Non-utility of Thyroid Nodule FNAs When Sampling Not Recommended by ACR TI-RADS

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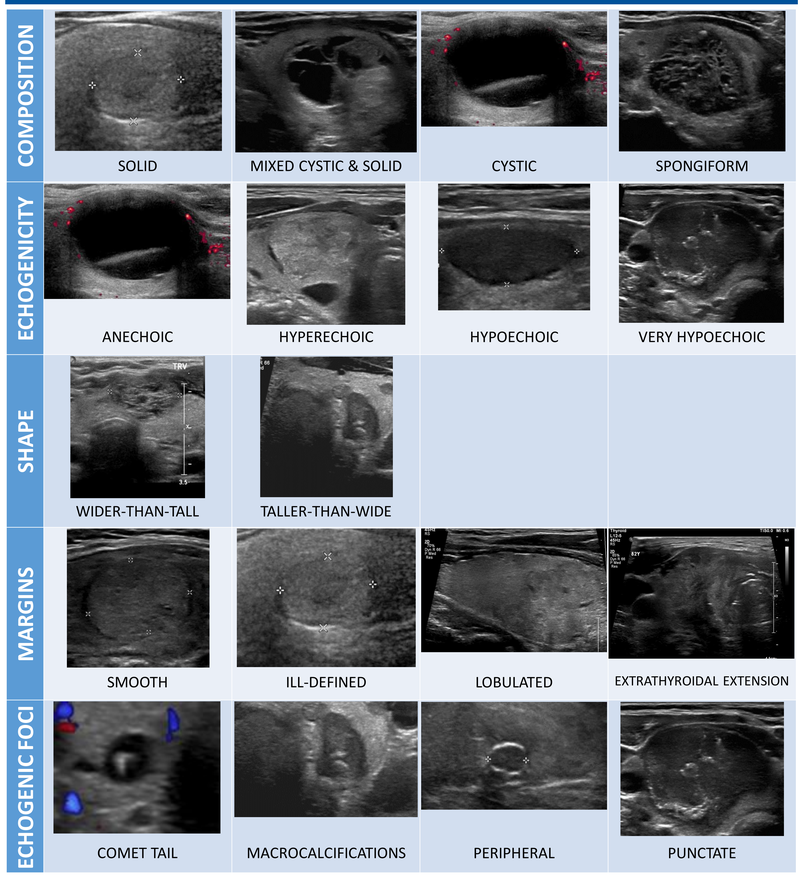
INTRODUCTION

BACKGROUND:
Thyroid nodules are extremely common and are regularly found on many imaging examinations that include the neck[1,2] and by physical exam in the clinic setting[3]. Further workup with thyroid ultrasound imaging is common[3]. Despite most nodules being benign, invasive sampling is not uncommonly ordered[2]. Fine needle aspiration (FNA) is generally effective and safe, but invasive and thus may contribute to unneeded anxiety and increased health care costs. As such, it can contribute to poor utilization of resources[2].

PURPOSE:
The ACR Thyroid Imaging Reporting and Data Systems (TI-RADS) is an evidence- and consensus-based guideline system designed to facilitate thyroid nodule management. Referring physician acceptance, however, is variable. We aimed to assess the results of thyroid nodule fine needle aspiration (FNA) on nodules which did not meet TI-RADS criteria for tissue sampling.

ACR TI-RADS LEXICON[4,5]



METHODS

- Single center, retrospective study
- All patients that underwent thyroid fine needle aspiration during a 12-month period
  - 160 patients, 198 thyroid fine needle aspirations
- Collected data:
  - FNA cytology and genetic testing
  - Surgical pathology in cases where thyroid gland resected
  - Radiology recommendations for sampling per TI-RADS criteria

RESULTS

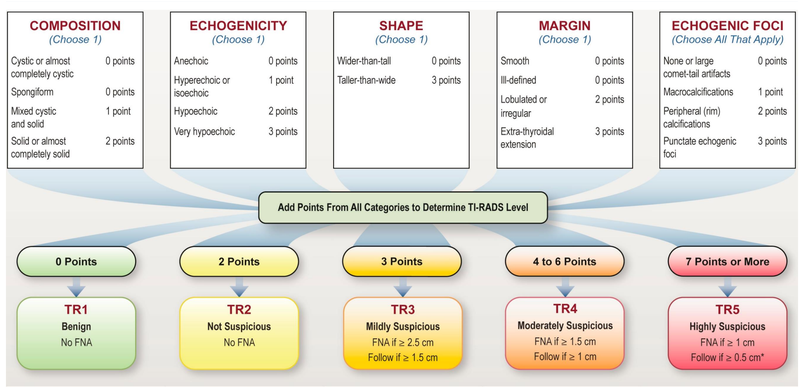
Of all 198 sampled nodules, 162 (81.8%) were benign, 14 (7.1%) showed follicular lesions of undetermined significance (FLUS) and/or atypia of undetermined significance (AUS), 8 (4.0%) were malignant, and 14 (7.1%) were non-diagnostic. Of the 198 total FNAs, 30 (15.1%) were not recommended by TI-RADS criteria. Of these, 25/30 (83.3%) were benign on initial sampling, 1 (3.3%) showed AUS, and 4 (13.3%) were non-diagnostic. The AUS nodule showed benign Hurthle cell adenoma on subsequent surgical pathology. On follow-up of the non-diagnostic samplings, the nodules were either sonographically stable (1/4; 25%) or benign by subsequent surgical pathology (3/4; 75%). As such, no malignancy was detected in any nodule which did not meet TI-RADS criteria to be sampled. The specialities most commonly ordering the non-recommended FNAs were Endocrinology (16; 53%) and Otolaryngology (12; 40%).

CONCLUSIONS

In the setting of thyroid nodules not meeting TI-RADS criteria for sampling, clinician referral for FNA is not uncommon despite exceptionally low risk of malignancy. Even in cases in which TI-RADS does advise sampling, malignancy is still uncommon. Efforts to improve referring physician education, optimize referral appropriateness, and institute collaborative care pathways are warranted to minimize unnecessary invasive procedures and most judiciously utilize procedure-related resources.

ACR TI-RADS SCORING SYSTEM[1]

COMPOSITION (Choose 1)		ECHOGENICITY (Choose 1)		SHAPE (Choose 1)		MARGIN (Choose 1)		ECHOGENIC FOCI (Choose All That Apply)	
Cystic or almost completely cystic	0 points	Anechoic	0 points	Wider-than-tall	0 points	Smooth	0 points	None or large comet-tail artifacts	0 points
Spongiform	0 points	Hyperechoic or isoechoic	1 point	Taller-than-wide	3 points	Ill-defined	0 points	Macrocalcifications	1 point
Mixed cystic and solid	1 point	Hypoechoic	2 points			Lobulated or irregular	2 points	Peripheral (rim) calcifications	2 points
Solid or almost completely solid	2 points	Very hypoechoic	3 points			Extra-thyroidal extension	3 points	Punctate echogenic foci	3 points



COMPOSITION	ECHOGENICITY	SHAPE	MARGIN	ECHOGENIC FOCI
Spongiform: Composed predominantly (>50%) of small cystic spaces. Do not add further points for other categories. *Mixed cystic and solid:* Assign points for predominant solid component. Assign 2 points if composition cannot be determined because of calcification.	*Anechoic:* Applies to cystic or almost completely cystic nodules. *Hyperechoic/isoechoic/hypoechoic:* Compared to adjacent parenchyma. *Very hypoechoic:* More hypoechoic than strap muscles. Assign 1 point if echogenicity cannot be determined.	*Taller-than-wide:* Should be assessed on a transverse image with measurements parallel to sound beam for height and perpendicular to sound beam for width. This can usually be assessed by visual inspection.	*Lobulated:* Protrusions into adjacent tissue. *Irregular:* Jagged, spiculated, or sharp angles. *Extrathyroidal extension:* Obvious invasion = malignancy. Assign 0 points if margin cannot be determined.	*Large comet-tail artifacts:* V-shaped, >1 mm, in cystic components. *Macrocalcifications:* Cause acoustic shadowing. *Peripheral:* Complete or incomplete along margin. *Punctate echogenic foci:* May have small comet-tail artifacts.

Figure 1: Outcomes of 30 non-recommended samplings

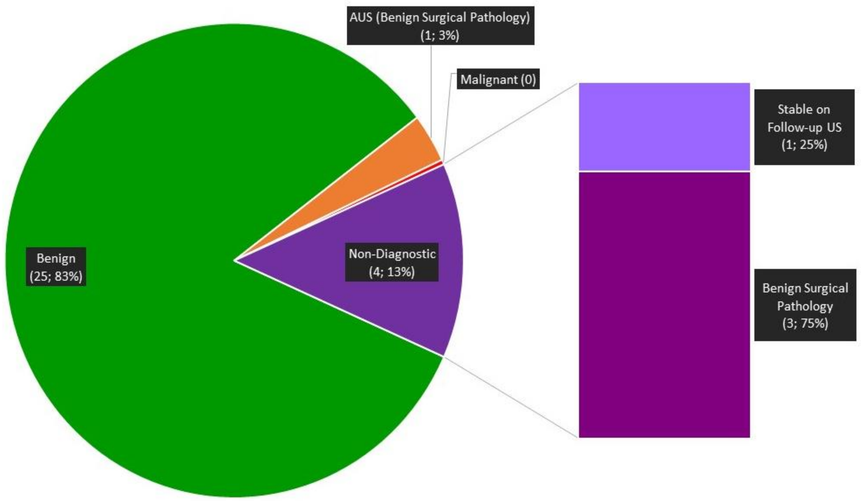
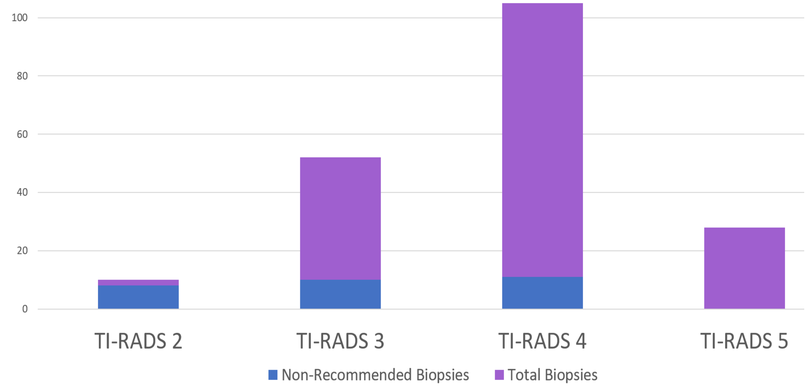


Figure 2: Breakdown of sampled nodules by TI-RADS category



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[5]Images provided courtesy of University of Mississippi Medical Center, Department of Radiology, Ultrasound Division

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