

A Study of Correlation of Preoperative Fine Needle Aspiration Cytology (FNAC) With Postoperative Histopathological Examination (HPE) in Thyroid Swellings

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Abstract:

Context: FNAC is cost effective, cheap, more patient compliant compared to histopathology. It is not only screening tool but has been considered as gold standard also. But it is not without limitations. Hence studies are required to prove its feasibility and accuracy compared to histopathology in different settings.

Aims: To correlate FNAC results before surgery with histopathology reports after surgery.

Settings and design: Present hospital based diagnostic evaluation prospective study was carried out at Government Medical College, Latur.

Methods: Detailed history was recorded in the pre designed, pre tested, semi structured study questionnaire prepared for the present study. Thorough clinical examination including general, local and systemic examination for each and every patient included in the present study was carried out. All patients were subjects to routine investigations. FNAC and USG of the thyroid gland was carried out for all the included patients. FNAC report was obtained from the pathology department.

Statistical Analysis: Sensitivity, specificity, positive predictive value and negative predictive value was

calculated for FNAC

Results: All cases had swelling of thyroid gland and majority on right side. Majority (73.4%) swelling was non neoplastic and 95.7% were females and 38.3% were in 41–60 years group. Out of 94 FNAC studies majority i.e. 33 cases as colloid goitre with cystic degeneration. Among the 69 non neoplastic lesions, 28 cases were colloid goitre with cystic degeneration. Among 25 neoplastic lesions 12 cases were benign neoplastic lesions. FNAC and HPE correlated well in majority of the cases i.e. 92.6% of the cases.

Conclusion: High rate of diagnostic accuracy can be achieved by use of ultrasound guidance with strict adherence to adequacy criteria and meticulous examination of all the smears.

Keywords: Histopathology; Smears; Cases; surgery; Goitre.

Introduction

Largest endocrine gland for humans is thyroid gland. It develops first during the fetal life. It is superficial and easily palpable. It is the only gland which is easily approachable to direct physical, cytological and histopathological examination. It faces a lot of disturbances not only from physiological processes but various pathological processes like hyperplastic, inflammation, developmental etc. Lesions of the thyroid gland are very commonly globally and hence in day to day practice they are commonly seen.¹

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It has been estimated that in general population the thyroid swelling prevalence is 4–10% while in pediatric population it is 0.5–1.2%.²

Diseases of the thyroid gland shows a great geographical variation all over the world. The incidence of thyroid lesions is higher in endemic areas. Age is one of the most important factors in occurrence of goitre. Incidence of disease is higher among females.³

Nodules of the thyroid gland are common. They are seen as swelling in the neck. Palpable thyroid can be seen in about 4–7% of the adults. Whereas non palpable swellings of the thyroid are said to be 10 times more common. Majority of these are benign in nature while <5% can be neoplastic.⁴

Nodules of the thyroid gland and cancer of the thyroid gland may occur due to exposure to ionizing radiation during pediatric age group. Due to advanced imaging technology and awareness among the general population, more and more new numbers of nodules of the thyroid gland are seen. Hence it has been said that nodule of the thyroid gland in asymptomatic patient finding is common.⁵

Differential diagnosis for nodule of the thyroid gland is required for proper management of it. In India, common diseases of the thyroid gland are goitre, deficiency of iodine disorder, hyperthyroidism, Hashimoto's thyroiditis and cancer of the thyroid.⁶

In India, cancer of the thyroid constitutes of all cancer of endocrines about 92% and among neck and head malignancies about 1%. In women, it is 0.7% of all malignancies and lesser i.e. 0.2% in men. Among malignancies, papillary carcinoma is most common.⁷

For evaluation of the swellings of the thyroid gland, FNAC is taken as gold standard. It is not only simple and cost effective but also can be done several times with ease quickly at the outpatient basis. Compliance of the patient is also more due to minimum invasion the procedure. The condition is that the sample must be representative of the gland and cytologist must be experienced.⁸

But there are limitations of FNAC also. Sample may not be adequate. Skill to obtain sample may be doubtful. Difficulty to differentiate between cancerous and benign neoplasms is also one concern. Some papillary carcinomas are also difficult to diagnose on FNAC.^{9,10}

The present study was carried out to study the efficacy of FNAC before surgery as compared to histopathology obtained after surgery.

Materials and Methods

Study design: The present study was a Prospective Cohort Study with Follow-up of patients with FNAC and HPR reports.

Sampling: Simple Random Sampling procedure was followed in the present study.

Ethics: Study was initiated after obtaining permission from ethical committee of Government Medical College and Hospital & Head of Department of General Surgery, ENT and Pathology & consent from the patients.

Study duration: 24 months - from September 2017 to august 2019.

Source of data: Patients admitted from Surgery OPD and ENT OPD of Government Medical College & Hospital, fulfilling inclusion criteria.

Sample size: The sample size was calculated based on 5% significant level and 10% allowable error. This was estimated by using the formula $x = 4PQ/L^2$.

Where P and Q are the prevalence in a study and L is the 10% allowable error. The prevalence of benign swellings in the study done by Kiran Rao et al.³¹ was 81%. So, $P = 81$, $Q = 19$ and L is 8.1 (10% allowable error). Putting the values in the formula we got the sample size as roughly 94.

Methods of collection of data

Patients attending OPD of ENT and surgery department and got diagnosis of swelling of the thyroid gland formed the study population. Detailed history was recorded in the pre designed, pre tested, semi structured study questionnaire prepared for the present study. Thorough clinical examination including general, local and systemic examination for each and every patient included in the present study was carried out. All patients were subjects to routine investigations. FNAC and USG of the thyroid gland was carried out for all the included patients. FNAC report was obtained from the pathology department.

Inclusion criteria

1. Swelling of the thyroid gland
2. Euthyroid status of the patient
3. Willing to participate in the present study

Exclusion criteria

1. Thyroiditis
2. Not fit for surgery
3. Refused to undergo surgery

Statistical Tools

The data was entered in the excel sheet. Sensitivity, specificity, positive predictive value and negative

predictive value were calculated.

Results

Table 1 shows clinical presentation of thyroid lesions. All cases had swelling of the thyroid gland. 11.7% of the cases complained of dysphagia and 3.2% of the cases complained of pain.

Table 1: Clinical presentation of thyroid lesions

Chief Complaints (No. = 94)	No. of Cases	Percentage (%)
Swelling in Neck	94	100.0
Difficulty in Swallowing (Dysphagia)	11	11.7
Pain	3	3.2

Table 2 shows percentage of side of thyroid gland involvement. 27 cases had swelling of both the lobes of the thyroid gland. 36 cases had it on

only right side. 30 cases had it on only left side while one case the swelling was isthmic.

Table 2: Percentage of side of thyroid gland involvement

Side	Number	Percentage (%)
Bilateral	27	28.7
Right	36	38.2
Left	30	31.9
Isthmic	1	1.2
Total	94	100.0

Table 3 shows percentage of non-neoplastic and neoplastic lesions of thyroid. Majority i.e. 73.4% of the cases the swelling was non neoplastic in nature

and remaining were neo plastic. Among the neoplastic cases, 12.8% were benign and 13.8% were malignant.

Table 3: Percentage of non-neoplastic and neoplastic lesions of thyroid

Type of lesion	Number	Percentage (%)
Non neoplastic	69	73.4
Neoplastic		
Benign	12	12.8
Malignant	13	13.8
Total	94	100.0

Table 4 shows sex distribution of thyroid lesions. In present study both male and female patients were included. Out of 94 cases, 90 (95.7%) were

females and 4 (4.3%) were males. In Non-neoplastic lesions out of total 69 cases 66 were females and 3 were males.

Table 4: Sex distribution of thyroid lesions

Sex	Thyroid lesions			Total	Percentage (%)
	Non-neoplastic	Benign-Neoplastic	Malignant		
Female	66	12	12	90	95.7
Male	3	0	1	4	4.3
Total	69	12	13	94	100.0

Table 5 shows Distribution of the study subjects as per age. Most commonly affected age group was 41-60 years of age in which 38.3% of the cases can be seen. Next most commonly affected age group

was 26-40 years of age in which 37.2% of the cases can be seen. Younger age group of 15-25 years of age was found to be least affected with only 9.6% of the cases in it.

Table 5: Distribution of the study subjects as per age

Age (years)	Thyroid lesions			Total	%
	Non-neoplastic	Benign-Neoplastic	Malignant		
15-25	5	2	2	9	9.6
26-40	26	3	6	35	37.2
41-60	28	5	3	36	38.3
61-80	10	2	2	14	14.9
Total	69	12	13	94	100.0

Table 6 shows FNAC Diagnosis. Out of these 94 FNAC studies, 22 cases were reported as colloid goitre, 33 cases as colloid goitre with cystic degeneration, 16 cases as follicular Neoplasm, 7

cases as Nodular Goitre, 6 cases as benign follicular nodule, 5 cases as Nodular goitre with cystic changes, 4 cases as Papillary carcinoma and 1 case as Atypia of undetermined significance.

Table 6: FNAC Diagnosis

FNAC Diagnosis	Number	Percentage (%)
Colloid goitre	22	23.4
Colloid goitre with cystic degeneration	33	35.1
Nodular Goitre	7	7.4
Nodular goitre with cystic changes	5	5.3
Benign Follicular Nodule	6	6.4
Follicular Neoplasm	16	17.1
Atypia of Undetermined significance	1	1.0
Papillary Carcinoma	4	4.3

Table 7 shows non-neoplastic Lesions. Among the 69 non neoplastic lesions, 28 cases were reported as colloid goitre with cystic degeneration, 22 cases

as colloid goitre, 10 cases as multinodular goitre, 6 cases as nodular goitre, and 3 cases as lymphocytic thyroiditis.

Table 7: Non-neoplastic Lesions

Histopathological Diagnosis	No. of cases	Percentage (%)
Colloid goitre	22	31.9
Colloid goitre with cystic degeneration	28	40.6
Multinodular goitre	10	14.5
Nodular goitre	6	8.7
Lymphocytic thyroiditis	3	4.3
Total	69	100.0

Table 8 shows neoplastic lesions of Thyroid. Out of the 25 neoplastic lesions 12 cases were reported as benign neoplastic lesions and 13 as malignant neoplastic lesions. Among the 13 malignant

neoplastic lesions 6 cases were reported as papillary carcinoma and 7 cases as follicular carcinoma thyroid.

Table 8: Neoplastic lesions of Thyroid

HPR diagnosis		Number	Percentage (%)
Benign neoplastic	Follicular adenoma	12	48
Malignant	Papillary carcinoma	6	24
	Follicular carcinoma	7	28
Total		25	100

Table 9 shows correlation between FNAC AND HPE. FNAC and HPE correlated well in majority

of the cases i.e. 92.6% of the cases while it was not found to be correlated in only 7.4% of the cases.

Table 9: Correlation between FNAC AND HPE

FNAC and HPE correlation	Number	Percentage (%)
Correlated	87	92.6
Not correlated	7	7.4
Total	94	100.0

Discussion

In the present study we observed that 11.7% of the cases had dysphagia. This proportion was found to be very high when it was compared with the findings of dysphagia from the study done by Gupta A et al.¹¹

In the present study, females were more than males which is 22.5 females for one male thus telling that swelling of the thyroid gland are more common in females which is high in comparison to studies by Kumar et al.¹²

Involvement of thyroid gland on right side was seen in 38.3% of the cases in the present study. Gupta A et al.¹¹ found this in 49% of the cases which is more than that found in the present study.

Out of total 94 cases, 56 (59.5%) specimens were obtained by hemithyroidectomy, 31 (33%) were obtained by total thyroidectomy, 6 (6.4%) was obtained by subtotal thyroidectomy and 1 (1.1%) was by near total thyroidectomy which is comparable with studies done by Sudarshan K et al.¹³ study showed 38 (78%) cases underwent hemithyroidectomy, cases 4 (8%) specimens were obtained by lobectomy, 4 (8%) cases underwent total thyroidectomy and 3 (6%) cases underwent near total thyroidectomy. Dhanaram et al.¹⁴ study shows 89% cases underwent hemithyroidectomy and 11% cases underwent total thyroidectomy. Ashwini et al.¹⁵ in their study of 179 thyroidectomies, 4 (2.2%) specimens were obtained by lobectomy, 80 (44.6%) specimens were obtained by hemithyroidectomy, 8 (4.4%) specimens were obtained by total thyroidectomy, 21 (11.7%) specimens were obtained by near total thyroidectomy and 66

(36.8%) specimens were obtained by subtotal thyroidectomy.

Out of the received 94 gross specimens for histopathological examination following initial cytological evaluation by fine needle aspiration cytology. In present study non neoplastic lesions accounts for 69 cases and neoplastic lesions accounts for 25 cases. The ratio between nonneoplastic and neoplastic thyroid lesions in this study is 2.76:1.

In the present study concordance between Fine Needle Aspiration Cytology and Histopathology is 92.6% which is significantly correlated with the other studies prevalent. In the present study we had True positive 11/94 cases, True negative 81/94 cases, False negative 2/94 cases. Sensitivity, Specificity, Diagnostic accuracy, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were calculated using the formulae. In the present study the total number of cases are 94 ($N = 94$) The number of cases that gave a positive report for malignancy on FNAC and were found to be malignant on Histopathological examination too were 11 cases (True Positive cases). The number of cases that gave a negative report for malignancy on FNAC but were found to be malignant on HPR are 2 cases (False Negative). The number of cases which were negative on both FNAC and HPR were found to be 81 cases (True Negative). The number of cases that were positive on FNAC but negative on HPR were found to be 0 cases (False Positive).

Conclusion

High rate of diagnostic accuracy can be achieved by use of ultrasound guidance with strict adherence

to adequacy criteria and meticulous examination of all the smears. In the present study the anatomy and the histological features of thyroid gland were studied and the origin of various malignancies from it. Various disorders of the thyroid gland comprising of the non-neoplastic lesion and the various neoplastic lesions are described. Through the present study, the correlation between Preoperative F.N.A.C. report and post-operative H.P.E. report was asserted and a significant correlation was seen. The incidence of Thyroid lesions is more common in females as compared to male population in all thyroid disorders. The incidence of malignancy is more common in the age Group 25 to 50 years of age.

Key messages

FNAC can be used as an alternative to histopathology in low resource settings.

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