Incorporating Head & Neck Ultrasound Into Your ENT Practice

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Advantages of In-Office US

- Patient convenience: one stop shopping (exam, US, and FNA all in one visit). Patients get instant information (less anxiety waiting for results and quicker workup so treatment can start sooner)
- Cost-effective
- Ultrasound - more sensitive than palpation especially with indurated neck from previous radiation or surgery. An extension of physical exam.
- Safer - No contraindications (may obviate need for CT with associated radiation exposure)
- Increased accuracy (radiologist only reads static images after tech does the US) ~~Clinical correlation is recommended.~~
- For thyroid cancer, surgeon-performed preop LN mapping and less local-regional recurrence.
- Surgeon-performed US for parathyroid localization can be superior to Sestamibi scan (also avoid nuclear exposure)

Incorporating Head & Neck Ultrasound Into Your ENT Practice

Issues to Consider

1. Training/credentialing
2. Documentation
3. Billing - CPT and ICD-10 codes
4. Purchasing equipment
5. Practice “The eye doesn't see what the mind doesn't know.”

Organizations which offer certification courses for head & neck US

1. Level 1 - certificate online course offered by American College of Surgeons (ACS) and American Association of Clinical Endocrinologists (AACE)

    A. overview of US physics, instrumentation, and scanning techniques

    B. prerequisite for advanced courses

2. Level 2 - ACS & AACE - hands-on teaching, practice, and testing sessions on diagnostic US and US-guided FNA

    C. Physics & principles of US

    D. Scanning techniques & normal head/neck US anatomy

    E. Head/neck US interpretation

    F. Interventional head/neck US

3. Level 3 - 25-50 variety of cases should be performed and cross checked under the guidance of a mentor for thyroid, parathyroid, and lymph node.

- Do not bill until accuracy of US skills are established

Documentation

1. Referring physician, name of surgeon ultrasonographer
2. Patient name, date of birth, medical record number
3. Indications for procedure
    - PCP referral of nodule may require diagnostic and FNA guidance by US
    - Endocrinologist referral of thyroid cancer may require preop LN mapping only
4. Consent
5. Findings - (See next slides) Thyroid: Volume 24, Number 9, 2014, p1341-49. Striving Toward Standardization of Reporting Ultrasound Features of Thyroid Nodules and Lymph Nodes: A Multidisciplinary Consensus Statement.
6. Impression - differential diagnosis, comparison to previous US
7. Keep copy of report and images in EMR. US-guided FNA should have saved image of needle going into the neoplasm.

Striving Toward Standardization of Reporting Ultrasound Features of Thyroid Nodules and Lymph Nodes: A Multidisciplinary Consensus Statement

Thyroid: Volume 24, Number 9, 2014, p1341-49.

Regarding content, terminology, and organization

1. US eval of thyroid gland
2. US eval of thyroid nodules
3. US eval of cervical LNs
4. US-guided FNA of thyroid nodules
5. US-guided FNA of cervical LNs

US evaluation of thyroid gland

1. Global assessment - normal, solitary nodule, multinodular, diffuse thyroiditis
2. Left lobe/right lobe/isthmus - present (size in 3 dimensions), remnant, absent
3. Echogenicity - normal, diffusely heterogeneous, hypoechoic
4. Vascularity of entire thyroid gland - normal, decreased, increased
5. Calcification patterns not assoc with nodule - absent/present
6. Pyramidal lobe - absent/present
7. Clinically significant thyroid nodules - absent/present
8. Extension into mediastinum - absent/present, right lobe/left lobe/both, caudal extent
9. Tracheal deviation - absent/present, right/left, extent of deviation from midline
10. Thyroglossal duct cyst - absent/present, size of 3 dimensions
11. Anomalous anatomic findings - absent/present, exophytic nodules, ectopic thyroid, etc

US evaluation of thyroid nodules

Overview of assessment of thyroid for nodules:

- Left lobe/right lobe/isthmus -

1. Clinically significant nodules (yes/no), # of nodules

2. Multiple nonsuspicious nodules (yes/no), # of nodules/too numerous to count

3. Multiple coalescent nonsuspicious nodules (yes/no)

US evaluation of thyroid nodules

For each clinically significant nodule:

1. General - size in 3 dimensions, location, taller than wide (yes/no)
2. Nodule contour - smooth/well defined, lobulated/irregular, indistinct, infiltrative
3. Extrathyoidal extension - absent/suspect, invasion of strap ms, posterior margin of thyroid, carotid/IJ vein
4. Internal architecture - cystic, solid, mixed, spongiform, complex
5. Nodule echogenicity - isoechoic, hypoechoic, hyperechoic, mixed, anechoic/cyst
6. Nonsuspicious echogenic foci - colloid, comet tail artifact, ring-down artifact, fibrosis
7. Calcifications - none, micro, macro, peripheral
8. Vascularity - Grade 1 none, Grade 2 peripheral vascularity, Grade 3 low vascularity predominantly central, Grade 4 high vascularization centrally
9. Suspicion of invasion of nearby structures - absent/present, muscle/vascular/tracheal/nerve

A sample template for documentation

RAJEEV H. MEHTA, MD, FACS

PATIENT: _____

DATE: _____

MR #: _____

PATIENT ULTRASOUND/ PROCEDURE FORM

REFERRING M.D. _____

REASONS FOR ULTRASOUND _____

[ ] Rationale for procedure, therapeutic options explained

[ ] Patient questions answered [ ] Consent obtained verbally [ ] Consent obtained written

PROCEDURES PERFORMED

[ ] DIAGNOSTIC ULTRASOUND HEAD AND NECK — CPT DIAGNOSTIC CODE

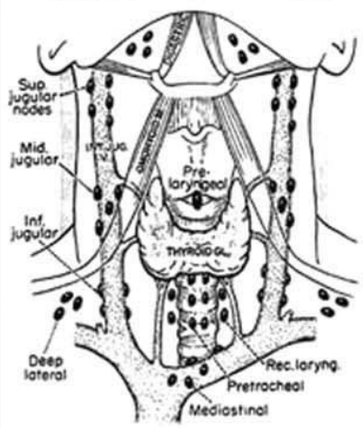
- [ ] 76536 Ultrasound Soft tissues Head and Neck with image documentation
- [ ] 76942 Ultrasound guidance for needle placement
- [ ] 10021 Fine needle aspiration without imaging guidance
- [ ] 10022 Fine needle aspiration with imaging guidance
- [ ] 60100 Biopsy thyroid, percutaneous core needle
- [ ] 76940 Ultrasound guidance for visceral tissue ablation
- [ ] 76986 Ultrasound guidance intraoperative
- [ ] 76999 Ultrasound procedure unlisted (ie diagnostic interventional)

E04.9 Goiter
E04.1 Thyroid nodule
C73 Thyroid cancer
D44.0 Thyroid neoplasm
E21.3 Hyperparathyroidism
D44.2 Parathyroid neoplasm
R59.9 Lymphadenopathy

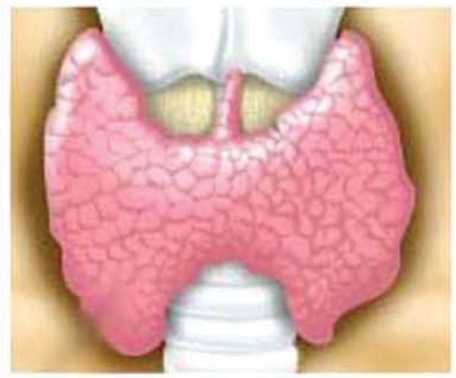
[ ] OTHER PROCEDURE

FINDINGS/COMMENTS

RIGHT LEFT



RIGHT LEFT



[ ] Selected images printed and appended [ ] Selected images saved on disc

TECHNIQUE

[ ] Betadine [ ] Yes [ ] No

[ ] Local Anesthetic _____ cc of Lidocaine

[ ] Pathology sent [ ] Cytology sent

MD Signature _____

Ultrasound Reimbursement

- CPT Code 76536 Ultrasound, soft tissues of the head and neck real time with image documentation
  - Global Payment $124.86 Professional Payment $27.22 Technical Payment $97.65
- CPT Code 76942 Ultrasonic guidance for needle placement, imaging supervision and interpretation
  - Global Payment $208.56 Professional Payment $32.66 Technical Payment $175.90
  - Use code for each nodule or lymph node needled
- CPT Code 10022 Fine needle aspiration; with imaging guidance
  - Non-facility Payment $141.20
- CPT Code 60100 Biopsy, thyroid, percutaneous core needle
  - Non-facility Payment $112.28

Ultrasound Equipment Considerations

Sonocyte Edge II

1. Size (8 pounds)
2. Portability
3. Cost (list price $57,000)
4. Ease of Use
5. Image Quality
6. Different Probes

6-15 MHz

US Machine Requirements

- 7.5 to 12 Mhz transducer
- color Doppler (blood flow)
- camera for capturing images

- cost - more expensive models tend to be less portable and are not necessary
  - Do not clean probe with alcohol (dries out the crystal)

What Is Adequate Training for US?

"Otolaryngologist-performed head and neck ultrasound: outcomes and challenges in learning the technique" by Badran K et al. The Journal of Laryngology & Otology (2014), 128 447-453.

ENT trainee took 2 day practical US course and then 50 US exams supervised/taught one-on-one by a radiologist with 20 years of US experience. Then they evaluated the accuracy of the next 250 US exams by the trainee:

- 207/250 US were accurate (83%) with 144 true positives and 63 true negatives
- 32 false negatives and 11 false positives, sensitivity 82% and specificity 85%
- Accuracy improved with time: first 50 exams had 10 missed lesions while the last 50 only had 2.

Ultrasound Features

1. Calcification
   a. Egg shell calcification (B/M)
   b. Coarse calcificaiton (B/M)
   c. Microcalcification/punctate
      i. with comet-tail (B)
      ii. without comet-tail (M)
2. Echogenicity
   a. hyperechoic (B)
   b. hypoechoid (M)
3. Vascularity
   a. peripheral (B)
   b. intranodular flow (M)
4. Margins/halo
   a. presence of halo (B)
   b. irregular margins/microlobulated (M)

B = benign
M = malignant

Ultrasound Features

Benign

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

Malignant

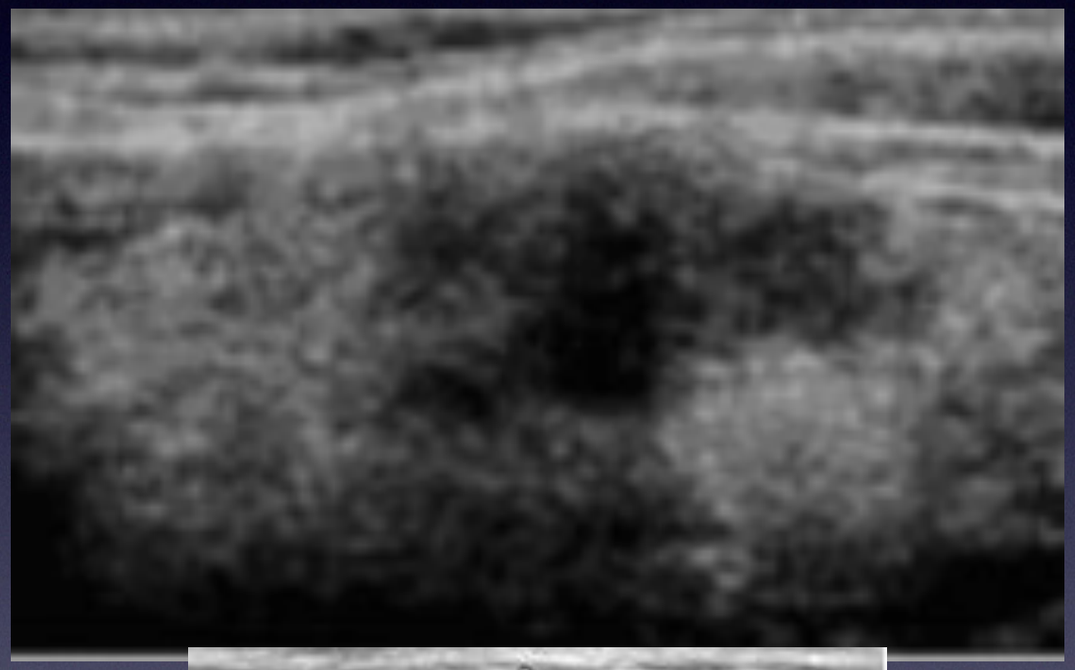
- ✦taller-than-wide shape
- ✦intranodule hypervascular
- ✦ irregular margins/microlobulated
- ✦ absence of halo
- ✦ hypoechogenic
- ✦ solid
- ✦ microcalcifications

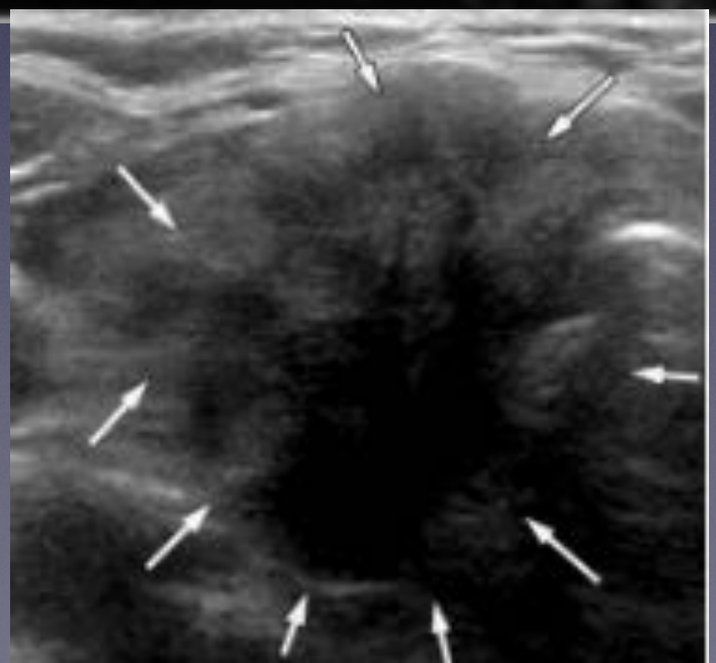
Hyperechoic Nodule

Hypoechoic Nodules

Well defined borders

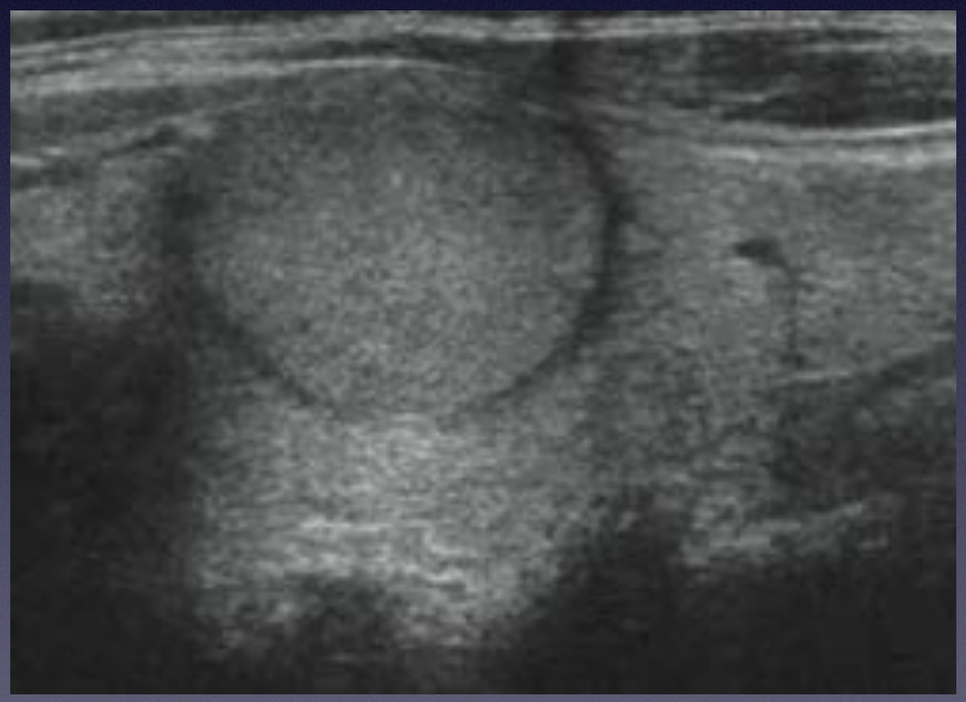
Ill-defined borders



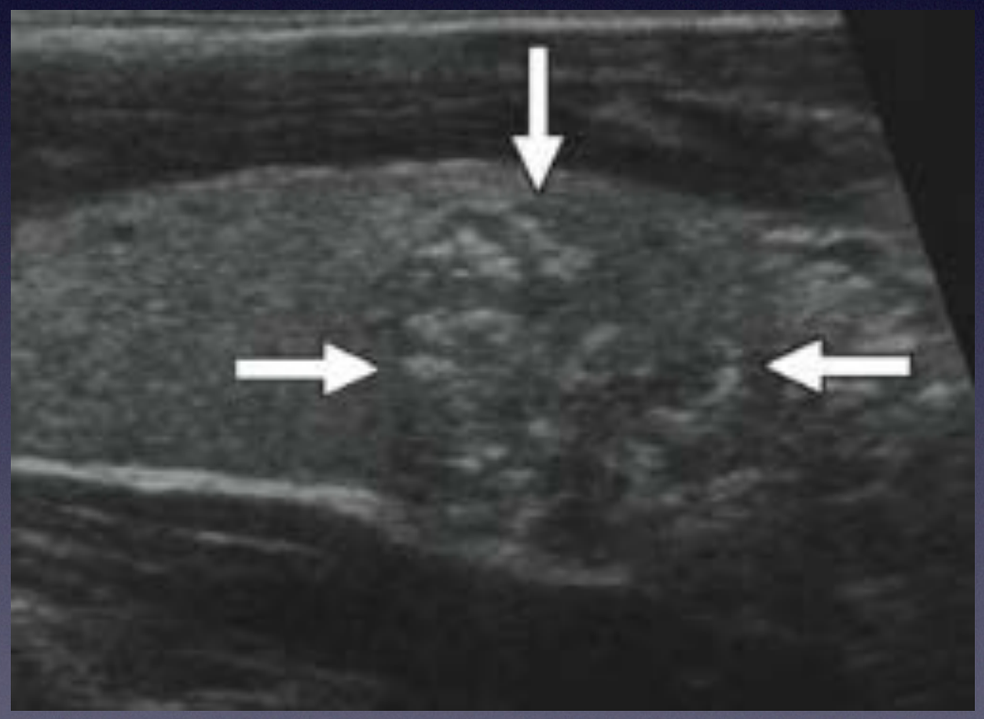


Isoechoic Nodule

With Halo

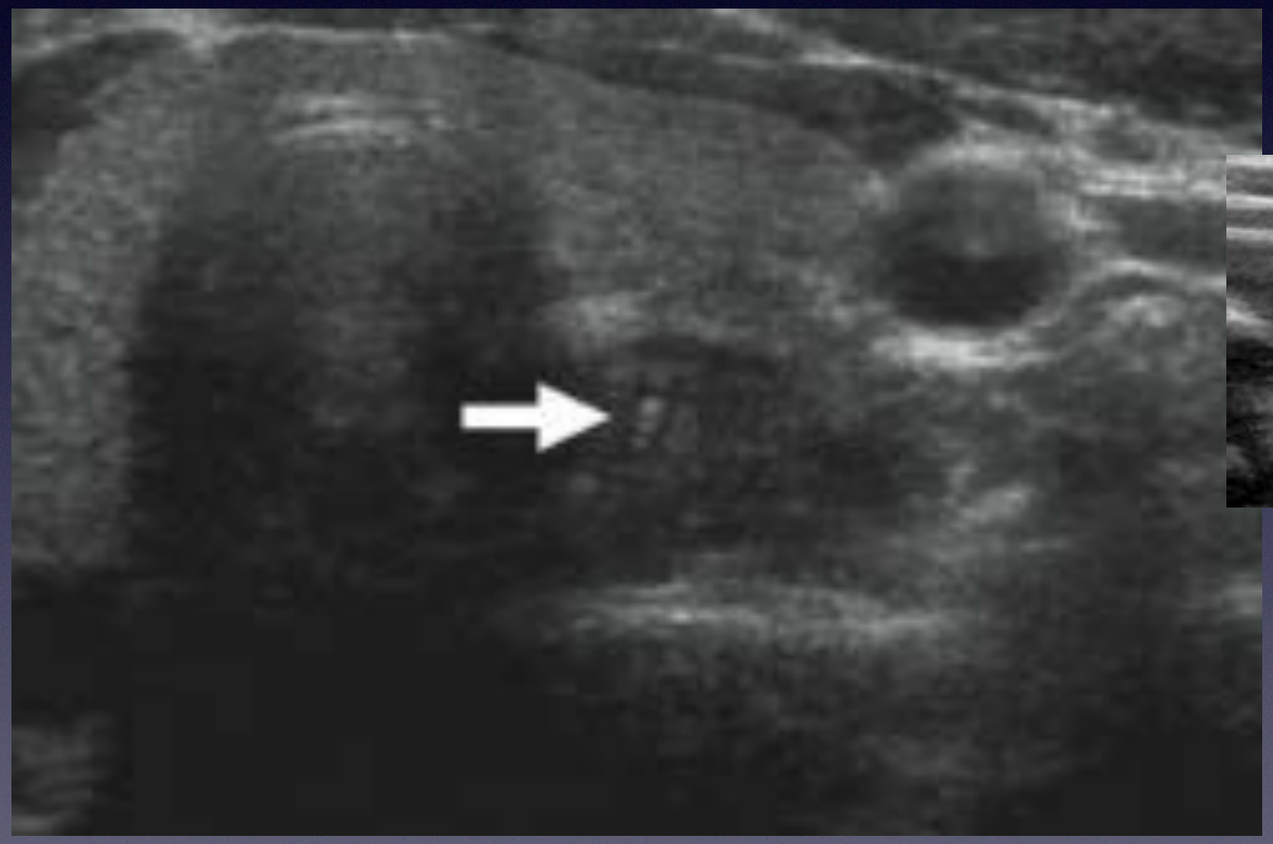


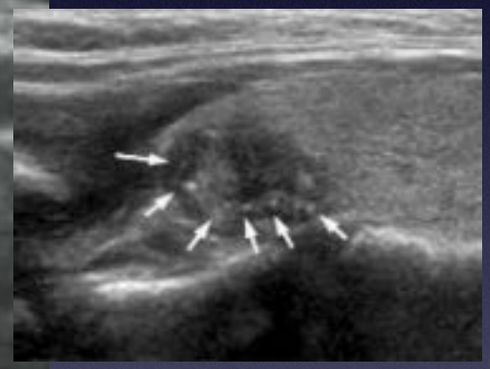
Without halo



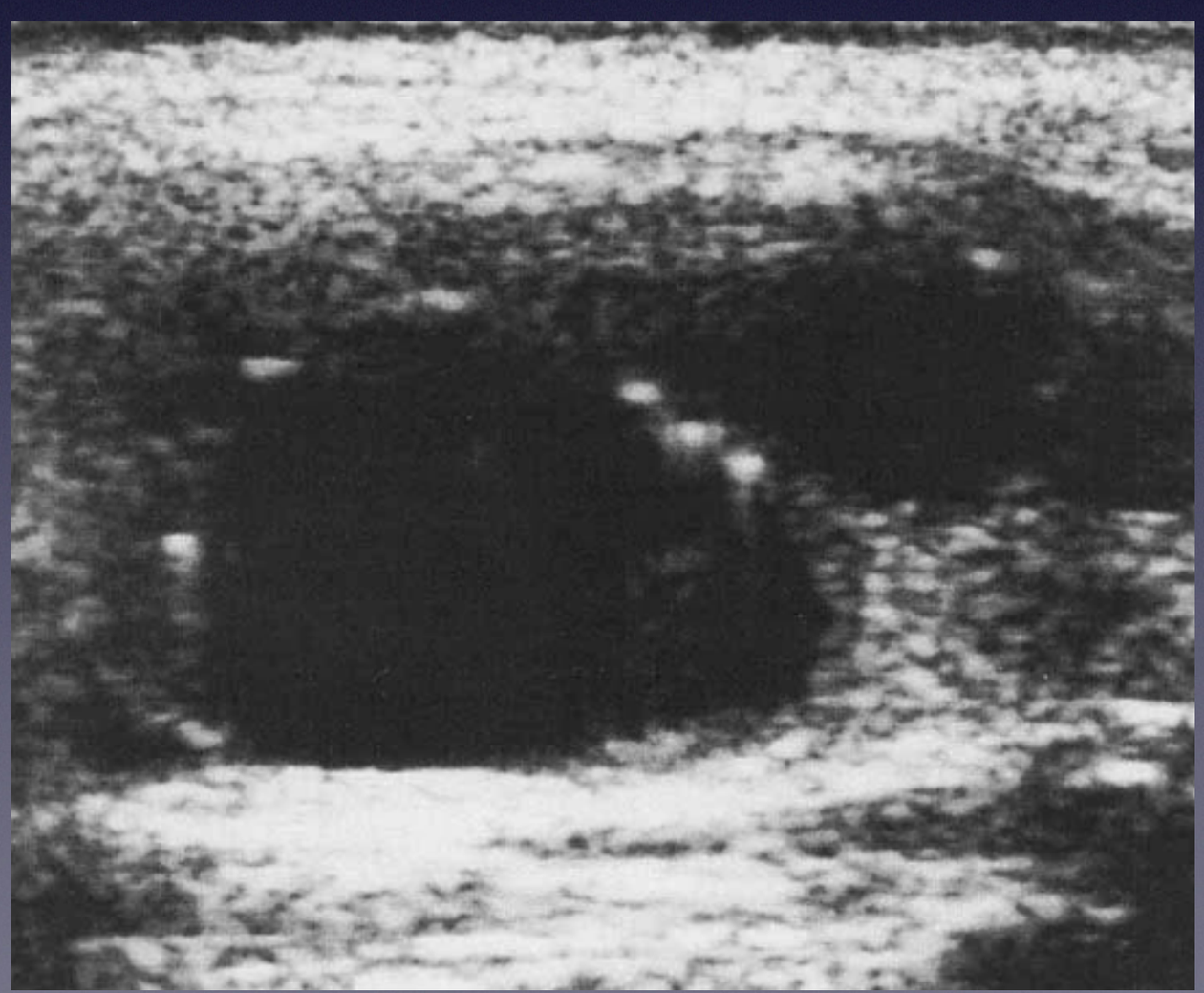
(and microcalcifications)

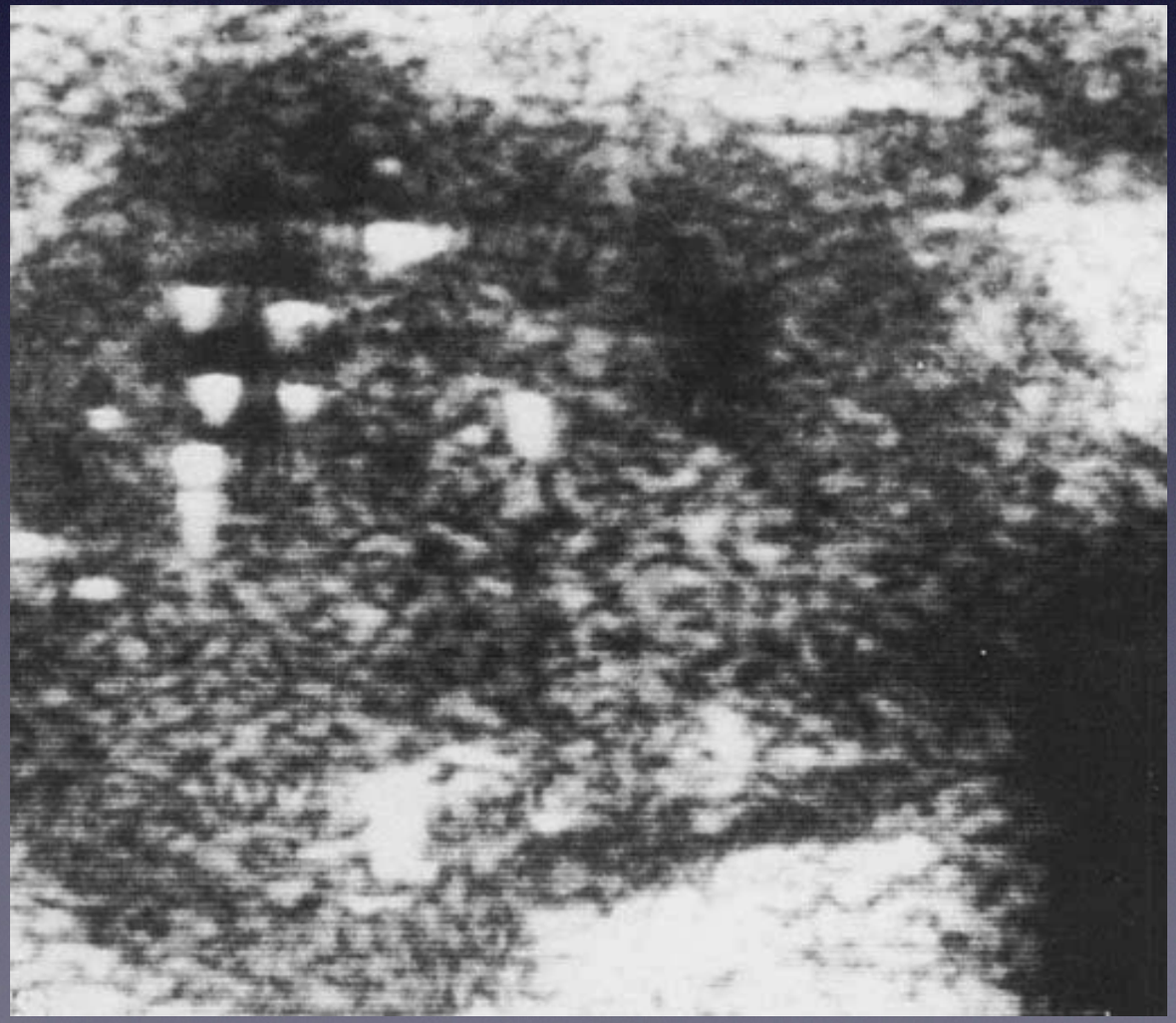
Microcalcifications



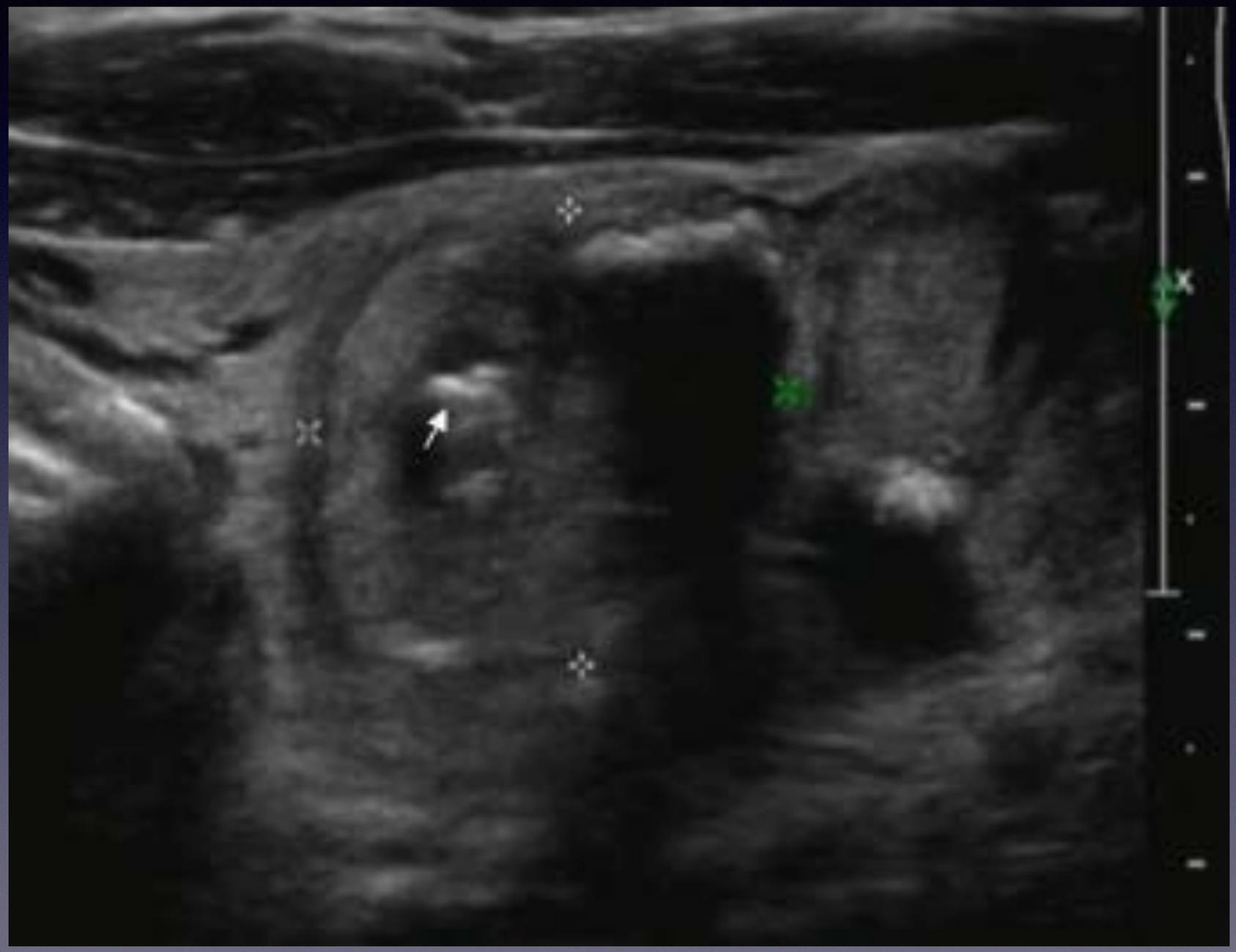


Comet-tail Artifact



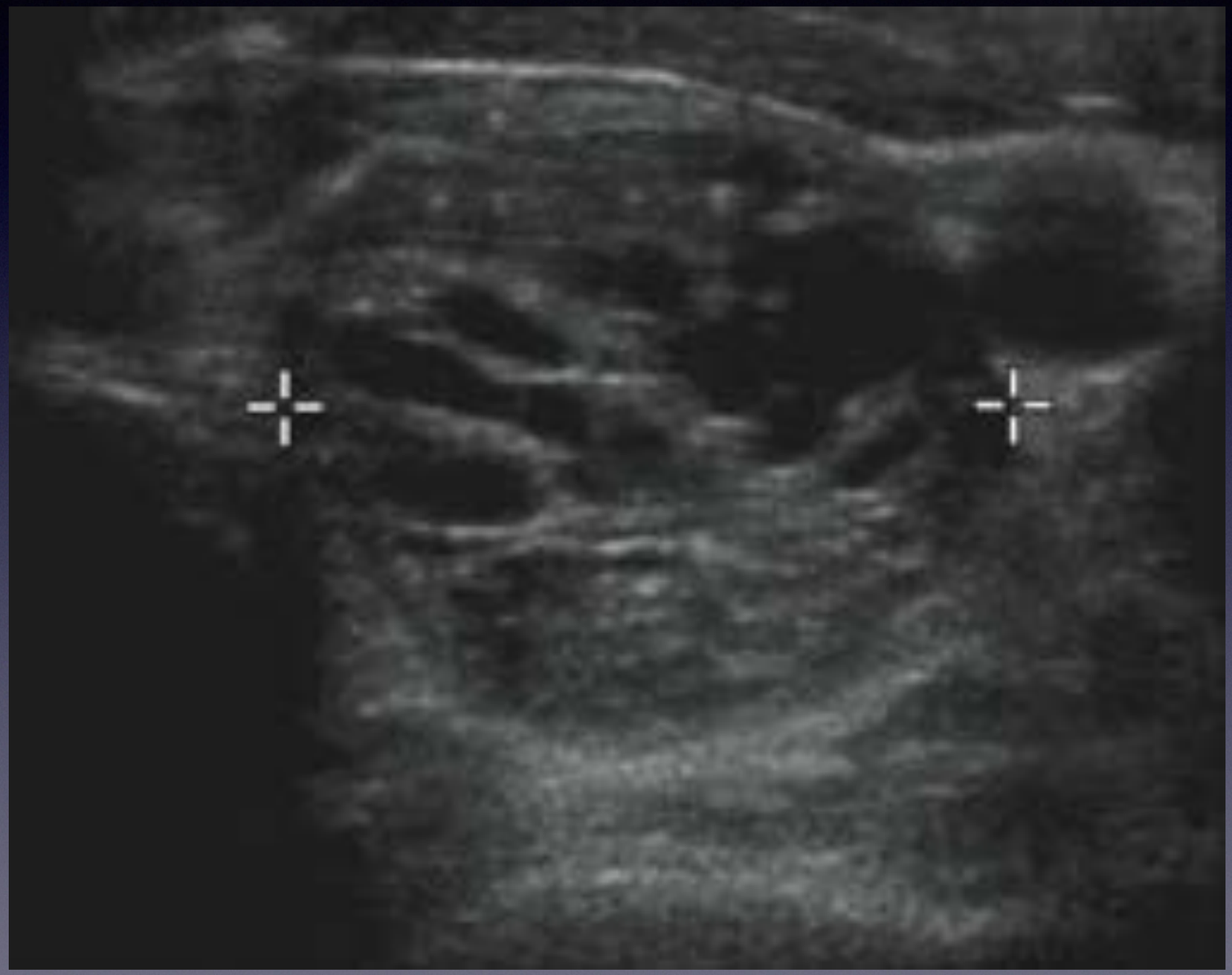


Macrocalcifications

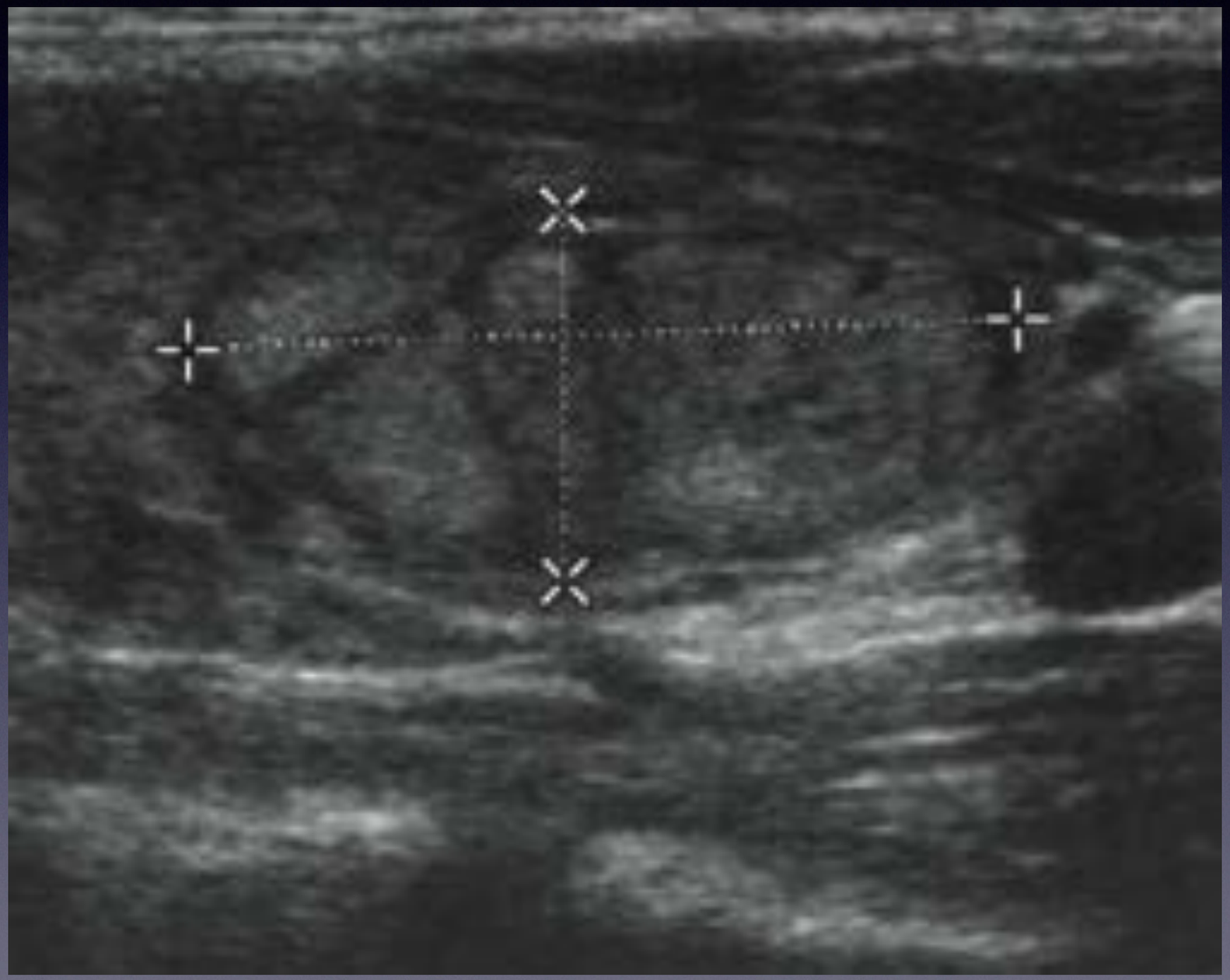


Cyst with Colloid Clot

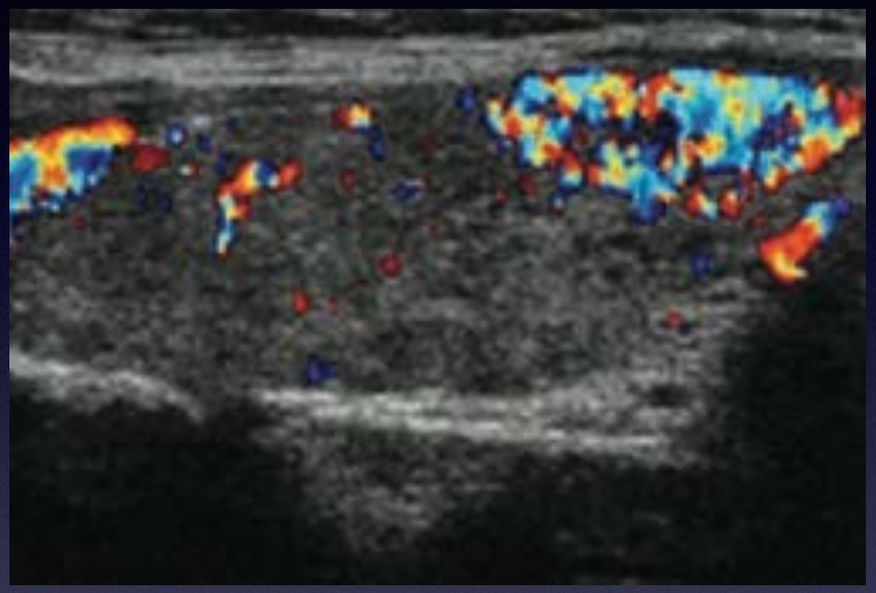
Spongiform Nodule

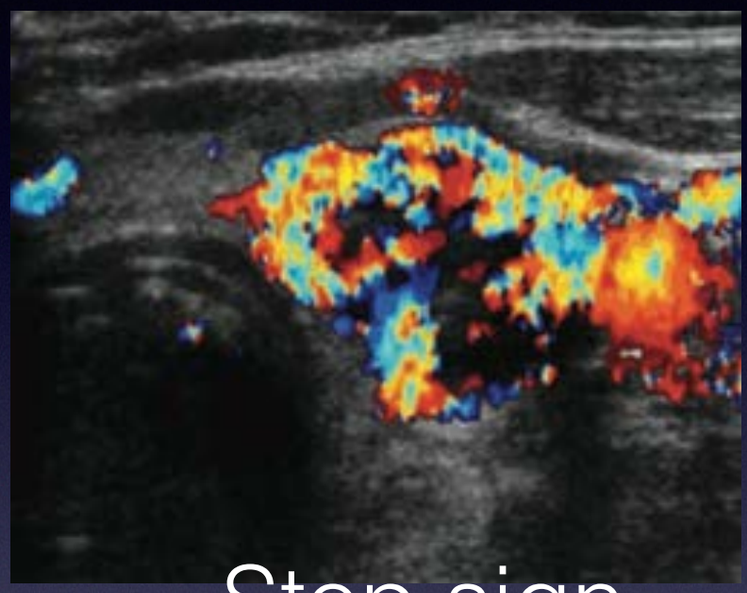


Giraffe Pattern

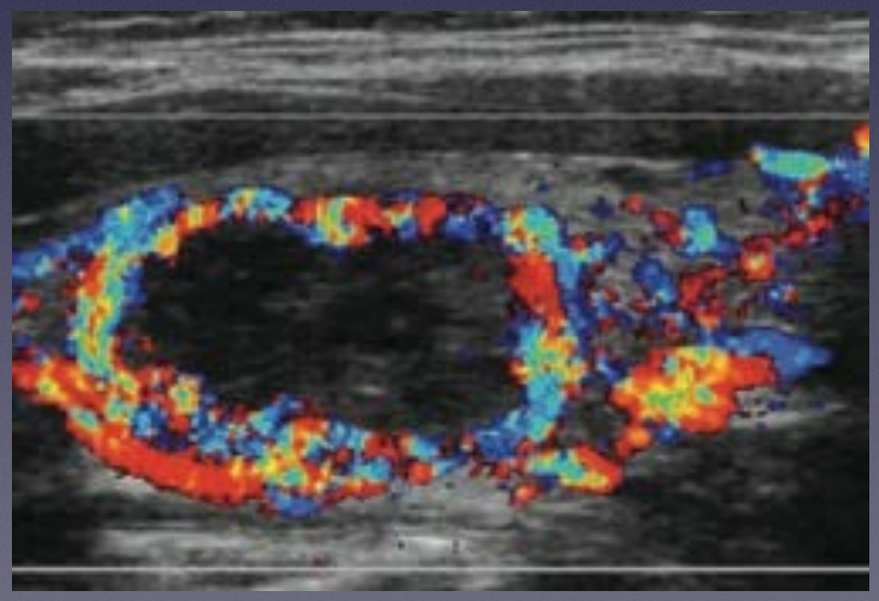


Hypervascular
on color flow doppler



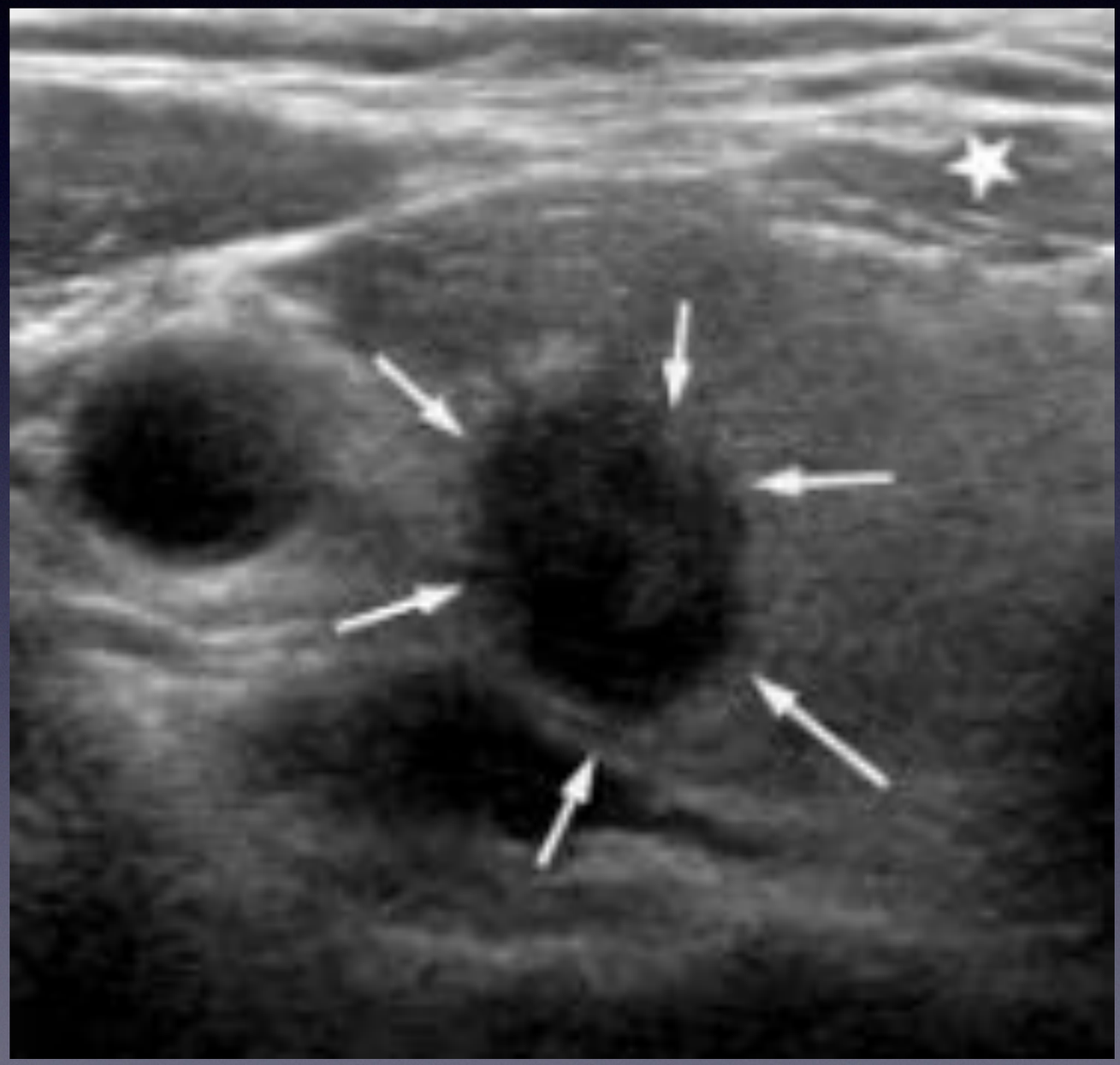


Stop sign



Ring of fire

Hypoechoic, microlobulated margin, taller-than-wide shape



Ultrasound Features

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.

Indications for Thyroid FNA

(2015 ATA Management Guidelines Taskforce)

(Recommendation 8)

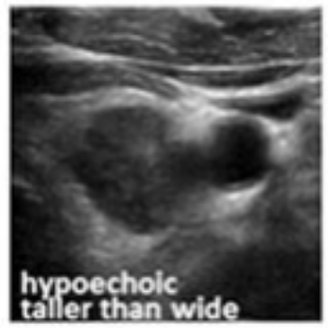
- Nodules > 1cm with high suspicion US features (strong recommendation, moderate-quality evidence)
- Nodules > 1cm with intermediate suspicion US features (strong recommendation, low-quality evidence)
- Nodules > 1.5cm with low suspicion US features (weak recommendation, low-quality evidence)
- Nodules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

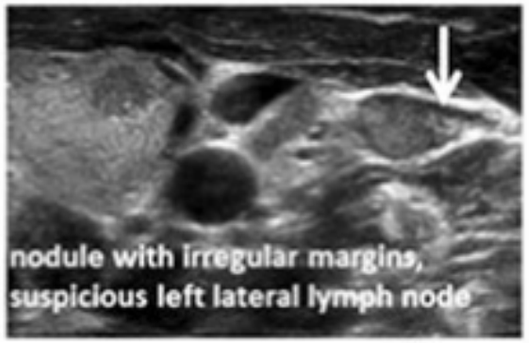
FNA not required for:

- 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

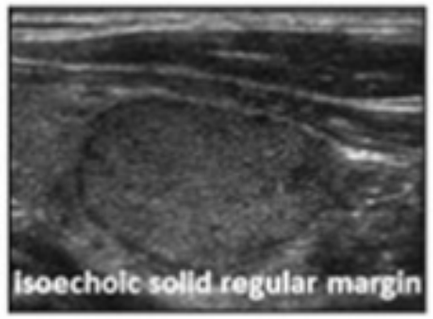
High Suspicion >70-90%

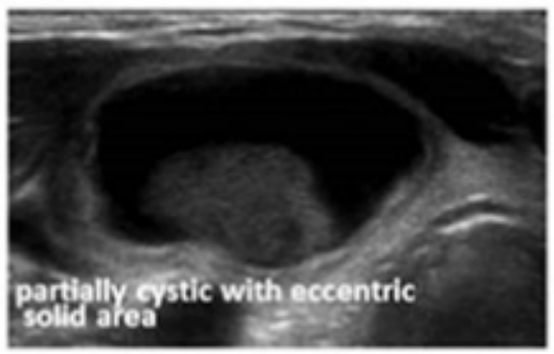


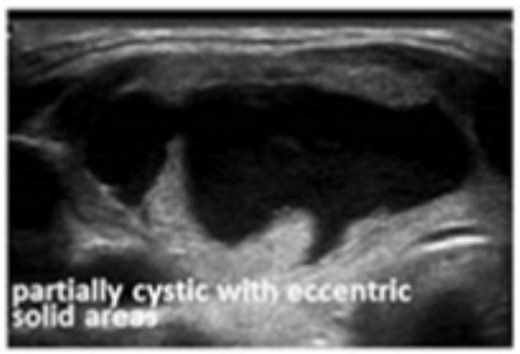


Intermediate Suspicion 10-20%

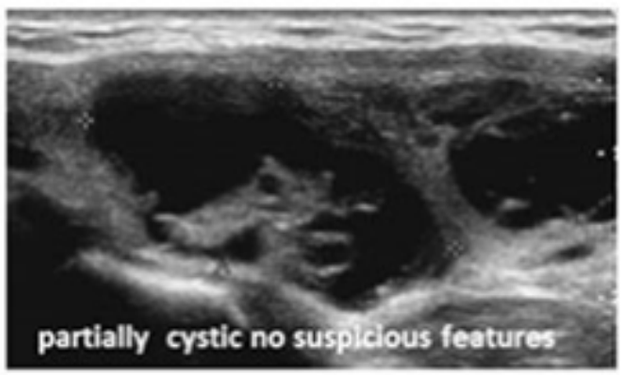
Low Suspicion 5-10%



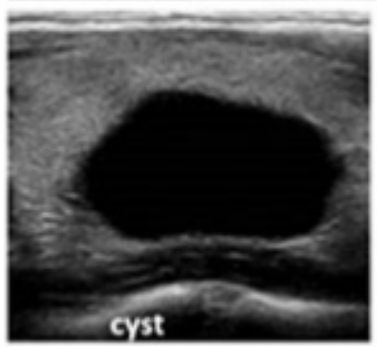




Very low Suspicion <3%

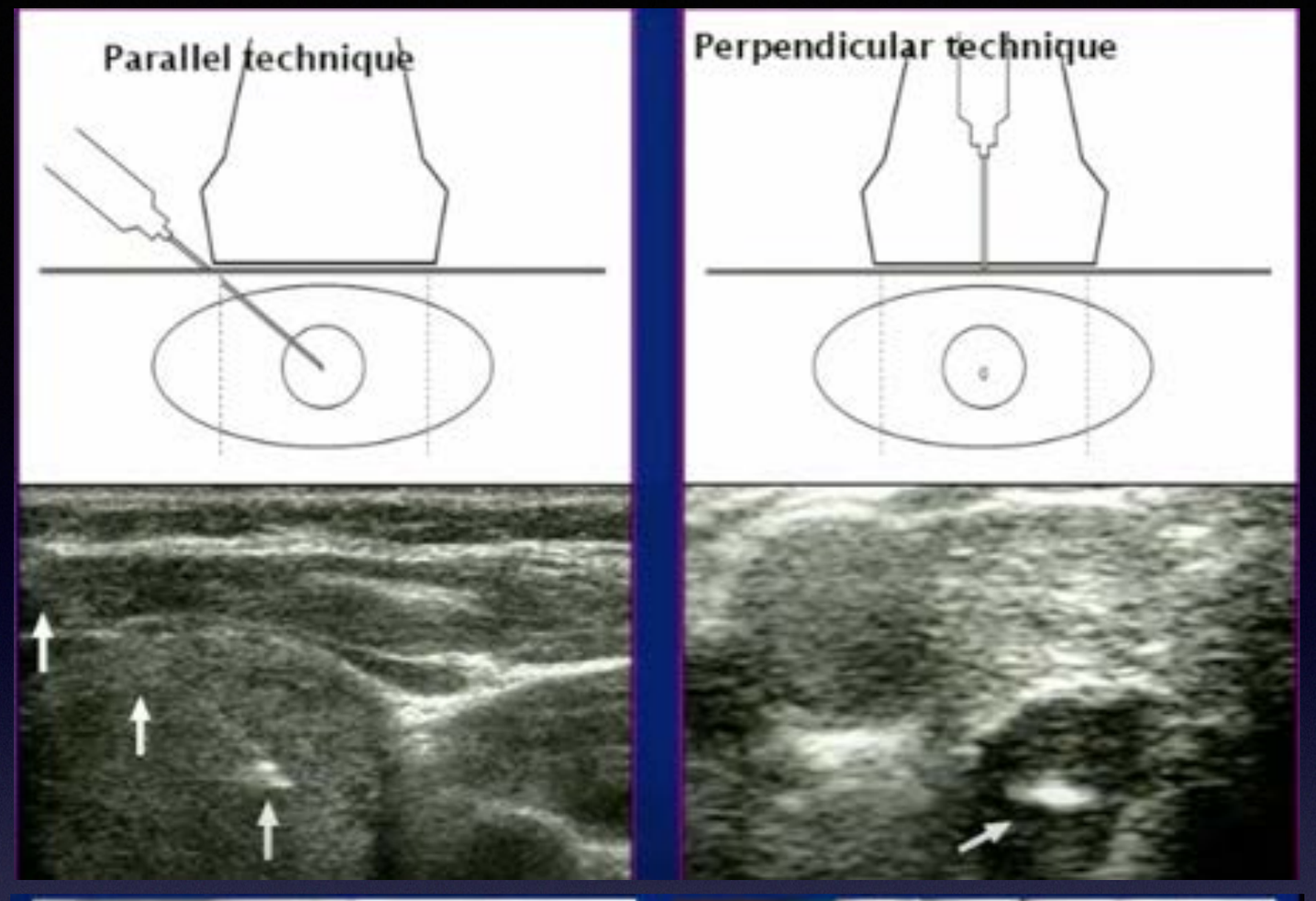


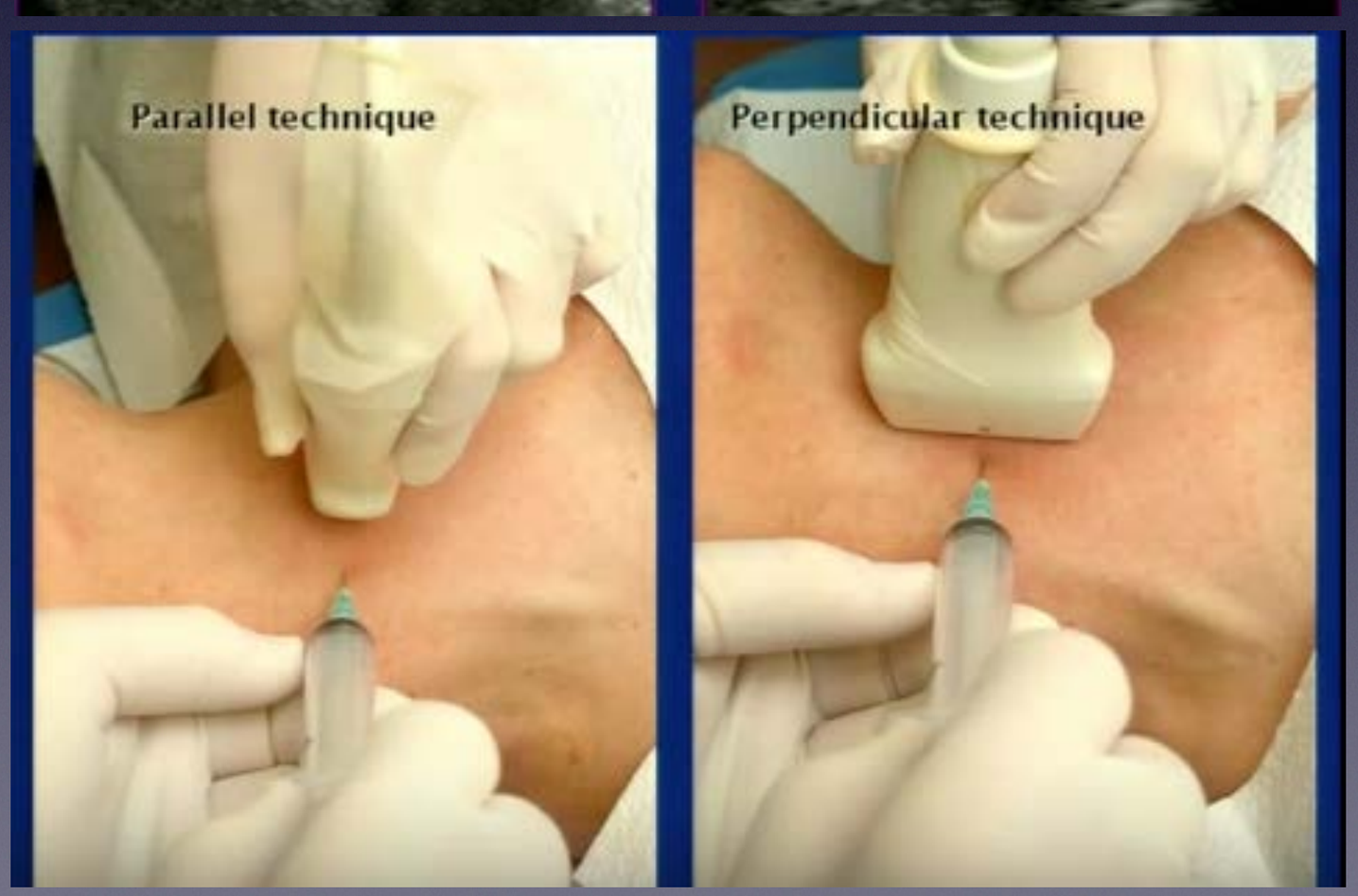
Benign <1%



Risk of malignancy

US guided FNA techniques





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:

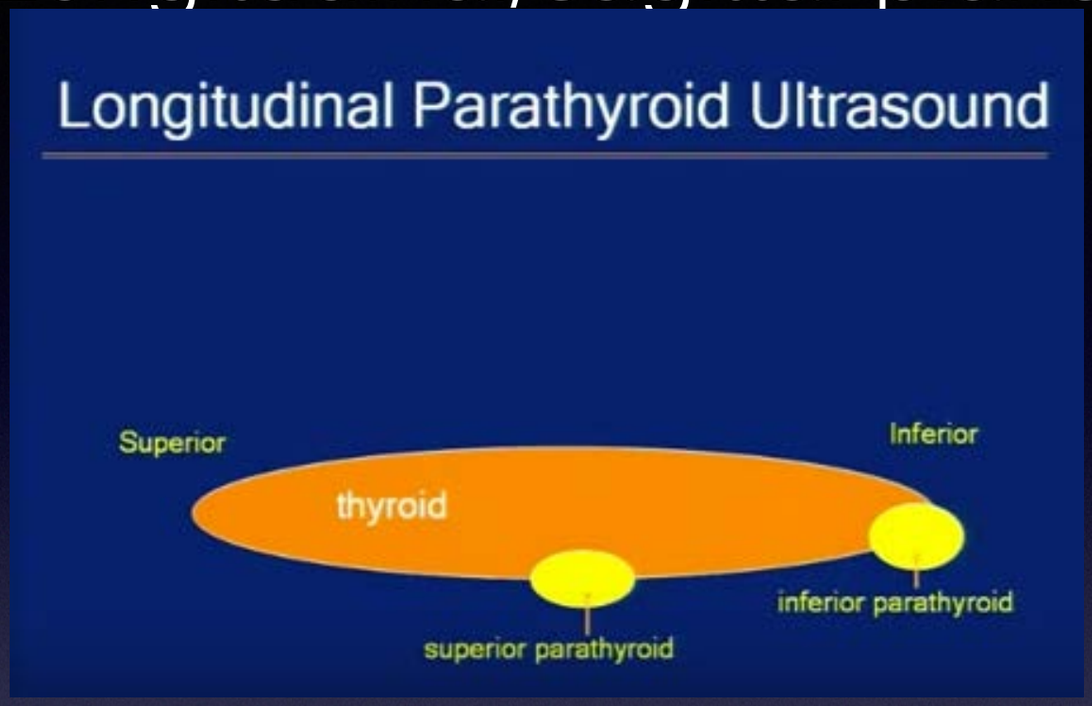
- Sensitivities for correct *quadrant* localization for US vs sestamibi were 87% vs. 58%.
- Sensitivities for correct *side* localization for US vs sestamibi were 91% vs 74%.

    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



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]

Sign	*Reported sensitivity, %*	*Reported specificity, %*
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

THANKS FOR WATCHING! 😀