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IP Journal of Otorhinolaryngology and Allied Science

Journal homepage: https://www.joas.co.in/

Original Research Article

Study on manifestations in benign versus malignant tumours in thyroid at a tertiary care centre: comparing USG, FNAC and HPE

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Abstract

Introduction: Thyroid swelling is commonly encountered by an Otorhinolaryngologist in OPD. With varying combination of manifestation clinically and varying manifestations requiring a thorough understanding of the gland and its pathophysiology and investigations. So a broad overview and clinical understanding regarding incidence of benign and malignant thyroid swellings and correlation of pre-operative Ultrasonography (USG) neck, Fine Needle Aspiration Cytology (FNAC) and post-operative histopathological examination (HPE) is imperative in a clinical setting.
Aim: To study clinical manifestations of Thyroid swellings. To study incidence of benign and malignant tumours in thyroid swellings. To co-relate findings of USG, FNAC & HPE
Materials and Methods: Patients attending ENT OPD with thyroid swelling of either sex in age group 18-75 were considered for study. History and complete physical examination of patients were done and patients in euthyroid state with Ultrasound and FNAC proven thyroid lesion willing to undergo thyroidectomy and participate in the study were included.
Patients were evaluated for the clinical manifestations of the thyroid swelling, incidence of benign and malignant swelling was calculated. Pre-operative USG and FNAC were correlated with Post-operative HPE to study accuracy of USG & FNAC compared to HPE
Result: Difficulty Swallowing was the most common among clinical features with 6 cases followed by difficulty breathing in supine position in 5 cases. 11 out of 70 cases turned out to be malignant, with papillary thyroid carcinoma being most common malignancy in 8 cases followed by Follicular Thyroid Carcinoma amongst 3 cases. Keeping HPE as the gold standard, USG showing 45% sensitivity and 86% specificity to HPE and FNAC showing 64% sensitivity and 93% specificity to HPE.
Conclusion: Clinically difficulty in swallowing was the most common complaint in patients with Papillary Thyroid Carcinoma is the most common malignancy. USG and FNAC proves to be easy and highly specific investigation for diagnosis with HPE being the gold standard of thyroid swelling evaluation though having relatively low sensitivities.

Keywords: Thyroid Swelling, Ultrasonography Neck, Fine Needle Aspiration Cytology Thyroid, Histopathological Examination

Received: 20-07-2025; **Accepted:** 11-09-2025; **Available Online**: 09-10-2025

1. Introduction

Thyroid gland is distinctive among endocrine organs. It is the largest endocrine gland in the body and the first to develop in the fetal life.[1] Around 4–7% of adults have palpable enlargement of thyroid amongst the population and can be more in endemic population affecting mostly females. Most of them are benign and fewer turn up to be malignant upon examination.[2]

A variety of diagnostic tests such as Thyroid function test, Ultrasonography neck, Fine Needle Aspiration Cytology (FNAC) and Histopathological Examination (HPE) among others, are utilized in the assessment of thyroid swellings. However, for a definitive diagnosis, it is essential to perform morphological examinations of lesions, making FNAC and histopathological examination (HPE) mandatory procedures.[2]

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http://doi.org/10.18231/j.ijoas.81551.1760002507

Neck Ultrasonography is a simple, cost-effective, investigation of assessment of thyroid swelling. It can distinguish between solid and cystic lesions and is capable of detecting cysts as small as 2 mm.[3] This imaging technique is safe, affordable, and provides rapid results, contributing to excellent patient compliance.

FNAC is widely regarded as the investigation of choice for evaluating thyroid swellings, offering a simple, cost-effective, easily repeatable procedure that can be quickly performed in outpatient settings with excellent patient compliance.[2] However, FNAC has limitations related to adequacy of specimen, sampling techniques, the skill of the person performing the aspiration, interpretation of the aspirate, and certain overlapping cytological features between benign and malignant follicular neoplasms.

Therefore, there is a need for final diagnostic test i.e., Histopathology (HPE) in which an excised specimen can be sent for examination after the surgery and a final diagnosis can be made and prognosis can be assessed.[4]

Thus, a thorough understanding about the various clinical manifestation, the investigation findings and their correlation is paramount in planning the treatment options for the same,

2. Materials and Methods

2.1. Source of data

Patients of either sex in age group of 18-75 years attending ENT OPDs were selected at Bapuji Hospital and Chigateri District Hospital, teaching hospitals attached to J.J.M Medical College, Davangere.

2.2. Study of design

Prospective Cross sectional - descriptive study.

2.3. Study duration

Time period of May 2023 – December 2024

2.4. Sample size

Total number of 50 cases considered.

2.5. Inclusion criteria

1. Patients of either sex
2. Age group 18-75 years.
3. Patients with thyroid swelling.
4. Patients with biochemically proven euthyroid state.

2.6. Exclusion criteria

1. Patients below 18 years and above 75 years
2. Patients with intubation or extubation injuries.
3. Patients not willing to take part in the study.

2.7. Method of data collection

Those patients attending ENT OPD with thyroid swelling who fulfilled all inclusion criteria and exclusion criteria and willing to participate in this study were selected, informed and written consent were taken from all patients.

Thorough physical examination of patients was done, swelling was evaluated for size, shape, extent, mobility, number, consistency, margins, and patients were inquired regarding symptoms.

All patients were subjected to pre-op routine investigations, IDL, Thyroid function tests, USG neck, FNAC and after surgery specimen was sent for HPE.

Patients with TFT proven euthyroid state and USG, FNAC proven thyroid lesion were selected, patients with deranged TFT were brought to euthyroid state before inclusion. Patients were divided into two categories- Benign and Malignant based on USG neck, FNAC and post op HPE reports

USG TIRADS grading was done, In our study TIRADS 1,2 and 3 have been considered as Benign whereas TIRADS 4 and 5 have been considered to be Malignant. FNAC Bethesda System staging was done and Bethesda 1,2 and 3 have been considered as Benign whereas Bethesda 4,5 and 6 have been considered to be Malignant. USG, FNAC and HPE reports were correlated and incidence of malignancy was studied. P value of <0.05 has been considered significant

3. Results

The highest incidence of thyroid swellings was seen in the age group of 31-40 years i.e., 25 out of total 70 cases constituting 35.7 % of the cases. Male to female ratio is 1:16.5 i.e., 94.3% of patients were females, 5.7% males.

In our study with 70 cases of neck swelling, most common symptom seen was difficulty swallowing in 6 cases (9%) followed by difficulty breathing in supine position in 5 cases (7%), weight loss and fatigue in 4 cases each (6%), weight gain in 3 cases (4%), foreign body sensation and dull pain in 1 case (1%) each.

In **Table 1** USG showed 13 cases to be malignant and 57 to be benign, FNAC shows 11 cases to be malignant and 59 to be benign, HPE shows 11 cases to be malignant and 59 to be benign

Table 1: Investigation result of thyroid tissue

Screening	Malignant		Benign	
	No of Cases	Percent	No of Cases	Percent
USG	13	18.6	57	81.4
FNAC	11	15.7	59	84.3
HPE	11	15.7	59	84.3

In **Table 2** the USG showed Sensitivity 55%, Specificity 88%, PPV 46%, NPV 91% and Accuracy 83% in diagnosing malignancy in comparison to FNAC.

Table 2: USG and FNAC correlation

USG	FNAC		Total
	Malignant	Benign	
A			
Malignant	6	7	13
Benign	5	52	57
Total	11	59	70
B			
Sensitivity	55%		
Specificity	88%		
PPV	46%		
NPV	91%		
ACCURACY	83%		
P Value	< 0.001		
AUC	0.713		

In **Table 3** USG showed Sensitivity 45%, Specificity 86%, PPV 38%, NPV 89%, Accuracy 80% in diagnosing malignancy in comparison to HPE in our study

Table 3: USG and HPE correlation

USG	HPE		Total
	Malignant	Benign	
A			
Malignant	5	8	13
Benign	6	51	57
Total	11	59	70
B			
Sensitivity	45%		
Specificity	86%		
PPV	38%		
NPV	89%		
ACCURACY	80%		
P Value	< 0.013		
AUC	0.659		

In **Table 4** FNAC showed Sensitivity 64%, Specificity 93%, PPV 64%, NPV 93%, and accuracy 89% in the diagnosing malignancy in comparison to HPE in our study.

Table 4: FNAC and HPE correlation

FNAC	HPE		Total
	Malignant	Benign	
A			
Malignant	7	4	11
Benign	4	55	59
Total	11	59	70
B			
Sensitivity	64%		
Specificity	93%		
PPV	64%		
NPV	93%		
Accuracy	89%		
P Value	< 0.001		
AUC	0.784		

In **Table 5** the most common benign thyroid swelling on HPE was multinodular goitre i.e.,17 cases (24.3%) followed by colloid goitre i.e. 15 cases (21.4%) and amongst malignant, papillary carcinoma thyroid i.e., 8 cases (11.4%) followed by follicular carcinoma thyroid 3 cases (4.3%) out of total 50 cases.

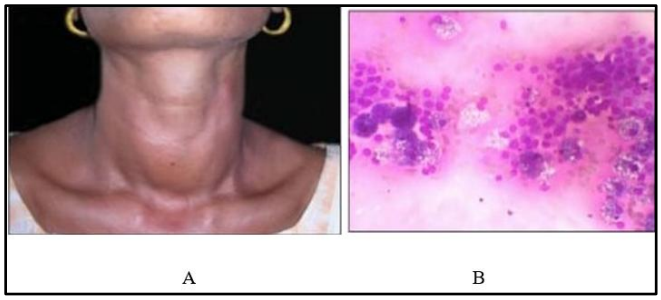

Figure 1: A; Clinical pre-operative photo of patient diagnosed as colloid nodular goitre B; HPE of colloid nodular goitre

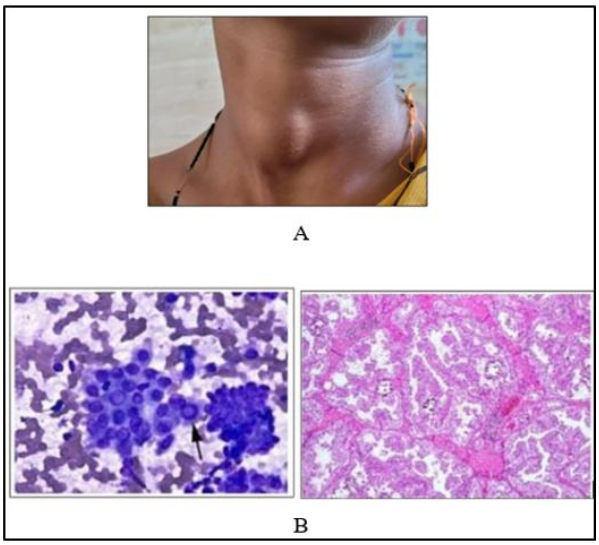

Figure 2: A; Clinical pre-operative photo of patient diagnosed as Papillary Carcinoma Thyroid **B;** FNAC (right) and HPE (left) of Papillary carcinoma of thyroid

Table 5: Diagnosis of tissues after HPE

Diagnosis	No of Cases	Percent
Multinodular goiter	17	24.3
Colloid nodular goiter	15	21.4
Papillary thyroid carcinoma	8	11.4
Hashimotos thyroiditis	9	12.9
Adenomatous nodule	10	14.3
Follicular carcinoma thyroid	3	4.3

Follicular adenoma	4	5.7
Hyperplastic nodule	3	4.3
Hurthel cell adenoma	1	1.4
Total	70	100.0

FNAC is a relatively better investigation in evaluation of thyroid swellings, but Ultrasonography aids in deciding the course of management and gives a basic idea of the diagnosis. Hence USG and FNAC should be used in conjunction for the evaluation of thyroid swellings.

However, in all cases the final diagnosis depends upon the histopathological examination of excised specimen, therefore it is considered as the gold standard of investigations.

Incidence of malignancy in studied population turned out to 11 cases out 70 i.e. 15.7% with most common malignancy being Papillary thyroid carcinoma with 8 cases followed by follicular thyroid carcinoma with 3 cases.

4. Discussion

Thyroid gland disorders are common, occurring in 4% to 7% of the general population[5,6] with greater incidences in endemic regions.[5] Because of its relatively superficial position, which makes it easy to palpate, thyroid enlargement is easily assessable. The primary reason for evaluating diffuse thyroid swellings or nodules is to rule out the potential of a malignancy. With increasing rates of thyroid malignancy, as found in a study by Panato C, Vaccarella S, Dal Maso L, et al, between 2006-2008 and 2012-2014 there was a 37% and 27% increase in the incidence of thyroid malignancy among women and men respectively.[7] But in our study the incidence of malignancy was only found to be 15.7 % (11 cases) which could be on the lower end due to the small sample size of the study population.

In the present study Clinical manifestation were studied of the patient with thyroid swellings.(**Figure 1**) In all cases USG and FNAC were compared with Histopathological examination. (**Figure 2**)

Abhay Kumar *et al*., conducted a prospective study on 295 cases of thyroid swellings from February 2016-June 2017 and compared findings of FNAC and HPE and concluded that FNAC is a simple, safe and cost-effective modality for investigating thyroid disease with high accuracy and specificity.[8]

Sreeramulu PN *et al*., conducted a prospective study on 200 patients to evaluate requirement of clinical examination, FNAC and Ultrasonography in management of thyroid nodule and to compare efficacy of FNAC and USG. The sensitivity and specificity of FNAC were 74% and 100% respectively and USG were 73% and 85.3%. All lesions suspicious on FNAC proved malignant on HPE.[9] This is similar to our study showing FNAC and USG to have high specificities of 93% and 86% respectively, but unlike our study which showed low sensitivity rates of 64% and 45% respectively.

De D *et al*., compared findings of USG (TIRADS) and FNAC (Bethesda classification) with the Histopathology findings. It was concluded that USG findings like microcalcification is most sensitive while taller than wider and irregular margins being more specific for malignancy.[9] Study also stated that USG and FNAC are equally sensitive but FNAC is more specific.[10]

Ali S Alshahrani *et al*., claimed in their study papillary carcinoma was the most prevalent malignancy found in the analysed samples in FNAC and Histopathology and also claimed that the study found a satisfactory agreement rate between FNAC and Histopathological results, particularly for malignant characteristics.[11]

In the study conducted by Monica Chaudhary *et al*., emphasised the use of FNAC with Bethesda, USG with TIRADS as a crucial tool for early thyroid cancer diagnosis, however Histopathology is regarded as the gold standard.[12]

Kiran Rao *et al*., conducted a study comparing FNAC and HPE. Results were similar in 73% and dissimilar in 27%, they concluded that FNAC is a commonly used investigation in diagnosis of thyroid swellings but final diagnosis and treatment should be planned according to HPE.[13]

Shirish Chandanwale *et al*., conducted a study on 150 patients of thyroid nodules to compare accuracy of FNAC with other diagnostic modalities to differentiate benign and malignant nodules with accuracy. They found that sensitivity, specificity, PPV, NPV, diagnostic accuracy as 90%, 100%, 100%, 90% and 87.5% respectively and incidence of malignancy in thyroid nodules was 6.75%.[14]

All these studies when put together with ours reiterate the finding that USG and FNAC are both excellent investigations in diagnosis and planning of treatment of thyroid swelling with high specificity. But when compared to HPE in our study was found to be lacking in sensitivity. Both the investigations were found to have highly accurate and also have high NPV which helps in avoiding early aggressive treatments being started in patients who have benign lesions, avoiding unnecessary anxiety to the patient and help in proper planning and counselling regarding the treatment with higher assurance.

5. Conclusion

The present study is undertaken to evaluate clinical manifestations of thyroid swellings. To correlate findings of USG Neck, FNAC, HPE of specimen. To determine incidence of Benign and Malignant thyroid swelling in the studied population.

To conclude the clinical manifestations: Difficulty breathing in supine position and Difficulty swallowing turned out to be most common symptoms other than swelling in the neck, followed by symptoms like Dull pain, foreign body sensation seen in the studied population. Symptoms like Weight gain, Weight loss and easy fatiguability were reported in few patients associated with thyroid swelling which were relieved with Thyroid Profile correction and then included in study.

USG Neck is a simple, cost-effective, non-invasive diagnostic tool used to assess thyroid swellings capable of detecting cysts as small as 2 mm. Therefore, it can be used as a screening test.

FNAC is minimally invasive, well tolerated safe procedure which can be readily conducted as an outpatient procedure without any preparation or anaesthesia. The FNAC process and interpretation are both rapid, and there is virtually little risk of consequences like infection or haemorrhage. To achieve the best outcomes, manage thyroid swellings further, and avoid needless procedures, USG and FNAC should be used in tandem. Histopathological analysis of thyroid enlargement provides the gold standard in diagnosis.

In our study, 11 cases (16%) turned out to be malignant out of 70, majority of cases being Papillary thyroid carcinoma 8 cases (11%) and 3 cases of Follicular Carcinoma (4%) of total population. Subsequently, for a diagnosis to be reliable and accurate, USG, FNAC, and HPE must be used in tandem.

6. Ethical Approval

This study was approved by Institute of Ethical approval with ref. no. JJMMC/IEC-Syc-117-2023.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Cite this article: Santosh UP, Arora S, Nasser A. Study on manifestations in benign versus malignant tumours in thyroid at a tertiary care centre: comparing USG, FNAC and HPE. *J Otorhinolaryngol Allied Sci.* 2025;8(3):73-77.