



**ORIGINAL RESEARCH PAPER**

**ENT**

**THE ROLE OF ULTRASOUND IN THE DIAGNOSIS OF NODULAR THYROID DISEASE**

**KEYWORDS:** Thyroid Nodule, Ultrasound in diagnosis of Nodular Thyroid Disease, Malignant Thyroid Nodules

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**ABSTRACT**

We tried to find out the role of USG in the diagnosis of nodular diseases of thyroid & correlate with clinical examination and other investigations like, FNAC, USFNAC, intra operatively and HPE. We took a sample size of 60 patients attending the ENT clinic with thyroid nodules. Total 47 females & 13 males enrolled in our study. Colloid goiter was the most common diagnosis (68.3%) followed by benign nodules (18.9%) followed by malignant thyroid nodules (11.6%). Ultrasound can be used to accurately direct the needle into the thyroid nodule wherever required. Papillary carcinoma was the most common malignancy (5 patients out of total 7 malignant thyroid nodules) which was associated with lymphadenopathy in our study. Features suggestive of malignancy include irregular shape, micro calcifications, central vascularity, irregular margins, markedly hypoechoic and associated lymphadenopathy. These patterns, taken singly, are poorly predictive. When they are simultaneously present the specificity increases. Benign nodules have ovoid shape, peripheral vascularity, regular margins, halo sign slightly hypoechoic and have no lymphadenopathy. They may or may not have calcifications. If present then they may be peripheral rim type. Thus in our study we found that surgeons should not solely rely on clinical findings, but every patient of thyroid should be sent for Ultrasonography which gives a very reliable report as that of intra operative findings. While considering malignancy though ultrasound gives us a definitive clue we should go for HPE report which helps us in further guiding the management of thyroid nodules more correctly.

**Introduction**

Thyroid nodules are a common diagnostic challenge encountered in clinical medicine. Approximately 4-8% of adults have palpable clinical nodules; up to 70% have nodules visible on Ultrasonography, many of which are less than one cm in diameter. Thyroid Ultrasonography commands a central role in the evaluation, diagnosis and treatment of thyroid disorders. Ultrasound has been the standard for imaging of thyroid gland for many years and is the first line imaging modality for thyroid nodules. It's painless, inexpensive, does not require use of contrast media and can display internal architecture and flow characteristics of thyroid nodules. Ultrasound has also been identified to play an important role in differentiating benign and malignant diseases.

**Aims and Objectives**

1. To study the role of ultrasound and co relate it with other investigations like FNAC, USG guided FNAC, intra operative and HPE examination.
2. To differentiate, thyroid nodules as benign or malignant
3. To sonographically guide FNAC, whenever required.

**Materials and Methods**

The prospective observational study was conducted on 60 patients from March 2012 to May 2013 in the Department of Otorhinolaryngology, MGM Hospital and College, Navi Mumbai. Patients selected were those of either gender between 18-60 yrs of age with clinically palpable thyroid nodules, who were euthyroid and willing for surgery.

All enrolled patients underwent clinical examination, thyroid function tests, Ultrasonography, FNAC, USG guided FNAC wherever required followed by thyroid surgery. The specimen was sent for histopathological examination and the findings co related.

**Observation and Results**

As per our title "To study the role of USG in the diagnosis of nodular thyroid diseases", we enrolled 60 patients in our study & we got the following results.

**Table No.1.-Age Distribution**

Age (in yrs)	No. of patients (%)
18-30	11 (18.3)
31-40	28 (46.6)
41-50	18 (30)
51-60	3 (5)
Mean age	37.41 + 8.49
Range	20-59

The highest incidence of thyroid swellings was seen in the age group between 31-40 years(46.6%).The mean age was 37.41 years.

**Table No. 2- Gender distribution**

Gender	No. of patients (%)
MALE	13 ( 21.6)
FEMALE	47 (78.3)

The ratio of male to female was 1:3.

**Table No.3- Various findings on USG of Thyroid Nodule**

USG Parameters	Findings	No.of patients(%)
Margins	Regular	53(88.3)
	Irregular	7(11.7)
Echogenicity	Slightly Hypoechoic	50((83.3)
	Markedly Hypoechoic	10(16.7)
Calcification	Absent	13(21.7)
	Peripheral	35(58.3)
	Microcalcification	12(20)
Vascularity	Central	10(16.7)
	Peripheral	50(83.3)
Retrosternal Extension	Absent	58(96.7)

	Present	2(3.3)
Lymphadenopathy	Not significant	51(85)
	Significant	9(5)

Out of 60 patients, 7 patients with thyroid nodules had irregular margins, 10 had hypoechoic nodules, 12 had microcalcifications, 10 had central vascularity and 12 had significant lymphadenopathy. All of these features are suggestive of malignant nodule.

**Table No.4-Variou Diagnosis of nodular diseases of thyroid by different investigations**

Diagnosis		C/E (%)	USG (%)	FNAC (%)	USFNAC (%)	HPE (%)
CG	STN	21(35)	42(70)	40(66.6)	3(5)	41(68.3)
	MNG	35(58.3)				
Malignancy	PC		3(5)	4(6.6)	1(1.6)	5(8.3)
	FC		1(1.6)	2(3.3)	1(1.6)	2(3.3)
	Suspicious		4(6.6)	2(3.3)		0(0)
Benign	FA	0(0)	10(16.6)	10(FN)(16.6)		10(16.6)
	HCA	0(0)	0	2(HCN)(3.3)		2(3.3)

Out of 60 patients with thyroid nodules 25(38.6) were diagnosed with solitary thyroid nodule, 35(58.3%) with multinodular goiter. On USG 42(70%) showed features suggestive of colloid goiter. FNAC reported 40(66.6) of them as Colloid goiter and HPE reported 41(68.3%) as colloid goiter.

On clinical examination 4(6.6%) patients with thyroid nodules were suspected to have thyroid malignancy. On USG 3(5%) patients were reported as Papillary carcinoma, 1(1.6%) follicular carcinoma and 4(6.6%) had features suspicious of malignancy. On FNAC 4(6.6%) patients were diagnosed as papillary carcinoma and 2(3.3%) follicular carcinoma and 2(3.3%) were reported as indeterminate FNAC report. USG guided FNAC reported as papillary carcinoma and other as follicular carcinoma. On HPE 5(8.3%) patients had papillary carcinoma and 2(3.3%) patients had follicular carcinoma.

**Table No.5- Correlation between benign & malignant thyroid nodule on USG & HPE.**

Investigations	Benign (%)	Malignant (%)	Suspicious (%)
USG	10(16.7)	4(6.6)	4(6.6)
HPE	12(20)	7(11.7)	0(0)

USG diagnosed 10(16.7%) patients to be benign, 4(6.6%) malignant and 4(6.6%) suspicious of malignancy. Histopathological examination diagnosed 12(20%) patients to have benign nodules and 7(11.7%) malignant.

**DISCUSSION**

Thyroid nodules are a common problem in clinical practice, Most of the lesions are benign, but the principal problem facing the clinician is that of identifying the malignant nodule requiring surgery. According to the Indian Thyroid Society, 4.2 crore Indians suffer from thyroid disorders and most of them are undiagnosed. Ultrasound has emerged as the preferred modality for imaging the thyroid. By age 60, about one-half of all people have a thyroid nodule that can be found either through examination or with imaging.

The prevalence of thyroid nodules increases with age. Malignancy is more common in nodules found in patients who are younger than 20 or older than 60 years of age than in patients between 20 and 60 years of age. In our study most of the malignancies

corresponded to this.

A total of 60 patients aged between 18-60 years were admitted for thyroid surgery and included in this study. The mean age found in our study was 37.41 +/- years. We found that majority of patients (30%) were in their fourth decade of life. This is in accordance with the study by Dorairajan and Jayashree<sup>1</sup>. Lim et al reported prevalence of thyroid nodules in women with a mean age of 41.5 +/- 13.9 years, and men with a mean age of 45.7 +/- 14.9 years<sup>2</sup>. Most of the cases in our study with thyroid nodules were females. Imani et al reported that 46% of patients with thyroid nodules are females.

Ultrasound is an excellent complement to the surgeon's physical examination, and facilitates determination of nodule size, nodularity, calcification, vascularity and echogenicity. The excellent resolution of ultrasound and accessibility of the thyroid gland enable the identification of foci as small as 3 mm<sup>4</sup>.

Out of 60 patients, 10(16.7%) patients showed markedly hypoechoic nodules and 50(83.3%) showed slightly hypoechoic nodules. 7 out of these 10 markedly hypoechoic nodules were malignant. Most benign adenomas or adenomatous nodules are slightly hypoechoic whereas malignant nodules are markedly hypoechoic.

Micro calcifications are strongly associated with increased risk of malignancy<sup>5</sup>. In our study 20% patients presented with micro calcifications but only 11.3 % patients actually had malignancy. Hence although suggestive of malignancy the overall specificity of micro calcifications for thyroid carcinoma has been reported to range from 71-94% and sensitivity of 34-72%<sup>6-8</sup>, and therefore should not be solely relied on to differentiate benign from malignant nodules. Peripheral or rim calcification was found in 58.3% patients representing previous hemorrhage and degenerative changes.

10 patients with thyroid nodules showed increased central vascularity (16.7%) while the remaining 83.3% showed peripheral vascularity. Out of these 10 patients 7(11.7%) had malignancy. Nodules with exclusively central blood flow had a higher incidence of malignancy but it should not be considered as a pathognomic feature<sup>6</sup>.

Our study showed that 16.7% patients had benign nodules on USG, 6.6% were malignant and 6.6% were suspicious on USG. Our study showed the majority of benign lesions are due to multinodular goiter and among the malignant lesions papillary carcinoma predominated. This is in accordance with the study done by Abdulla H Darwish et al<sup>7</sup>.

Papillary carcinoma represents 70-80% of all thyroid malignancies. Our study showed 5 patients to have papillary cancer out of 7 patients with malignancy. Follicular carcinoma represents 10% of all thyroid malignancies. 2 patients out of 7 malignant thyroid cases were diagnosed of follicular carcinoma in our study.

Cystic thyroid nodules represent a major challenge for an adequate cytological diagnosis, yielding a high rate of non diagnostic fine needle aspiration biopsies attributable to scarcity or absence of follicular cells. In complex (solid cystic) nodules, USG guided FNAC was seen to be diagnostic in 63% of cases<sup>8</sup>.

The use of USG guided FNAC to evaluate thyroid nodules has improved the detection rates of thyroid cancer and decreased the number of thyroid surgeries performed<sup>9</sup>.

USG guided FNAC was performed in 5 patients in our study. 1 was diagnosed of papillary carcinoma, 1 of follicular carcinoma and 3 of colloid goiter. It was seen in our study that USG guided FNAC has a higher sensitivity than conventional FNAC. However there is not much difference in the specificity between the two procedures. Since the number of cases investigated by the former procedure is small, definitive conclusions cannot be drawn and further studies with much larger number of patients needs to be

done. Hence Ultrasound has been the standard imaging modality for thyroid nodules its versatility, speed, safety profile, ability to offer dynamic real time images, and low cost compared with other radiologic modalities have made it popular. It not only helps to differentiate benign and malignant nodules but also helps determine modularity, shape, site of nodules and associated lymphadenopathy.

#### **Conclusion:**

Sonographic evaluation of the thyroid nodules continues to have a great impact on our diagnosis and therapeutic decisions. For thyroid nodules with non diagnostic FNAC cytology, USG evaluation is a feasible and useful method in predicting malignancy. Routine thyroid Ultrasonography should be seriously considered for all patients with suspected thyroid nodules. It is very effective as a tool to diagnose benign and malignant nodules. It helps to guide FNAC whenever conventional FNAC gives indeterminate results. Ultrasound plays a very important role in the diagnosis of thyroid nodule.

#### **References:-**

1. . . N. Dorairajan and N. Jayashree, "Solitary nodule of the thyroid and the role of fine needle aspiration cytology in diagnosis," *Journal of the Indian Medical Association*, vol. 94, no. 2, pp. 50–52, 1996.
2. . . Lim JD, Chao TC, Huang BY, Chan ST, Chang HY, Hsueh C. *Thyroid* 2005 Jul;15(7): 708-13.
3. . . Imani EF, Aminoroava A, Soheilipour F, Adibi A, Sirous M, Rosh E, Mostafavi M, Amini M. *Endokrynol Pol*, 2010 Mar-Apr;61(2): 188-91.
4. . . Scheible W, Leopold GR, Woo VL, Gosink BB. High-resolution real-time ultrasonography of thyroid nodules. *Radiology*. 1979; 133: 413–417.
5. . . Cappelli C, Castellano M, Piroli L, et al. The predictive value of Ultrasound findings in the management of thyroid nodules. *QJM* 2007; 100: 29-35.
6. . . Miyakawa M, Onoda N, Etoh M, et al. Diagnosis of thyroid follicular carcinoma by the vascular pattern and velocimetric parameters using high resolution pulsed and power Doppler Ultrasonography. *Endocr J* 2005; 52: 207-12.
7. . . Abdulla H Darwish, Khalid. A. Al Sindi et al: Pattern of thyroid diseases- A Histopathological study: Bahrain Medical Bulletin, Vol 28, No 4, December 2006.
8. . . Braga M, Teresa C et al. (2001) Efficacy of ultrasound guided FNAB in the diagnosis of complex thyroid nodules. *J Clin Endocrinol Metab* 4089-4091.
9. . . Yokozawa T, Miyauchi A, Kuma K, Sugawara M. Accurate and simple method of diagnosing thyroid nodules: the modified technique of ultrasound-guided fine needle aspiration biopsy. *Thyroid* 1995; 5: 141–145