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ACR TI-RADS in a nutshell: A case report

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Abstract

Thyroid nodules are very common and often deceptive in their appearance. Deciding whether the nodule requires biopsy, fine needle aspiration or just follow up will be difficult without using standard guidelines. The American College of Radiology-Thyroid Imaging Reporting and Data Systems was published in 2017. It is entirely based on ultrasound imaging and allows a risk-based classification of thyroid nodules. In addition of estimating the risk of the lesion being malignant, it also determines the further course of action, like biopsy, fine needle aspiration or follow up.

Keywords: ACR TI-RADS, ACR TI-RADS TR3, isoechoic thyroid nodule, thyroid nodule

Introduction

Case Report

39-year-old female presents for ultrasound evaluation following swelling over the neck for a period of four months. She does not have any other symptoms. No masses or lymphadenopathy were noted on physical exam of the neck. Biochemical results were as follows:

Thyroid Stimulating Hormone: 0.93 u[IU]/mL (Normal: 0.50 - 4.50 u[IU]/mL)

T3: 2.28 nmol/L (Normal: 1.49 - 2.60 nmol/L)

T4: 7.96 ug/dl (Normal: 5.40 - 11.70 ug/dl)

USG revealed a well-defined solid isoechoic nodule without internal echogenic foci. The lesion was wider than tall and showed moderate colour uptake on colour doppler study. (Figures 1, 2)



Fig 1: Transverse axis grey-scale ultrasound image through the left thyroid lobe shows a nodule (white arrows) with the following imaging features: Composition: Completely solid (2 points), Echogenicity: Isoechoic (1 point), Shape: Wider-than-tall (0 points), Margin: Smooth (0 points), Echogenic foci: none (0 points); The nodule receives a total of 3 points (ACR TI-RADS TR3)

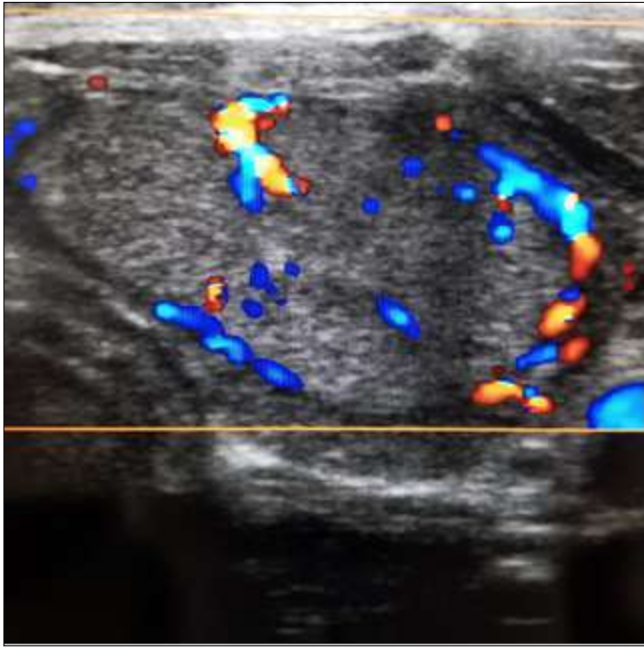


Fig 2: Transverse axis doppler ultrasound image through the left thyroid lobe shows increased vascularity within the nodule

US guided FNA of the nodule was done. Cytology features were consistent with Bethesda 2 category. (Figure 3)

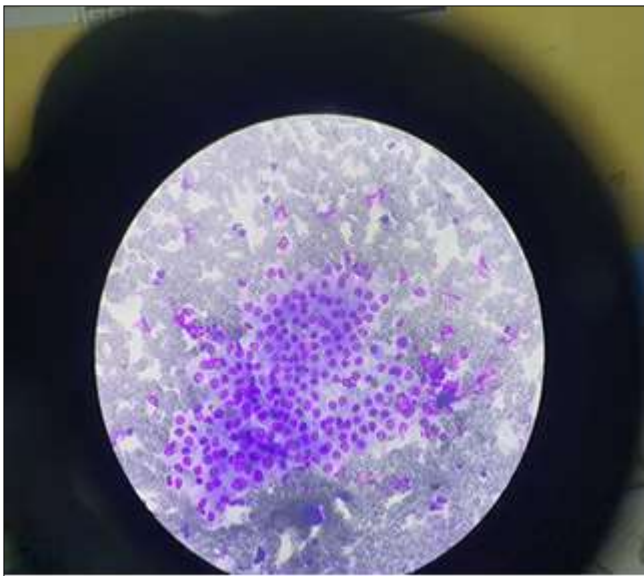


Fig 3: FNA of the nodule was consistent with multinodular goitre (Bethesda II category) As per TI-RADS guidelines, sonography features are evaluated in five categories:

Discussion

The scoring system of The American College of Radiology-Thyroid Imaging Reporting and Data Systems (ACR TI-RADS) is based on the ultrasound appearance of the thyroid nodule as given below:

1. Composition

Cystic or almost completely cystic: 0 points

Spongiform: 0 points

Mixed cystic and solid: 1 point

Solid or almost completely solid: 2 points

2. Echogenicity

Anechoic: 0 points

Hyperechoic or isoechoic: 1 point

Hypoechoic: 2 points

Very hypoechoic: 3 points

3. Shape

Wider-than-tall: 0 points

Taller-than-wide: 3 points

4. Margin

Smooth: 0 points

Ill-defined: 0 points

Lobulated or irregular: 2 points

Extra-thyroidal extension: 3 points

5. Echogenic foci

None or large comet-tailed artifacts: 0 points

Macrocalcifications: 1 point

Peripheral (rim) Calcifications: 2 points

Punctate echogenic foci: 3 points

Classification is based on the total points:

TR1: 0 points: benign

TR2: 2 points: not suspicious

TR3: 3 points: mildly suspicious

TR4: 4-6 points: moderately suspicious

TR5: ≥ 7 points: highly suspicious

The ACR TI-RADS recommends reporting up to four nodules with the highest point totals. About 50-percent of the highly suspicious nodules are malignant on cytology. Sensitivity and specificity of TI-RADS classification is 76% and 97.5% respectively. However positive predictive value is only 63.3%^[1].

On CT, MRI, and US scans, thyroid nodules exhibit varied appearances. The most favoured imaging technique for assessing the severity of a thyroid nodule is ultrasound (US). With or without internal calcifications, thyroid nodules can look as a solid, cystic, and solid nodule on a CT scan. Microcalcifications, however, might be too small for CT scans to detect them. Depending on the intrinsic T2 signals, thyroid nodules can also appear solid or cystic and solid on an MRI. The nodule should also show intravenous contrast enhancement. The primary method for evaluating thyroid nodules for treatment purposes is ultrasound (US). Each ultrasonography feature in a nodule is evaluated using the ACR TI-RADS scoring system to assign a TR1 (benign) to TR5 (suspicious) level of suspicion (highly suspicious).

ACR TI-RADS recommendation for a TR3 thyroid nodule is follow up if maximum dimension is ≥ 1.5 cm and < 2.5 cm and FNA if maximum dimension is ≥ 2.5 cm.

Teaching Points

For a nodule to be classified as spongiform, more than 50-percent of the nodule should be spongiform (small cystic spaces). The presence of peripheral calcifications and macro-calcifications exclude the nodule being classified as spongiform.

A very hypoechoic lesion is more hypoechoic than normal muscle. If dense calcifications are obscuring the nodule, the nodule should be considered at least isoechoic or hypoechoic and is allotted 1 point.

Round nodules can be considered under the category of wider-than tall.

Large comet tail artifacts are those larger than 1 mm while smaller comet tail artifacts should be treated as punctate echogenic foci. In nodules with more than one type of echogenic foci, the points of both types of echogenic foci are added. This is different from the rest of the categories where the number of points is decided by the imaging feature with the most points ^[2].

Table 1: Differential Diagnosis of Thyroid Nodule

Benign nodule	Malignant nodule
Follicular adenoma Thyroid cyst Focal thyroiditis	Papillary thyroid carcinoma Follicular thyroid carcinoma Medullary thyroid carcinoma Lymphoma

Declarations

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

Dr. Dixit Varma was the primary author. Dr. Ibrahim Khalil Ullah and Dr. Horish Rabha also contributed to this work.

Ethical considerations

This article followed all ethical standards for research.

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Data availability

Data sharing is not applicable to this research article as no new data were created or analysed in this study.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy of any affiliated agency of the authors.

References

1. Tappouni RR, Itri JN, McQueen TS, Lalwani N, Ou JJ. ACR TI-RADS: Pitfalls, Solutions, and Future Directions. *RadioGraphics*. 2019 Nov;39(7):2040-2052.
2. Şahin M, Oguz A, Tuzun D, Akkus G, Törün GI, Bahar AY, *et al.* Effectiveness of TI-RADS and ATA classifications for predicting malignancy of thyroid nodules. *Adv Clin Exp Med*. 2021 Nov;30(11):1133-1139.
3. Al-Ghanimi IA, Al-Sharydah AM, Al-Mulhim S, Faisal S, Al-Abdulwahab A, Al-Aftan M, *et al.* Diagnostic Accuracy of Ultrasonography in Classifying Thyroid Nodules Compared with Fine-Needle Aspiration. *Saudi Journal of Medicine & Medical Sciences*. 2020 Apr;8(1):25.
4. Popova NM, Radzina M, Prieditis P, Liepa M, Rauda M, Stepanovs K. Impact of the Hypoechoogenicity Criteria on Thyroid Nodule Malignancy Risk Stratification Performance by Different TIRADS Systems. *Cancers (Basel)*. 2021 Nov 8;13(21):5581.
5. Tessler FN, Middleton WD, Grant EG. Thyroid Imaging Reporting and Data System (TI-RADS): A User's Guide. *Radiology*. 2018 Apr;287(1):29-36.

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