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Original Article

A Study of Correlation of Fine Needle Aspirationcytology and Histopathology in Diagnosis of Thyroidswelling

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ABSTRACT

Aims and objectives:
1) To compare and correlate the result of FNAC with histopathological examination in diagnosis of thyroid lesions .
2) To define the role of FNAC in differentiating between benign and malignant lesions.
Materials and methods: A prospective study carried out at a tertiary care centre. All patients with thyroid enlargement visiting the ENT department for a duration of 18 months were included in the study. Histopathological examination of the tumor could be done only in operated patients. Correlation of FNAC with histopathological examination will be done in those patients.
Inclusion Criteria: Those patients with thyroid swelling, who underwent FNAC, Thyroid surgery and histopathological examination within the study period will be included in the study
Exclusion Criteria: All the cases of thyroditis will be excluded. Those patients having FNAC done and did not have thyroid surgery and underwent medical management will be excluded.
Results: 27 subjects showing anterior neck swelling, 23 subjects were female (85.2%) and 4 were male (14.8%). When FNAC based diagnosis was compared with Gold standard Histopathology Diagnosis, it was found that True positive cases were 3. There were no False positive cases. 21 cases were true negative whereas 3 cases came false negative.
Conclusion: FNAC provides a more rapid and accurate diagnosis of thyroid lesions than any other combination of diagnostic test, however Histopathology is always required to confirm the diagnosis and for further management

Key Words: *Thyroid, Neck swelling, fnac ,Biopsy.*

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INTRODUCTION

Thyroid diseases are common problem of the world and it is essential in the clinical practice to differentiate few malignant thyroid tumors from benign thyroid lesions. Hencea definitive preoperative tissue diagnosis of the malignancy allows planning of appropriate surgery and relevant patient counseling. Fine needle aspiration cytology (FNAC) is simple, readily available, reliable, time saving, and minimally invasive procedure[1,2,3,4]. Hence, it is widely accepted as a diagnostic tool in recent years.

Various literatures and articles have been published during the last 50years, which have put the cytology in first line. In 1993, Stewart had stated that "diagnosis by FNAC is reliable as combined intelligence of the clinicians and pathologists make it"[5]. It is usefulfor diagnosis of pathological lesions of multiple organs such as lymph node, breast, thyroid, etc. Being superficial and easily accessible thyroid is an ideal organ for FNAC.It is vital for surgeon to know the morphological nature of the lesion before any surgery[6]. With FNAC, thyroid function tests are also helpful in diagnosis in thyrotoxicosis and thyroiditis.

It also helps in deciding the line of treatment and taking decision about the surgical procedure[7]. Another procedure, like histopathological examination of surgically excised thyroid swelling is also one of the accurate ways to determine the pathology. However, itrequires preparation and long procedure like anesthesia, hospitalization and sometime even over treatment[8]. Primary objective of this study was to evaluate the result of FNACin diagnosis of various thyroid lesions and correlate the result of FNAC with histopathological examination in diagnosis of various thyroid lesions.

MATERIALS AND METHODS

A prospective study carried out at Tertiary care hospital .Institutional ethics committee permission was taken before starting the study. All the patients with thyroid enlargement visitingENT department will be included in the study. The

patient having the thyroiditis are excluded. During the study duration of 18 months total number of patients with thyroid enlargement will be recruited in the study. Informed written consent from all the patient will be taken before recruitment in the study.

Detail history of patients like demographic data, history of present thyroid swelling, weight loss, diplopia, mood swings, palpitation, tremors and drug history will be taken. Patient's general examination and thyroid function test like serum T3, T4, TSH as well as FNAC examination will be performed in each patient .

Histopathological examination of the tumor could be done only in operated patients.Correlation of FNAC with histopathological examination will be done in those patients.

Inclusion Criteria

Those patients with thyroid swelling, who underwent FNAC, Thyroid surgery and histopathological examination within the study period will be included in the study

Exclusion Criteria

All the cases of thyroditis will be excluded. Those patients having FNAC done and did not have thyroid surgery and underwentmedical management will be excluded

RISK FACTORS AND ADVERSE EVENTS: No additional risk was involved in the study. The procedure related risks were mentioned at the time of obtaining informed consent.

RESULTS:

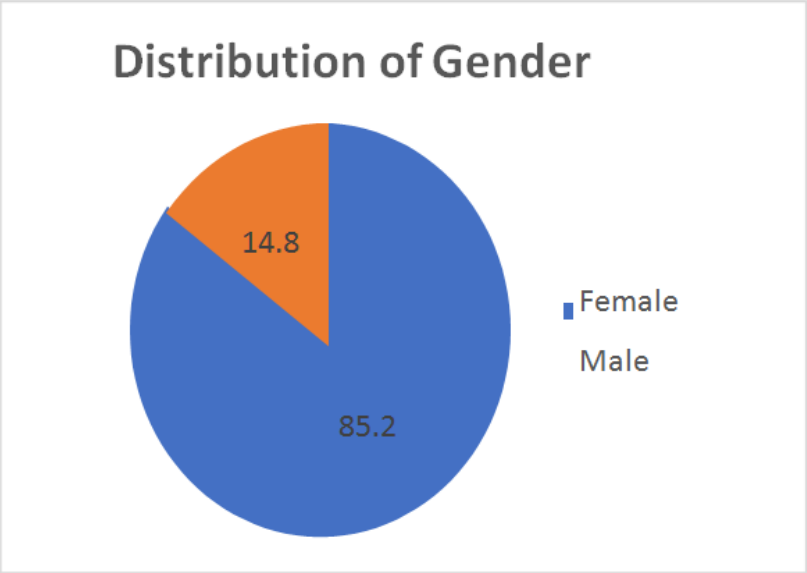


Fig 1 : Gender Distribution

TABLE 1: AGE DISTRIBUTION

Age Group (Years)	Frequency	%
21 to 30	3	11.1
31 to 40	8	29.6
41 to 50	4	14.8
51 to 60	8	29.6
61 to 70	3	11.1
>70	1	3.7

Study included 23 females and 4 males. (Fig 1)

The patients of different age groups were included from 21 to 70 years and the distribution is shown in Table 1. The age

groups 31 to 40 years and 52 to 60 years hadshown the maximum frequency (29.6%) of occurance of thyroid swellings in this study.
Out of 27 patients ,1 patient had Diabetes Mellites and 4 had Hypertension as shown inTable 2.

TABLE 2: DISTRIBUTION OF COMORBIDITIES

Major comorbidity	**Number**	**%**
DM	1	3.7
HTN	4	14.8
No	22	81.5

The history of anterior neck swelling was analysed. The shortest time period mentioned was 3months and the longest duration included in this study is8 months. Only 2 subjects (7.4%) had shown anterior neck swelling within 3 months. (Fig 2)

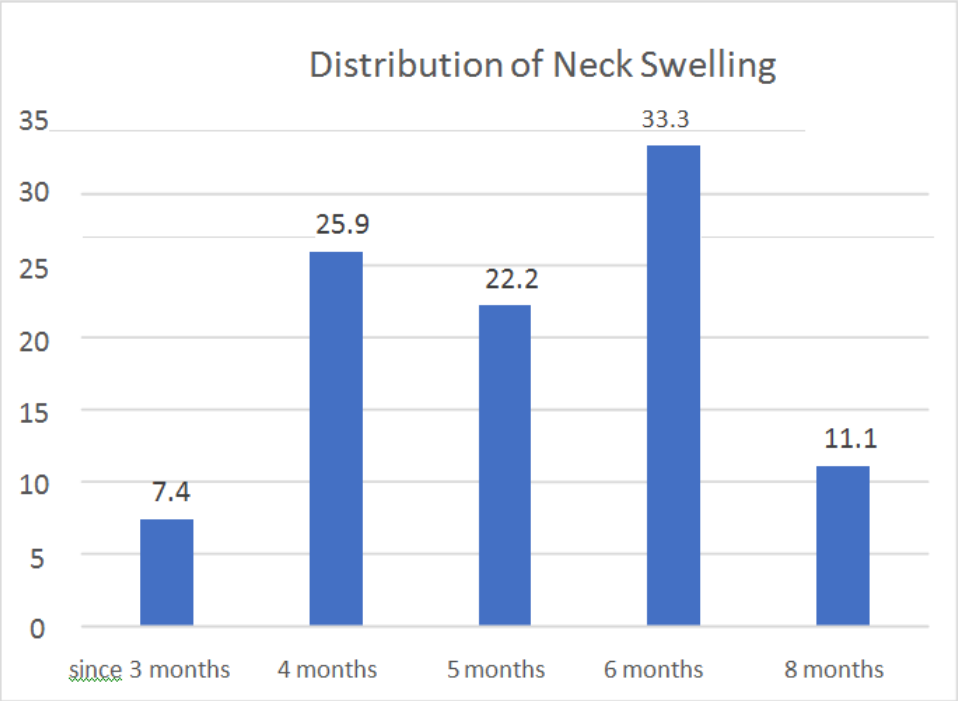


FIG 2 : Duration of neck swelling

The most common symptoms associated with anterior neck swelling like difficulty in swallowing, difficulty in breathing were assessed. 2 subjects (7.4%) shown difficultyin swallowing and only 1 subject (3.7%) shown difficulty in breathing. (Table 3A and 3B)Rest all were asymptomatic in spite of clinically palpable swelling.

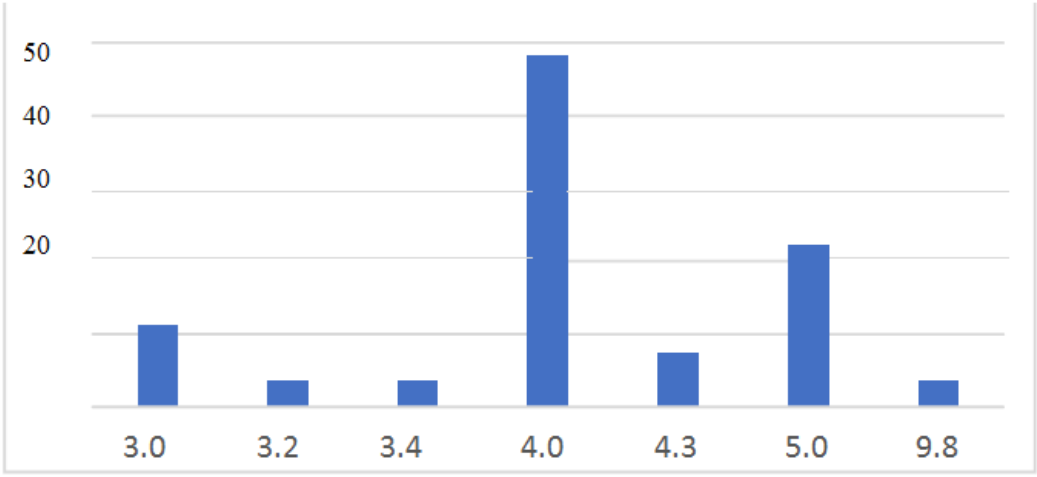
TABLE 3A and 3B : INCIDENCE OF DIFFICULTY IN SW ALLOWING AND BREATHING

Difficulty in swallowing	**Number**	**%**
Yes	2	7.4
No	25	92.6

Difficulty in breathing	**Number**	**%**
Yes	1	3.7
No	26	96.3

Measuring the size, consistency of the thyroid neck swelling can be a predictive diagnostic feature of the type of swelling. Soft and firm solitary nodules could direct in favour of benign lesions and hard lesions could indicate the possibility of malignancy.

Minimum swelling size was 3 cm and maximum was 9.8 cm. While minimum volume of nodule was 12 cc and maximumbeing 138.3 cc.(Fig 3)



Mutinodular swelling was seen in 18.5% cases whereas remaining 81.5% werenodular swellings. (Table 4) The overall distribution of benign and malignant on final diagnosis after histopathological confirmation are benign (77.8%), Malignant (22.2%). (Table 5)

Table 4: Distribution of consistency

Consistency of swelling	**No.**	**%**
Multinodular	5	18.5
Nodular	22	81.5

Table 5: Final Histopathological Diagnosis

DISTRIBUTION OF FINAL DIAGNOSIS		
Final diagnosis	**Number**	**%**
Benign	21	77.8
Malignant	6	22.2

There was no additional risk found in any of the gender, age group or type ofswelling. (Table 6)

Table 6 : Risk assessment of Age, sex and consistency

RISK FACTORS		**Parameter**	**Final diag Histopath**		**P**
			Benign(N=21)	**alignant(N=6)**	
Gender	Female (N=23)	Number	19	4	0.148
		%	90.5%	66.7%	
	Male (N=4)	Number	2	2	
		%	9.5%	33.3%	
	>70 (N=1)	Number	1	0	
		%	4.8%	0.0%	
	21 to 30 (N=3)	Number	2	1	

		%	9.5%	16.7%	
Age Groups	31 to 40 (N=8)	Number	5	3	0.606
		%	23.8%	50.0%	
	41 to 50 (N=4)	Number	4	0	
		%	19.0%	0.0%	
	51 to 60 (N=8)	Number	6	2	
		%	28.6%	33.3%	
	61 to 70 (N=3)	Number	3	0	
		%	14.3%	0.0%	
Swelling Consistency	MultiNodular (N=5)	Number	5	0	0.185
		%	23.8%	0.0%	
	Nodular (N=22)	Number	16	6	
		%	76.2%	100.0%	

Acellular smear that is no cells were seen in (N=2) samples. In one case there was haemorrhagic aspirate (N=1) which turned out malignant. Cystic lesion was seen in 1 benign case. Colloid goitre was seen in 12 cases. (57.1%). One adenomatous goitre was foundmaliganant out of 2 on FNAC.2 Cases of multinodular goitre were observed which turned out benign. Inadequate sample was found in one case and no findings wee seen on one case both of these cases were later found to be malignant. (Table 7)

Table 7 : FNAC Findings correlation with Histopath diagnosis

Findings of FNAC	**Parameter**	**Final_diag_Histopath**		**P**
		Benign (N=21)	**Malignant (N=6)**	
acellular smear . nocellsseen (N=2)	Number	2	0	0.03
	%	9.60%	0.00%	
adenomatous goitre(N=2)	Number	1	1	
	%	4.80%	16.70%	
colloid cyst (N=1)	Number	1	0	
	%	4.80%	0.00%	
colloid goitre(N=12)	Number	12	0	
	%	57.10%	0.00%	
colloid Nodular(N=1)	Number	1	0	
	%	4.80%	0.00%	
cystic lesion (N=1)	Number	1	0	
	%	4.80%	0.00%	
follicular neoplasm adenomatous goitre(N=1)	Number	0	1	
	%	0.00%	16.70%	
haemorrhagic aspirate(N=1)	Number	0	1	
	%	0.00%	16.70%	
hyperplastic colloidgoitre(N=1)	Number	1	0	
	%	4.80%	0.00%	
inadequate foropinion(N=1)	Number	0	1	
	%	0.00%	16.70%	

multiNodular goitre(N=2)	Number	2	0
	%	9.50%	0.00%
scanty macrophages, colloid and few epithelial cells(N=1)	Number	0	1
	%	0.00%	16.70%
No finding	Number	0	1
	%	0.00%	16.70%

When FNAC based diagnosis was compared with Gold standard Histopathology Diagnosis, it was found that True positive cases were 3. There were no False positive cases. 21 cases were true negative whereas 3 cases came false negative (Table 8)

Table 8

		Histopathology Diagnosis				**P**
		Positive (N=6)		Negative (N=21)		
		Number	%	Number	%	
FNAC Diagnosis	Positive (N=3)	3	50.0%	0	0.0%	0.006
	Negative (N=24)	3	50.0%	21	100.0%	

DISCUSSION:

Statistics	**Value**	**95% CI**
Sensitivity	50.00%	11.81% to 88.19%
Specificity	100.00%	83.89% to 100.00%
Positive Likelihood Ratio		
Negative Likelihood Ratio	0.50	0.22 to 1.11
Disease prevalence (*)	22.22%	8.62% to 42.26%
Positive Predictive Value (*)	100.00%	
Negative Predictive Value (*)	87.50%	75.87% to 93.97%
Accuracy (*)	88.89%	70.84% to 97.65%

Comparison of results of present study with various previous studies is shown inTable 7. With the help of statistical parameters, the significance of FNAC in surgical decision-making protocol has been evaluated.

Study	year	Number of patients	Sensitivity	Specificity	Accuracy	NPV	PPV
Al-Sayer et al	1985	70	86	93	92	96	80
Cusick et al	1990	283	76	58	69	64	72
Bouvet et al	1992	78	93.5	75	79.6	88.2	85.3
KO HM et al	2003	207	78.4	98.2	84.4	66.3	99
Kessler et al	2005	170	79	98.5	87	76.6	98.7
Present study	2021	27	50	100	88.9	87.5	100

In present study, 27 patients were evaluated thoroughly with clinical examination, FNACand finally correlated with histopathology. Among the subjects evaluated, the age of patients ranged from 26 to 73 years with mean of 46.4 years. This age range and mean incidence is slightly lower as compared with previous studies (32-42). We found that majority of patients were in their third and fifth decade of life (p-0.606) and least in old age group. This is in accordance with the study by **Dorairajanand Jayashree et al** [9].

The maximum size ranged from 3 cm to 9.8 cm with a mean of 4.3cms. The thyroid nodules were 6-7 times more in females as compared to males which is in concordance with the previous literature mentioning 4-9 times more in females (41, 51). The female to male ratio showing benign lesions more than malignant (p-0.148). In our series detailed history was taken and clinical evaluation was done for every cases. All the 27 patients presented to us with a complain of swelling at thyroid region. Most of the patients were asymptomatic at the time of presentation. 2 subjects (7.4%) shown difficulty in swallowing and only 1 subject (3.7%) shown difficulty in breathing. Rest all were remained asymptomatic. Most of the thyroid swellings appear solitary nodular and only few appeared as multinodular and the malignancy rate was more in solitary nodules (p-0.185). The shortest duration of thyroid swelling observedwas 3 months in this study.

The presence of associated comorbidities like Diabetes Mellitus, Hypertension in our patients presented with thyroid swellings did not correlate with malignancy (p-0.416). In our study themaximum samples (N-15) with size ranging 3 to 4 cms showed malignancy on final diagnosis (p-0.448). This study findings correlated with the previous literature as thyroid swellings associated with Diabetes Mellitus and Hypertension were diagnosed as benign[10].

The methods used for the calculation of sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were similar to previous studies [11]. Sensitivity and accuracy of FNAC for detection of neoplasm were 100% and 87.5%, respectively, whereas they were 76% and 69%, respectively, in a study by **Cusick et al**.[12]

The sensitivity, specificity, and accuracy of FNAC for solitary thyroid nodules were 100%, 87.5%, and 88.9% respectively, in our study whereas sensitivity, specificity, and accuracy of FNAC were 93.5%, 75%, and 79.6%, respectively, in a study by **Bouvet et al.** [13] and 79%, 98.5%, and 87%, respectively. The Bethesda system of classification is used in the FNAC description of thyroid nodules. Cytological diagnoses were classified as: non-diagnostic (ND), benign, atypia of undetermined significance/follicular lesions of undetermined significance (AUS/FLUS), follicular neoplasm/suspicious for follicular neoplasm (FN/SFN), suspicious for malignancy (SUS) and malignant. In our study 6 cases were found to be malignant on histopathological examination (p-0.001). It is to be stressed that all malignant cases diagnosed by FNAC were carcinoma on histopathological examination also. This is in accordance with previous studies[10]. In this study a discrepancy was noted after FNAC and histopathology of thyroid swellings were compared. In spite of highaccuracy of FNAC in differentiating between a benign and malignant lesion, the common false negative diagnoses were follicular pattern cases, cystic papillary thyroid carcinoma (PTC) and papillary microcarcinoma in the literature were not seen in the present study. The reason for false positive diagnoses was the occurrence of nuclear features characteristic of PTC in other thyroid lesions. The overall sensitivity was found 50% however specificity and accuracy were relatively high as observed in this study.

CONCLUSION

FNAC is a simple and cost-effective modality in investigation of thyroid disease with high specificity and accuracy.

FNAC exhibits an adequate diagnostic correlation with the final histopathological examination and is an invaluable tool in the management of thyroid lesions with a high degree of accuracy. FNAC provides a more rapid and accurate diagnosis of thyroid lesions than any other combination of diagnostic test, however Histopathology is alwaysrequired to confirm the diagnosis and for further management.

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