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Role of ultrasound in evaluation of nodular thyroid lesions

Dr. Rajesh Rathore
Professor, Department of Radiodiagnosis, S.B.K.S Medical Institute & Research Centre, Sumandeep Vidyapeeth, Pipariya, Waghodia Road, Vadodara, Gujarat, India
Email: rajeshrathore26rj@gmail.com

Dr. Kundan Patel
Resident, Department of Radiodiagnosis, S.B.K.S Medical Institute & Research Centre, Sumandeep Vidyapeeth, Pipariya, Waghodia, Vadodara, Gujarat, India
*Corresponding author email: kundanpatel467@gmail.com

Dr. Shaishavi Shah
Resident, Department of Radiodiagnosis, S.B.K.S Medical Institute & Research Centre, Sumandeep Vidyapeeth, Pipariya, Waghodia Road, Vadodara, Gujarat, India
Email: shaishavishah320@gmail.com

Dr. Akshay Gupta
Resident, department of Radiodiagnosis, S.B.K.S Medical Institute & Research Centre, Sumandeep Vidyapeeth, Pipariya, Waghodia, Vadodara, Gujarat, India
Email: guptakshay1995@gmail.com

Dr. Ashutosh Patel
Assistant professor, department of Radiodiagnosis, S.B.K.S Medical Institute & Research Centre, Sumandeep Vidyapeeth, Pipariya, Waghodia Road, Vadodara, Gujarat, India
Email: radioashu@gmail.com

***Abstract*---**BACKGROUND AND PURPOSE: Thyroid disorders have become widely prevalent in India. Using latest sonography techniques, evaluation of thyroid nodule and diagnosing as malignant without FNAC has risen to 90% specificity. MATERIAL AND METHODS: The study was done in 100 patients who came to sonography department with clinical suspicion of thyroid nodule. High frequency superficial ultrasound probe is used in this study. The ultrasound characteristics used in our examination were echogenicity (hypoechoic /isoechoic /hyperechoic), composition (solid /cystic /mixed /spongiform), margin, shape, echogenic foci as specified by ACR-TIRADS. RESULTS:

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In this study on 100 patients with thyroid nodules, 34 cases were classified as TIRADS 3, 4 or 5. From this 30 patients underwent surgical resection of which 30 people had histopathological proved thyroid carcinoma meaning the accuracy of sonography with TIRADS has 90% specificity and 100% sensitivity in diagnosing malignancy. CONCLUSION: Ultrasonography with ACR TIRADS scoring is very much helpful tool in diagnosing malignancy without FNAC is cost effective and easy available modality. In hands of a good sonologist with following of TIRADS criteria properly Thyroid nodules can be effectively evaluated for malignancy.

***Keywords*---**malignant nodule, thyroid, USG, FNAC, ACR Tirads.

Introduction

Thyroid malignancy is the most common endocrine cancer all around the word and there has been a increase in incidence of thyroid cancer over the last few years[1,2]. The probability of malignancy in any given thyroid nodule is about 5–15%[3,4], so according to current thyroid guideline it recommend imaging modalities like ultrasound to detect of thyroid malignancies early for better prognosis.[5]Thyroid disorders have become widely prevalent in India despite fortification of salt with iodine and are more common in females than males.Majority of patients with thyroid disease present with midline neck swelling occassionally causing dysphagia and hoarseness of voice. The thyroid nodule is discrete lesion distinct radiologically from the normal thyroid. Using latest sonography techniques evaluation of thyroid nodule as malignancy without FNAC has risen to 90%. Despite the advantages in ultrasound imaging, the evidence is not conclusive in predicting thyroid malignancies.[6,7] Hence, the diagnostic accuracy of the ultrasound scanning needs to be evaluated by comparing with the results of a gold standard test. Fine needle aspiration cytology (FNAC) is considered as the most reliable cost effective method for definitive evaluation of thyroid nodules.[8-15] An evaluation of cervical lymph nodes also helps to determine the malignancy risk.

Aims and Objectives

To evaluate role of sonography in evaluation of thyroid nodules to differentiate a benign thyroid lesion from malignancy and to evaluate sensitivity and specificity of ACR TIRADS criteria. Role of sonography grading by ACR TI-RADS which help to analyse when a thyroid nodule needs FNAC and follow up and usefulness of I ultrasound as an isolated modality to reduce need of FNAC in every case of thyroid nodule.

Materials and Methods

The study was done in 100 patients who came to sonography department with suspicion of thyroid nodular lesions.Ultrasound machine used in my study is GE LOGIQ P9 with superficial high frequency probe.(frequency 7-12MHZ). The ultrasound characteristics used in examination were echogenicity (hypoechoic

/isoechoic /hyperechoic) , composition (solid /cystic /mixed /spongiform), margin, shape, echogenic foci as specified by ACR-TIRADS. In cases where TIRADS 3 and above , in which suspicion of malignacy was high , FNAC was advised and the sonography reports were correlated with the histopathological biopsy report.

Results

In my case control study on 100 persons with thyroid nodules, 34 were classified as TIRADS 3, 4 or 5 in which 30 patients underwent surgical resection of which 30 people had post operative histopathological proved thyroid carcinoma meaning the accuracy of sonography with TIRADS scoring has 90% specificity and 100% sensitivity in diagnosing malignancy without FNAC.

Table 1

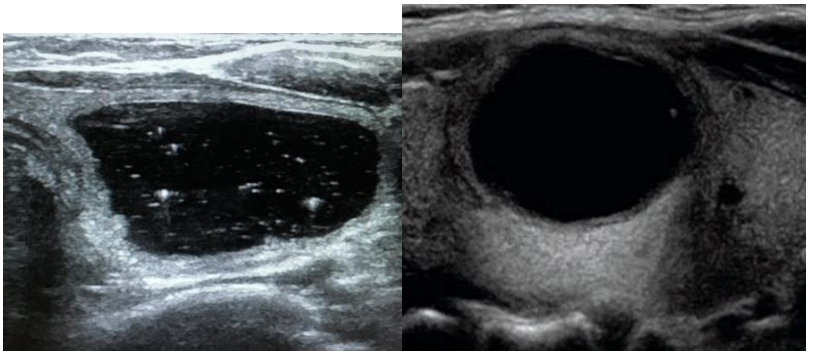
TOTAL-100 PATIENTS	USG (ACR TIRADS)
NON-SUSPICIOUS	66
SUSPICIOUS	34

Table 2

SUSPICIOUS (34 PATIENT)	BENIGN	MALIGNANT
FNAC	4	30

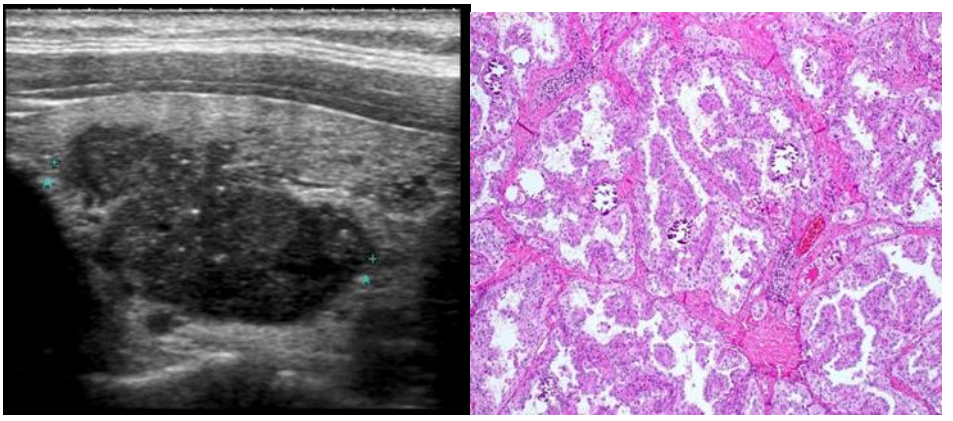
Sensitivity- 100%
Specificity- 90%

Amongst the single ultrasound characteristics assessed, the highest positive likelihood ratio was observed for the presence of microcalcifcations and it had a very high specificity, but the sensitivity was relatively low. On the other side, hypoechogenicity had a relatively higher sensitivity and specificity values. Amongst the combined ultrasound characteristics, the presence of at least one positive characteristic yielded the highest sensitivity, whereas, the sensitivity values were substantially lower when more than one characteristic was combined. On the contrary, presence of all three characteristics yielded a near perfect specificity.



This is benign colloid nodule which shows few specs of calcification for which there is no need of biopsy. Purely cystic anechoic structure seen in right lobe of thyroid suggestive of benign etiology and no need of any biopsy.

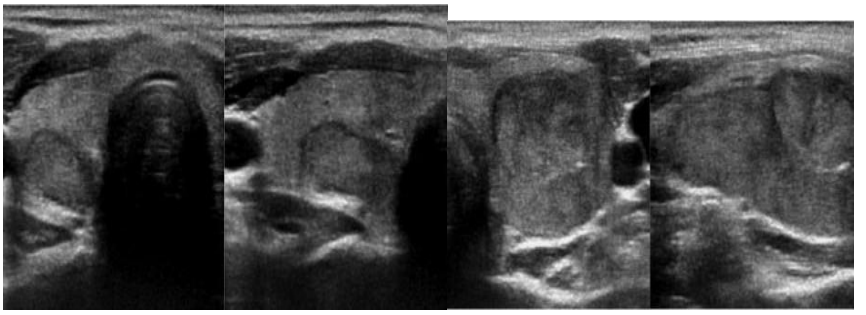
Malignant thyroid lesions
Papillary carcinoma of thyroid



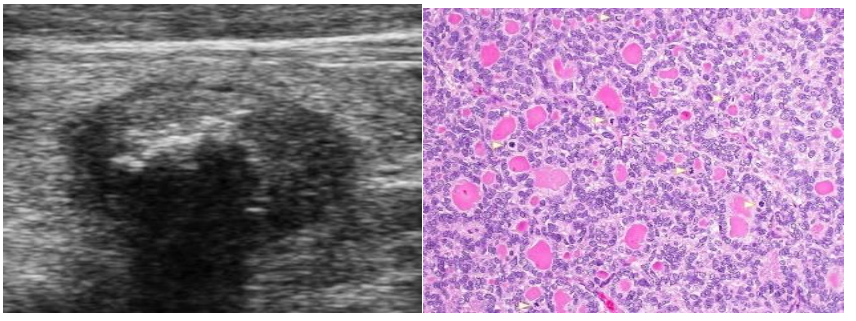
Papillary cell carcinoma showing microcalcifications detected on sonography Papillary cell carcinoma showing Psammoma Bodies

Follicular carcinoma of thyroid

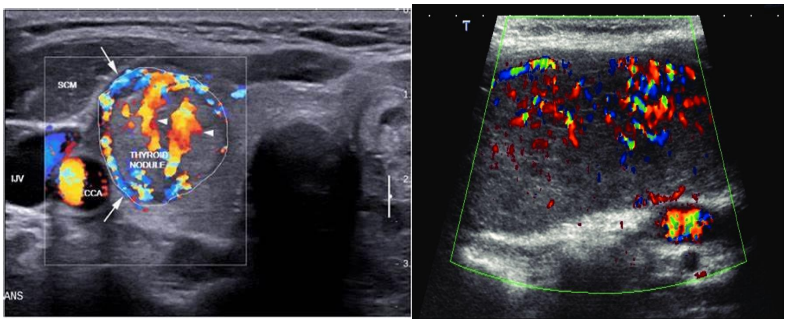
USG can differentiate follicular adenoma from follicular carcinoma as follicular carcinoma shows capsular breach while follicular adenoma does not breach thyroid capsule.



Follicular adenoma no capsular breach
Follicular carcinoma showing capsular breach. Confirm by histopathology



Role of color doppler
Color doppler showing increased vascularity suggestive of malignancy



Discussion

Thyroid disorders have become widely prevalent in India. It is very important to predict/ diagnosis the etiology of benignity or malignancy of the thyroid lesion as early diagnosis of maligancy is life saving , as well it is very important to reduce the very much rising need of FNAC in every case of thyroid nodule. Using latest sonography techniques, evaluation of thyroid nodule and diagnosing as malignant without FNAC has risen to 90% specificity and almost 100% sensitivity. In the present study, ultrasound was considered as the index test with compare with gold standard diagnosis FNAC used as the reference standard. Rather than evaluating all ultrasound characteristics for their diagnostic

accuracy, statistically significant characteristics were identifed. Analysis was important in addressing the potential confounding effect of ultrasound characteristics on each other and has aided in determining the most signifcant characteristics to be used in diagnostic accuracy evaluation. Three signifcant ultrasound characteristics, namely, microcalcifcations, hypoechogenicity and internal vascularity are mainly important for diagnosting malignant thyroid nodule.

Diagnostic accuracy of ultrasound characteristics in the identifcation of thyroid malignancy

Ultrasound characteristics	sensitivity	specificity
Hypoechogenicity	70.5%	74.9%
Microcalcification	40.2	95.5
Internal vascularity	50.2	80.3
At least one positive characteristic	90.0%	30.3%
At least two positive characteristics	54.7%	45.2%
All three positive characteristics	25.1%	78.5%

Conclusion

Ultrasonography with ACR TIRADS scoring is very much helpful tool in diagnosing malignancy without FNAC is cost effective and easy available modality. In hands of a good sonologist with following of TIRADS criteria properly Thyroid nodules can be effectively evaluated for malignancy. Ultrasound has higher sensitivity and specificity to diagnose malignant thyroid nodule with almost 100% sensitivity and 90% specificity.

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