

# Evaluation of Thyroid Abnormality Studies by using High Resolution Sonography

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## ABSTRACT

To study a common thyroid disorder in our setup. Evaluating the accuracy of ultrasound in diagnosing thyroid disorders. To evaluating the important sonological parameters in various thyroid disease. To differentiate between possible benign and probably malignant masses based on their sonographic appearance.

### Keywords:

## 1. Introduction

The thyroid's main role in the endocrine system is to regulate your metabolism, which is your body's ability to break down food and convert it to energy. The thyroid gland is affected by a wide spectrum of pathologic conditions including benign and malignant lesions. Thyroid lesions are a common finding in the general population, especially in iodine deficiency areas such as in our country. Thyroid disorders like thyroid neoplasm still pose a major problem in both developing and developed countries. [1-3]

Sonography has become the method that is most commonly employed. The ultrasound examination of the thyroid should always include the entire neck, looking for abnormal lymph nodes, enlarged parathyroid glands, and abnormal masses. Both lobes must be scanned individually in the transverse and longitudinal planes. [4] Its use has resulted in early and accurate detection of various thyroid disorders. This is of immense help in timely management and prevention of complications. [5]

Now sonography has largely replaced it for the majority of the patient, who require a graphic representation of the regional anatomy because of its higher resolution, superior correlation of true thyroid dimensions with the image, smaller expense, greater simplicity, and lack of need for radioisotope administration. [6] Ultrasound vascular study is a noninvasive and low-cost method and is very reliable in the differential diagnosis of cold thyroid nodule; the best ultrasonographic modality is power Doppler. The majority of cold nodule will demonstrate a peripheral rim of color flow and no internal color flow with color Doppler sonography. A large number of hot nodules will demonstrate internal color flow. [7] The vascular network of the thyroid nodules will distinguish the rare malignant nodules from the high amount of benign ones. (9)The lymph nodes number and location will be evaluated by screening all the compartments of the anterior and lateral cervical region, along with their diameters and ratio, their shape, structure, and echogenicity. Pathological lymph nodes can be inflammatory or metastatic, and they display some characteristic features. [8,9] Fine needle aspiration cytology (FNAC) is inexpensive and easy to perform and widely available and will be done as an initial investigation for a thyroid nodule. Ultrasound guided FNAC will be done. [10]

## 2. Materials and Methods

- Study group comprised 50 patients with suspected thyroid diseases referred for ultrasound scanning.

- Informed consent was taken from all the patients or their relatives for the study.
- Inclusion criteria – Those patients who are having imaging finding of benign or malignant lesions on ultrasonography will be included in the study.
- Exclusion criteria – those patients with no demonstrable sonographical abnormality in the thyroid gland

### **Type of study - cross sectional study**

Each patient was examined as follows

1. Brief history, clinical examination and relevant biochemical investigation will be obtained in all patients.
2. Radiological evaluation by high resolution real time ultrasonography and color Doppler in all patients

The finding was correlated and confirmed with follow up FNAC or biopsy

### **Procedure of scanning:**

Scanning was performed in GE VOLUSON 730 Expert Ultrasound machine with a 12 MHz probe in longitudinal and transverse planes. The thyroid was evaluated under the following headings.

### **Ultrasound guided fnac:**

The patient was placed in supine position with neck hyper extended and the skin was cleaned with betadine solution. Sterilized ultrasound gel was applied. The needle was held in one hand and the ultrasound probe in other. The needle was advanced alongside the transducer and the position of the needle tip inside was monitored with ultrasound. After introducing the needle, it is moved rapidly through the lesion under ultrasound guidance keeping negative pressure. The gentle suction is done with the syringe.

Sample was collected from the solid part of the lesion or aspiration is done in case of cystic lesion. The sample in the syringe is ejected over a clean slide and smear is prepared with help of spreader. After these two slides were prepared, one wet fixed in absolute alcohol in coplin jar and other was dry fixed. Both slides are sent to the pathology department for cytopathological study.

### **BIOPSY:**

Specimen after thyroid surgery (Total or near total thyroidectomy or lobectomy) was sent for histopathological examination in containers with adequate amount of fixative (usually 10 % neutral buffered formalin). After gross section were processed and the slides prepared. The slides are stained with hematoxylin and eosin, mounted with DPX and taken up for final histopathological diagnosis by examining under microscope which is considered as the gold standard.

### **Statistical analysis:**

Sensitivity, Specificity, positive value, negative predictive value and diagnostic Accuracy are obtained.

### 3. Results

**TABLE 1:**Distribution According To Sex

Sex	count	Percentage
Female	35	70%
Male	15	30%
Total	50	100%

Most of the patient are female (70%).Only 30 % are males

**Table 2:** Distribution According to peripheral Halo

Peripheral Halo	count	Percent
Absent	30	60%
Thin Halo	16	32%
Thick Halo	4	8%
Total	50	100%

It is observed that out of the 50 cases peripheral halo was seen in 40 % cases only. Out of which 32% of thin halo and 8% cases had thick halo.

**Table 3:** Distribution of the thyroid diseases finding according to age

Age	Colloid Goitre		Benign Nodule		Thyroiditis		Carcinoma	
	count	percent	count	percent	count	percent	count	percent
10-20	1	2%	1	2%	1	2%	0	0%
21-30	7	14%	2	4%	1	2%	1	2%
31-40	9	18%	3	6%	1	2%	1	2%
41-50	6	12%	2	4%	1	2%	1	2%
51-60	6	12%	1	2%	1	2%	2	4%
61-70	0	0%	1	2%	0	0%	1	2%
Total	29		10		5		6	

Thyroid Disease finding according to age

**Table 4:** Distribution According to FNAC/HPE

FNAC/HPE	count	Percent
Colloid Goitre	25	50%
Benign Nodule	18	36%
Thyroiditis	3	6%
Carcinoma	3	6%
Thyroglossal cyst	1	2%

In the study maximum number of cases observed by FNAC/HPE are colloid goiter which include SNG and MNG ( 50 %), followed by benign nodules which includes adenoma and hyperplastic nodule (18%) primary thyroid carcinoma (11%) and thyroiditis (3%). Only one case of thyroglossal cyst have been reported.

#### 4. Discussion

High resolution sonography was used to evaluate thyroid abnormalities in 50 patients in our study. It demonstrated thyroid abnormalities with remarkable clarity to distinguish normal from abnormal thyroid, to differentiate the abnormalities as diffuse or focal and also have been helpful in characterization of the lesion and suggestion a pathologic diagnosis. Pathological correlation (FNAC/HPE) was obtained in all the cases to assess the diagnostic accuracy of high resolution sonography. [11] The larger group of patient was in 21-50 yr age group. the oldest patient was of 63 years and youngest was of 15yrs. A female preponderance 70% was noted in the study. A similar demography was reported in the study conducted by Jeffery R.wienke et al., most of the patient were in the age group of 30-50 and out of 68 cases 63 were female and only 7 were males [12]. Uzmabukkari et al., reported thyroid lesion in 158 cases, of which 138 were female and 27 were male. Most of the cases were found in the age group of 30-50 yrs [13-15]. Mary et al., studied 1985 patient of which 1742 occurred in woman and 203 were males and most of patients was in the age group of 30-50. The commonest thyroid pathology diagnosed in our study was colloid goiter 57%. Most of the cases were hetero echoic in appearances followed by hypo echoic. Calcification was seen only in 7%. Lymphadenopathy was seen in 6% peripheral halo was seen in 25 case only, out of which 20 were thin halo and 5 cases had thick halo. In a study by Mary et al., They reported out of 1985 patient 1181 patients had solitary thyroid nodules and 804 patients had multiple nodules. And they noted that solitary nodules. [16] jeffery R.winke et al., reported 27 cases of colloid cysts in their study. The second largest group were benign nodules, which includes adenoma and hyperplastic nodule. A total of 18 cases were reported, out of which 14 were adenomas and 6 were hyperplastic nodules. Jeffery R.winke et al., reported, on 82 thyroid nodules out of the 50 cases they studied. The appearance of benign nodules were predominantly hypoechoic and solid followed by mixed (solid and cystic) or heterogeneous. In a study conducted by kamalijitkaur et al on 50 thyroid nodules of which 41 nodules were predominantly hypo echoic followed by mixed and cystic. [17-19]

Carcinoma was diagnosed in 3 patients by FNAC/HPE out of 50 cases, of which papillary carcinoma was 1 follicular carcinoma 1, medullary carcinoma 1. M.allauddin et al., studied 1140 thyroid cases of which 154 were malignant. out of the 98 were papillary thyroid carcinoma and

32 were follicular carcinoma and 6 were medullary carcinoma. Kamaljitkaur et al reported 9 malignant cases among 50 patients they studied. [20] In heterogeneous and 2 were hypo echoic in echo texture. Calcification were positive in 5 cases. Lymph nodes were noted in 5 cases. Thick peripheral halo was seen in 4 cases. Irregular margin was seen in 6 cases and speculated margin in 2 cases. On Doppler normal internal flow was seen in 16 cases (3 cases were predominantly cystic), increased flow in 2 cases and peripheral flow in 1 case. The present study had a sensitivity of 72%, specificity of 100% and diagnostic accuracy of 97% in detecting thyroid malignancy. [21] The sensitivity and specificity of USG in various studies ranges from 60-80% and 59-96% respectively. The high specificity obtained in the study can be attributed to stringent adherence to the above mentioned criteria, which in turn reduced the sensitivity in our study.

## 5. Conclusion

Ultrasound was clearly able to delineate benign nodules in 18 cases which include adenoma and hyperplastic nodules. One case diagnosed as benign nodules turned out to be malignant on FNAC. Carcinoma is diagnosed in 8 patients by ultrasound and in 3 patients by FNAC/HPE. Ultrasound is useful in diagnosis of congenital conditions like thyroglossal cyst. Ultrasound is a useful imaging modality in evaluation of thyroid in children and pregnant women as there is no radiation risk. Ultrasound can be used to guide FNAC from thyroid lesions. Ultrasound can be used to guide the FNAC. The assisted FNAC definitely increases the yield of diagnostic materials and aids in the correct diagnosis.

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Ethical approval: The study was approved by the Institutional Ethics Committee

### Conflict of interest

The authors declare no conflict of interest.

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