2.8%), 2 cases Graves disease (0.68%). About 7 cases (2.8%) of Thyroglossal cyst and 2 cases (0.68%) diagnosed on FNAC and USG as well. All the malignant cases were given as papillary carcinoma (2.8%) (Table 3).

Discussion

Fine needle aspiration cytology is the corner stone of the laboratory evaluation of benign and malignant thyroid lesions. Thyroid ultrasound is a non invasive imaging method that should be performed on all patients with clinically suspected nodules or incidentally noted. Thyroid ultrasonography and Fine needle aspiration cytology is a cost effective way of managing thyroid lesions in India. High resolution thyroid ultrasonography is a specific and sensitive diagnostic method used in clinical evaluation and epidemiological studies of thyroid nodular lesions [9]. Ultra sound guided Fine needle aspiration cytology of thyroid nodule can diagnose most thyroid nodules and differentiate between malignant and benign [10].

In the present study maximum number of cases was between 28-37 years of age, followed by 38-47 years of age. The mean age was 39.04±12.88 years. Study by Chavan US [11] also showed more cases in age group of 28-47 years. In the present study 88% patients were females and 12% were males. The male to female ratio was 1: 733. In a study by Handa U [12], male to female ratio was 1 : 6.55 and in Chavan US [11] study male to female ratio 1 : 6.26. All 250 patients presented with swelling in front of neck (100%) 10 cases (4%) dyspnea, 15 cases (6%) pain in swelling, 30 cases (12%) dysphagia and 12 cases (5%) Hoarseness of voice. These findings correlated with studies carried out by Chavan US [11] and sanjay Kothari [13].

In ultrasonography examination was done in all 250 cases. About 170 cases (68%) cases were diagnosed as benign. Multinodular goitre being the

most common 133 (52.4%), followed by 16 cases (6.4%), Follicular adenoma 14 cases (5.6%) colloid goiter, 7 cases (2.4%) Thyroglossal cyst, 2 cases (0.68%) Graves' disease noted. 73 cases (29.2%) Thyroiditis under inflammatory category and 7 cases (2.82%) of papillary carcinoma under malignancy category in our study. In our study Multi nodular goiter (52.4%), Thyroiditis (29.2%) and malignancy (2.8%) diagnosed on USG which were higher than study carried out by Sanjay kothari et al [13] (Table 4). Graves disease (0.68%) of benign lesion in our study correlated with Study carried out by Chavan US et al [11](Table 4).

In Fine needle aspiration cytology majority, 227 (90.8%) cases were diagnosed as benign which included like Multinodular goiter 118 (47.2%), Colloid goiter 15 (6%), Thyroglossal cyst 7 cases (2.4%), 73 cases (24.8%) Hashimotos thyroiditis and 12 Cases (4.8%) Lymphocytic Thyroiditis. On Fine needle aspiration cytology 8 cases (3.2%) of papillary carcinoma are noted under malignancy category, 10 cases (4%) Follicular neoplasm, 5 cases (2%) suspicious of malignancy noted under indeterminate category in our study. Fine needle aspiration cytology revealed malignancy in one patient in whom Ultrasonography diagnosed Benign lesion (Follicular adenoma). Fine needle aspiration cytology revealed Hashimotos thyroiditis diagnosis in 12 patients whom USG diagnosed as nodular goiter. Fine needle aspiration cytology revealed follicular neoplasm 10 cases (4%), suspicious of malignancy 5 cases (2%) which are diagnosed as follicular adenoma on ultrasonography. In our study Thyroiditis (34%) and Multinodular goiter (47.2%) cases are diagnosed on Fine needle aspiration cytology Which were higher than study carried out by Sanjay Kothari et al [13] (Table 4). Graves disease (0.68%), Thyroglossal cyst (2.8%) diagnosed on Fine needle aspiration cytology which is almost similar to study done by Chavan et al [11] (Table 4). Malignancy (3.2%) diagnosed on Fine needle aspiration cytology in our study which was almost similar with study done by Sanjay Kothari et al [13] (Table 4). There was no statistically significant differences observed between Fine needle aspiration cytology and ultrasonography assessing thyroid lesions (Table 5). In a study by Sanjay Kothari [13] statistically there was no significant differences were observed in both Fine needle aspiration cytology and ultrasonography in assessing thyroid lesions except multinodular swelling.

Fine needle aspiration cytology should be suitable as an initial investigation of thyroid lesions in all tertiary hospitals. The information given by ultrasound has no significant direction in the management of solitary thyroid nodules. Fine needle

aspiration cytology provides valuable information and may be used along with clinical information to provide best form of treatment in a solitary thyroid nodules. Fine needle aspiration cytology has certain limitations because of scanty sample and suspicious diagnosis. The limitation can be minimized by Histopathological examination [14]. Another limitation of applying Fine needle aspiration cytology and ultrasound for diagnosing thyroid lesions is that it cannot differentiate between benign and malignant follicular neoplasm [15]. All benign and malignant Fine needle aspiration cytology findings were confirmed on Histopathological examination Final histology [16].

Conclusion

We can conclude that for diagnosis of thyroid lesion, Fine needle aspiration cytology is the main diagnostic modality along with Ultrasonography and clinical examination which helps for proper diagnosis. Fine needle aspiration cytology has reduced the number of patients with thyroid nodules undergoing unnecessary Surgery and planning for Surgery in malignant cases. In clinically suspected benign & malignant lesions of Thyroid, FNAC can accurately diagnose the condition when compared to ultrasonography which fails to give correct diagnosis.

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