

Management of Thyroid Nodules, Parathyroid and Lymph Nodes

Rajeev H. Mehta, MD, FACS

ENT Surgical Consultants, Ltd

Assistant Clinical Professor

Department of Otolaryngology-Head and Neck Surgery

University of Illinois-Chicago

Ultrasound Features

2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. *Thyroid*. 2016 Jan 1; 26(1): 1–133

Thyroid US is a poor screening tool because:

- 66% of benign nodules have at least one positive US predictor of papillary thyroid cancer
- 66% of papillary cancers have at least one non-suspicious US feature

So US guided FNA is a vital adjunct.

[2015 ATA Guidelines](#) RECOMMENDATION 7: FNA is the procedure of choice in the evaluation of thyroid nodules, when clinically indicated.

Indications for Thyroid FNA

(2015 ATA Management Guidelines Taskforce)

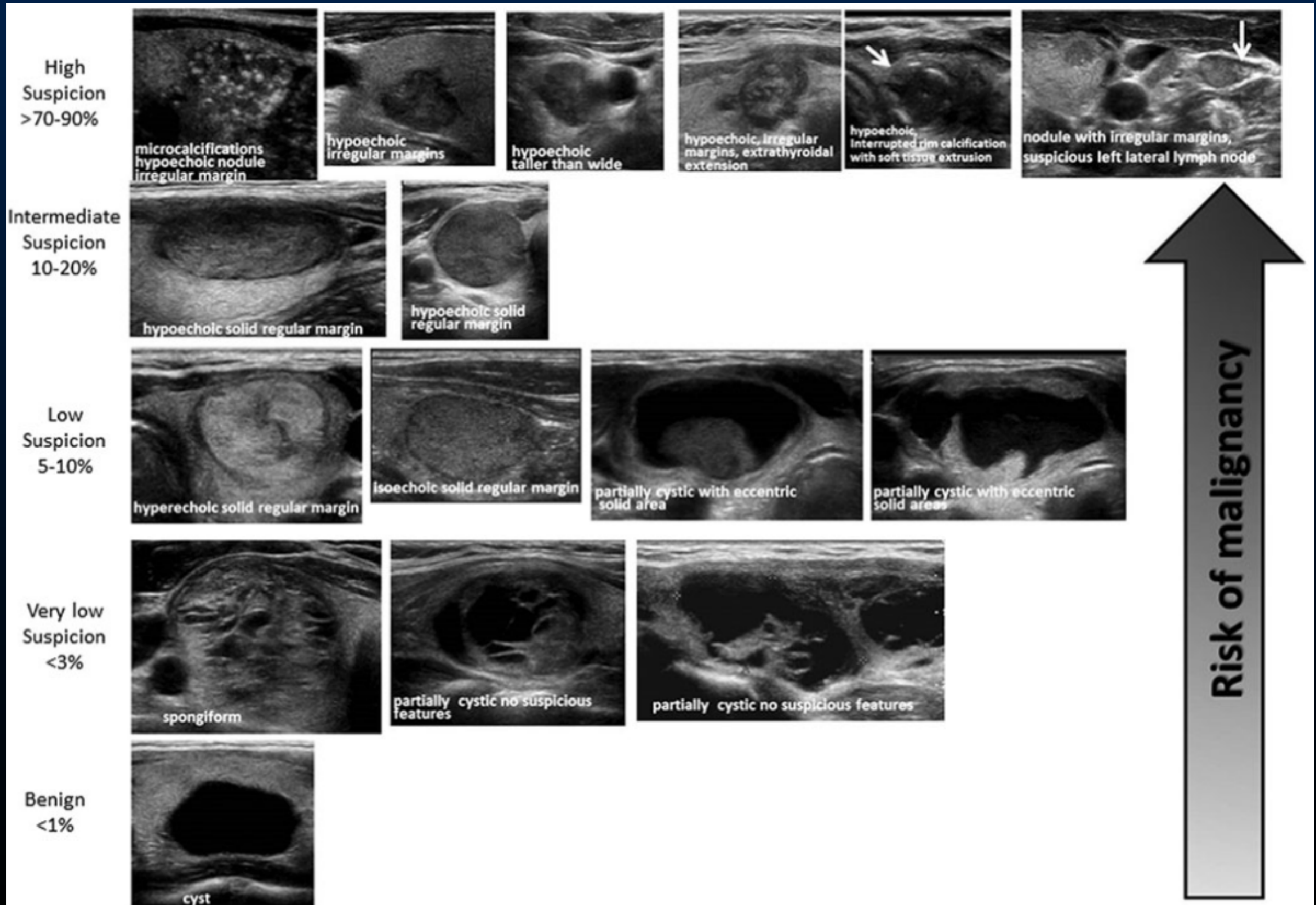
(Recommendation 8)

- Nodules > 1cm with high suspicion US features (strong recommendation, moderate-quality evidence)
- Nodules > 1cm with intermediate suspicion US features (strong recommendation, low-quality evidence)
- Nodules > 1.5cm with low suspicion US features (weak recommendation, low-quality evidence)
- Nodules > 2cm with very low suspicion US (weak recommendation, moderate-quality evidence)

FNA not required for:

- Nodules that do not meet above criteria (strong recommendation, moderate-quality evidence)
- Purely cystic nodules (strong recommendation, moderate-quality evidence)

2015 ATA Management Guidelines Taskforce



2015 ATA Management Guidelines Taskforce

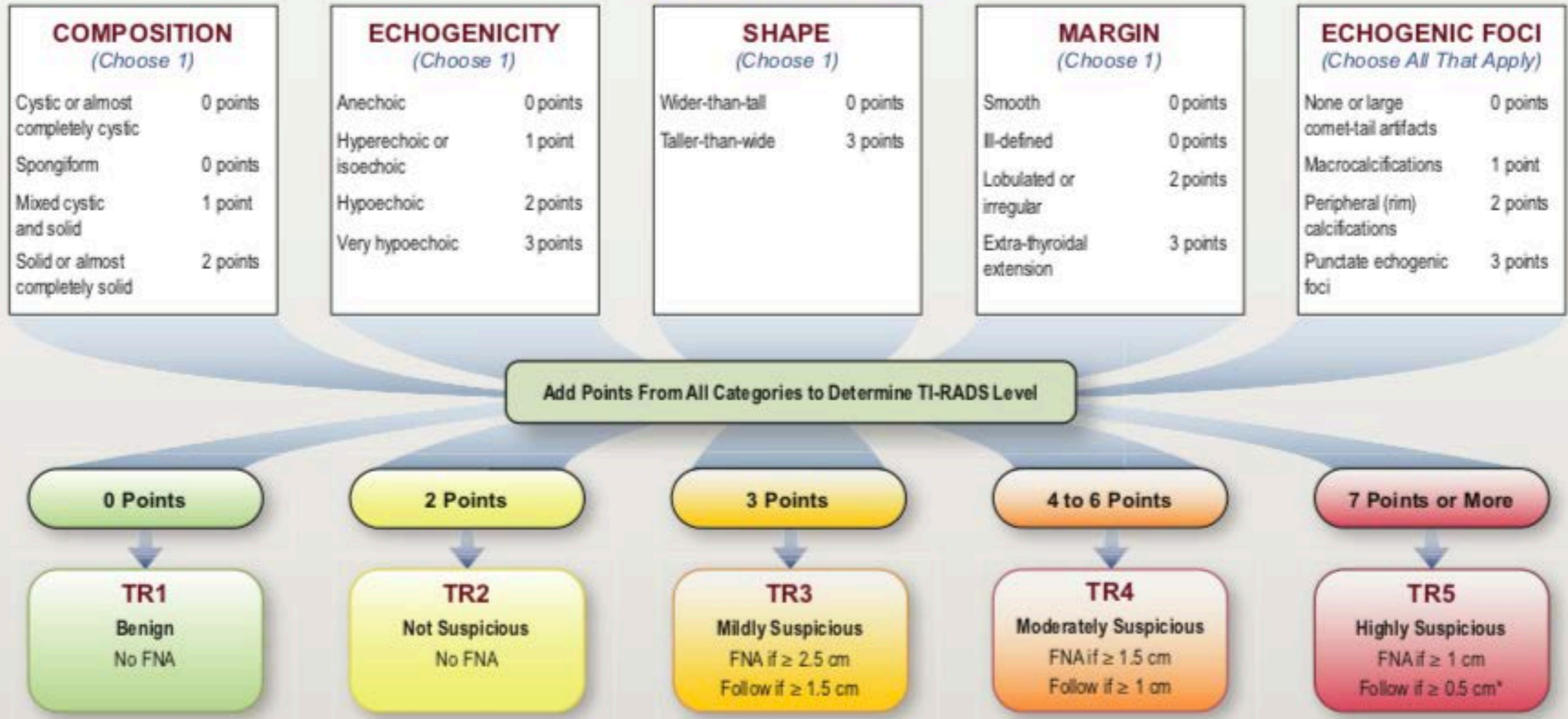
TABLE 6.

SONOGRAPHIC PATTERNS, ESTIMATED RISK OF MALIGNANCY, AND FINE-NEEDLE ASPIRATION GUIDANCE FOR THYROID NODULES

<i>Sonographic pattern</i>	<i>US features</i>	<i>Estimated risk of malignancy, %</i>	<i>FNA size cutoff (largest dimension)</i>
High suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule <i>with</i> one or more of the following features: irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of ETE	>70–90 ^a	Recommend FNA at ≥1 cm
Intermediate suspicion	Hypoechoic solid nodule with smooth margins <i>without</i> microcalcifications, ETE, or taller than wide shape	10–20	Recommend FNA at ≥1 cm
Low suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, <i>without</i> microcalcification, irregular margin or ETE, or taller than wide shape.	5–10	Recommend FNA at ≥1.5 cm
Very low suspicion	Spongiform or partially cystic nodules <i>without</i> any of the sonographic features described in low, intermediate, or high suspicion patterns	<3	Consider FNA at ≥2 cm Observation without FNA is also a reasonable option
Benign	Purely cystic nodules (no solid component)	<1	No biopsy ^b

TIRADS 2017 Flow Chart

ACR TI-RADS



<http://tiradscalculator.com>

<http://tiradscalculator.com>

TI-RADS Calculator

Online calculator for Thyroid Imaging Reporting and Data System (TI-RADS) based on 2017 ACR white paper with guidance on fine needle aspiration (FNA) and follow-up.

[Click here for images and description for each of the ultrasound features](#)

- Composition (Choose 1)*
- Cystic or almost completely cystic 0 points
 - Spongiform 0 points
 - Mixed cystic and solid 1 point
 - Solid or almost completely solid 2 points

- Echogenicity (Choose 1)*
- Anechoic 0 points
 - Hyperechoic or isoechoic 1 point
 - Hypoechoic 2 points
 - Very hypoechoic 3 points

- Shape (Choose 1)*
- Wider-than-tall 0 points
 - Taller-than-wide 3 points

- Margin (Choose 1)*
- Smooth 0 points
 - Ill-defined 0 points
 - Lobulated or irregular 2 points
 - Extra-thyroidal extension 3 points

- Echogenic Foci (Choose All That Apply)
- None or large comet-tail artifacts 0 points
 - Macrocalcifications 1 point
 - Peripheral (rim) calcifications 2 points
 - Punctate echogenic foci 3 points

Total Points

TI-RADS Score

Recommendations

Reset

Ultrasound Features

1. Calcification

- a. Egg shell calcification (B/M)
- b. Coarse calcification (B/M)
- c. Microcalcification/punctate
 - i. with comet-tail (B)
 - ii. without comet-tail (M)

B = benign

M = malignant

2. Echogenicity

- a. hyperechoic (B)
- b. hypoechoic (M)

3. Vascularity

- a. peripheral (B)
- b. intranodular flow (M)

4. Margins/halo

- a. presence of halo (B)
- b. irregular margins/microlobulated (M)

Ultrasound Features

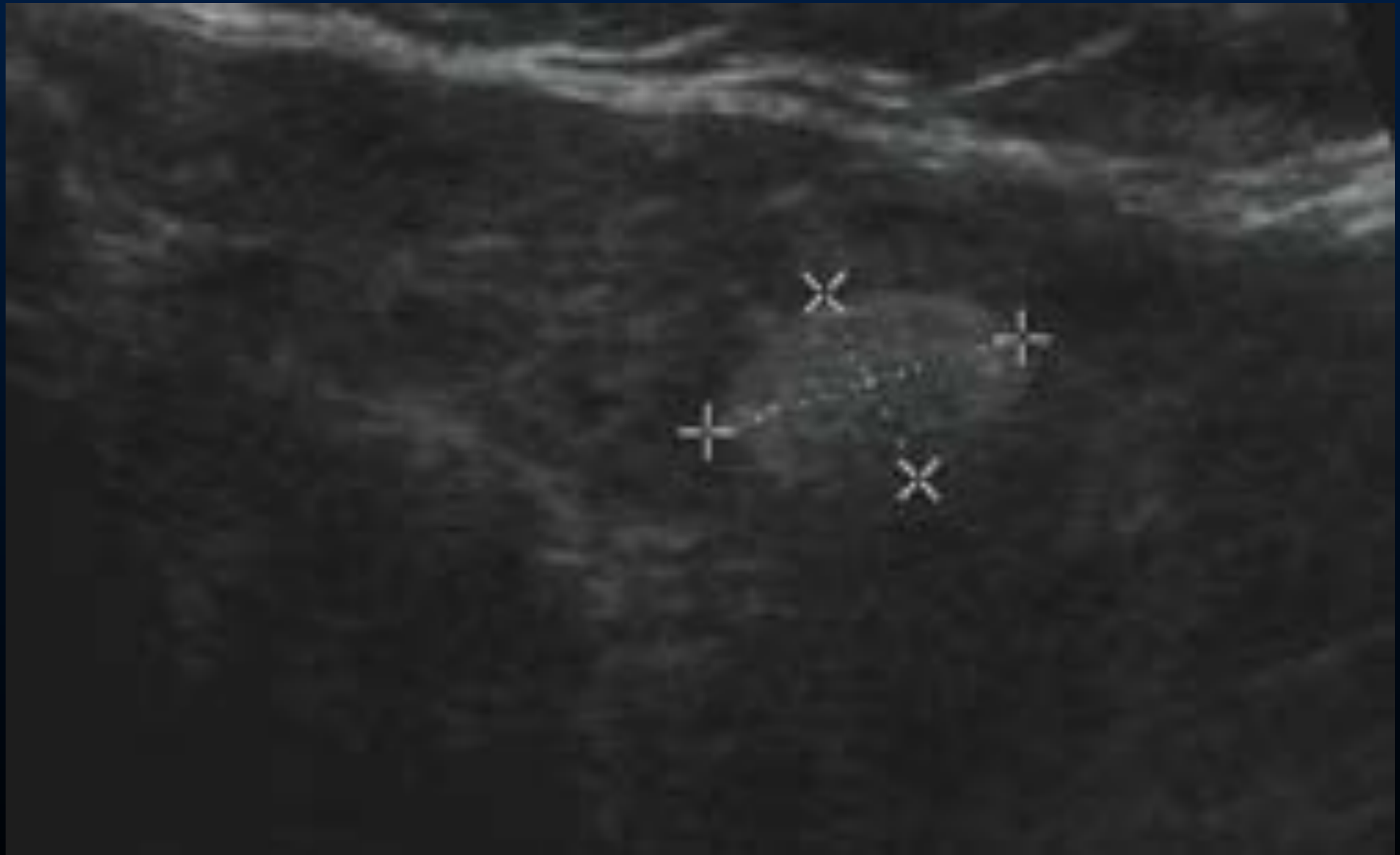
Benign

- ✦ spongiform
- ✦ giraffe pattern
- ✦ cyst with colloid clot
- ✦ diffuse hyperechogenic
- ✦ comet-tail artifact (colloid)

Malignant

- ✦ taller-than-wide shape
- ✦ intranodule hypervascular
- ✦ irregular margins/microlobulated
- ✦ absence of halo
- ✦ hypoechogenic
- ✦ solid
- ✦ microcalcifications
- ✦

Hyperechoic Nodule

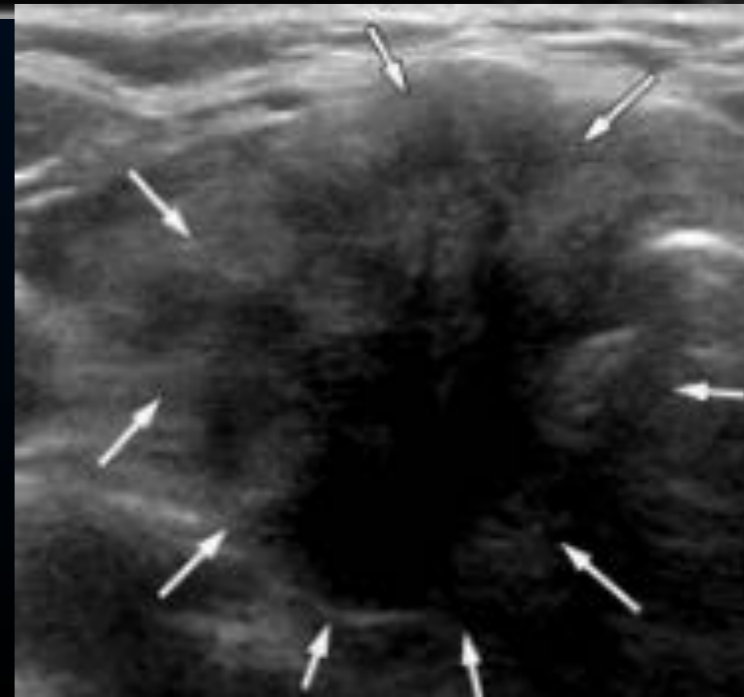
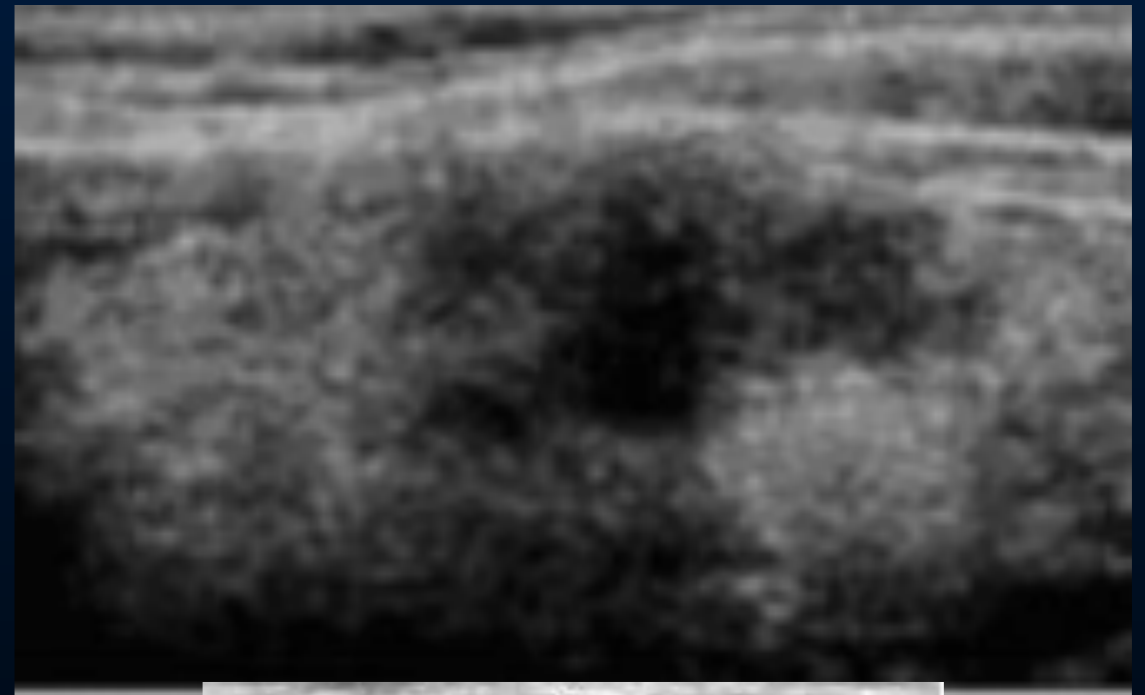


Hypoechoic Nodules

Well defined borders

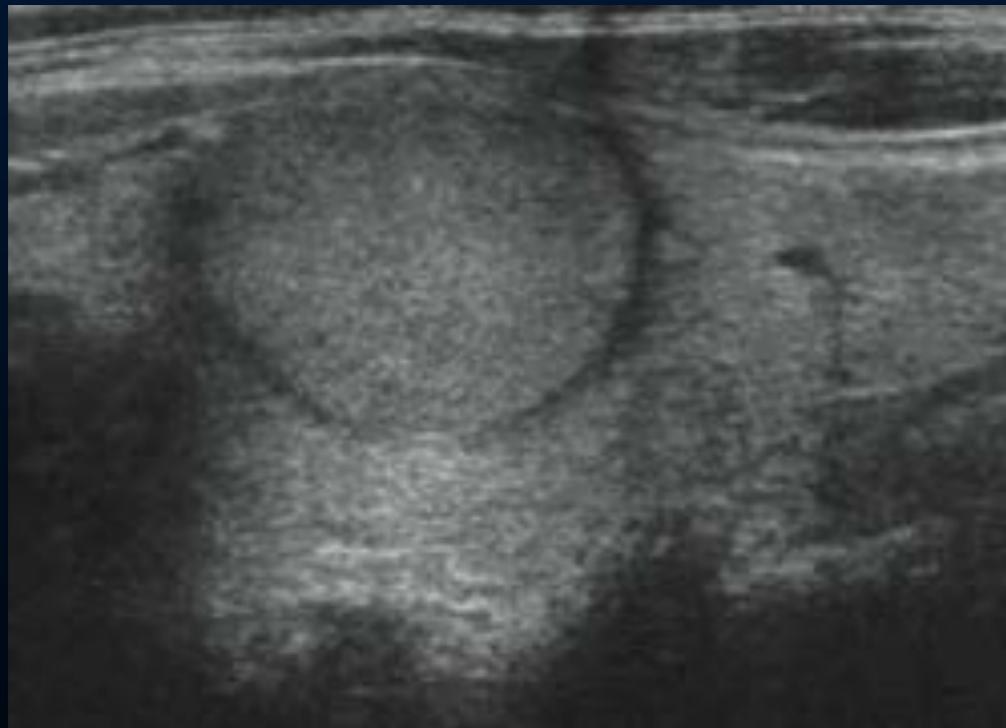


Ill-defined borders

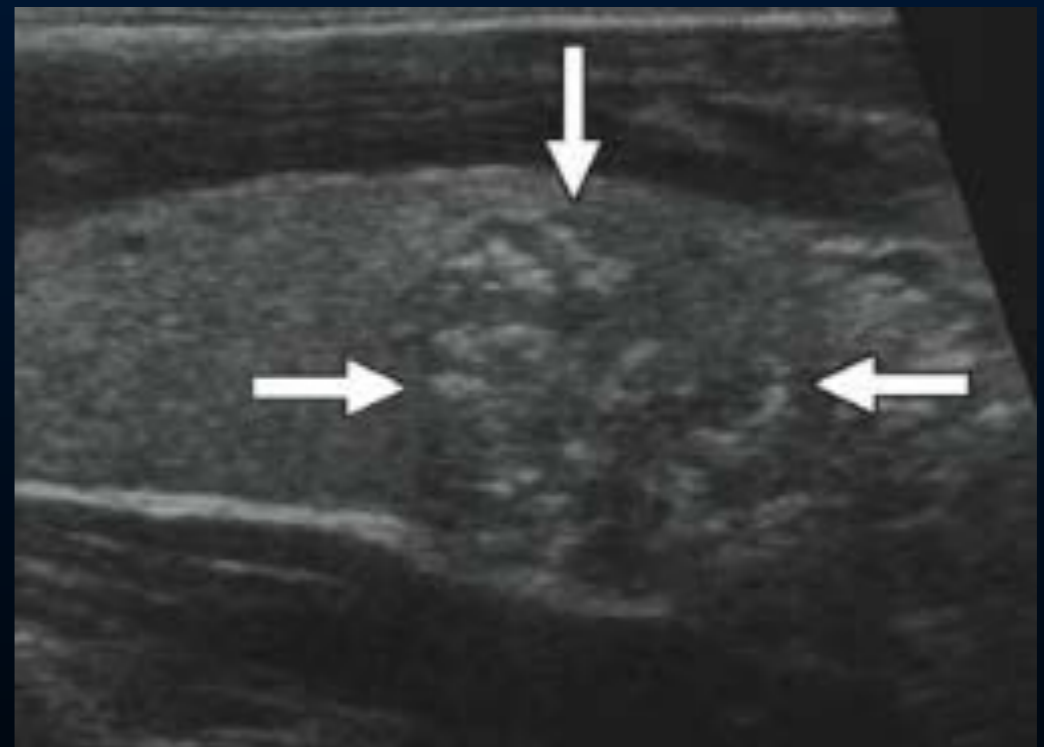


Isoechoic Nodule

With Halo

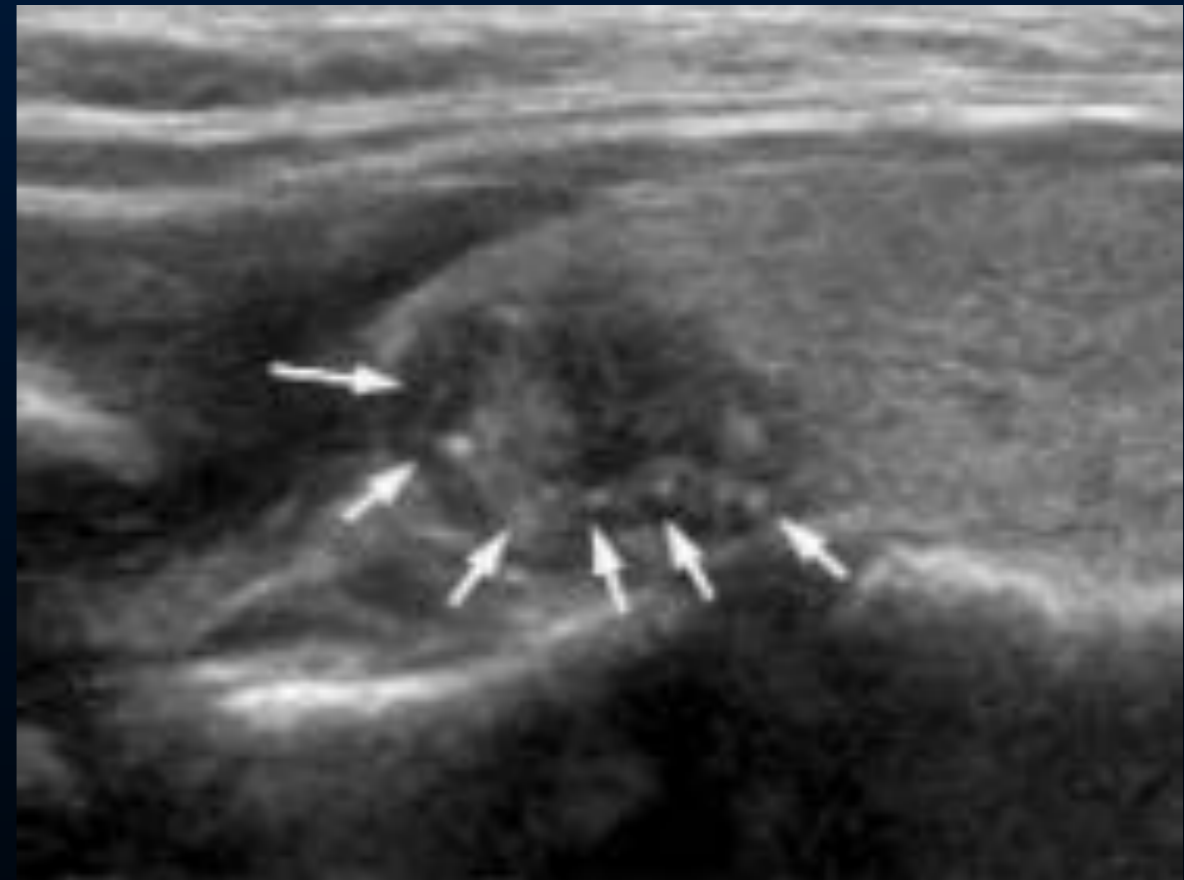
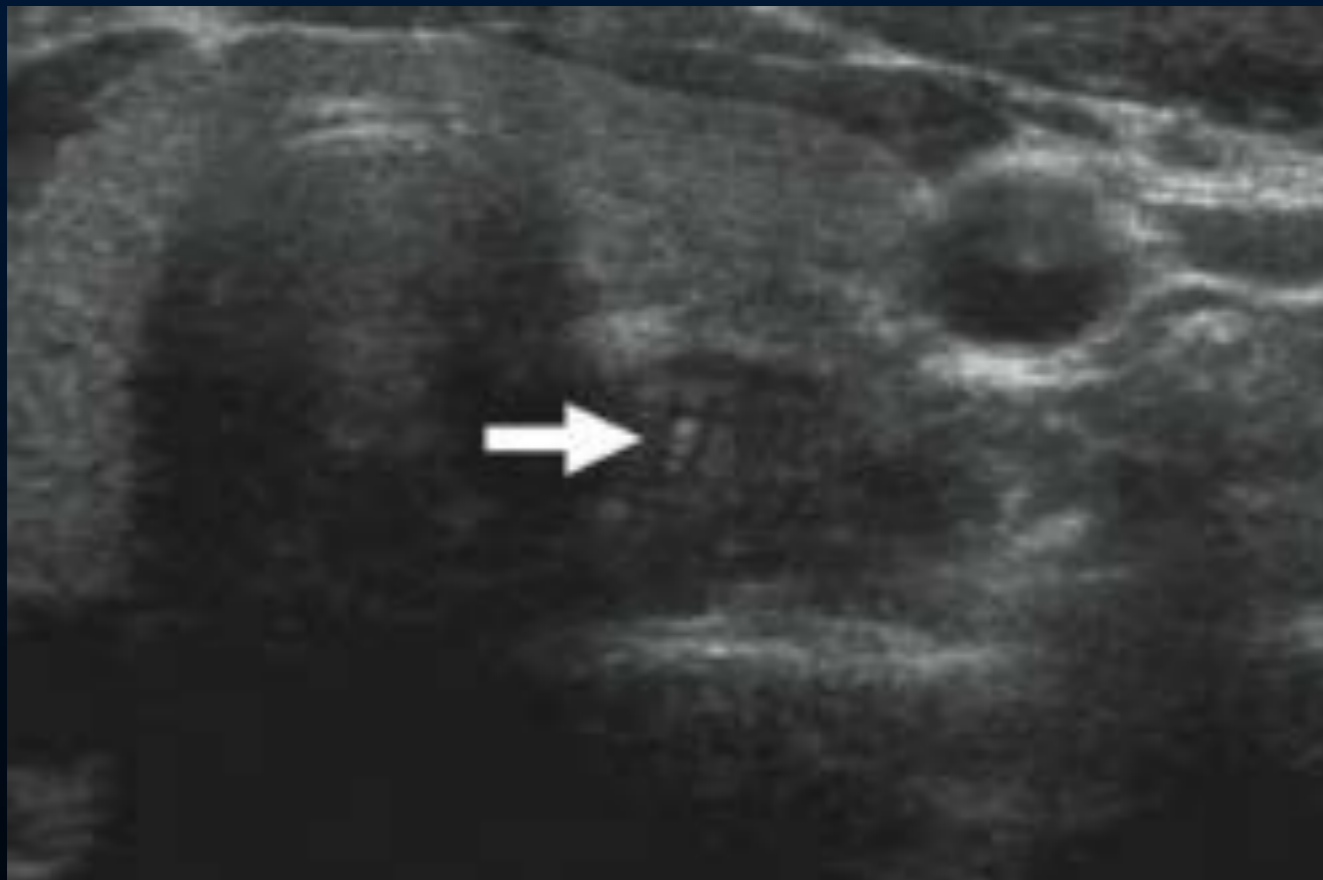


Without halo

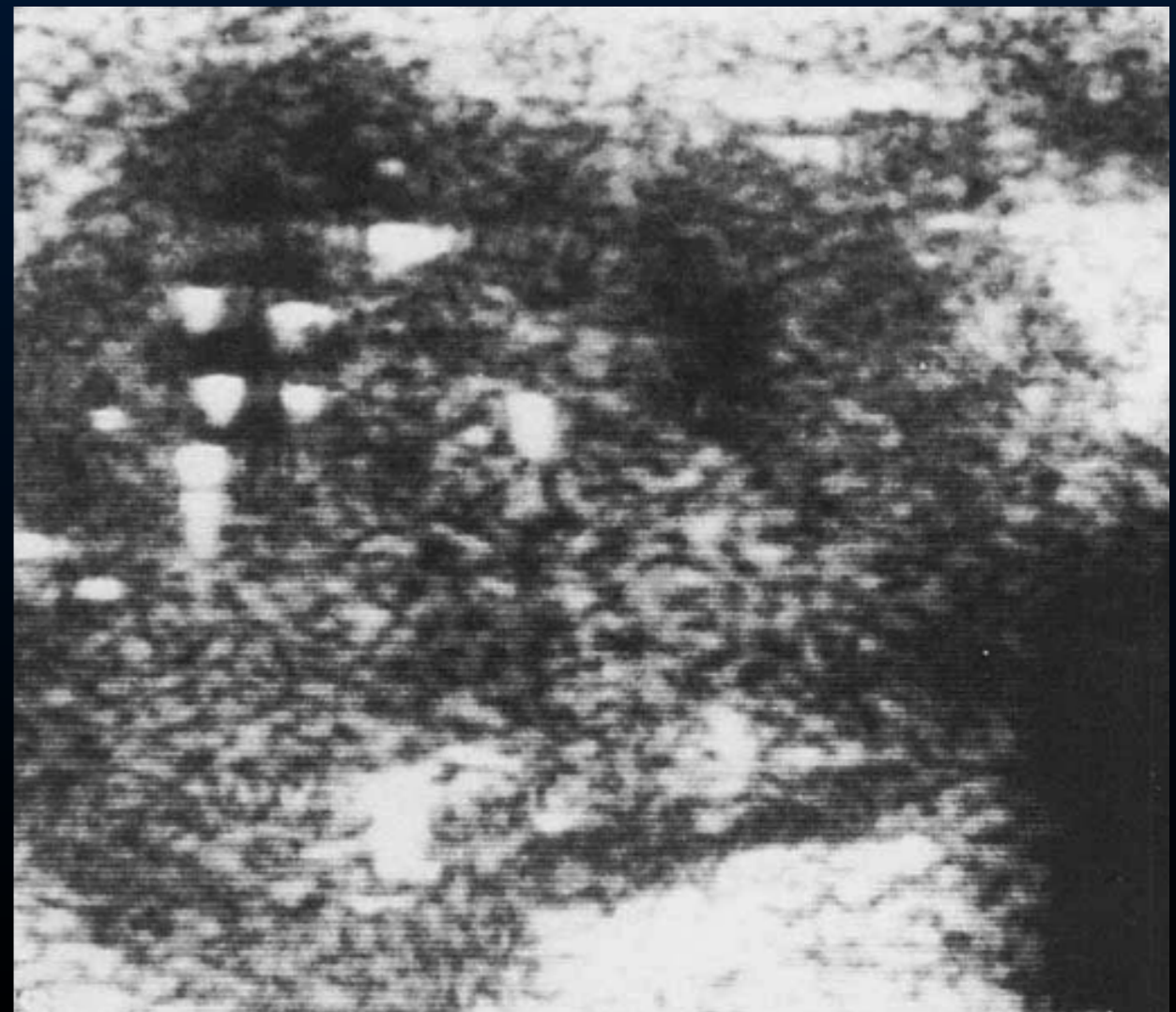
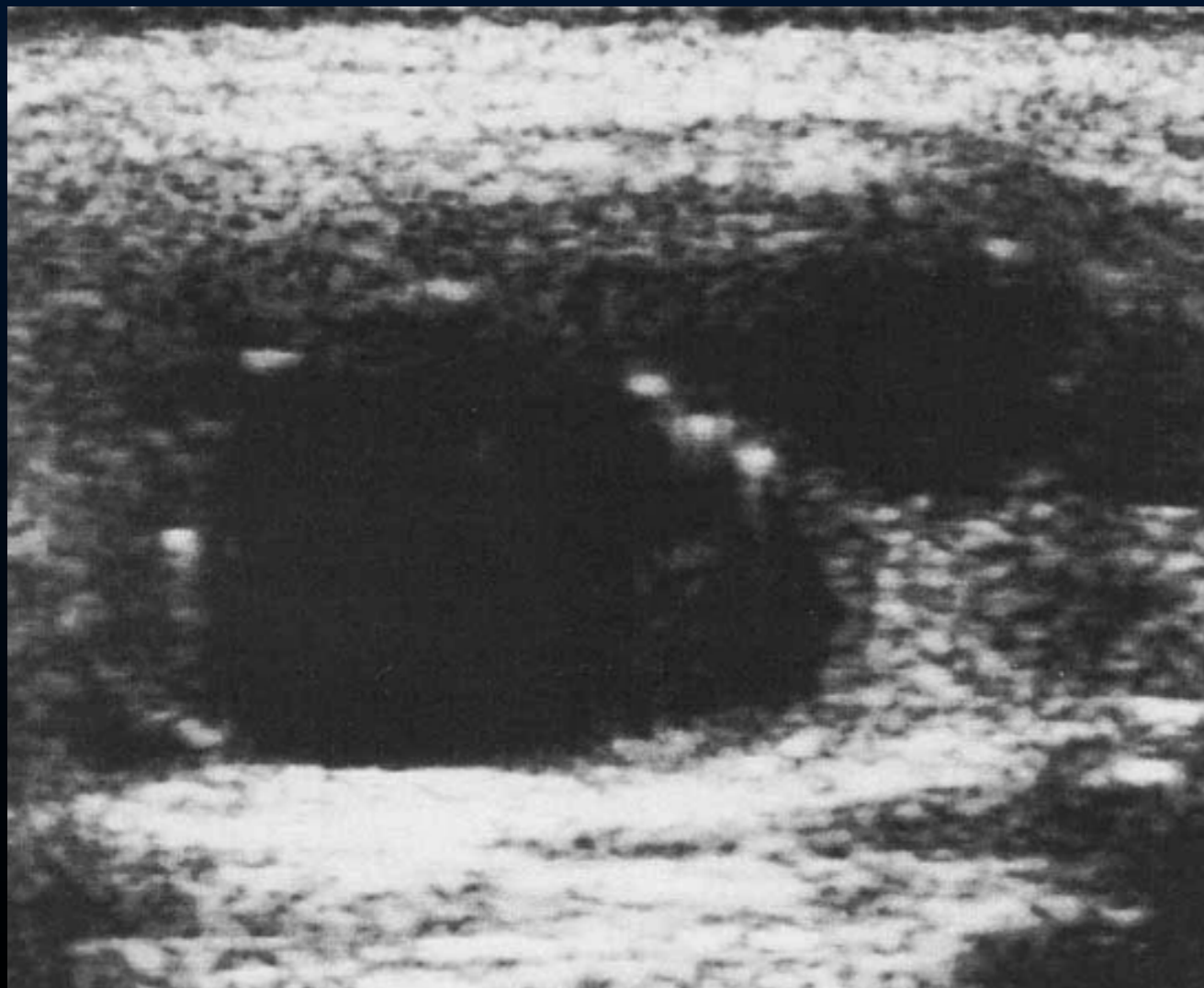


(and microcalcifications)

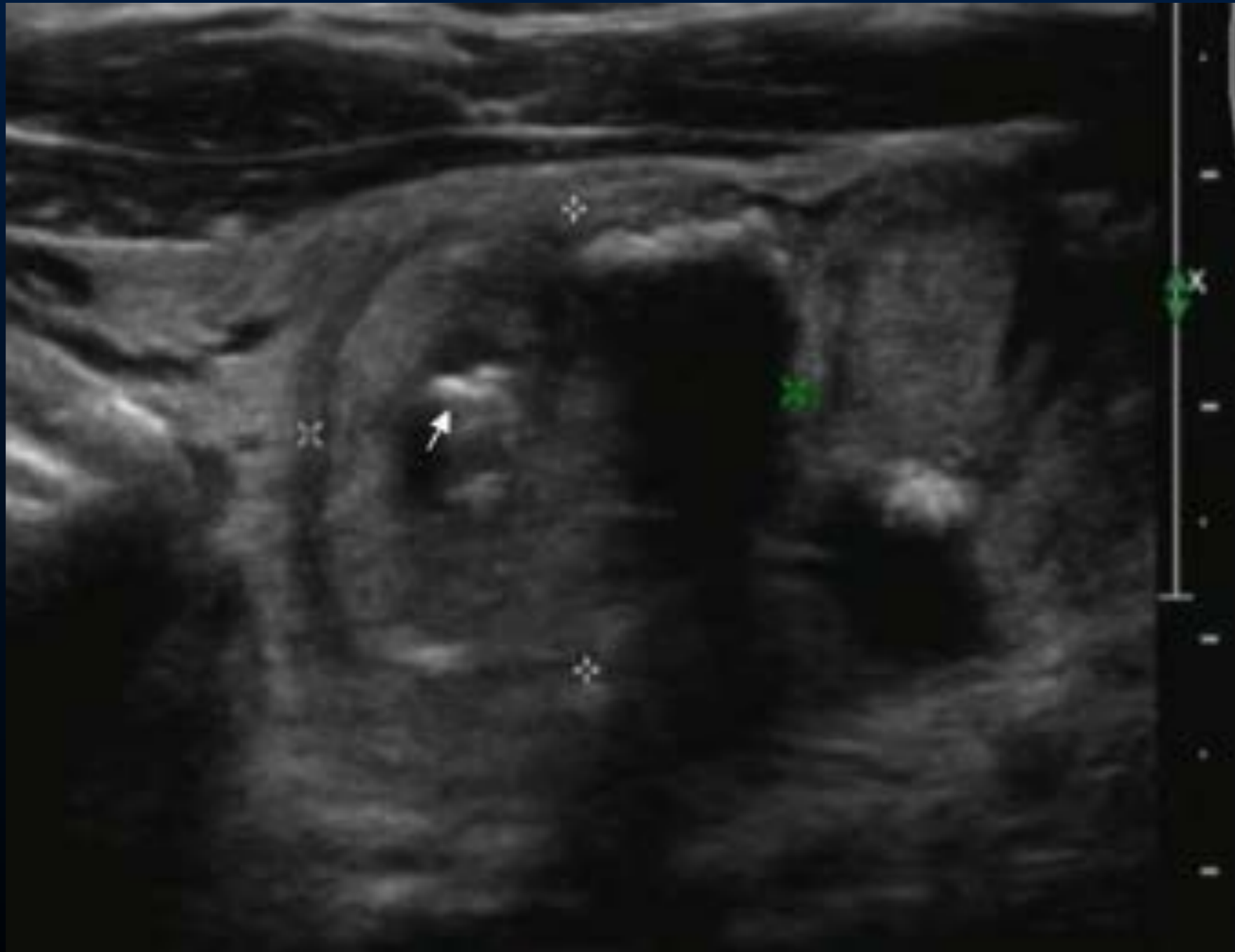
Microcalcifications



Comet-tail Artifact



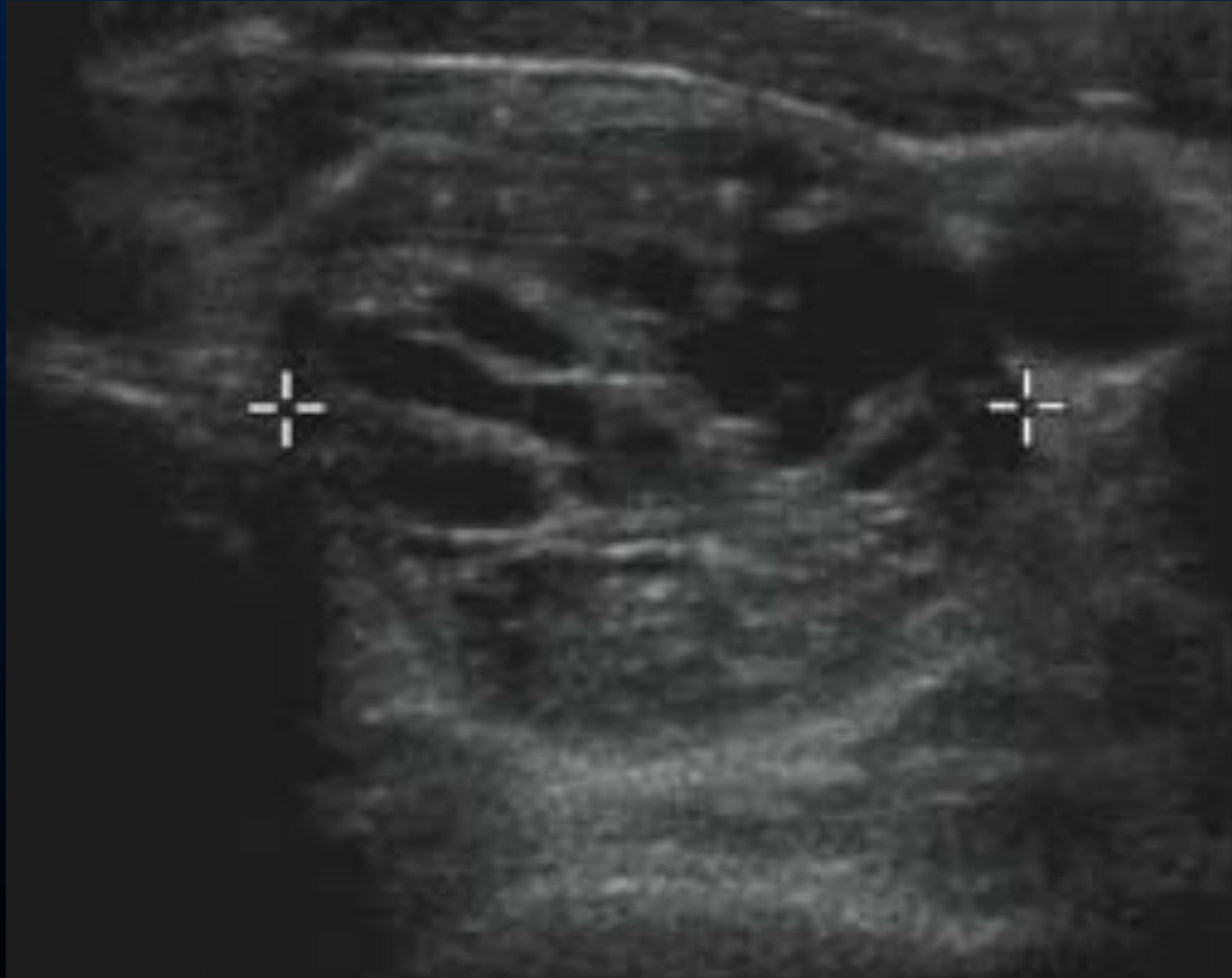
Macrocalcifications



Cyst with Colloid Clot



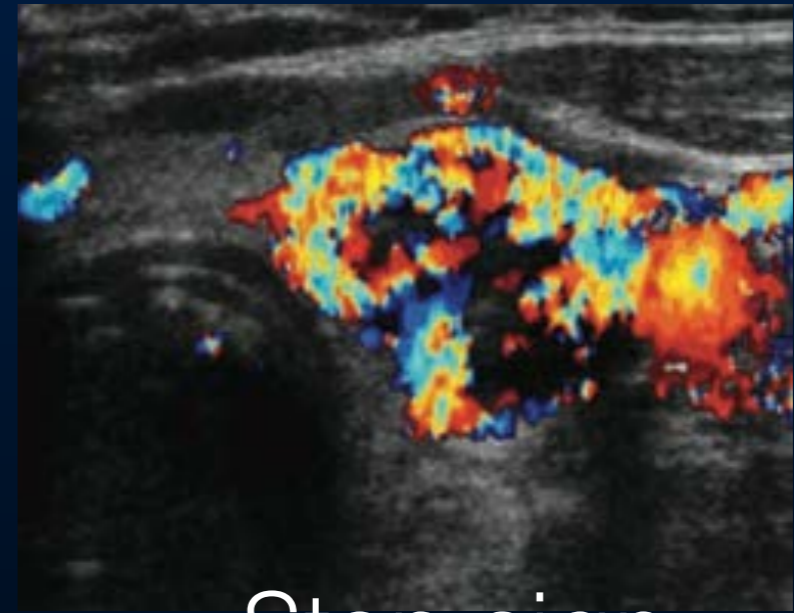
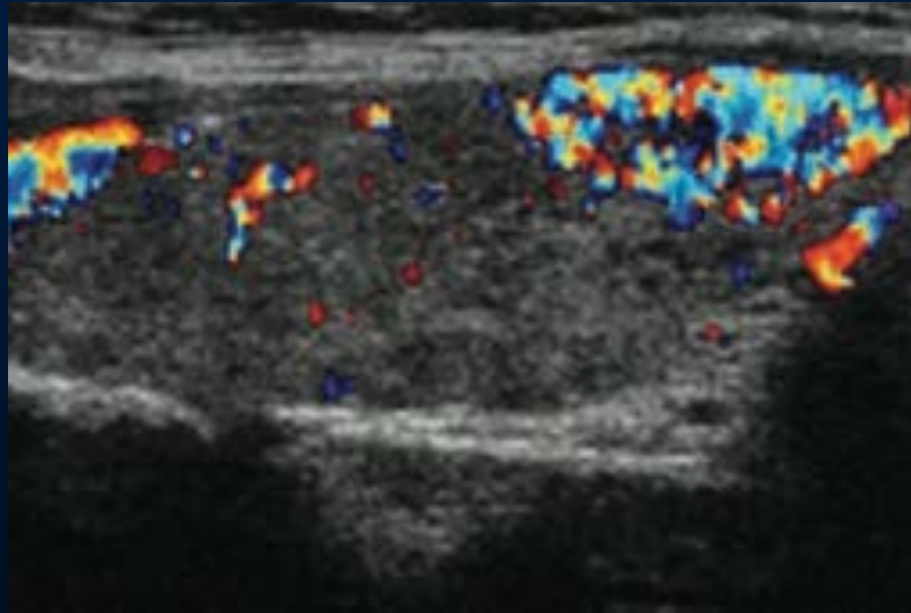
Spongiform Nodule



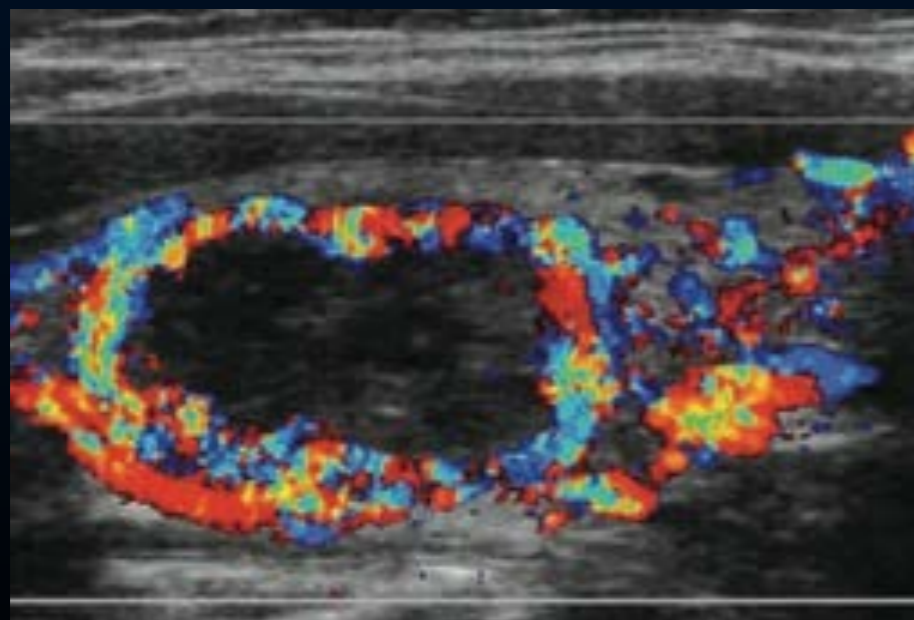
Giraffe Pattern



Hypervascular on color flow doppler



Stop sign



Ring of fire

Hypoechoic, microlobulated margin, taller-than-wide shape



Parathyroid Adenoma Localization: Surgeon-Performed Ultrasound Versus Sestamibi

Steward, David L et al. Laryngoscope 116: August 2006, 1380-84.

106 patient undergoing parathyroidectomy had pre-op surgeon US and sestamibi localization:

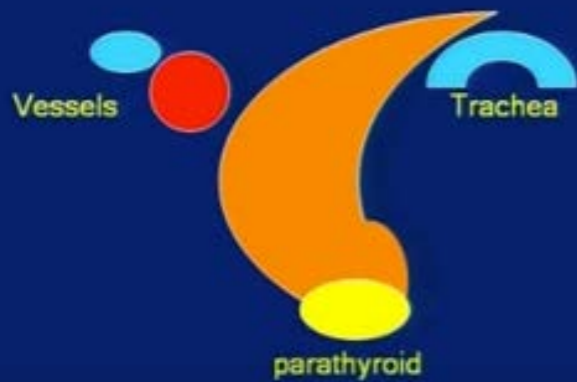
- Sensitivities for correct quadrant localization for US vs sestamibi were 87% vs. 58%.
- Sensitivities for correct side localization for US vs sestamibi were 91% vs 74%.
 1. Superior parathyroid - Seen on US above level of cricoid or posterior to carotid artery.
 2. Inferior parathyroid - Seen on US ventral to carotid artery.

Parathyroid Adenoma

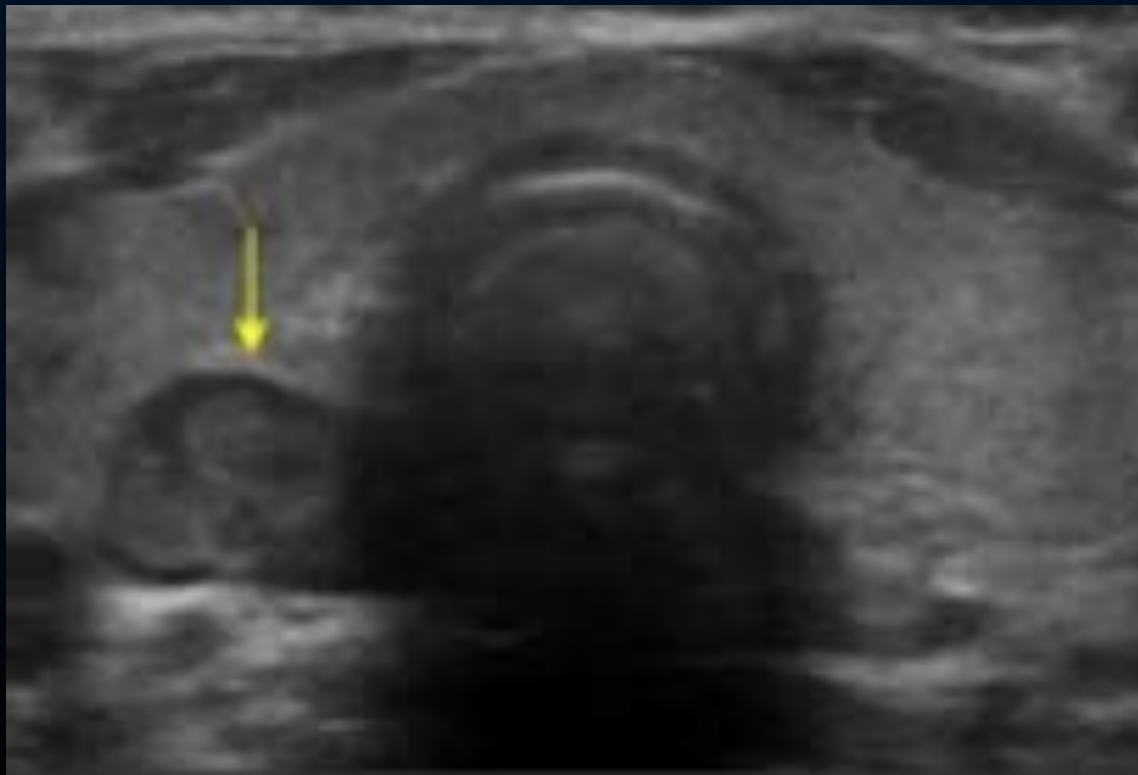
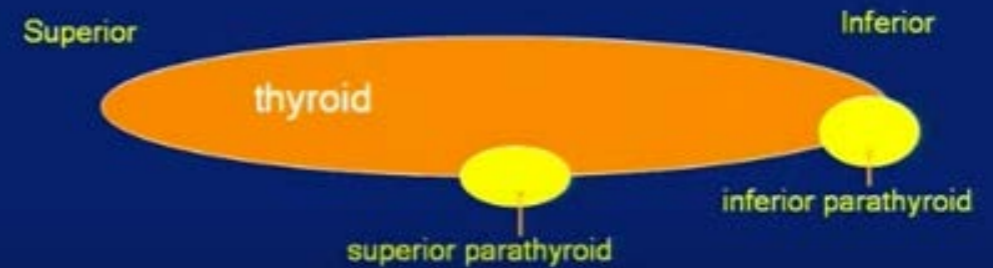
Transverse/axial plane

Longitudinal/sagittal plane

Transverse Parathyroid Ultrasound



Longitudinal Parathyroid Ultrasound



Lymph Node Evaluation for Surgical Planning of Thyroid Cancer

(2015 ATA Management Guidelines Taskforce)

- (Recommendation 32) Preoperative neck US for cervical (central and especially lateral neck compartments) lymph nodes is recommended for all patient undergoing thyroidectomy for malignant or suspicious for malignancy cytologic or molecular findings. US-guided FNA of sonographically suspicious lymph nodes > 8-10mm in the smallest diameter should be performed to confirm malignancy if this would change management. (strong recommendation, moderate-quality evidence)

US Lymph Node Normal



1. Shape: Oval shape

2. Echogenicity: Hypoechoic lymph node with hyperechoic hilus

3. Vascularity: Hilar vascularity or avascular

US Lymph Node Abnormal

1. Shape: Round shape
2. Hyperechoic lymph node
3. Vascularity: ↑ vascularity
4. Absence of hills
5. Cystic change
6. Vascularity



US Lymph Node Abnormal

TABLE 7. ULTRASOUND FEATURES OF LYMPH NODES
PREDICTIVE OF MALIGNANT INVOLVEMENT^a

<i>Sign</i>	<i>Reported sensitivity, %</i>	<i>Reported specificity, %</i>
Microcalcifications	5–69	93–100
Cystic aspect	10–34	91–100
Peripheral vascularity	40–86	57–93
Hyperechogenicity	30–87	43–95
Round shape	37	70





That's all folks!

