

University of Massachusetts Medical School

eScholarship@UMMS

PEER Liberia Project

UMass Medical School Collaborations in Liberia

2021-02-25

Ultrasound of Superficial Lumps and Bumps

Robert D. Harris

RAD-AID

Let us know how access to this document benefits you.

Follow this and additional works at: https://escholarship.umassmed.edu/liberia_peer



Part of the [Diagnosis Commons](#), [Family Medicine Commons](#), [Medical Education Commons](#), and the [Radiology Commons](#)

Repository Citation

Harris RD. (2021). Ultrasound of Superficial Lumps and Bumps. PEER Liberia Project. <https://doi.org/10.13028/ryen-7q98>. Retrieved from https://escholarship.umassmed.edu/liberia_peer/74

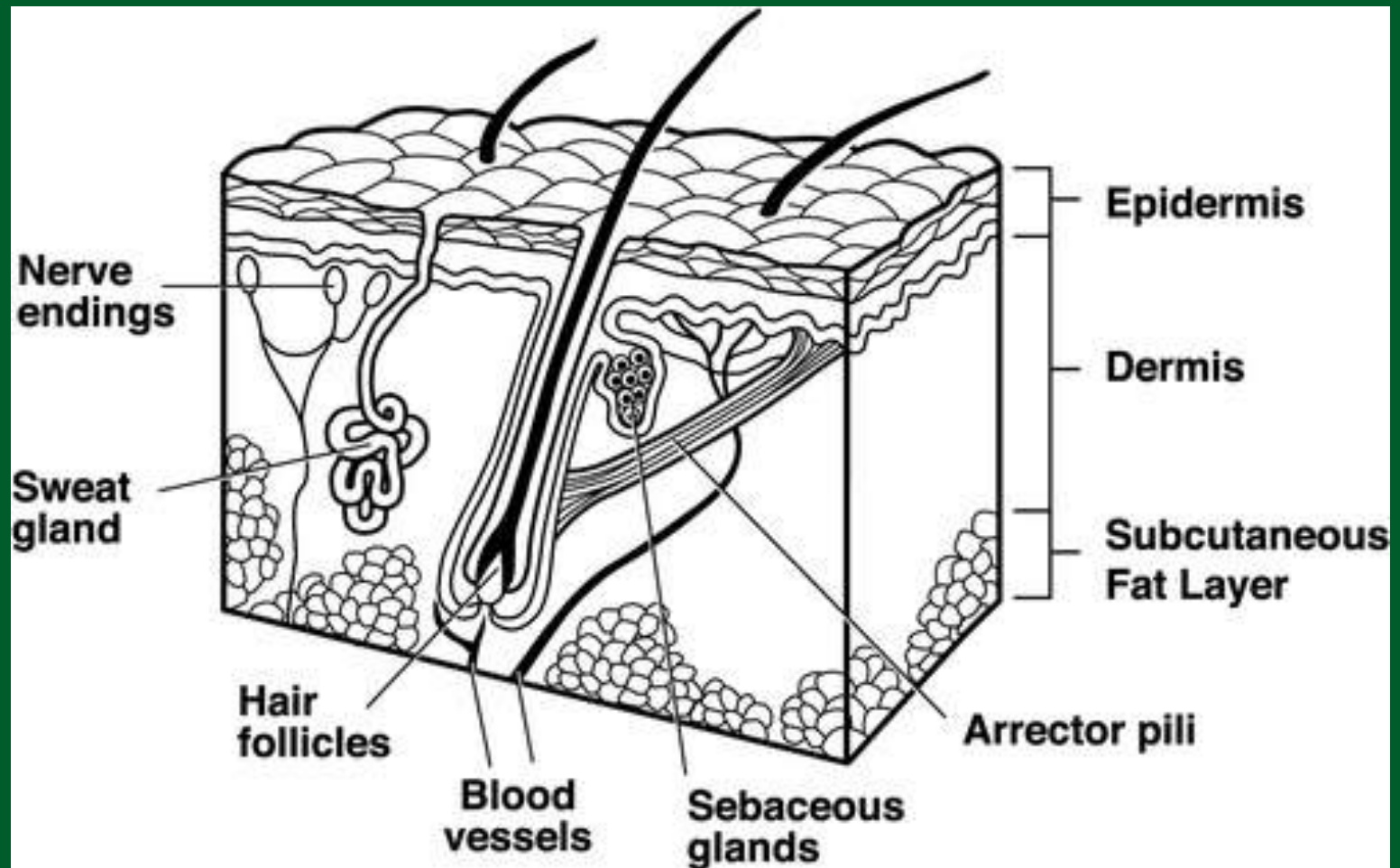
This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in PEER Liberia Project by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.

Ultrasound of Superficial Lumps and Bumps

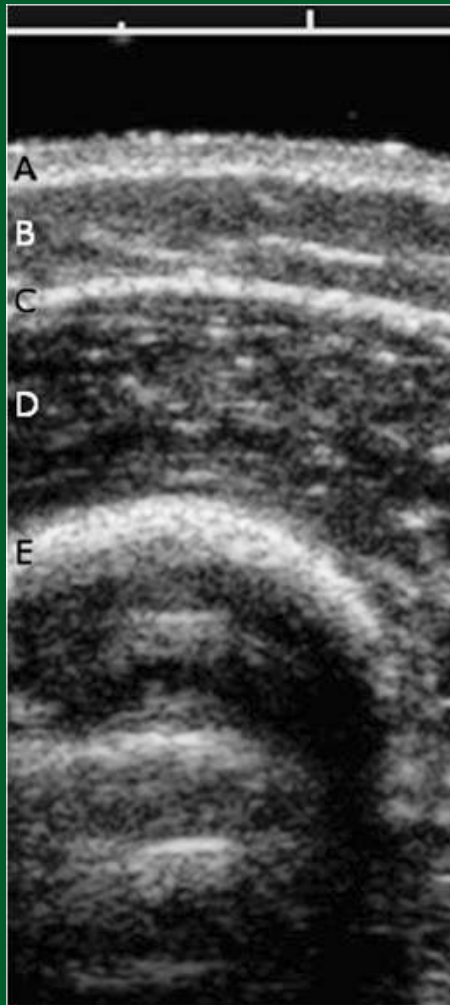
Robert D. Harris, MD, MPH

Professor of Clinical Radiology, USC-Keck
Section of Abdominal Imaging, Radiology Dept.
USC-LAC Med Centers, LA, CA
February, 2021

Layers of the Skin



Superficial Anatomy



- A — Epidermis and Dermis
- B — Subcutaneous
- C — Deep Fascia
- D — Muscle
- E — Bone

Shah and Callahan, Pediatric Radiology
2013; 43:S23-40

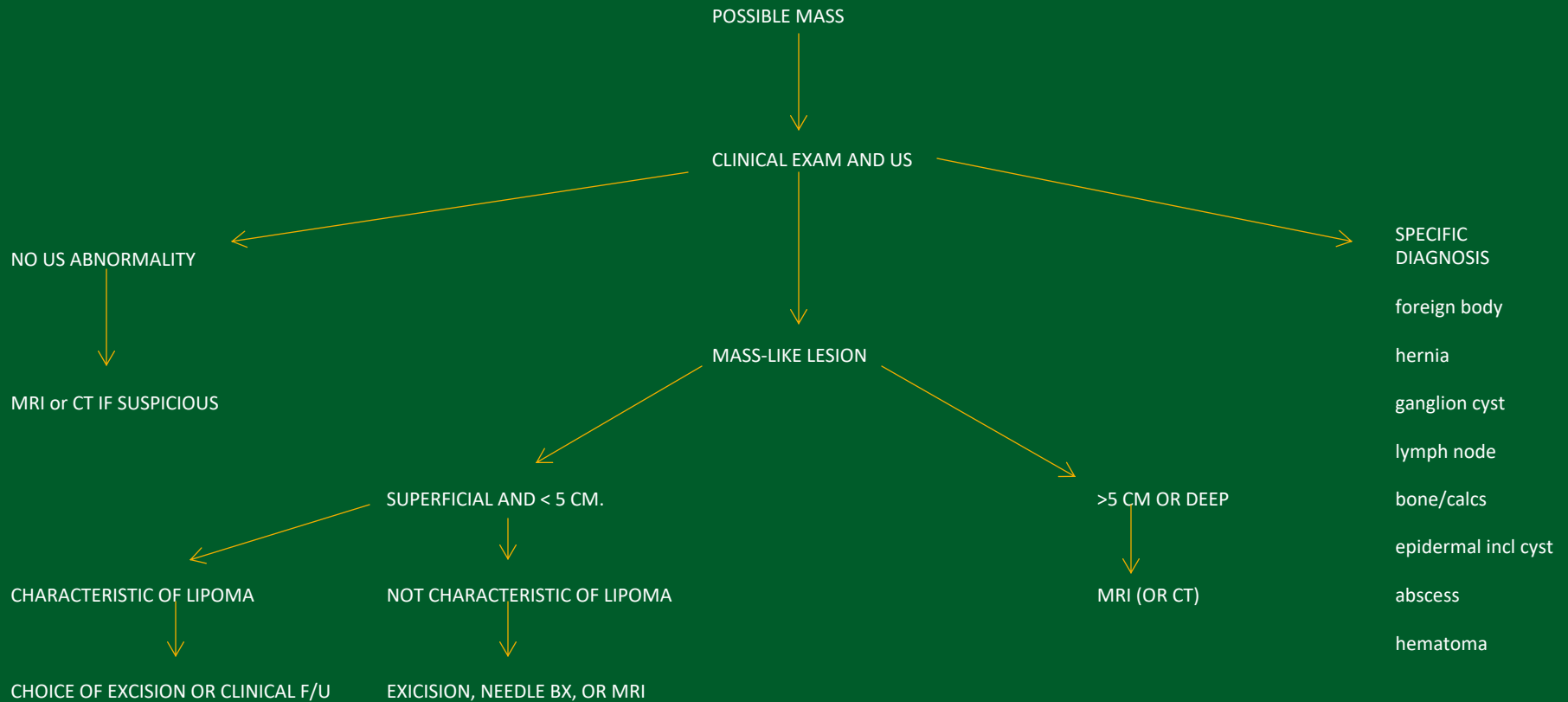
Skin Layers

- Epidermis
 - Thinnest layer
 - Keratinocytes
 - Merkel cells, melanocytes
- Dermis
 - Fibroblasts, endothelial and neural cells
 - Collagen
- Subcutaneous
 - Lipid cells, blood vessels, septa

General Principles

- History-especially for post-trauma pts.
- Physical exam is mandatory (MD)
- Scan with highest frequency transducer ($\geq 8-12$ MHz)
- Lots of gel/stand-off pad/light touch
- Color Doppler-optimized for slow flow
- **** Use contralateral side for comparison-Dual imaging mode ****

Decision Tree for U/S of Superficial Lumps



4 Criteria of a Simple Cyst by U/S

- Anechoic
 - Imperceptible walls
 - Smooth, round shape
 - Increased through transmission
-
- Rarely, simple cysts in the skin or subQ tissue

US-All ages (1-90+)

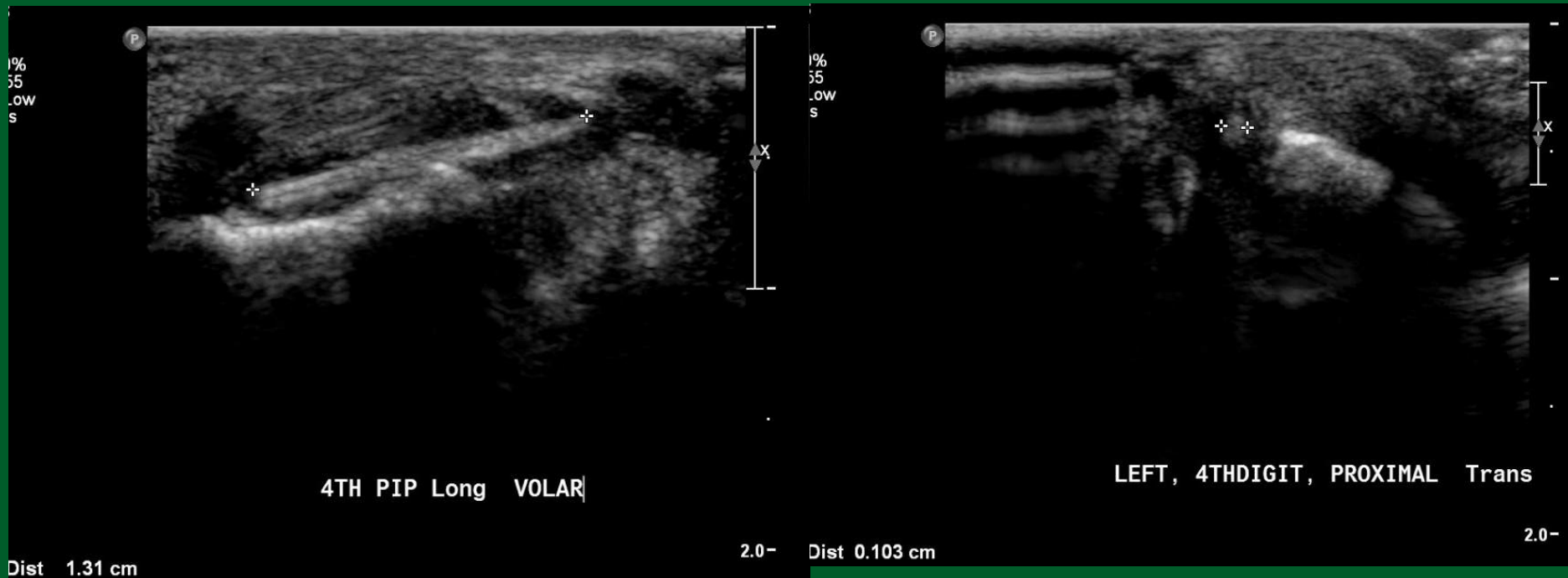
- Foreign Bodies
- Cellulitis/Abscess

Foreign bodies-US invaluable

- Sensitivity, PPV– both > 95%
- Wood, thorns, glass, plastic, metal: all well shown
- *Echogenic structures +/- shadowing*
- If Hyperechoic rim surrounding hypoechoic center, + compressibility, think = abscess

Foreign body- Ultrasound is best search method (before plain films)

Wooden splinter



Deep wood splinter causing partial tendon tear



Skin and ST infection

- Cellulitis/Phlegmon
 - infection of skin and soft tissues
- Ultrasound Findings
 - Skin thickening
 - Hyperemia (color Doppler)
 - Subcutaneous edema
- Classic cobblestoning
 - Fluid tracking between fatty lobules in SubQ
- Dirty shadowing
 - think gas from infection

“Cobblestoning” of Sub-Q fat



← SubQ
Edema

Sonosite 180,
Kigali, Rwanda

Cobblestoning-Sub Q edema++

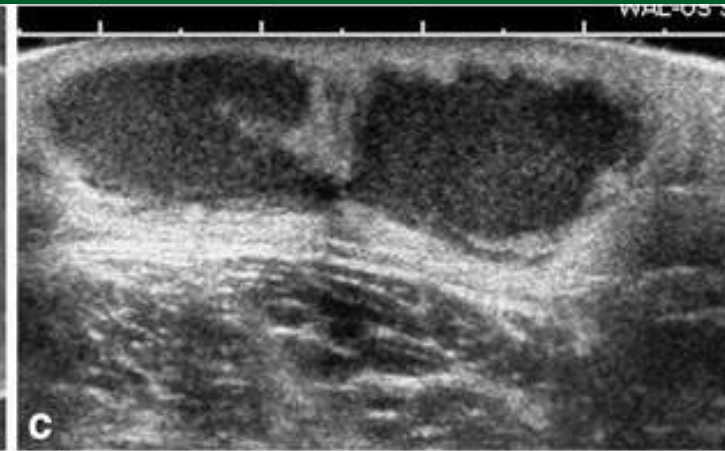
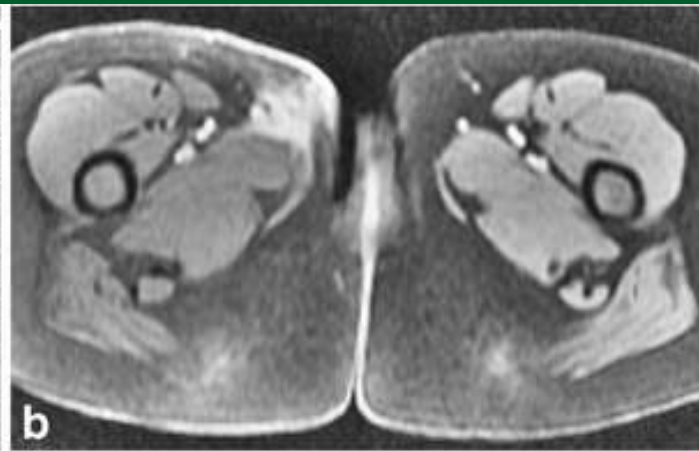


Cellulitis

Skin/fat thickening

MRI with contrast

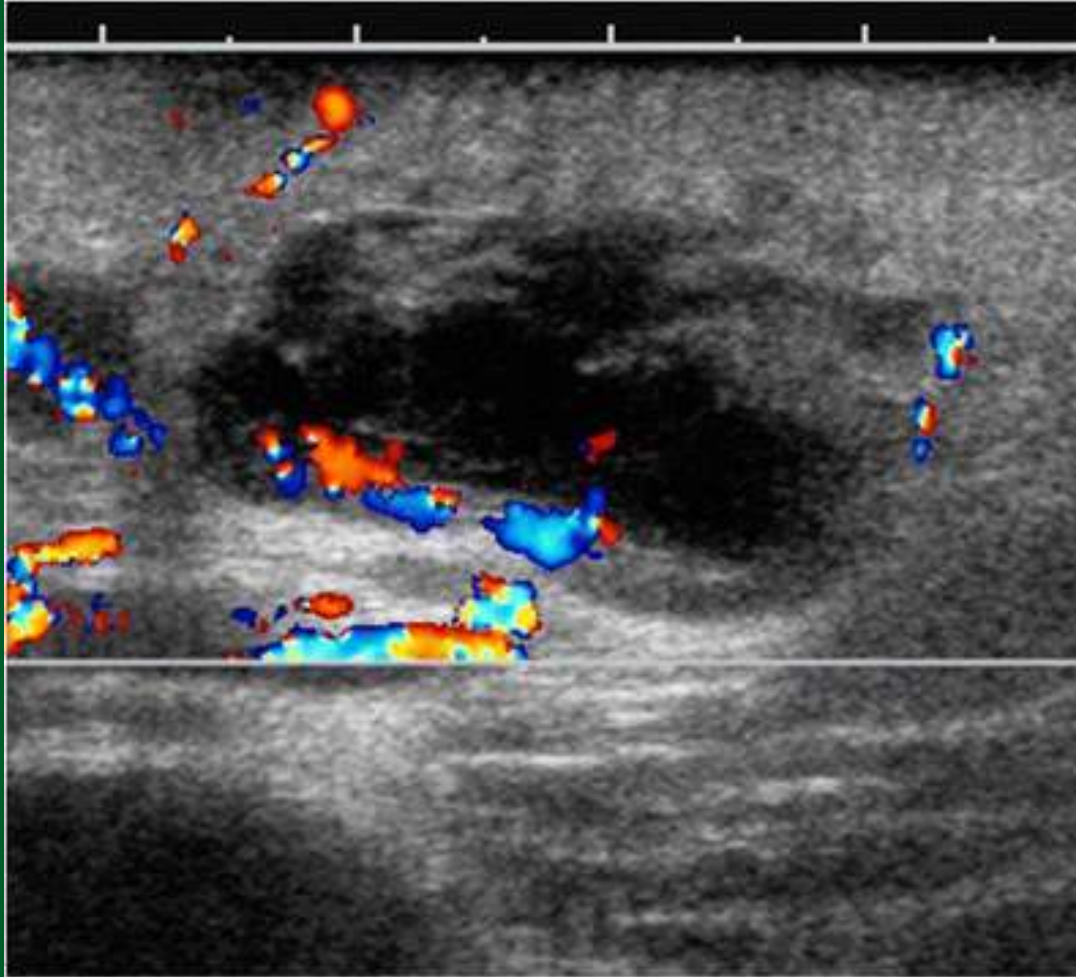
Frank abscess



Skin and ST Infection

- Abscess
 - Early-difficult clinically to distinguish from cellulitis
 - Complex (int. echoes) fluid collection with thick, irregular (+/- hyperemic) wall
 - May be pockets of gas-echogenic foci
 - US allows for easy aspiration, drainage

Early abscess-discrete, anechoic collection with marginal hyperemia



Late lymphadenitis/early abscess



Early abscess



Early abscess in IV drug abuser

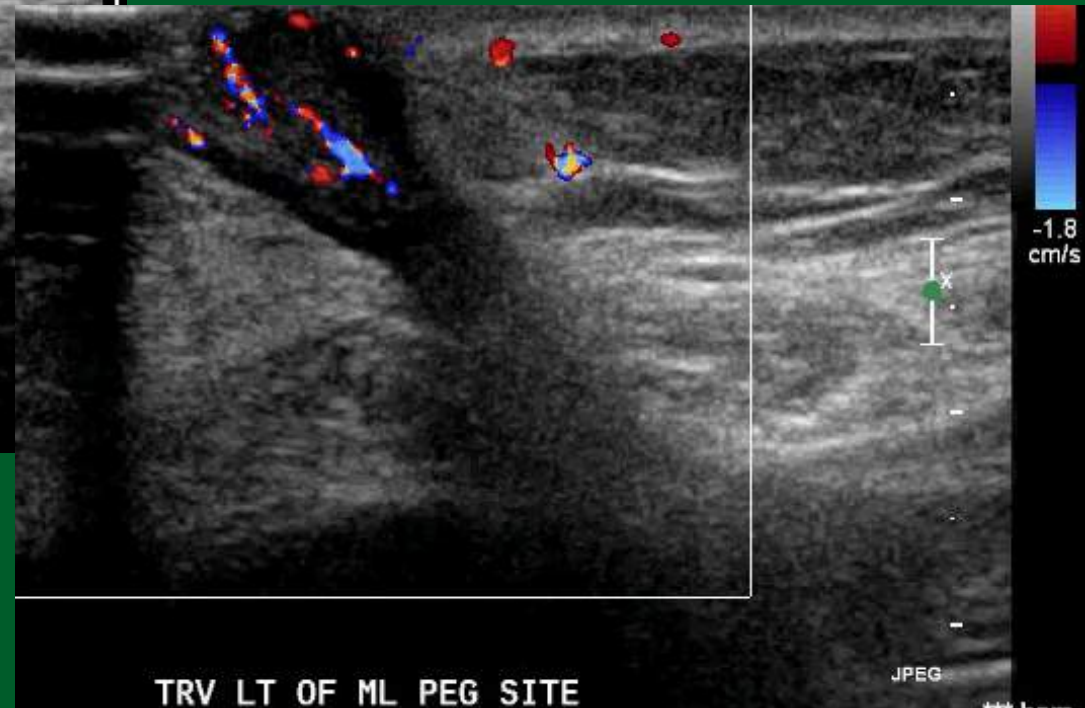
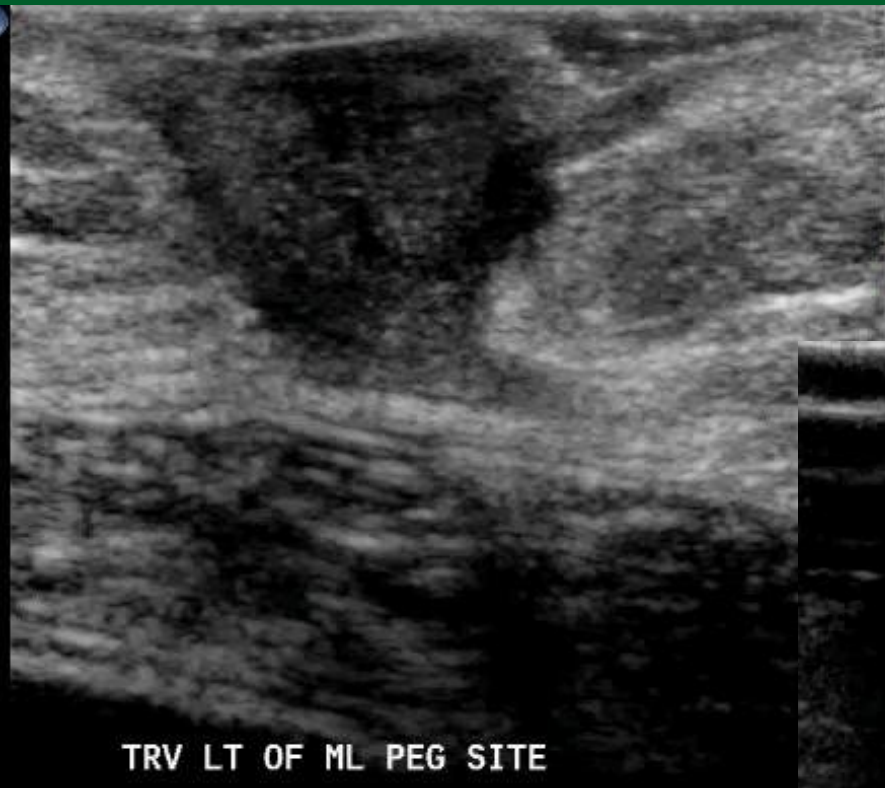


st 4.07 cm
RT LAT INNER ELBOW SWELLING SAG 1 D 1

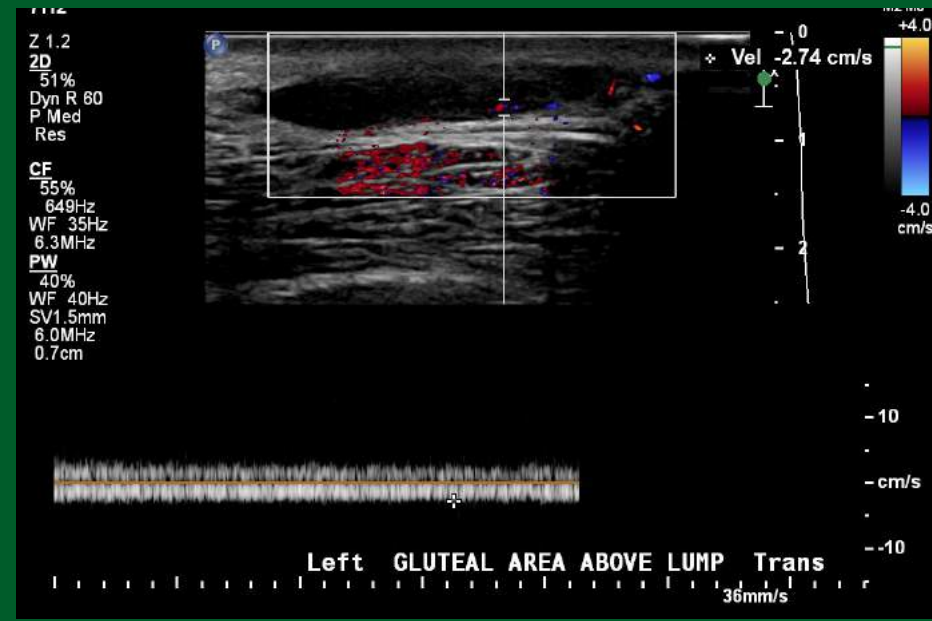
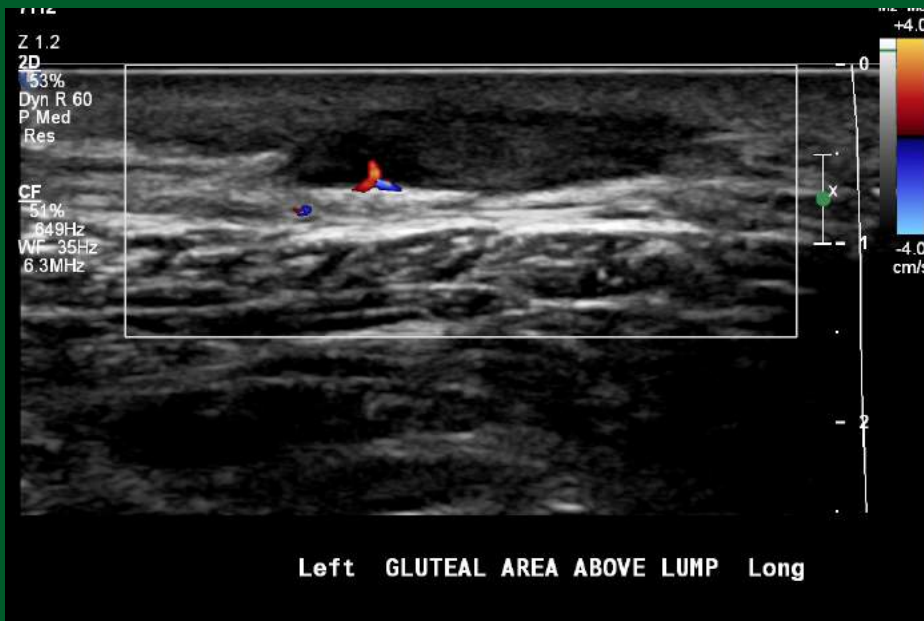


RT LAT INNER ELBOW SWELLING SAG

Granulation Tissue @ PEG site

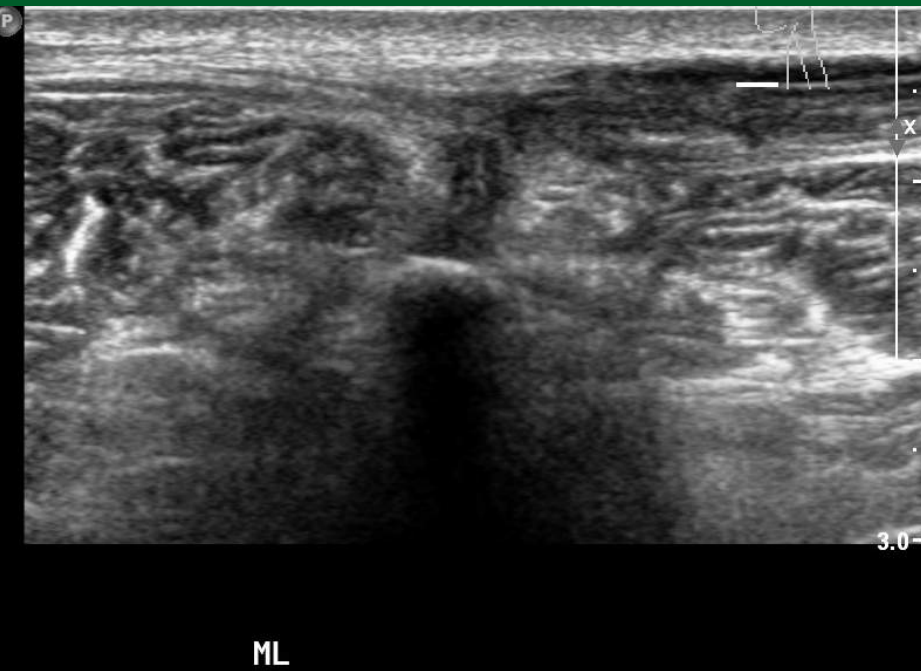


77 yo with Gluteal area lump with + color Doppler-concern for sarcoma



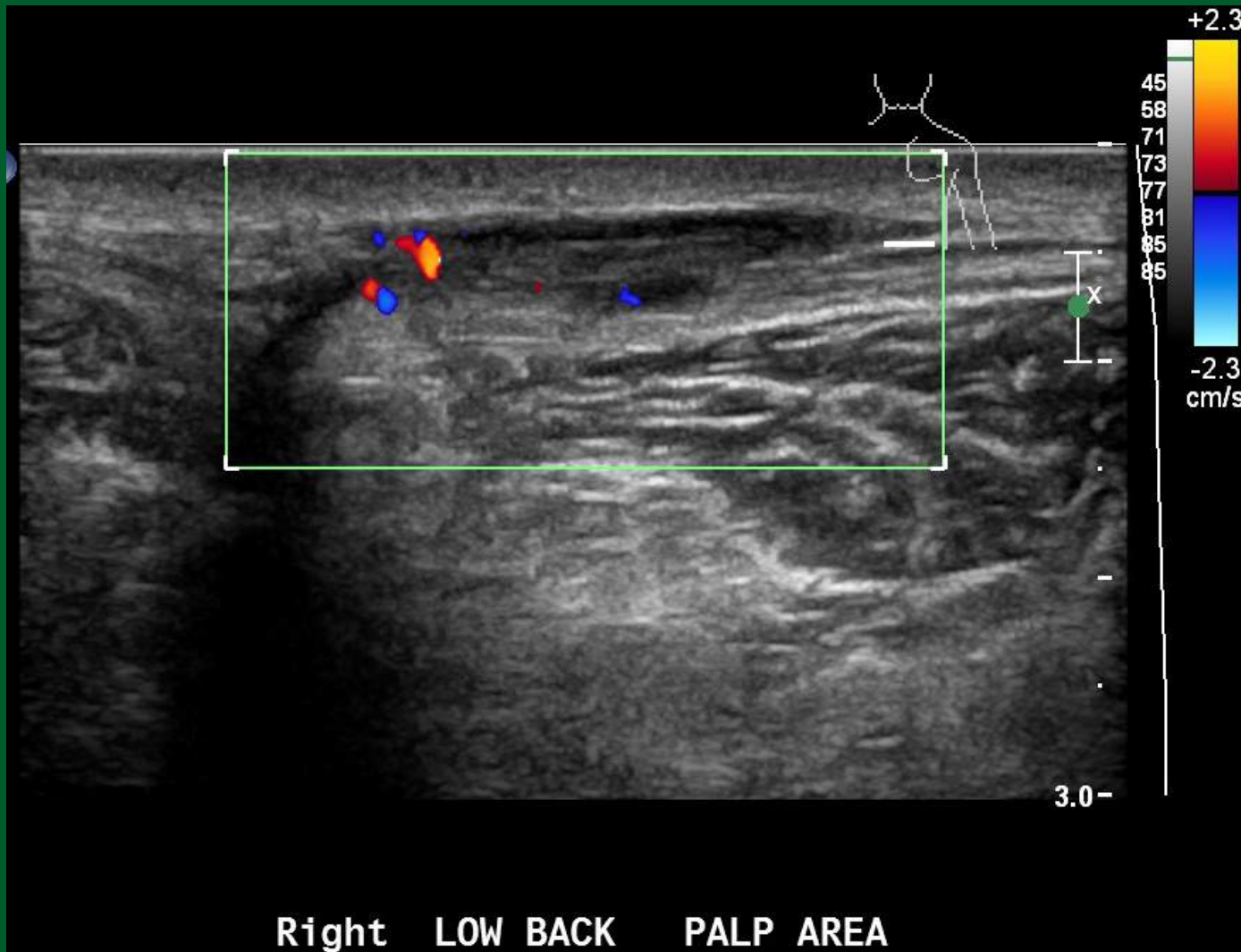
UW bx 5/18— granulation tissue

Non-painful lump in back- asymmetry

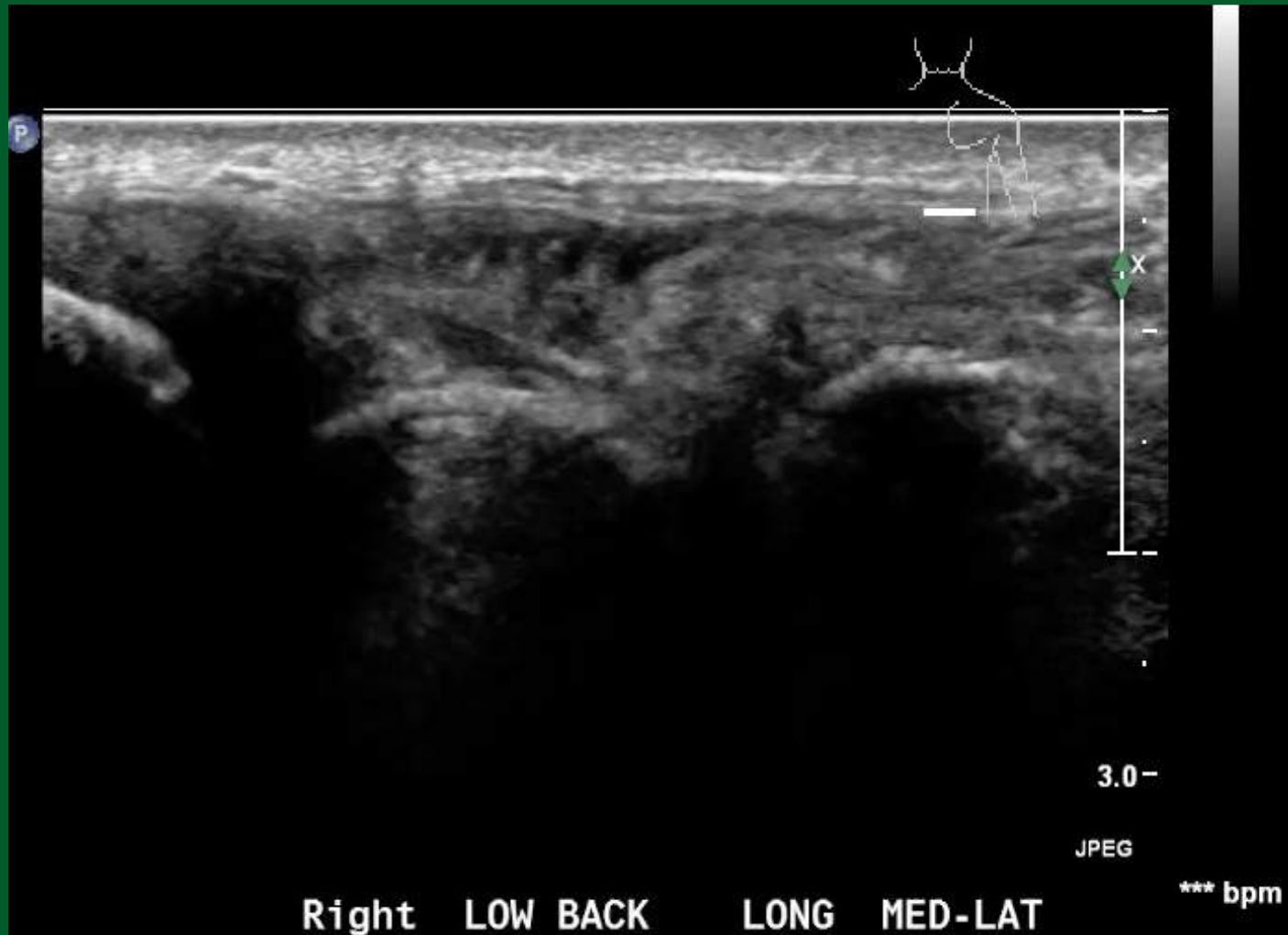


No biopsy or f/u imaging-
presumed hematoma

Hematoma-no blood flow



Hematoma clip

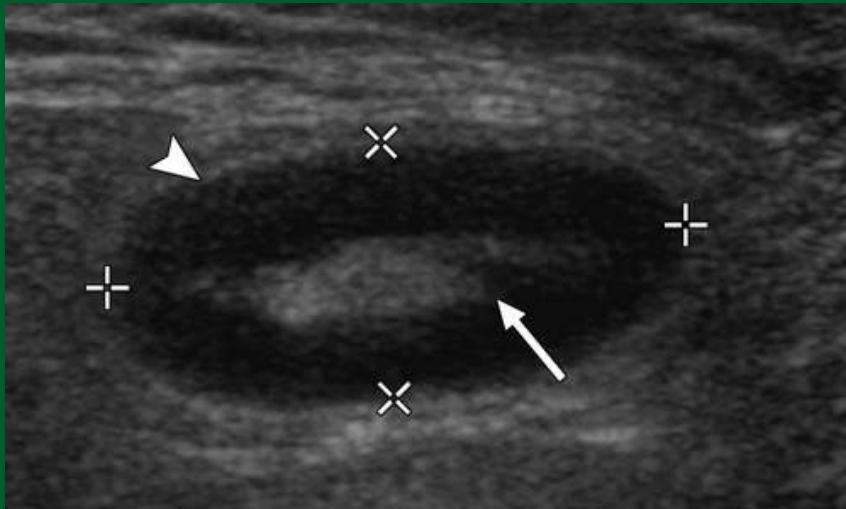


Lymph Node

- Among most common superficial nodules/lumps
- Children-95% are benign, reactive, hx infection/inflammation
- Lymphadenitis on U/S
 - Hypervascular cortex, loss of fatty hilum, adjacent cellulitis, indurated fat
 - +/- Necrosis and abscess*
 - *Hard to differentiate from cancer

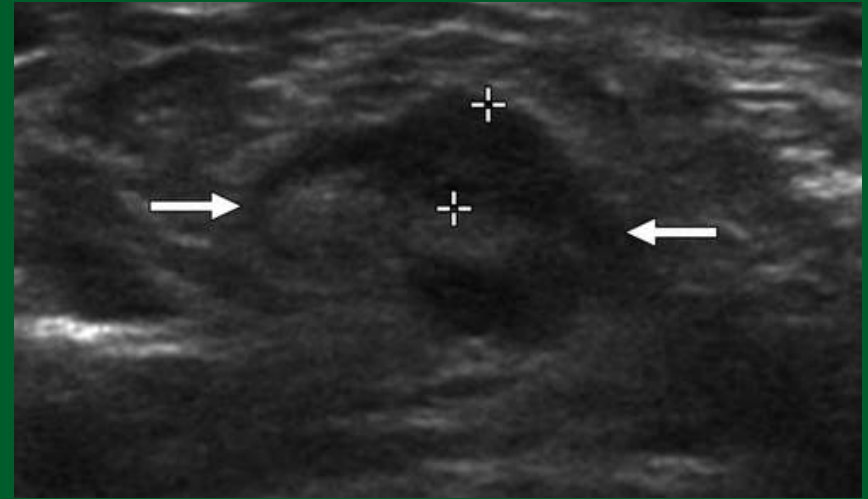
Lymph nodes

Benign in 8 yo male neck



Oval Shape, wider than high,
uniform cortical thickness

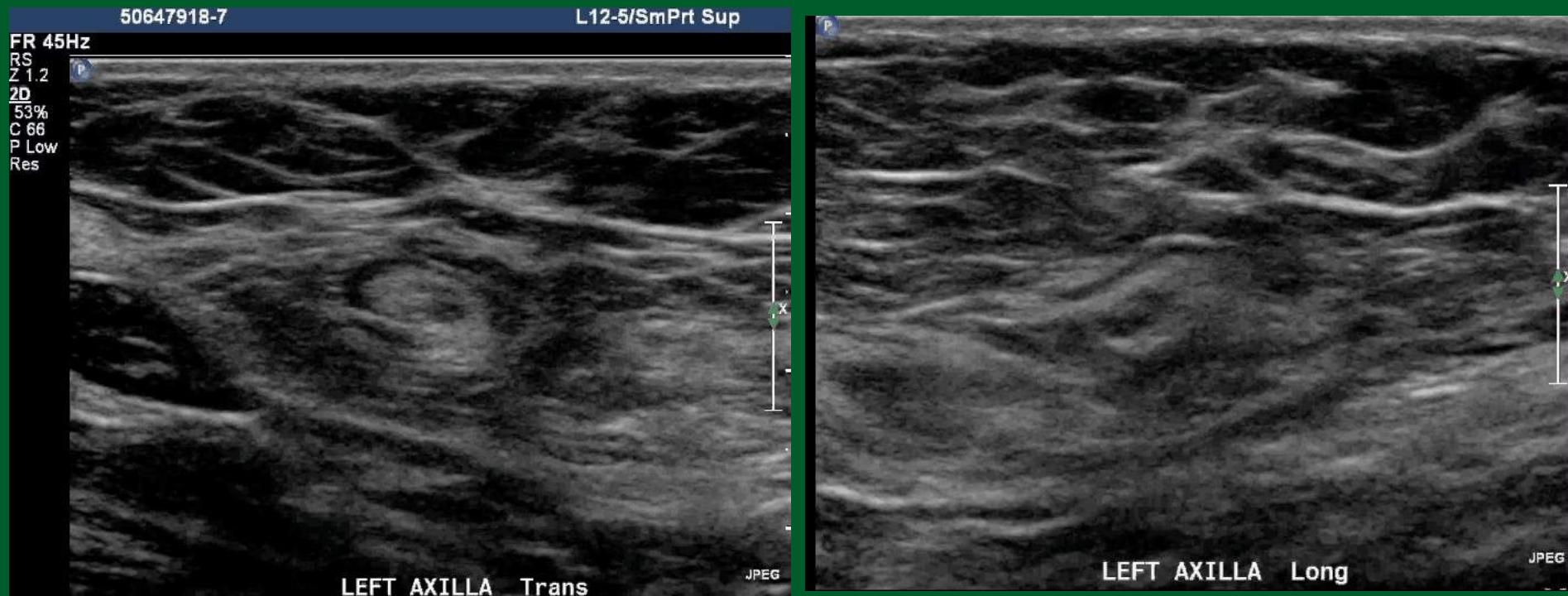
Malignant in 72 yo woman
w/ breast CA



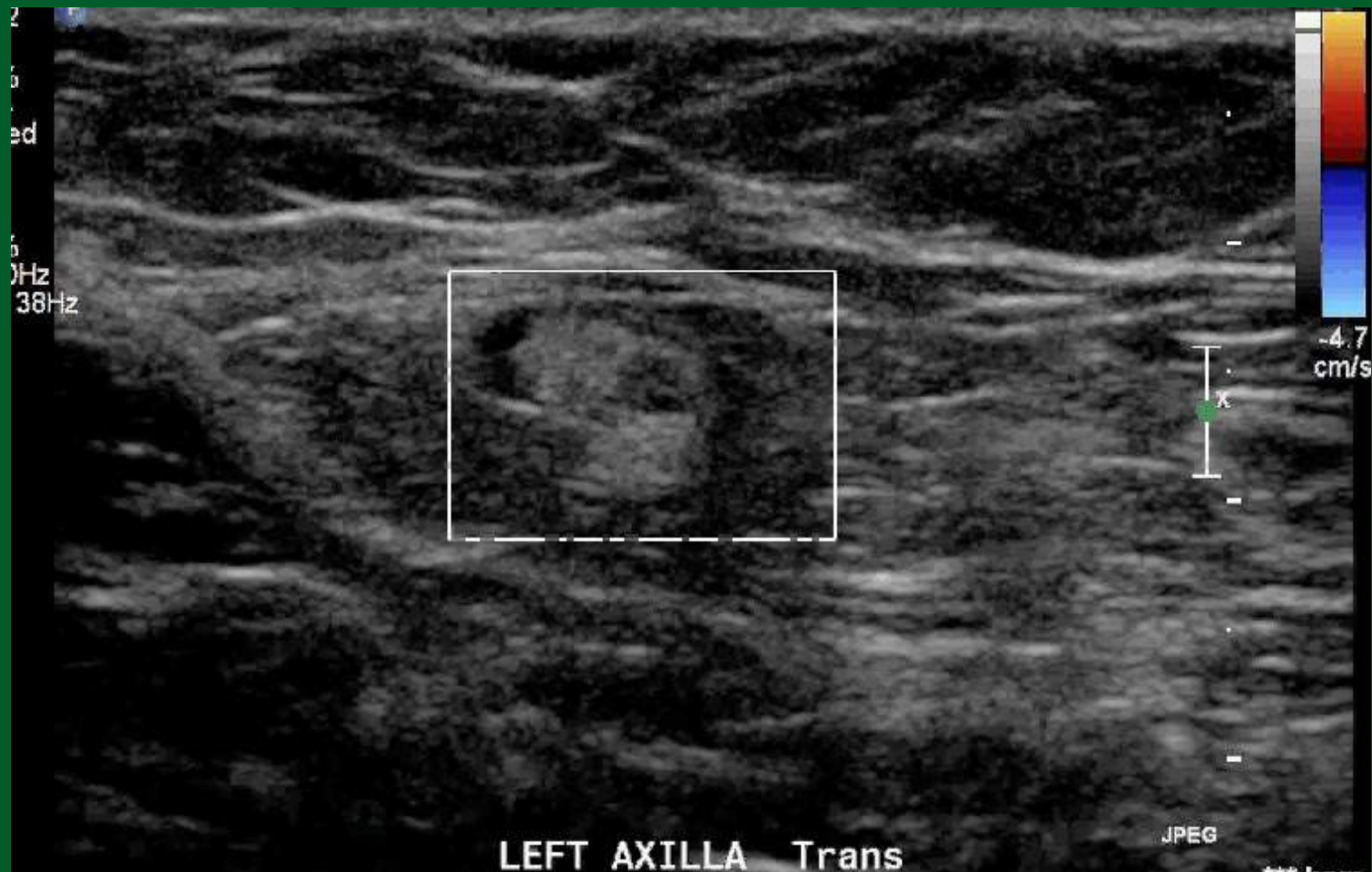
Focal cortical bulge, CA
finding + FNA

Shah and Callahan, 2013

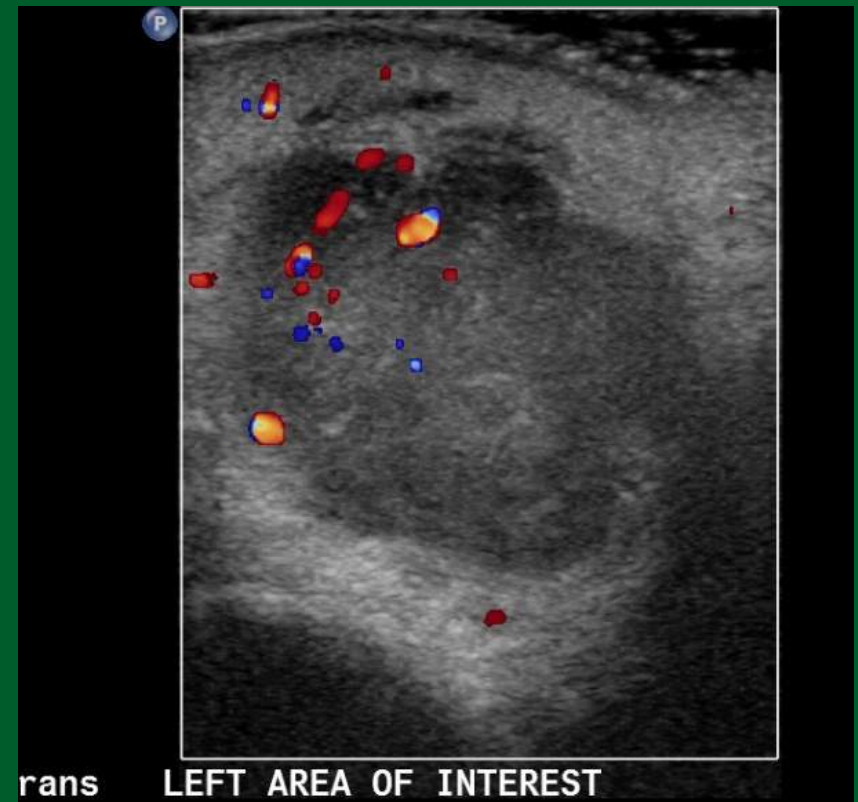
Axillary Lymph node-hypoechoic lesion in fatty hilus



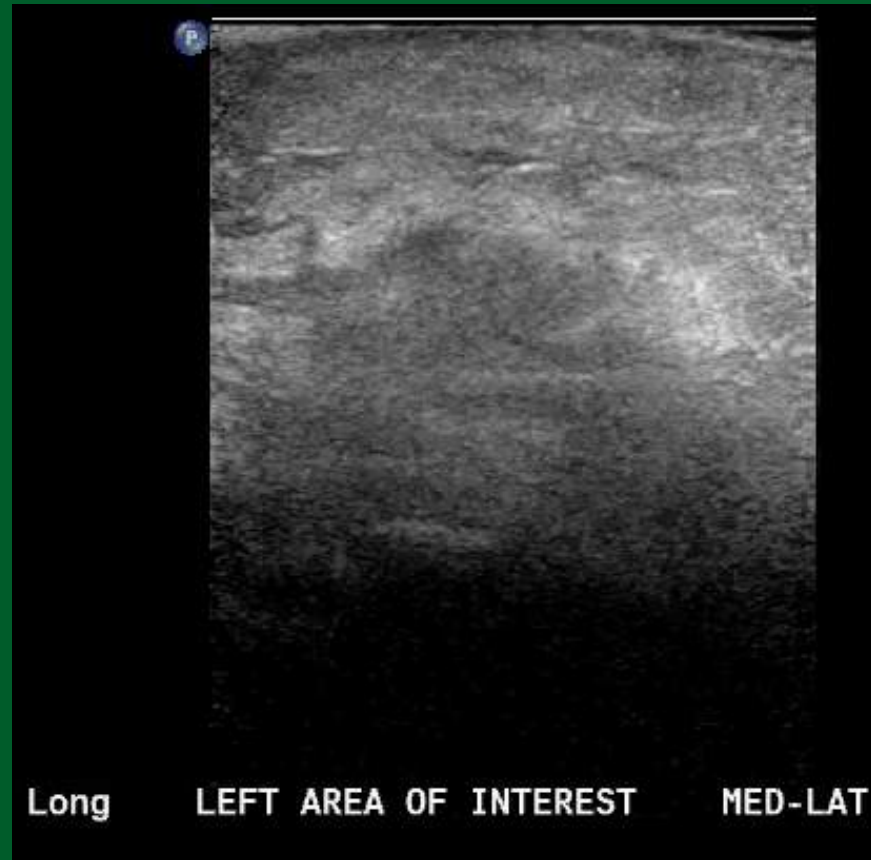
+ FNA of focal lesion in sinus



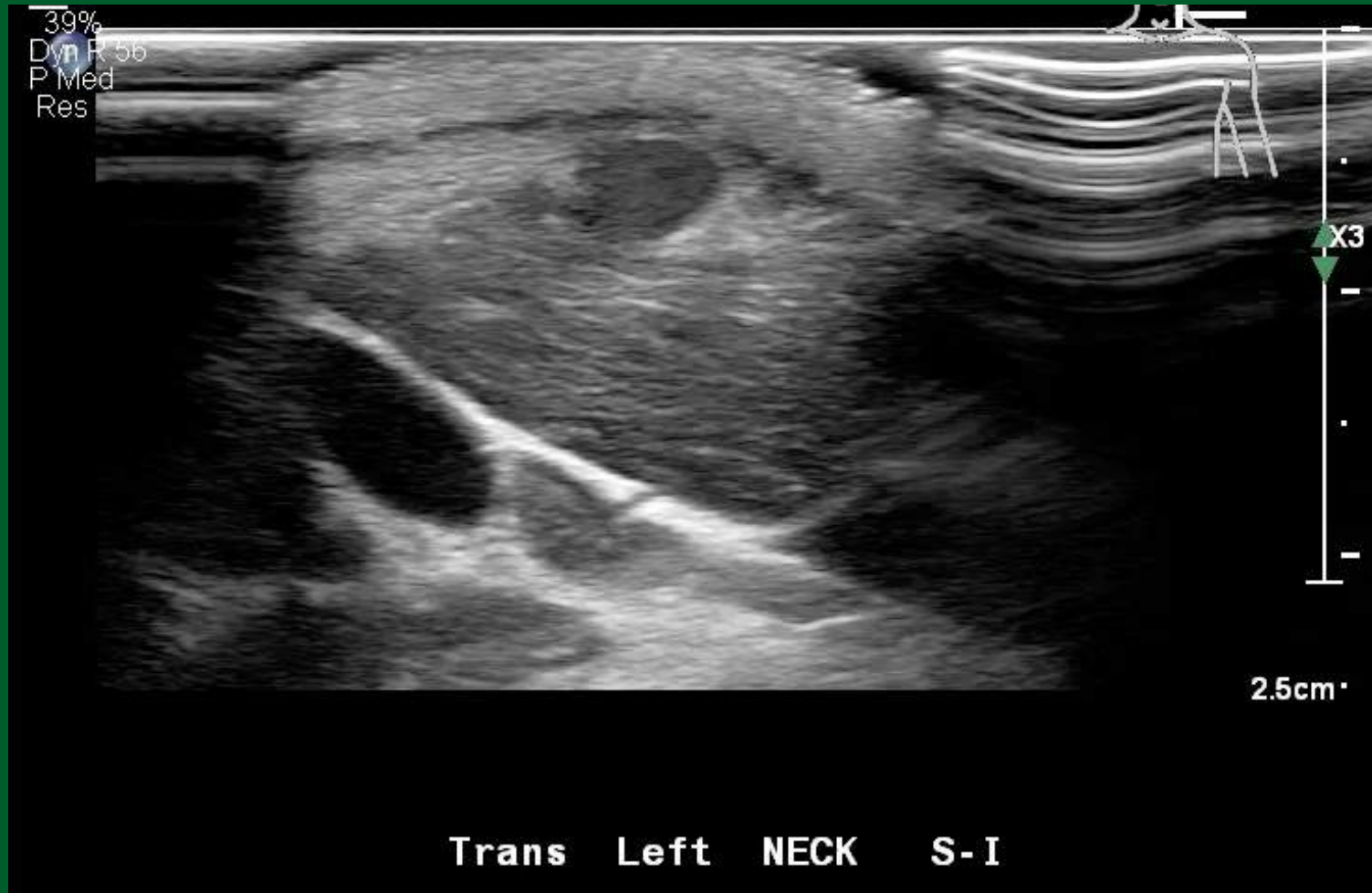
Lymphadenitis in 7 y.o. girl: left pre-auricular space



Lymphadenitis in 7 year old female



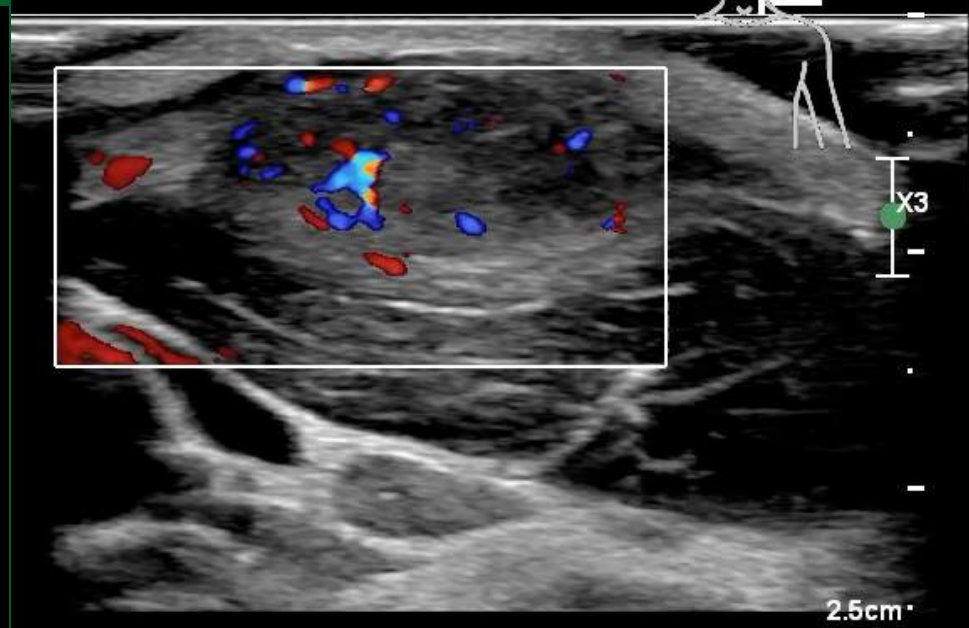
Neck lump in 33 yo pt.



Neck lump

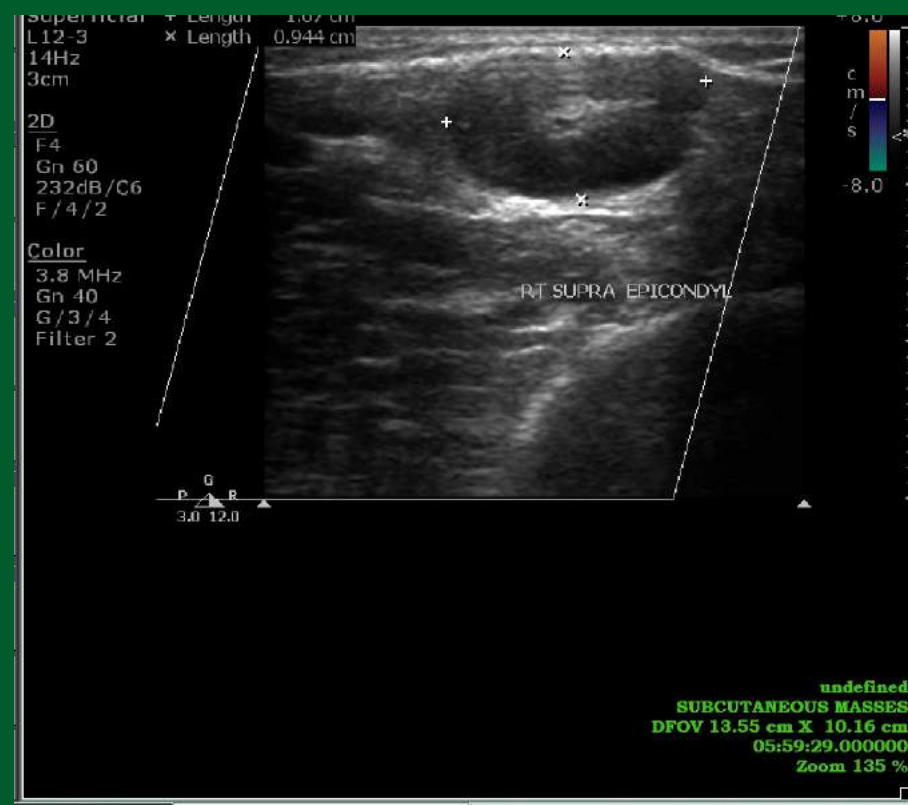
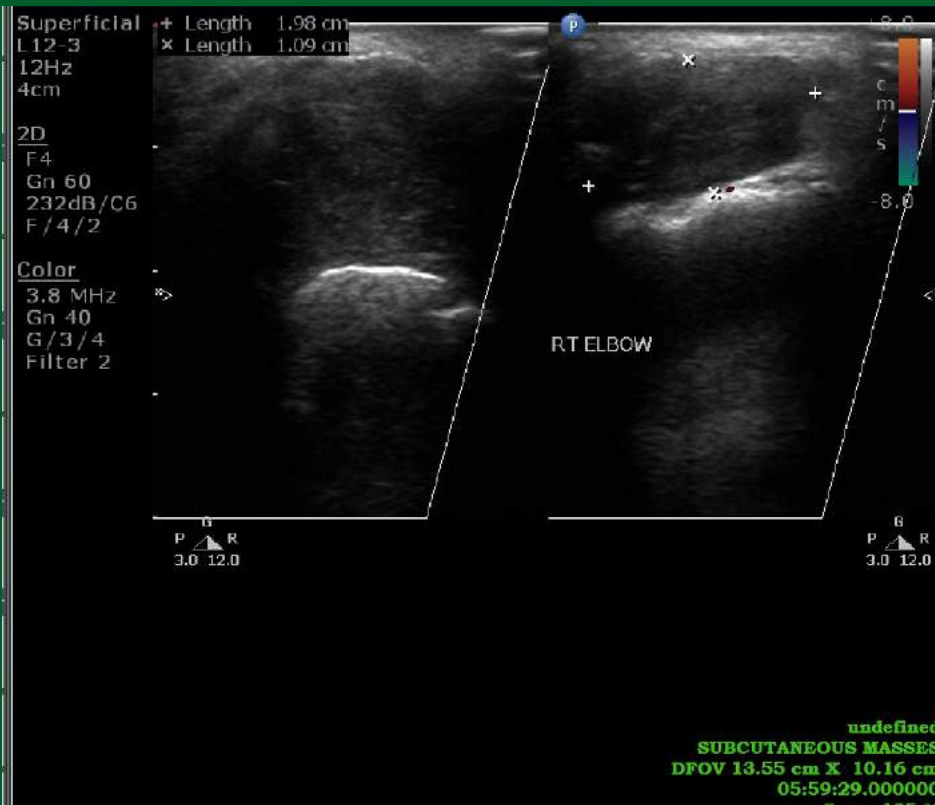


Trans Left NECK W/COMP

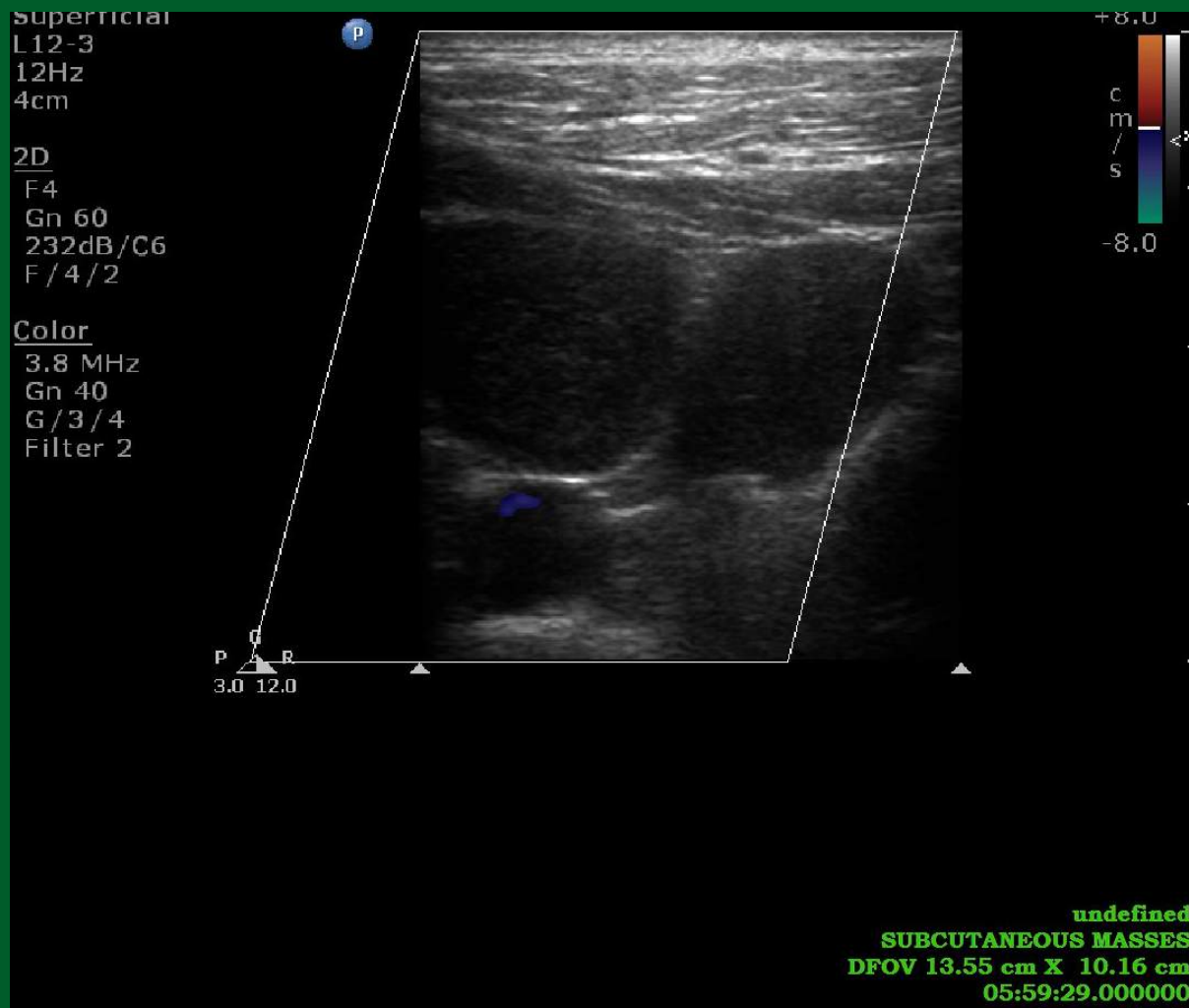


Trans Left NECK

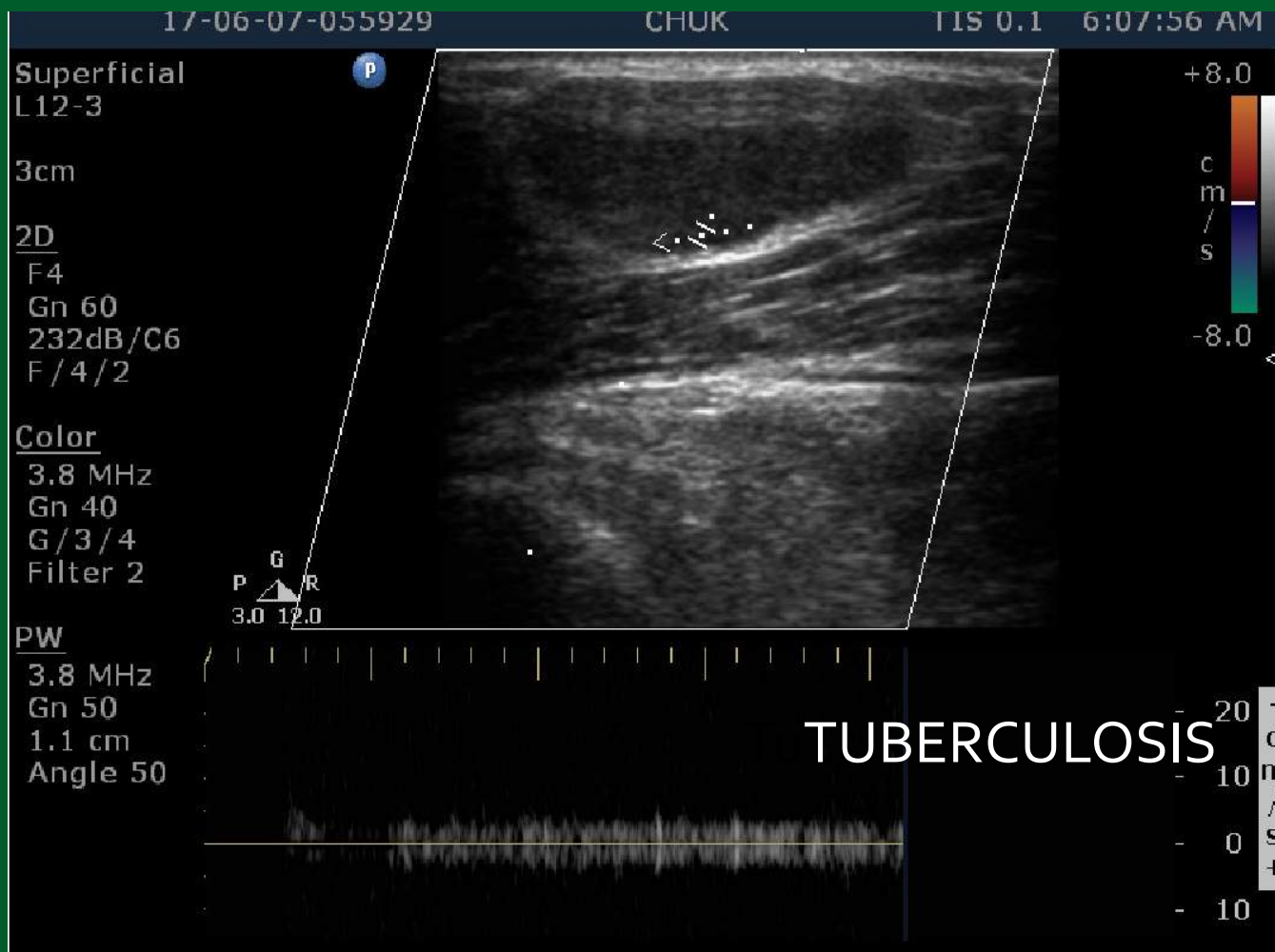
Multiple superficial lymph nodes in elderly African female



Superficial lymphadenopathy



Use Spectral Doppler to confirm color Doppler



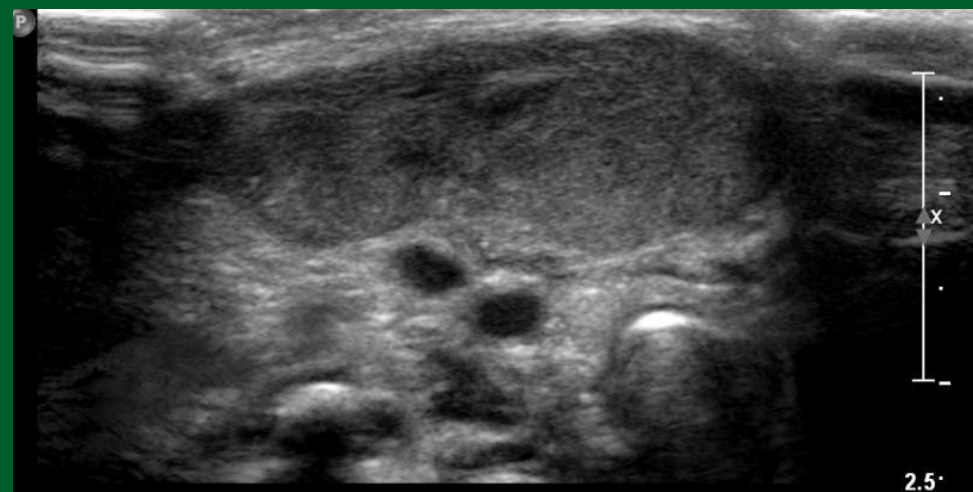
Lumps/Bumps in Pediatrics

- Infantile hemangiomas (IH) / Vascular lesions
 - Hemangioma, vascular malformation (low or high flow), lymphangioma, or AVM
- fibromatosis colli
- ectopic breast tissue

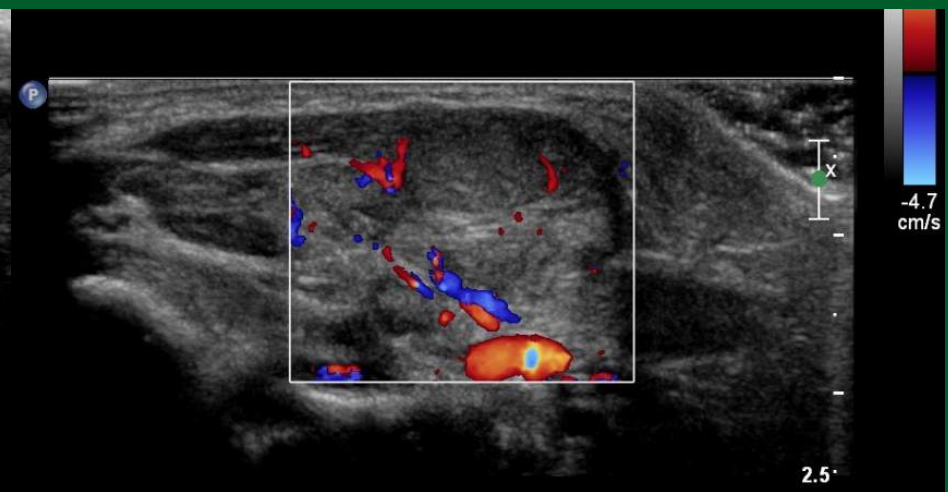
Fibromatosis Colli

- Contracture of SCM
- Head tilt to ipsilateral side
- Chin rotates to contralateral side
- Right side 75%
- Frequent traumatic breech or forceps delivery HX
- Occurs ~ age 4-6 weeks, regresses over 4-8 months
- Treat conservatively
- US-fusiform swelling of SCM

Fibromatosis Colli

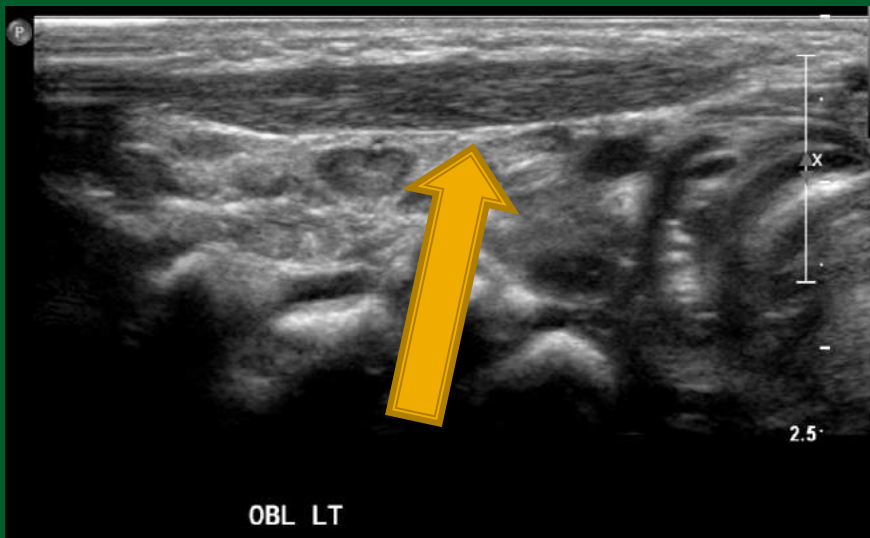


OBL RT

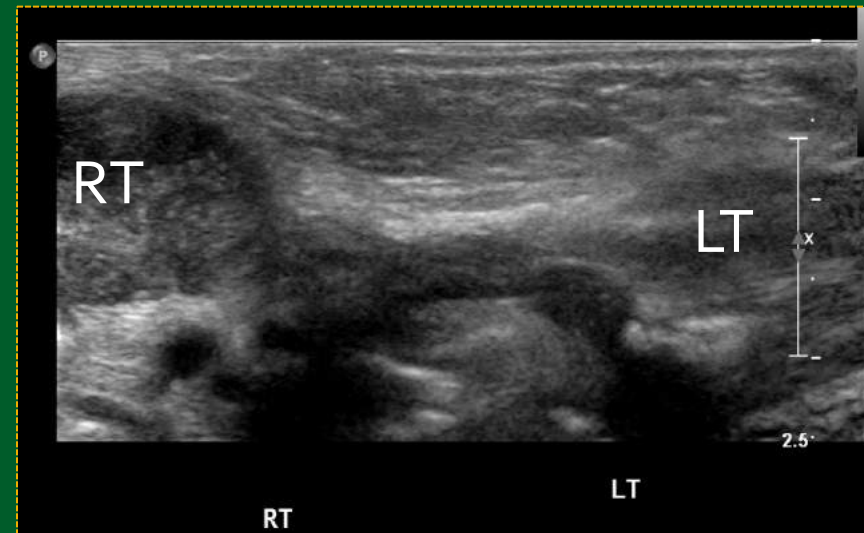


RT NECK TRV

Fibromatosis Colli



Contralateral SCM



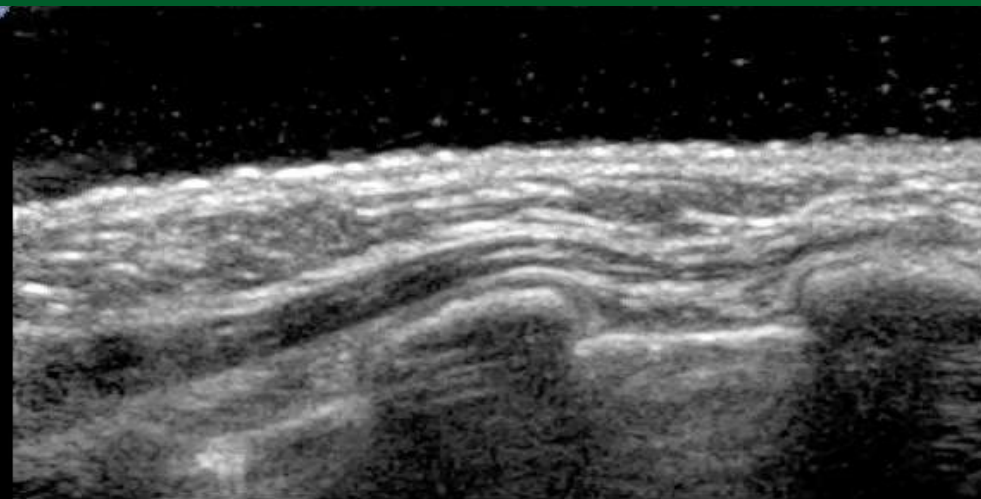
Trans neck view

Fibromatosis Colli

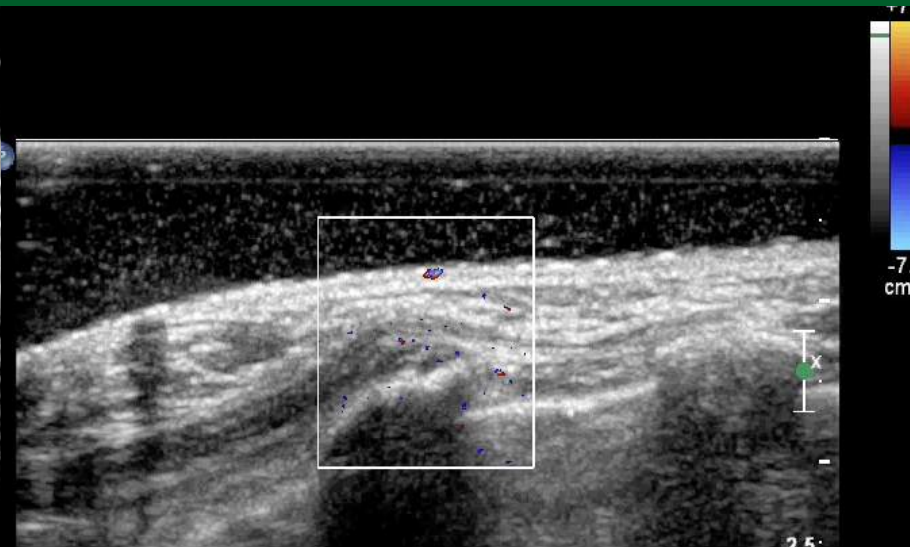


Transverse view of the neck anteriorly

Rib chondroma in 2 year old girl



Long Left RIBS M TO L



Long Left RIBS M TO L

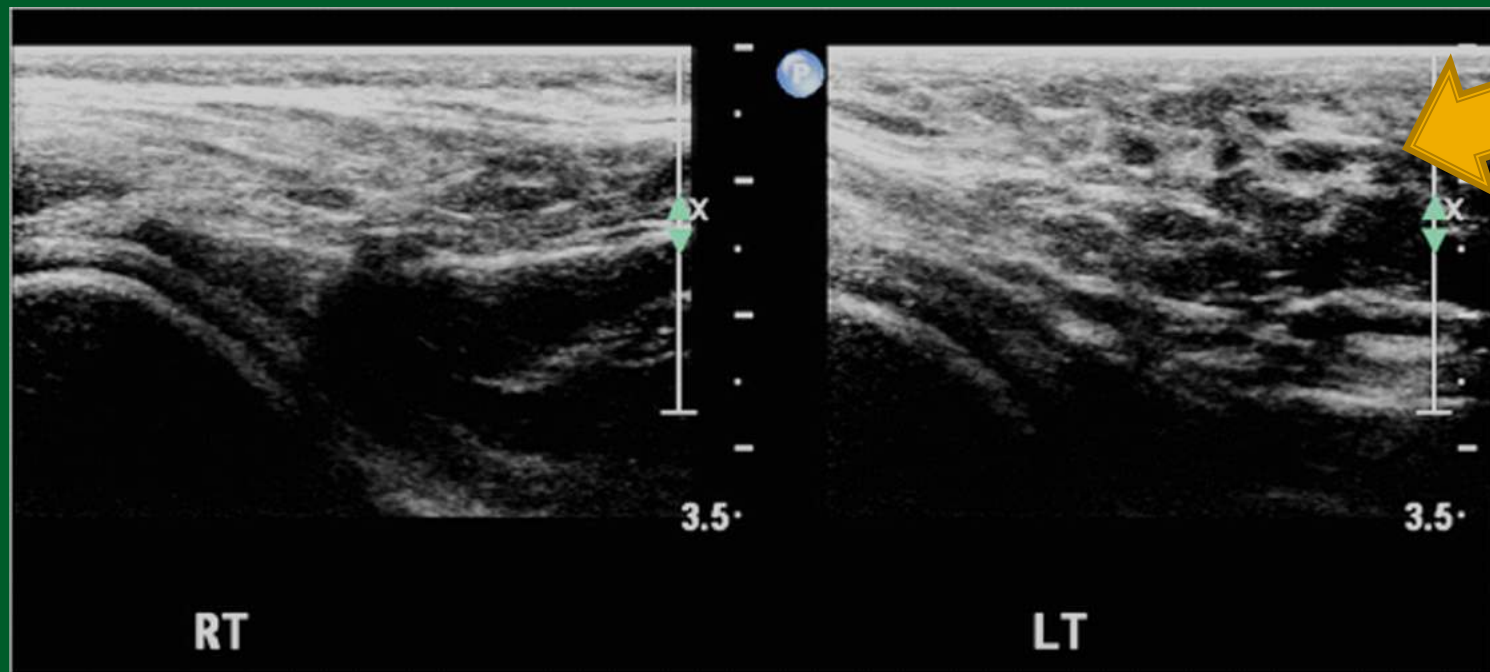
JPEG

Ectopic Breast tissue

- Failure of regression of embryologic tissue
- Puberty-becomes more prominent
- Palpable, tender lesion(s) in axilla
- Echogenic tissue similar to breast tissue

Ectopic breast tissue

- Generally ill- defined
- Multiple small, hypoechoic areas
- May mimic lymph nodes
- Comparison to contralateral breast or area helpful



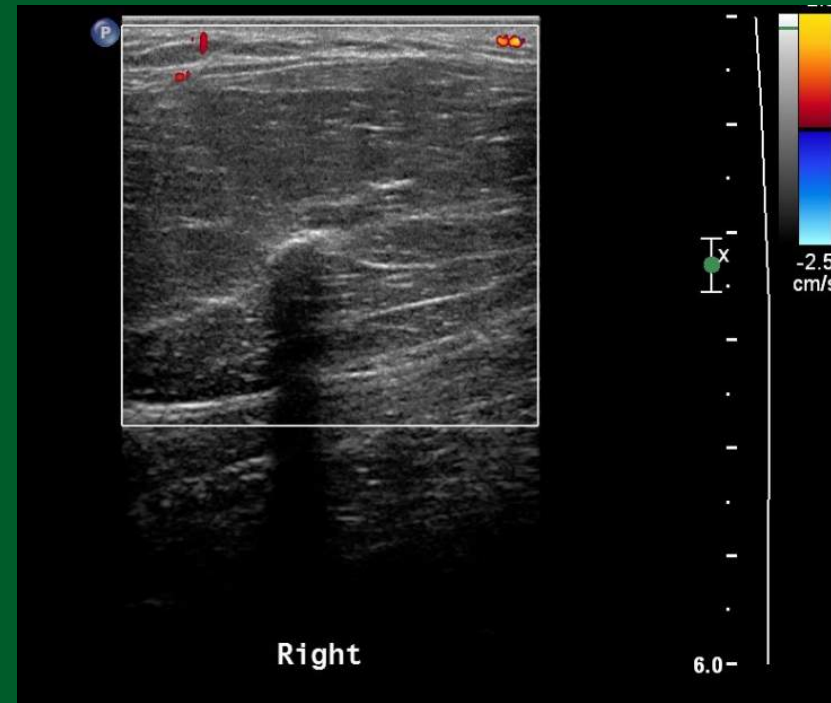
Common Lumps/Bumps in Adults

- Lipoma
- Hernia
- Epidermal inclusion cyst
- Ganglion cyst
- Popliteal cyst
- Morton's "neuroma"
- Fat necrosis
- Neurofibroma
- Uncommon-Sarcoma/malignancy

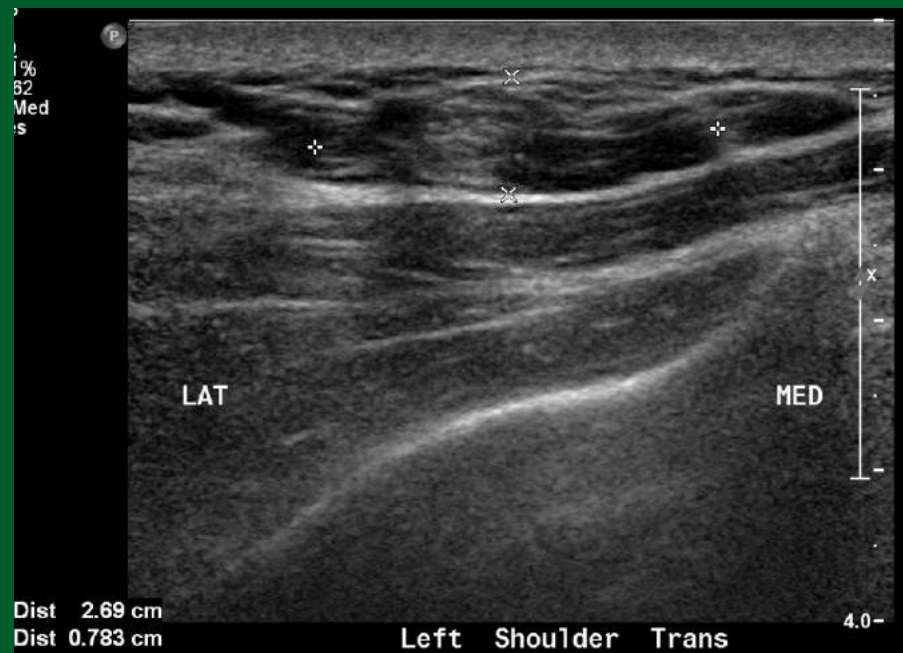
Lipoma

- Common in adults
 - > 50% or more of superficial lesions on U/S
 - 2-4% prevalence overall
- Rarer in children
 - 10% of all lesions
- Variable in appearance
 - Hypo- to hyperechoic, well-defined to vague borders
- Difficult to separate from surrounding fat
- Asymmetry of soft tissues
- Hard to see--***Look at contralateral body part***
- Ultrasound usually pathognomonic

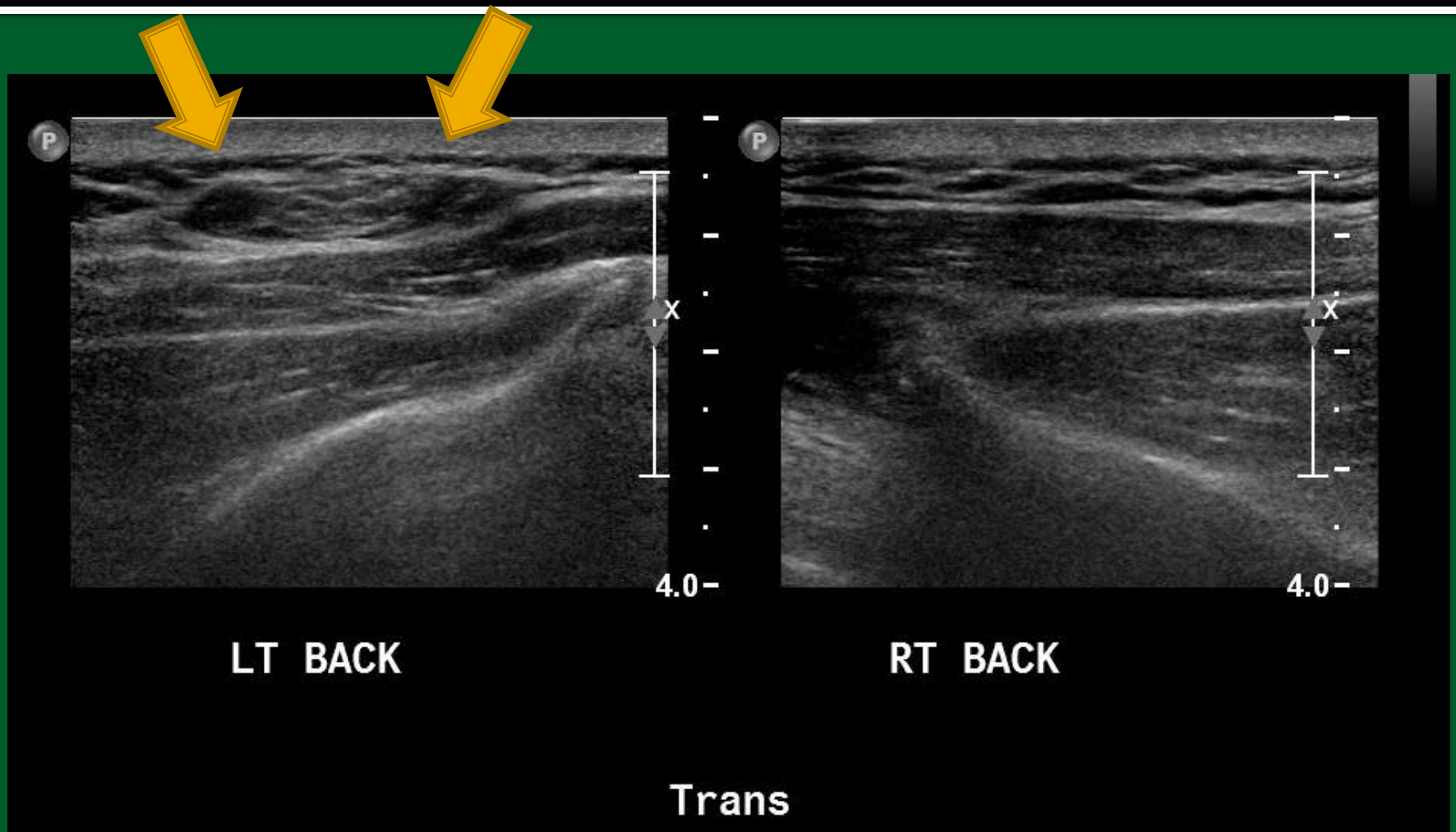
Lipoma-typical and atypical



Ill-defined upper back mass in 62 yo male



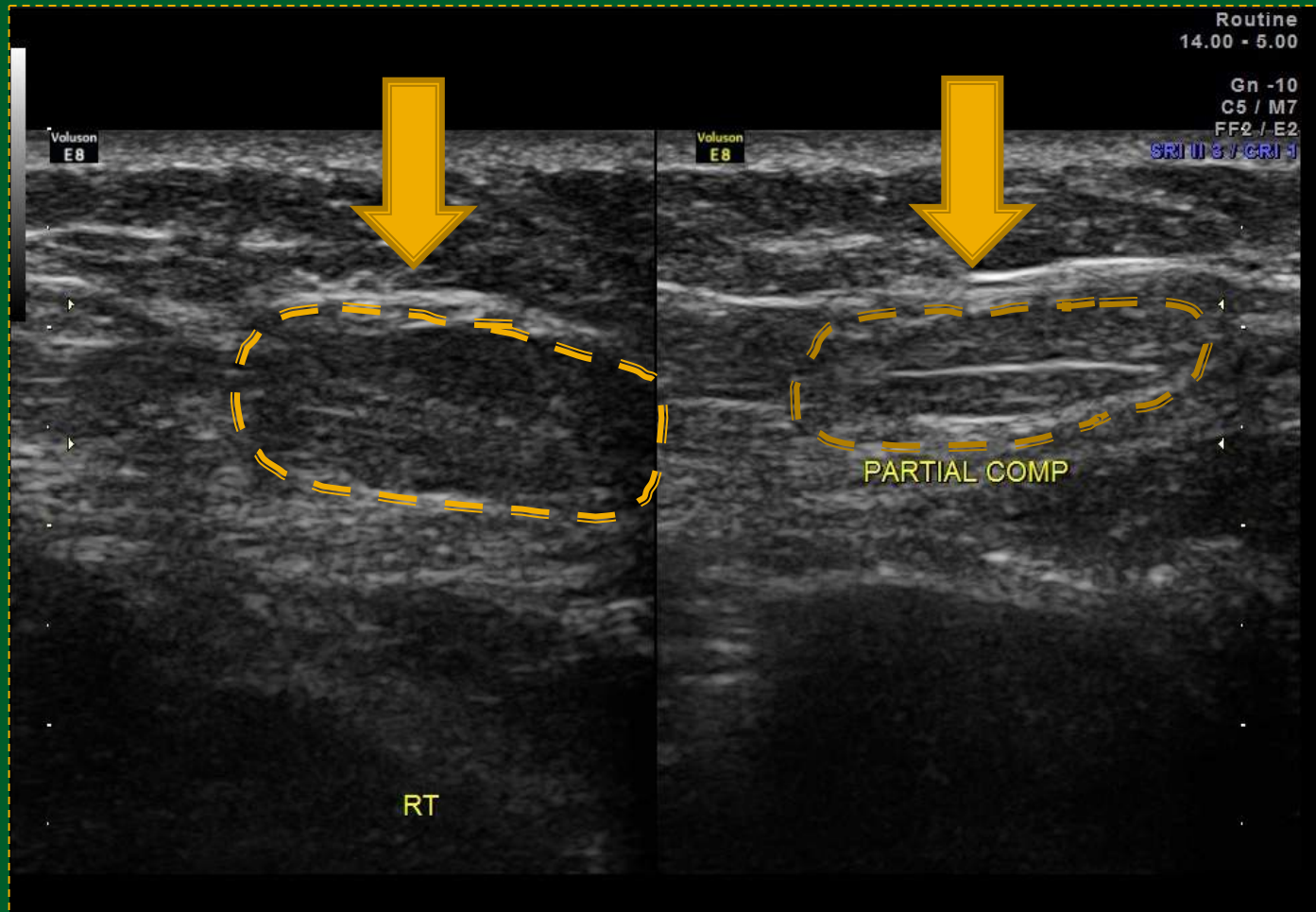
Lipoma –use contralateral side comparison!!



Lipoma in 57 yo woman-back



Lipoma –usually compressible



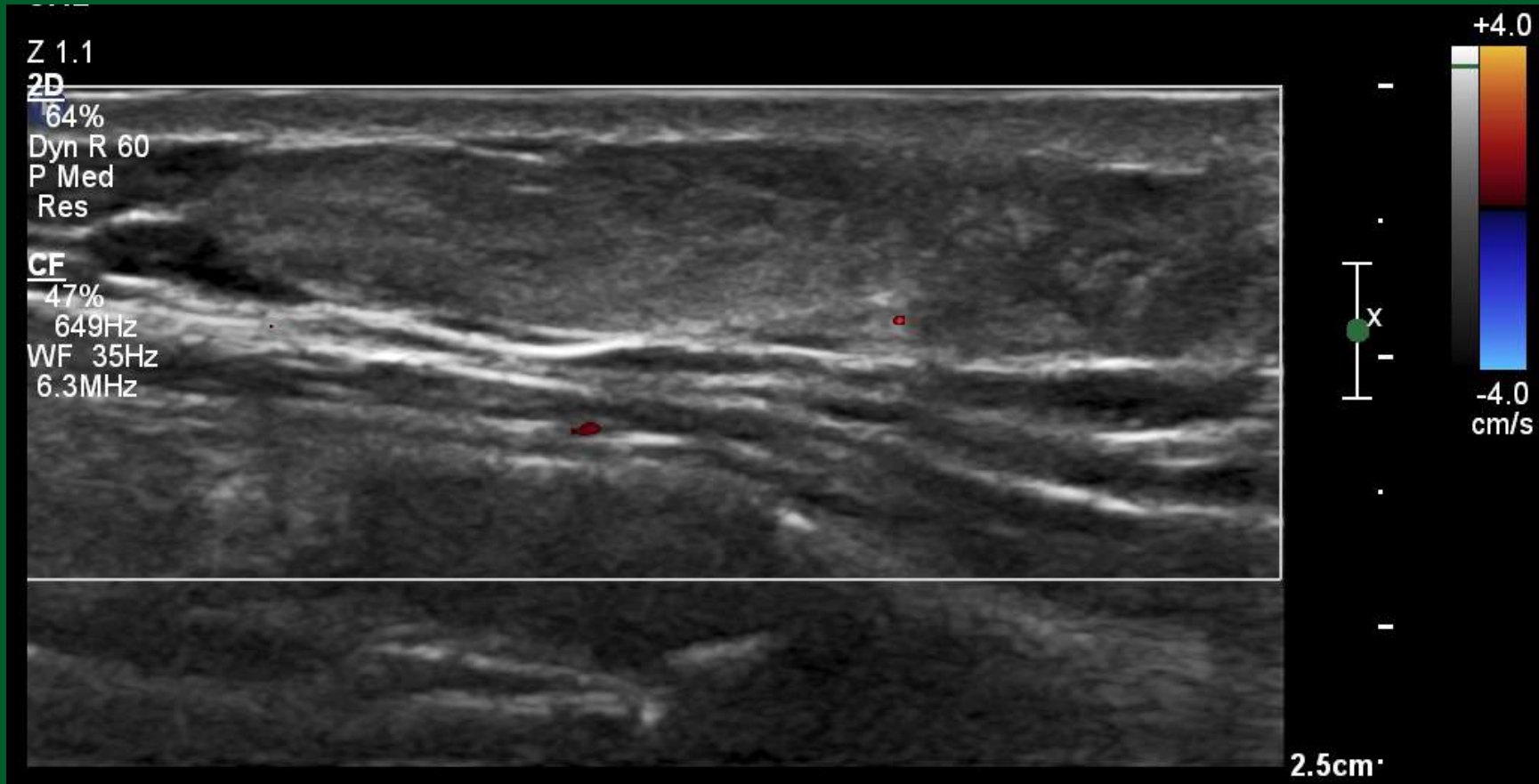
Lipomas and Blood flow (Color Doppler)

- 7 of 31 (23%) echogenic masses (lipoma or lipoma-like) in subQ fat had blood flow on color Doppler US
- Most were in upper arm, mean size 1.7 cm.
- Second most common site: trunk and chest
- Well-circumscribed
- Half homogeneous, half heterogeneous echogenicity

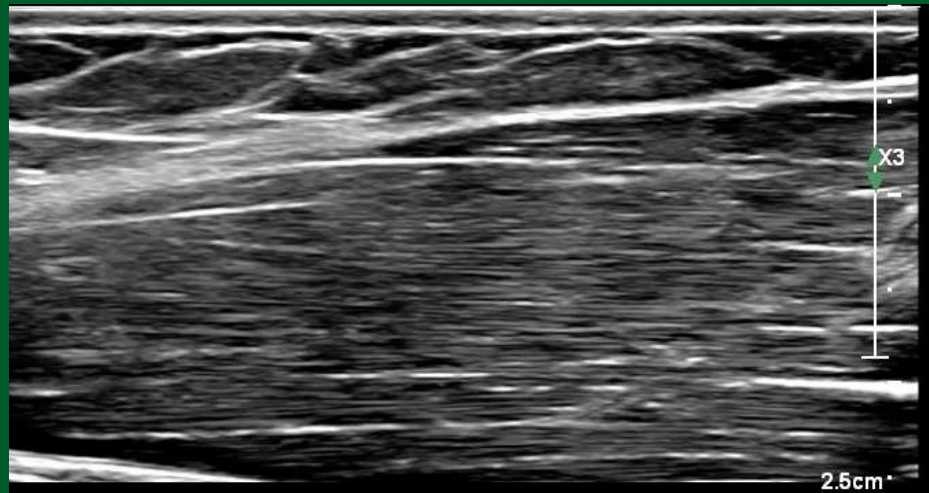
Superficial lesion in 25 yo male with hx of Burkitt's lymphoma



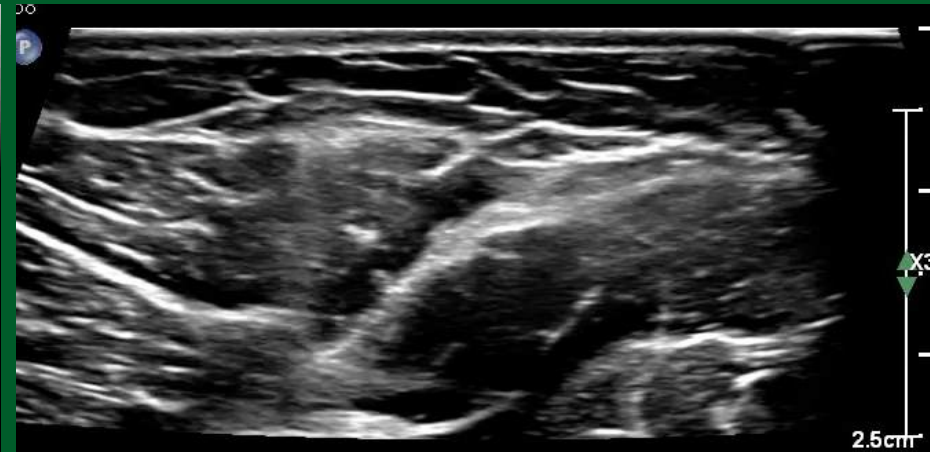
Bx x 3 => mature fibrous and fatty tissue



Cine clips of lipoma in axilla

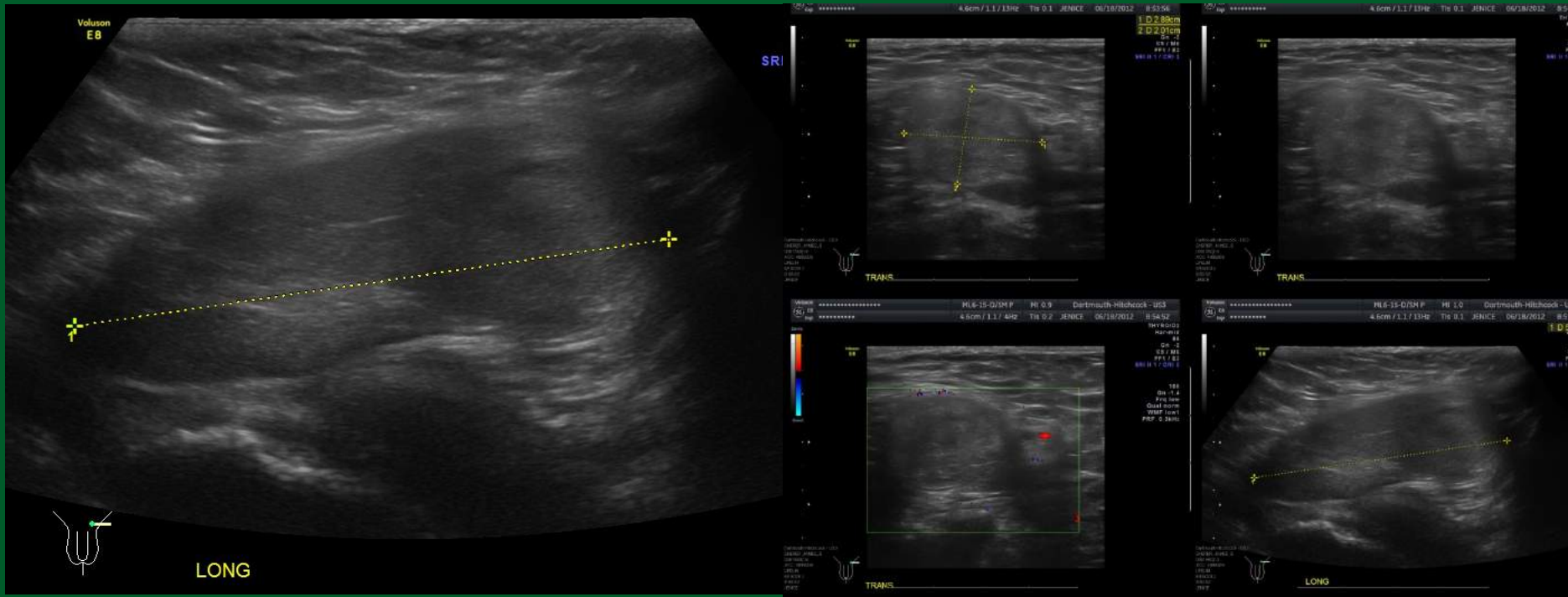


Right UPPER ARM/AXILLA Long

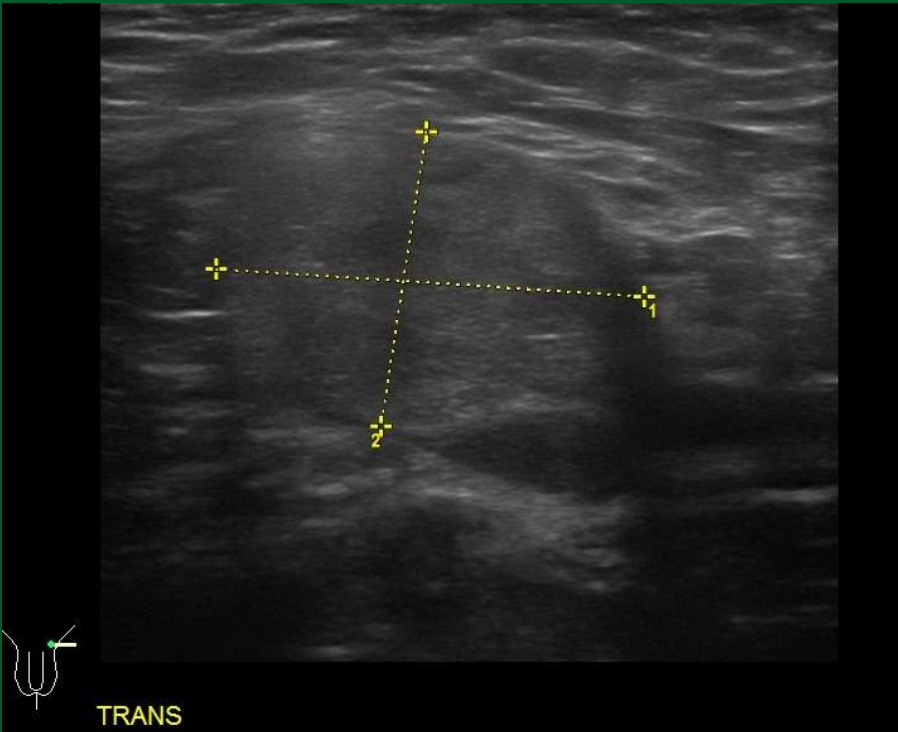


Right UPPER ARM/AXILLA

Hernia-Inguinal



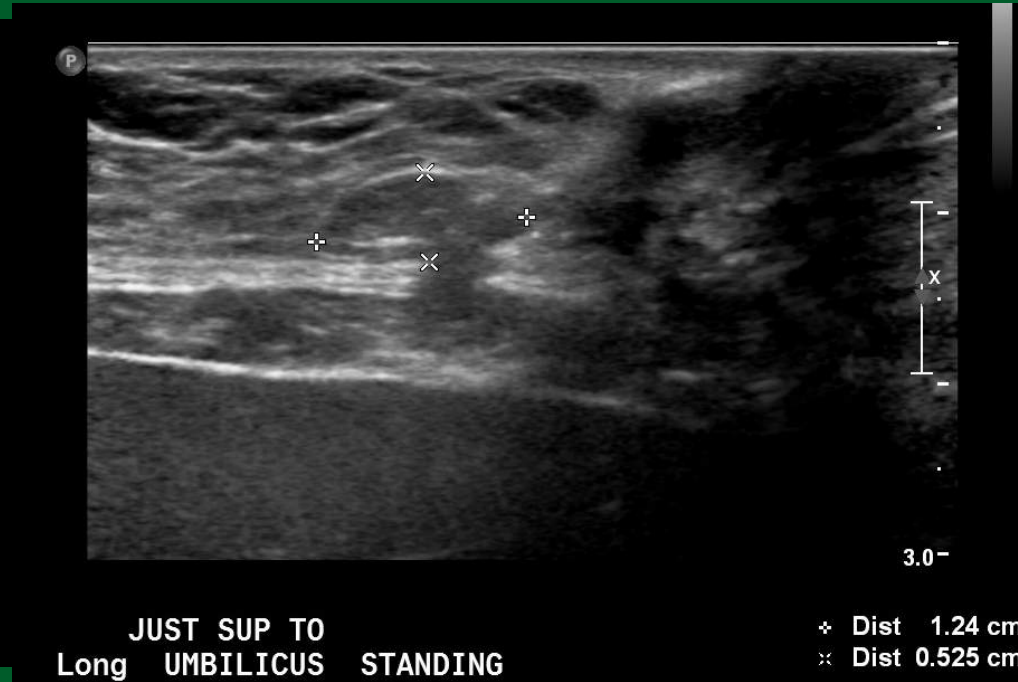
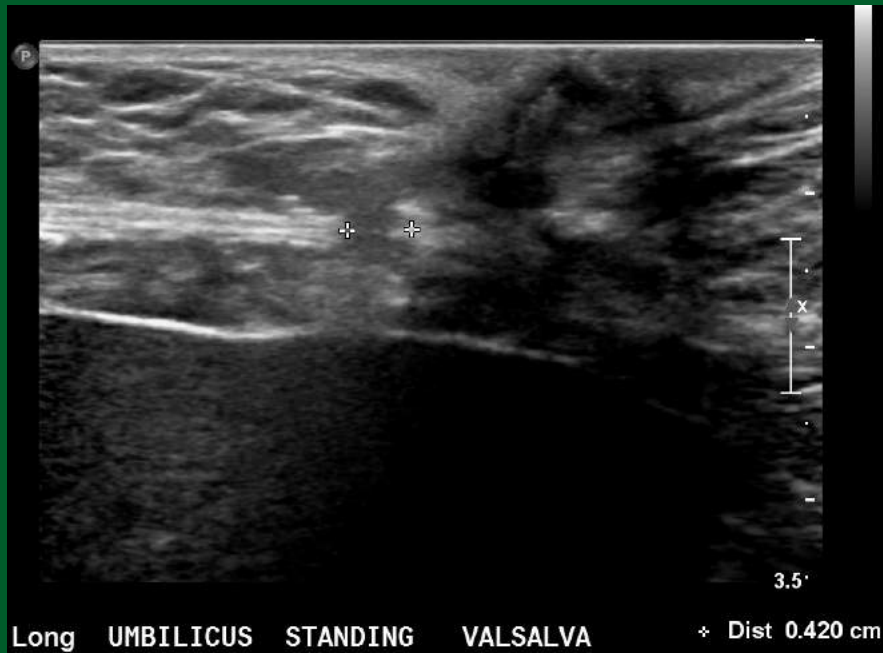
Hernia-Inguinal



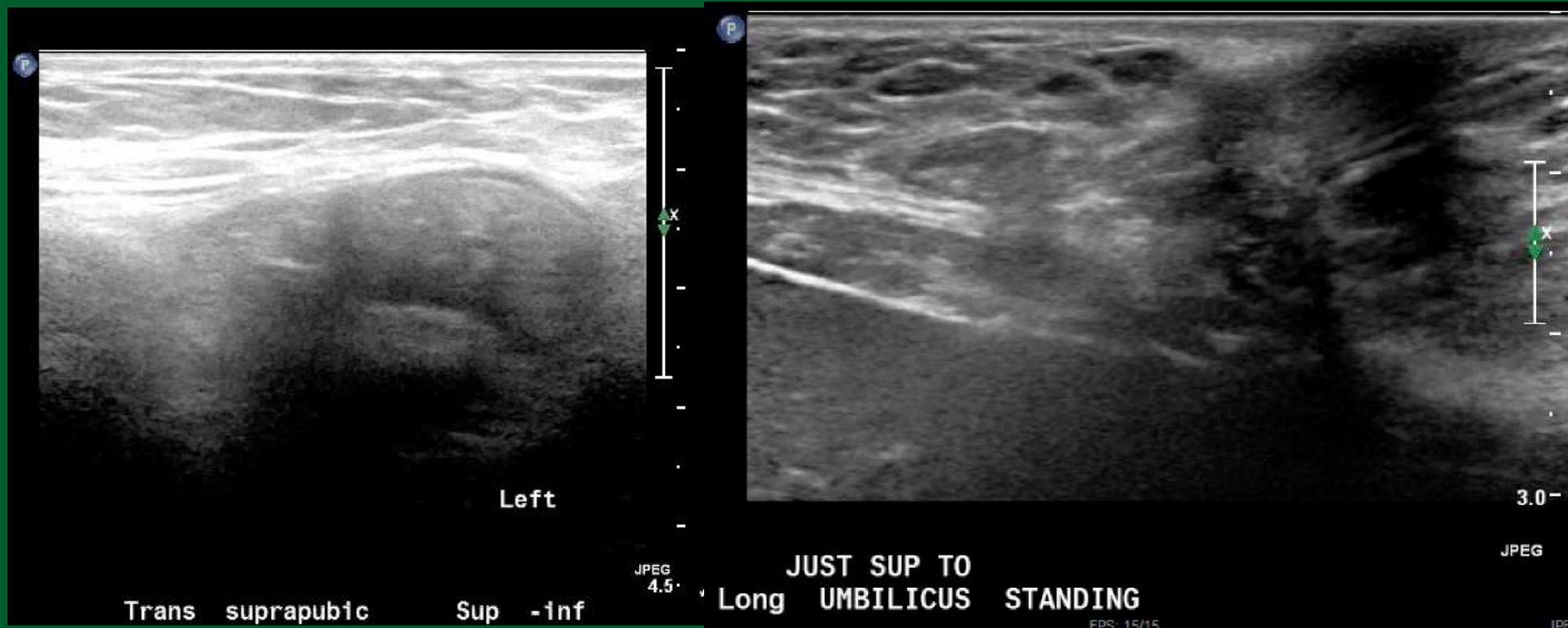
Abdominal hernia-mind the gap!



Hernia—only visible standing



Ventral Hernias-large and small



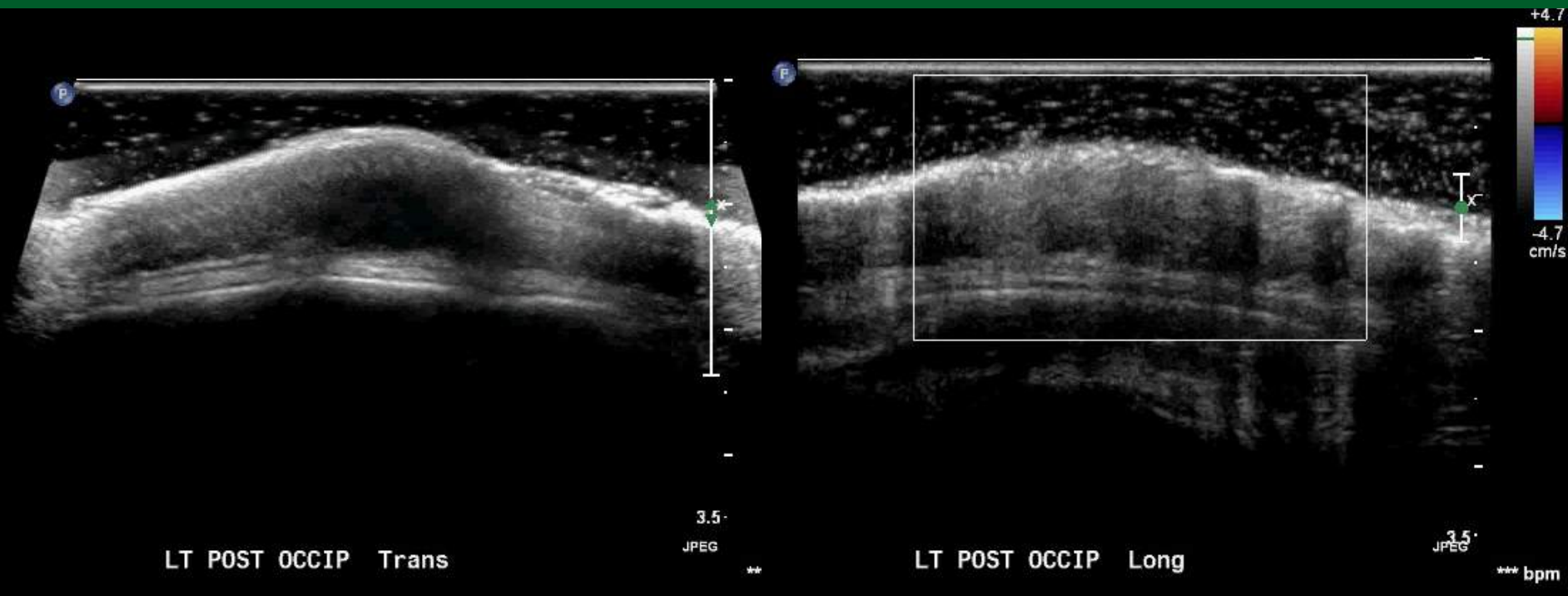
Epidermal Inclusion Cyst (EIC)

- Most common subcutaneous “cyst”
- Most common over trunk & scalp
- Rarely extremities
- Often clinical diagnosis
- Congenital or post-traumatic etiology
- Inclusion of squamous epithelium into dermis
- Hypoechoic rim
- Varying internal echoes
- No vascularity

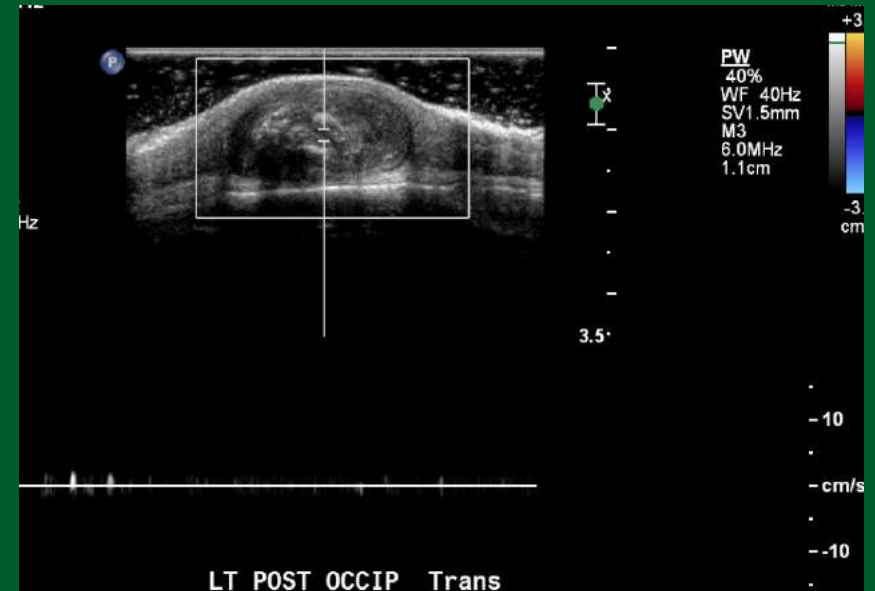
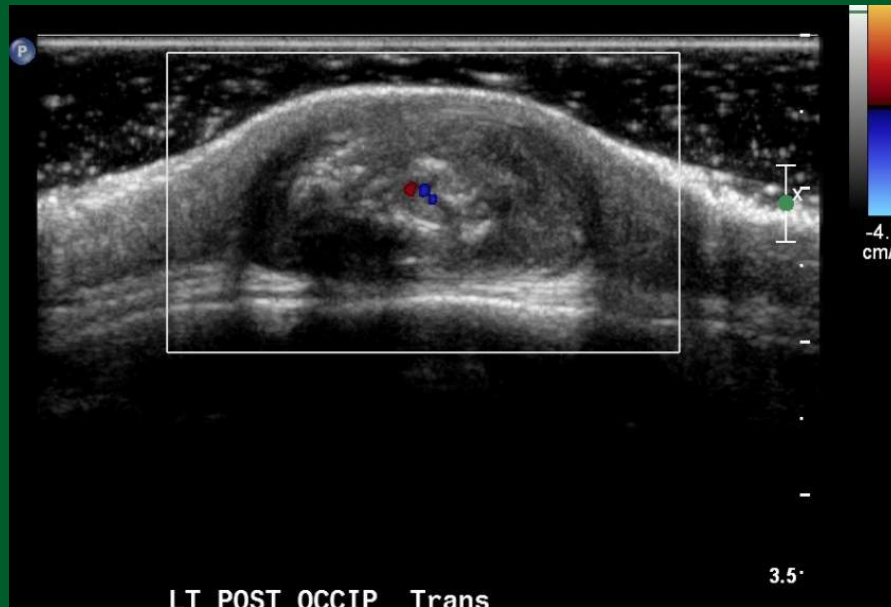
Epidermal Inclusion Cyst-Scalp



Epidermal Inclusion Cyst

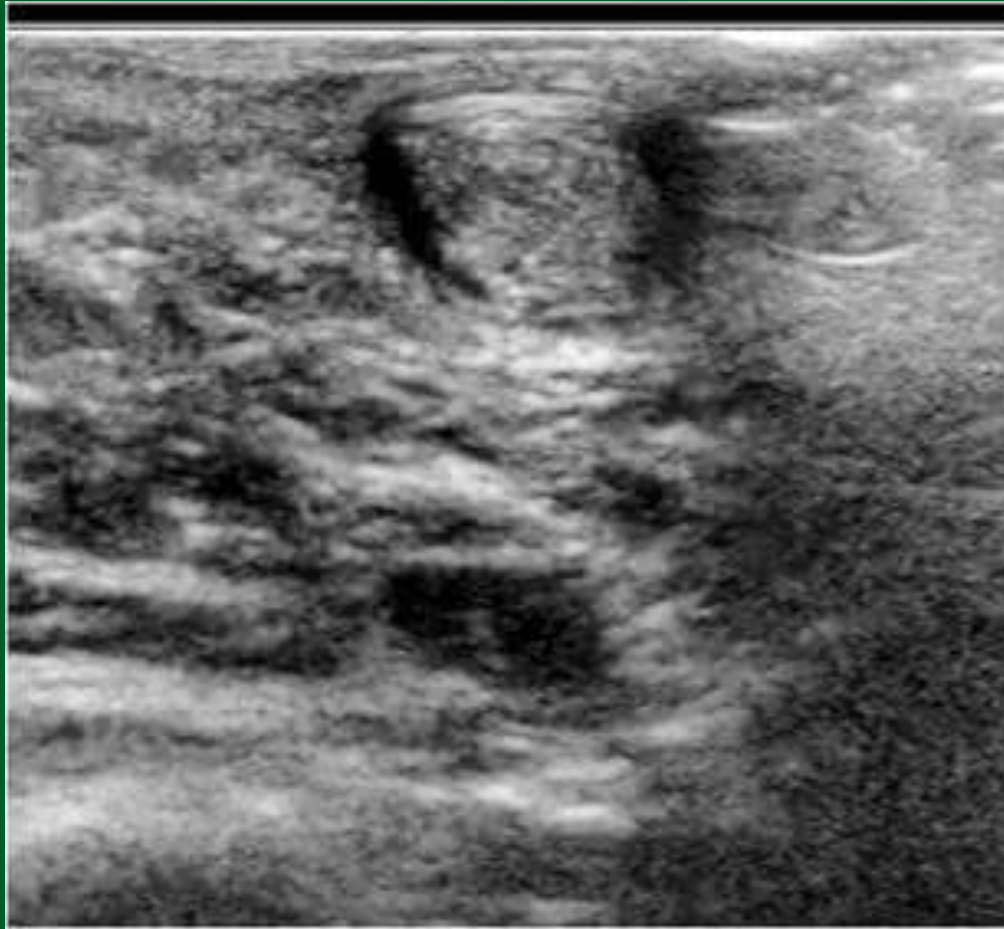


Epidermal Inclusion Cyst



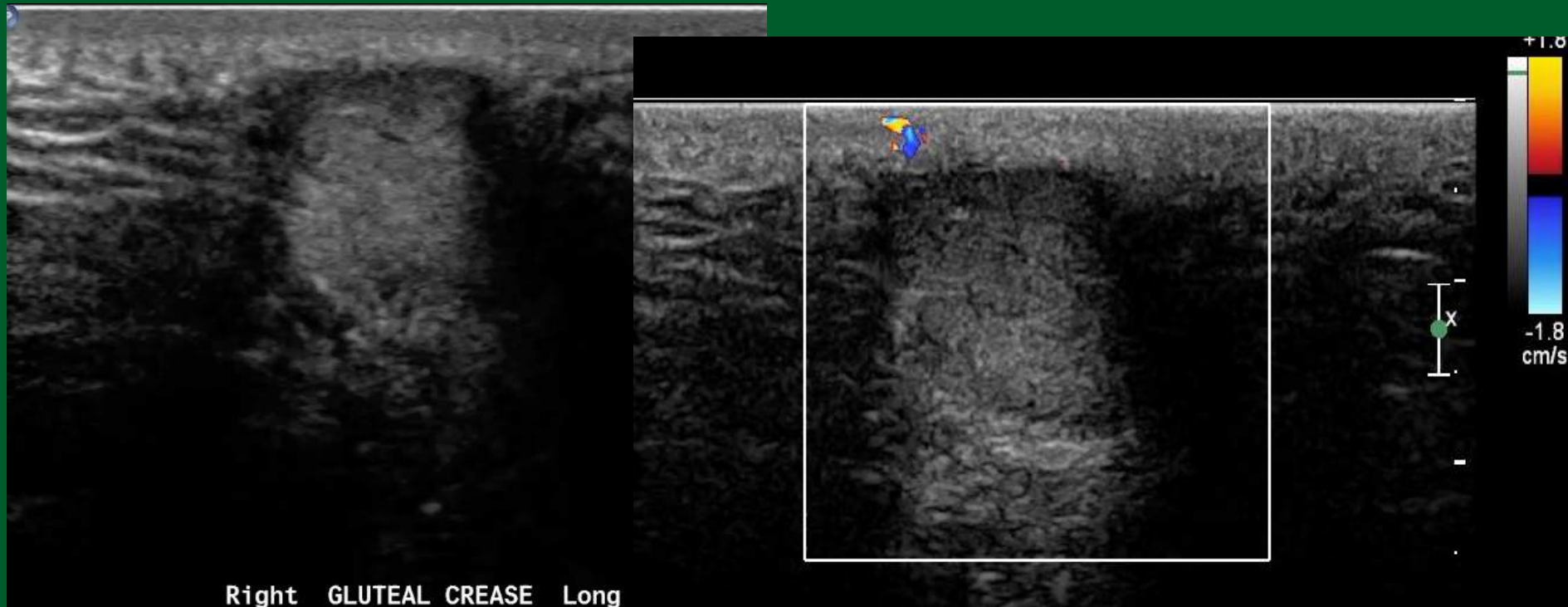
If in doubt, always exclude color Doppler twinkle artifact with spectral Doppler—if it is artifactual, only see noise

Epidermal Inclusion Cyst



Shah and Callahan, Pediatric Radiology 2013;
43:S23-40

Gluteal Crease Mass in Man

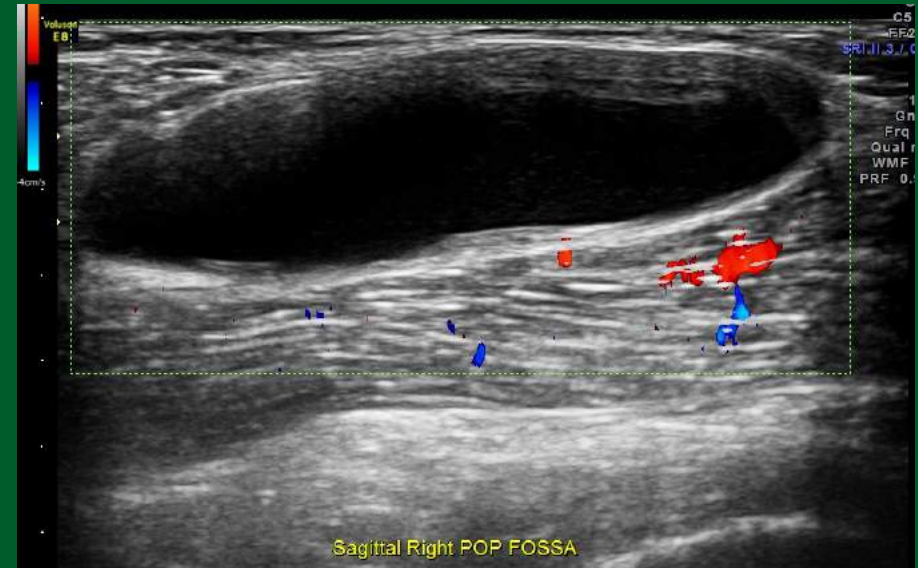
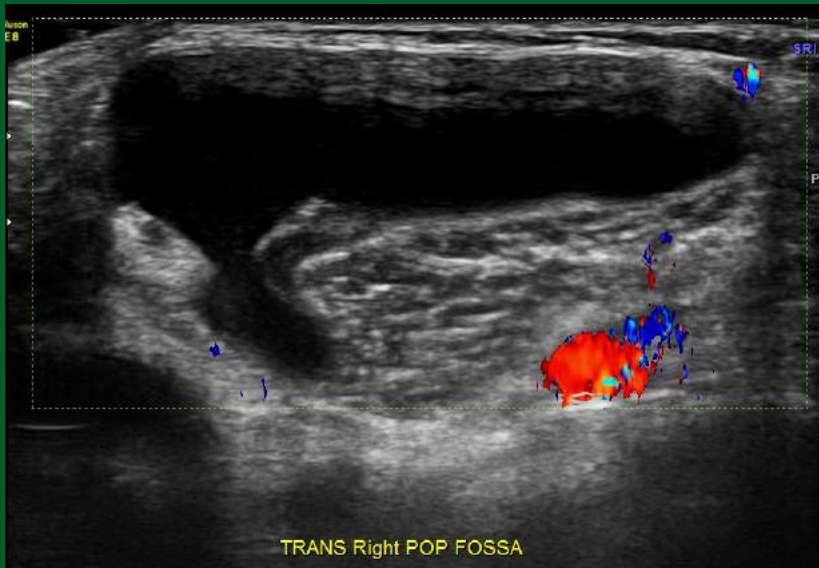


Pilonidal Cyst

Baker's or Popliteal Cyst

- 5 % of palpable masses
- Fluid in bursa behind knee
 - Postero-medial to the joint
 - Usually anechoic fluid, may contain debris or septa
 - Usually reflects knee joint pathology
 - May see septa in R.A., inflammatory processes

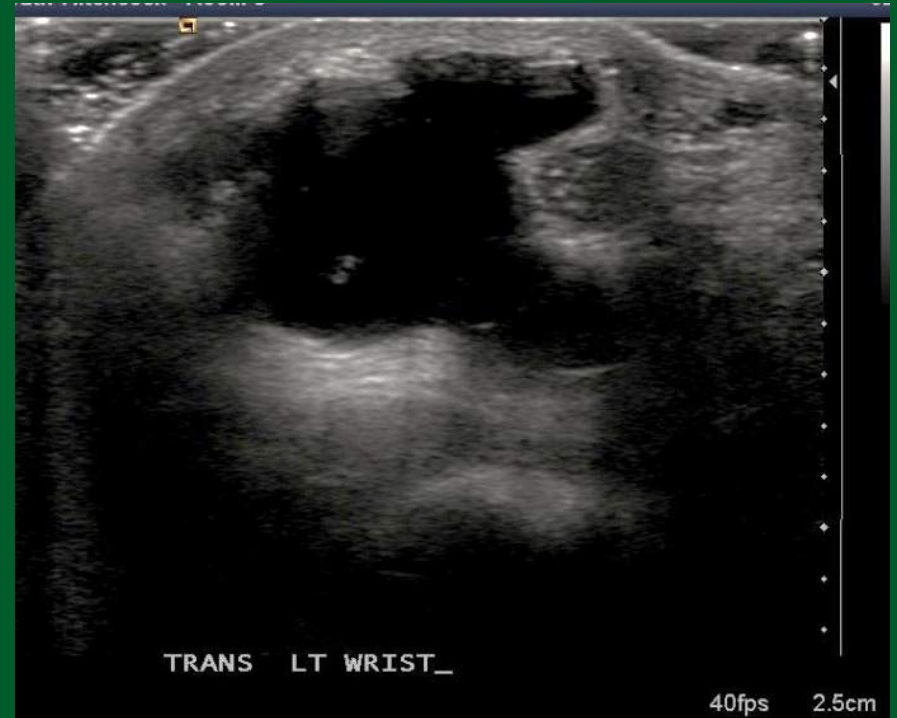
Popliteal (Baker's) Cyst



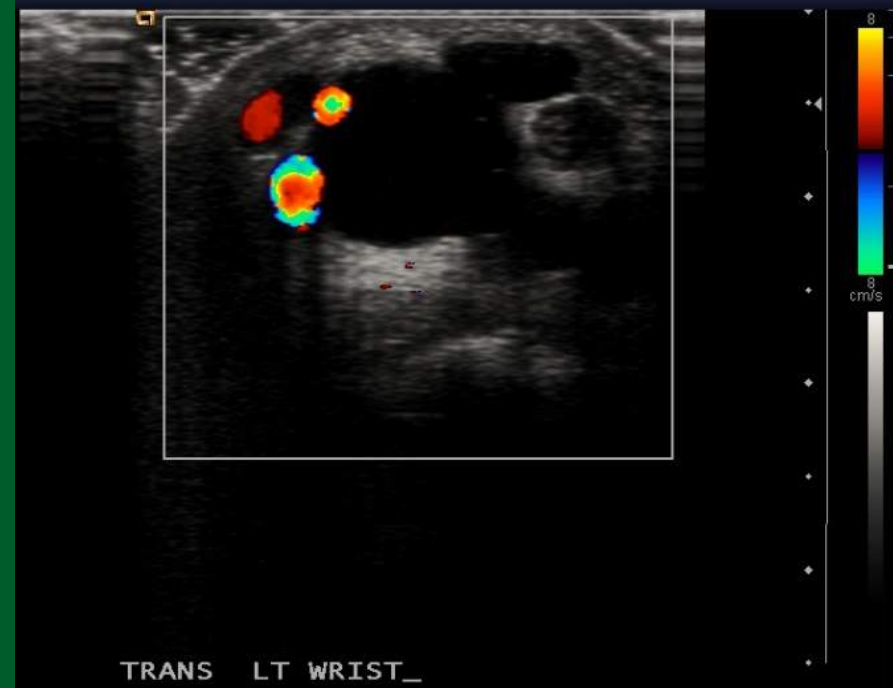
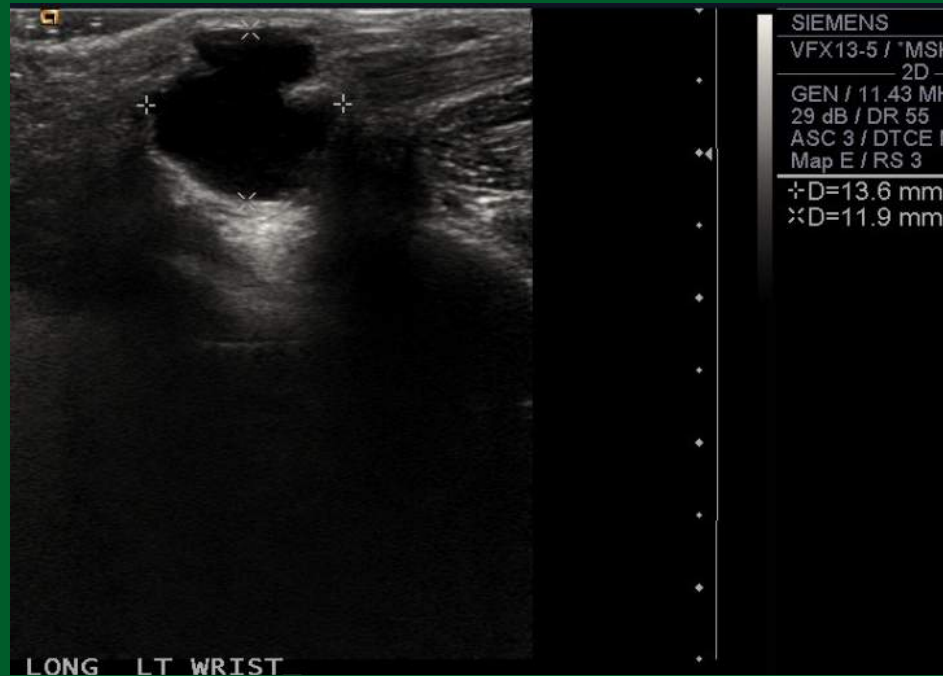
Ganglion Cyst

- Hand and wrist most common--near articular joints
- Pain and/or palpable abnl. -*often feel hard*
- 10-40 years of age
- 2nd most common soft tissue lesion after lipoma
- U/S appearance
 - Anechoic or mildly complex cystic
 - Generally round or oval
 - Often, lobulated or septated
 - No blood flow
 - Connection to tendon sheath or joint capsule

Ganglion Cyst



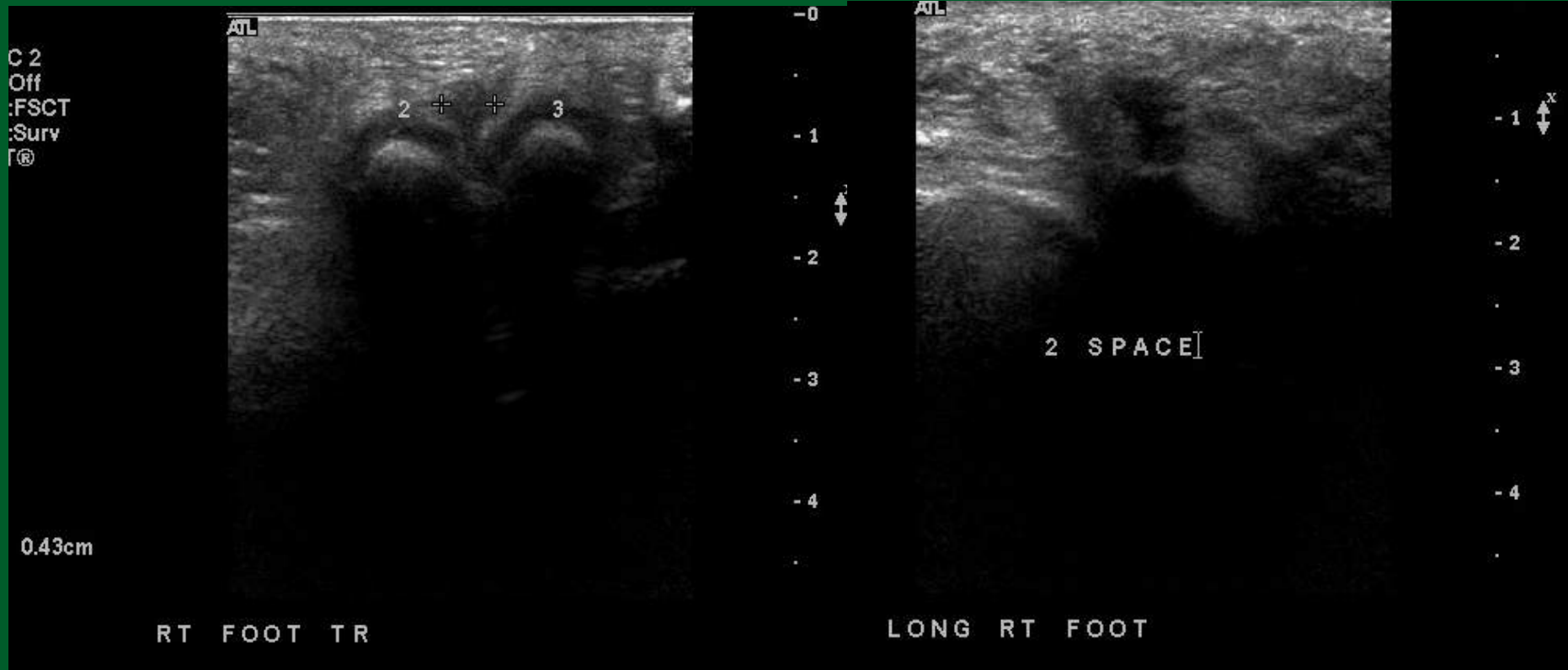
Wrist ganglion



Morton's "Neuroma"-perineural fibrosis

- 2nd-3rd web space of foot -most common site
- Bilateral in 10%
- Multiple in up to 30% of pts
- Middle aged
- Female
- US appearance
 - Hypoechoic
 - Well-defined
 - Ovoid, ~ 5-7 mm. diameter

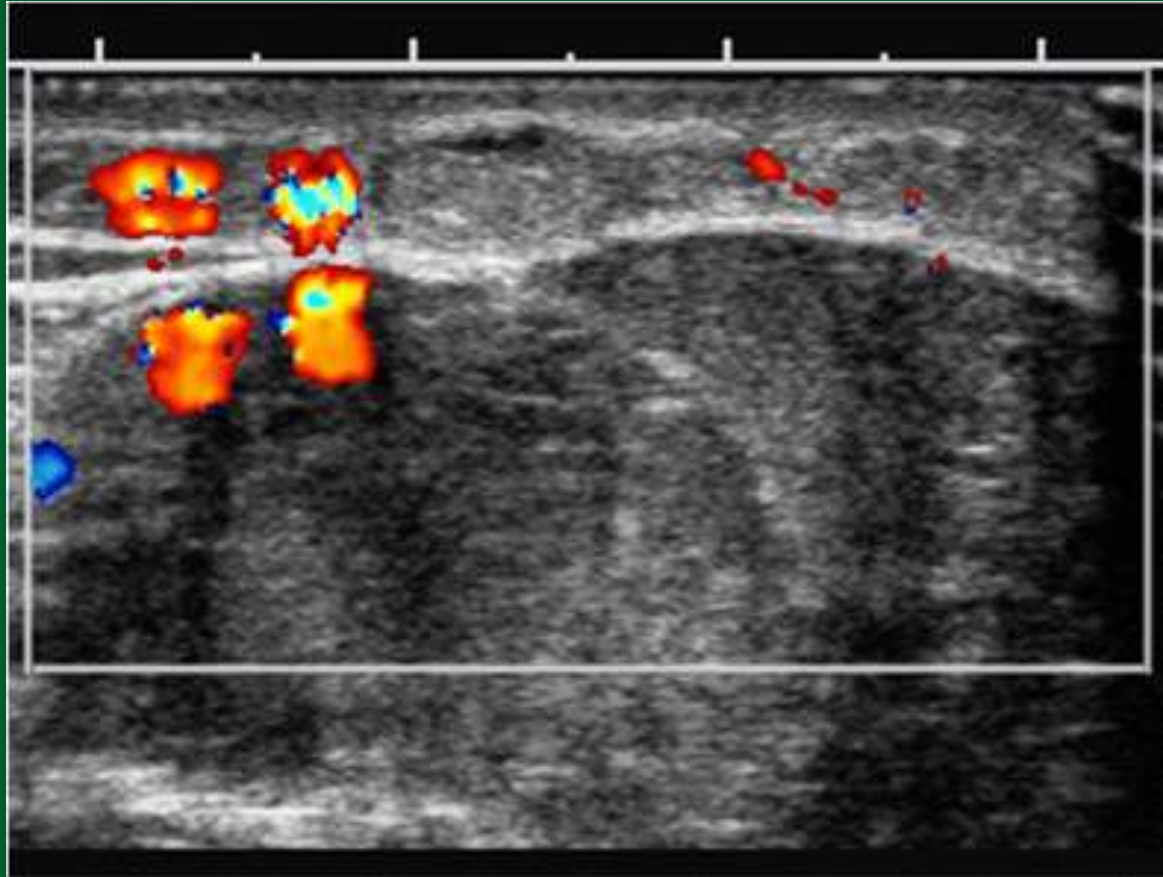
Morton's "Neuroma" - "pops" out



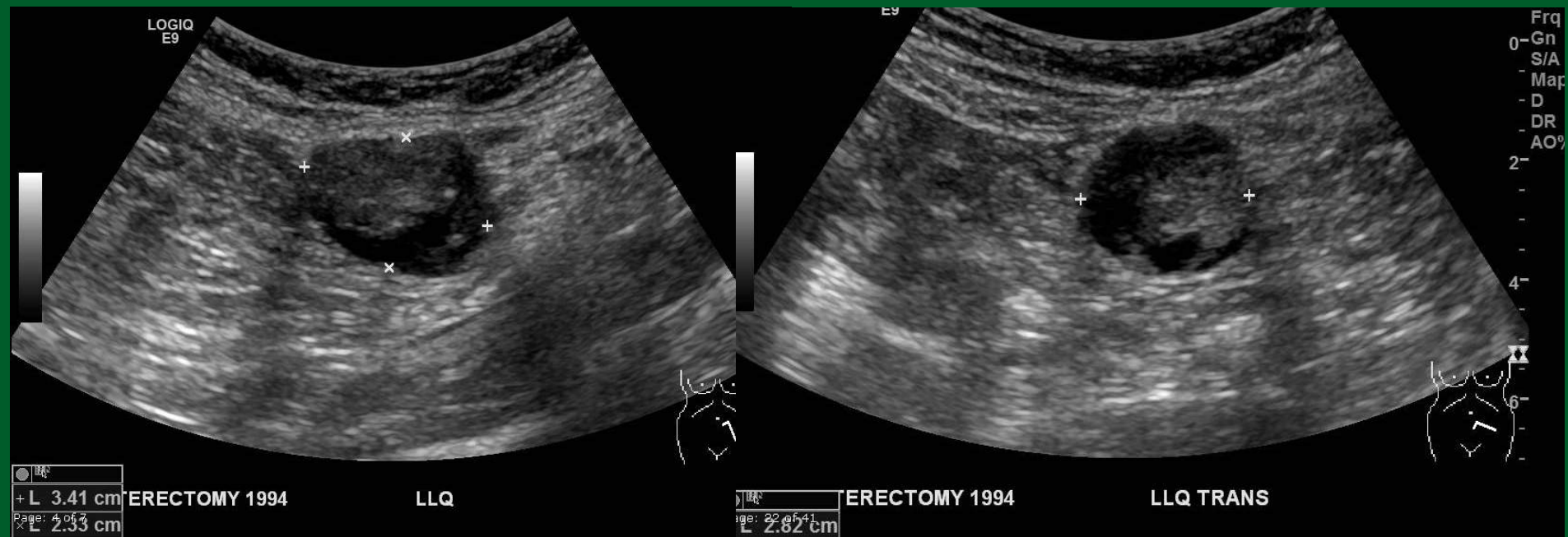
Fat (Dystrophic) Necrosis

- Etiology
 - S/p blunt trauma (but pt may not recall, often minor)
 - Sickle cell dz, vasculitis
 - Autoimmune disease (SLE, Wegener's)
 - Hypothermia
 - Medication injection
- PE-Firm, non-tender
- US
 - Hyperechoic, in subcutaneous tissues
 - Indistinct, hypoechoic margins
 - Little vascularity

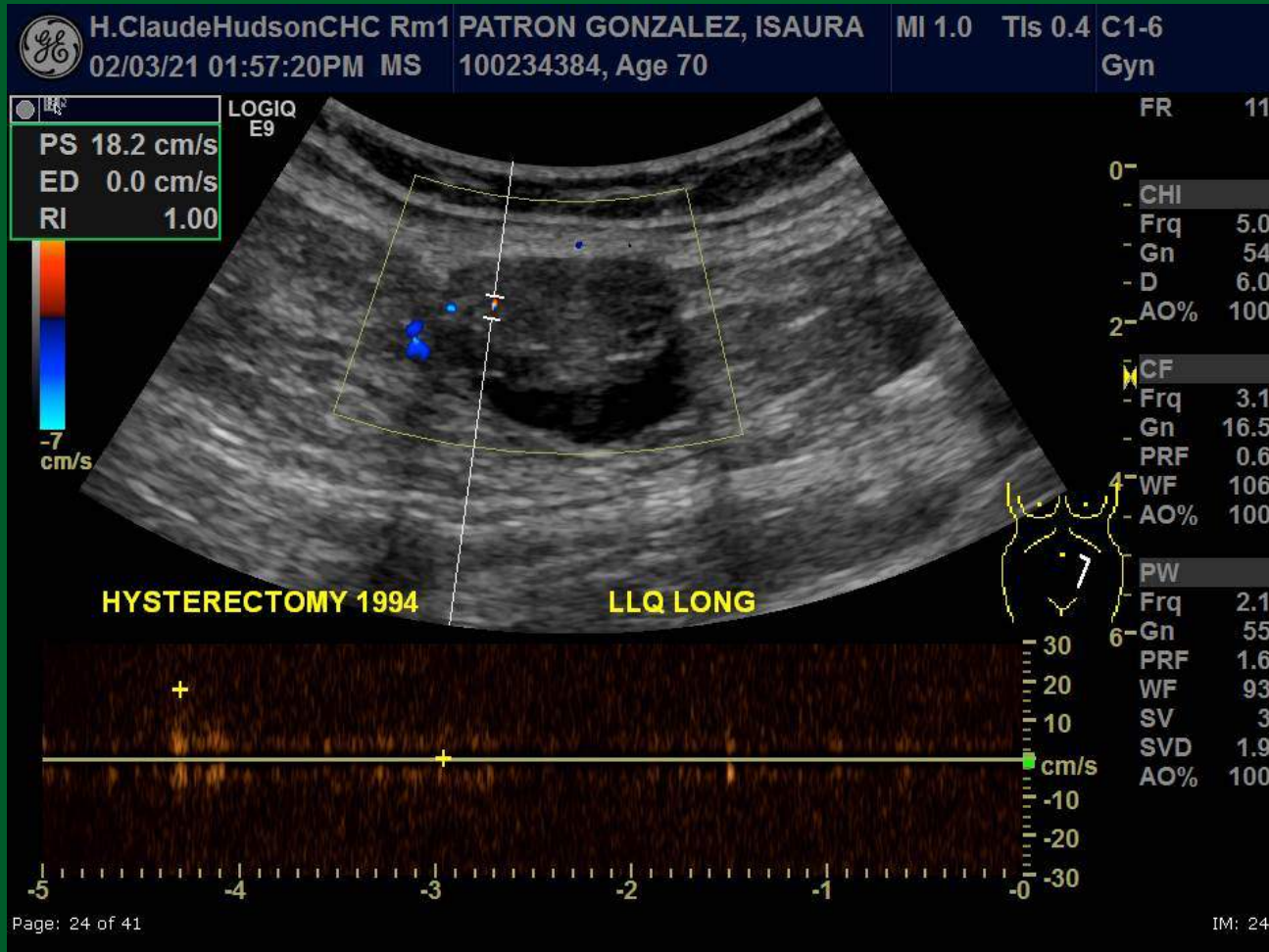
Fat necrosis



Fat necrosis in 70 yo female



Fat Necrosis



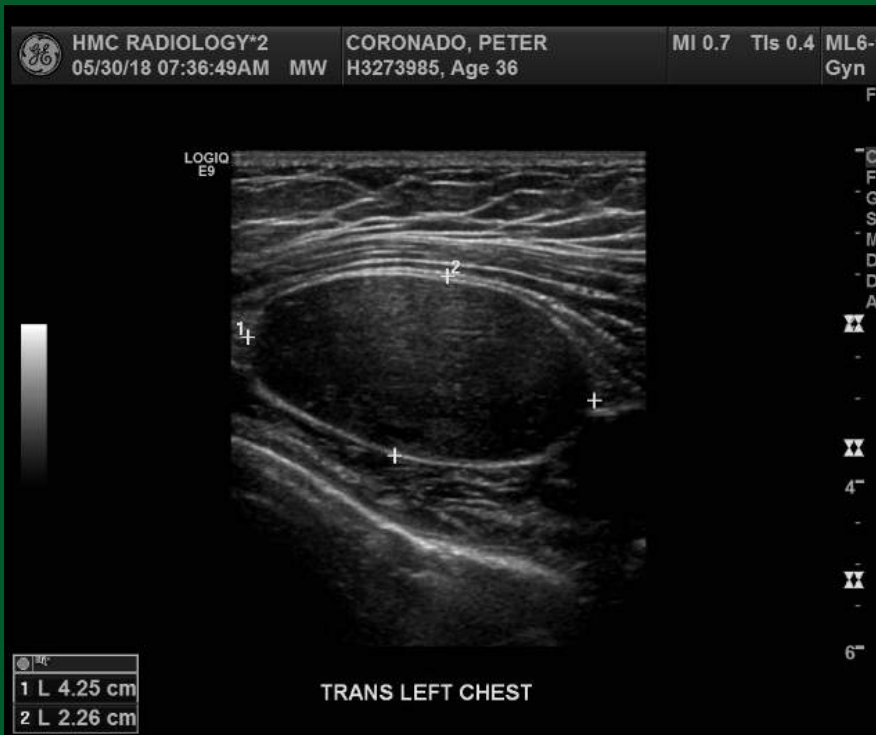
Fat necrosis s/p hysterectomy



Neurofibroma/Schwannoma

- Benign lesion of nerve /nerve sheath (Schwann cells)
- Age ~ 20-50
- Most in deep locations
- Rarely superficial-dermal
- Tenderness, numbness frequent symptoms
- Smooth, well-defined
- Optimally-see nerve at either end of lesion

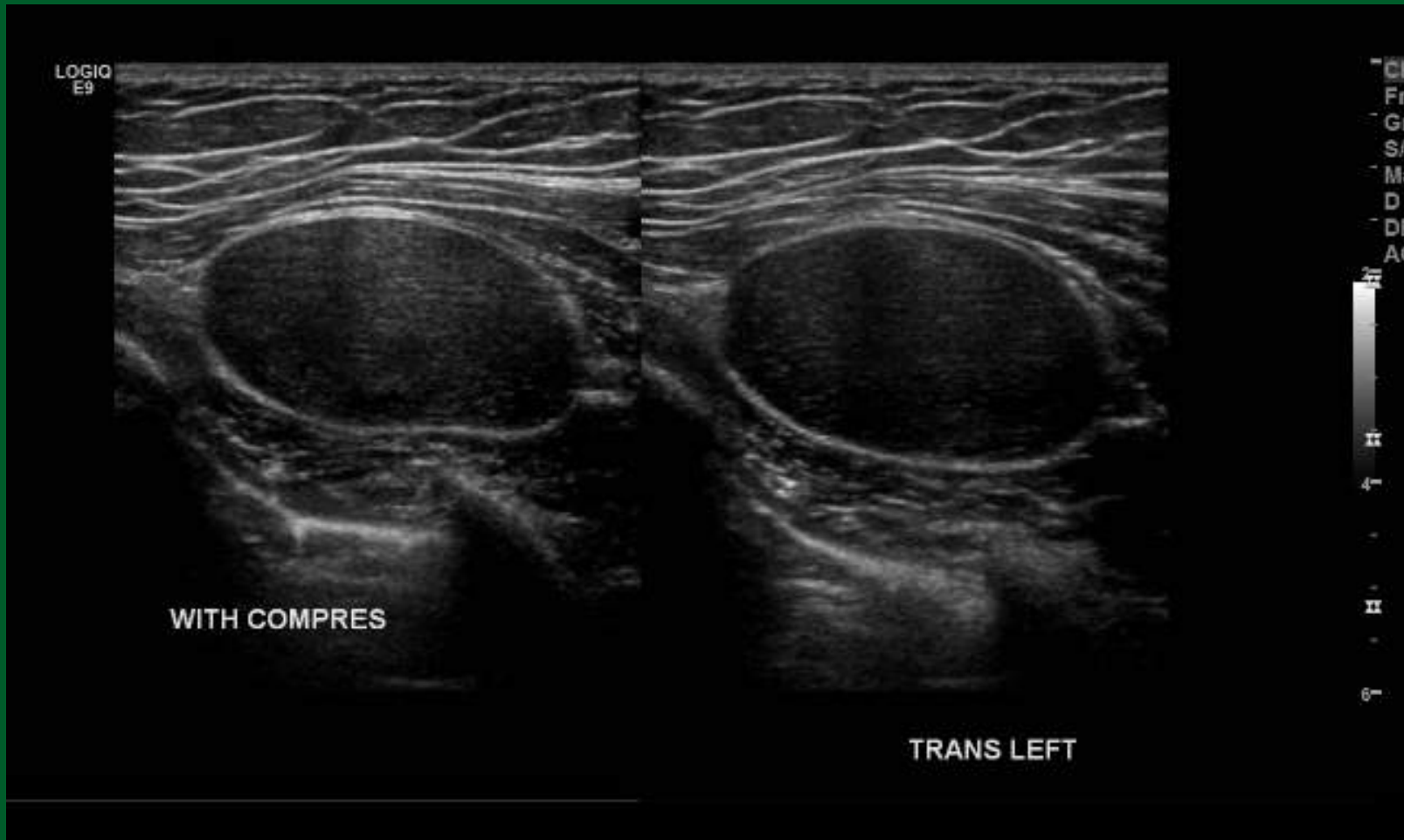
36 yo male with slow growing lump



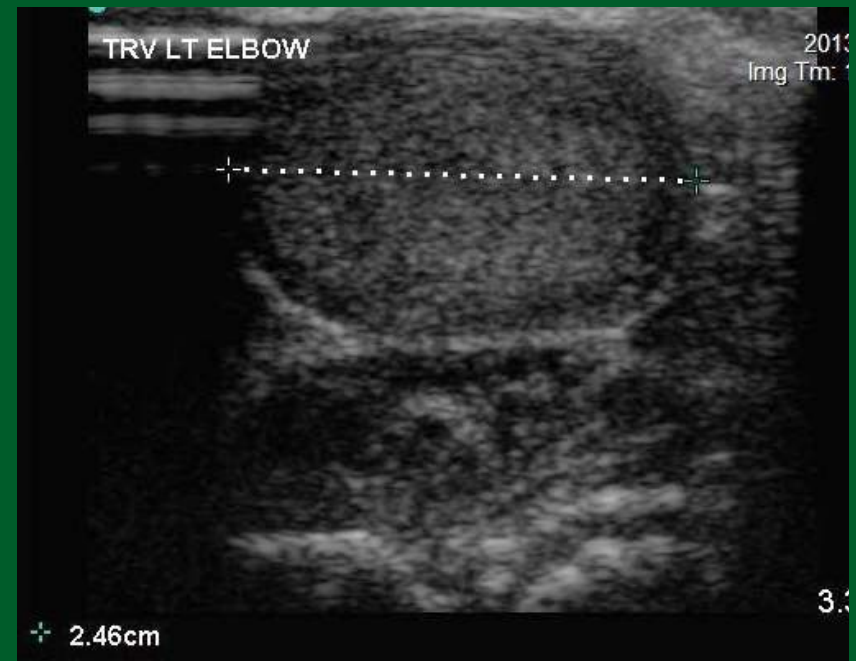
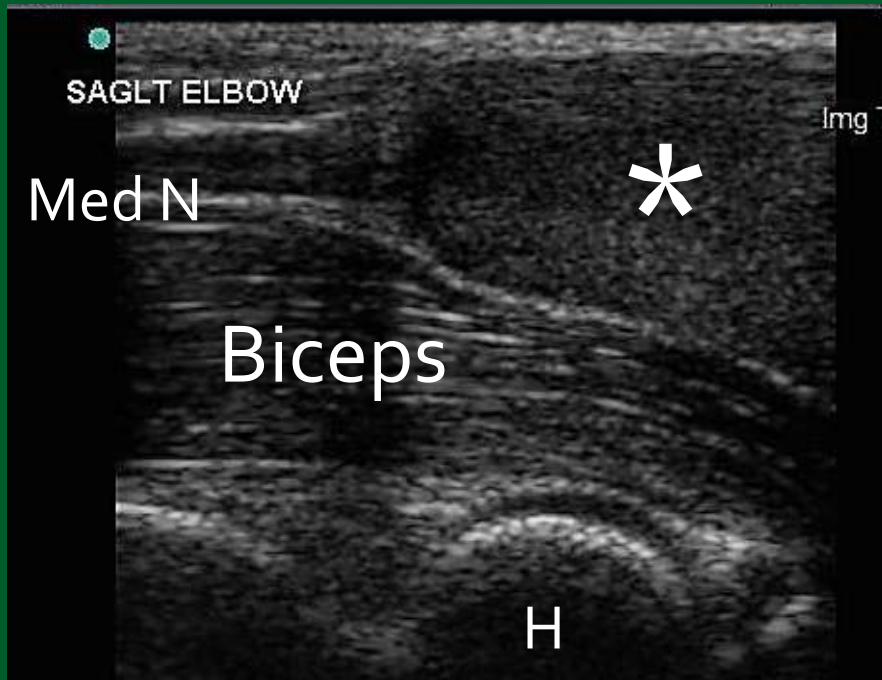
Vascularity??



Neurofibroma with degen. changes



Neurofibroma- Mercy Ships (West Africa) screening



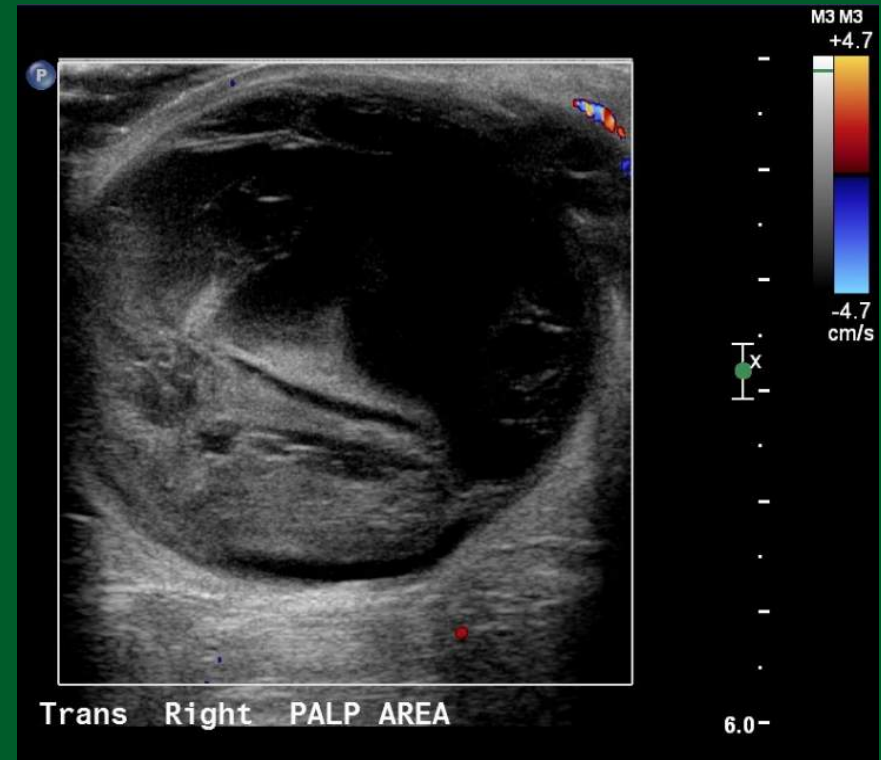
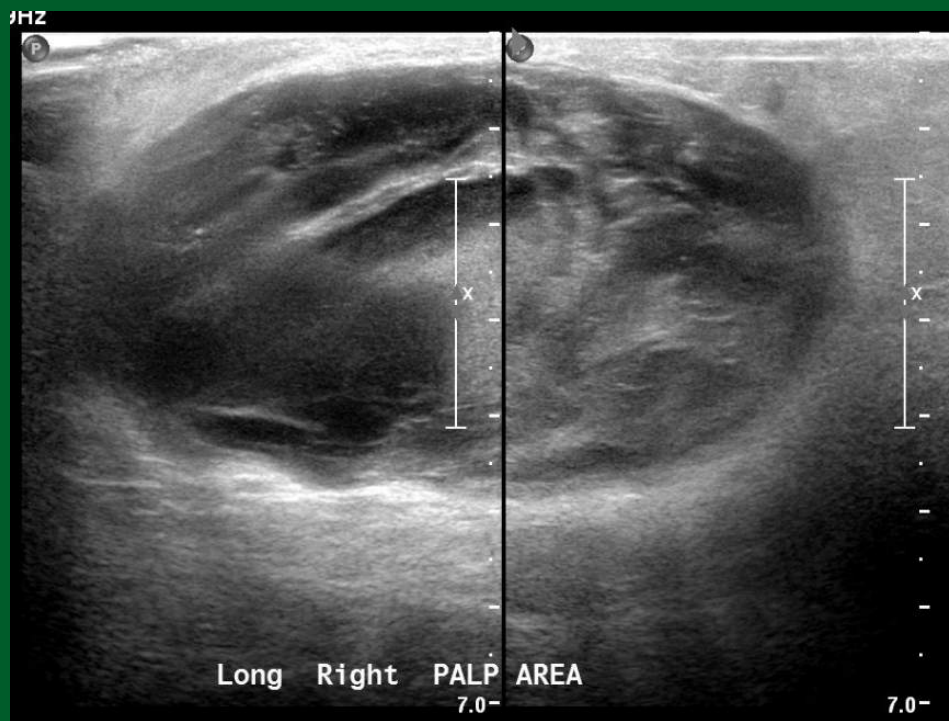
13 yo male, Congo-Brazzaville, 2013

88 yo s/p melanoma resection

Large groin hematoma-
confirmed by MRI, no tumor



Hematoma (s/p melanoma resection) – color Doppler absence helpful



81 yo female with thigh pain, lump

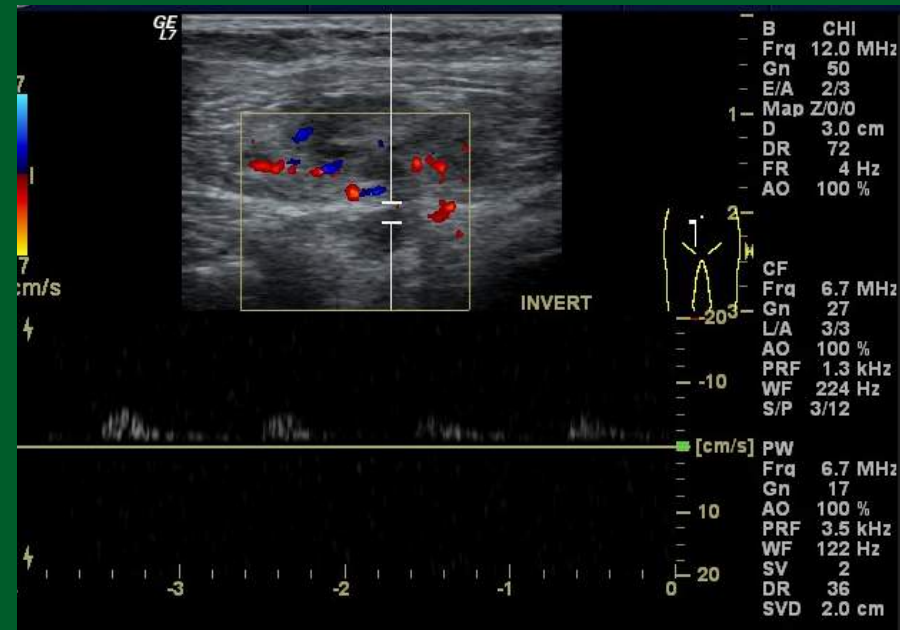
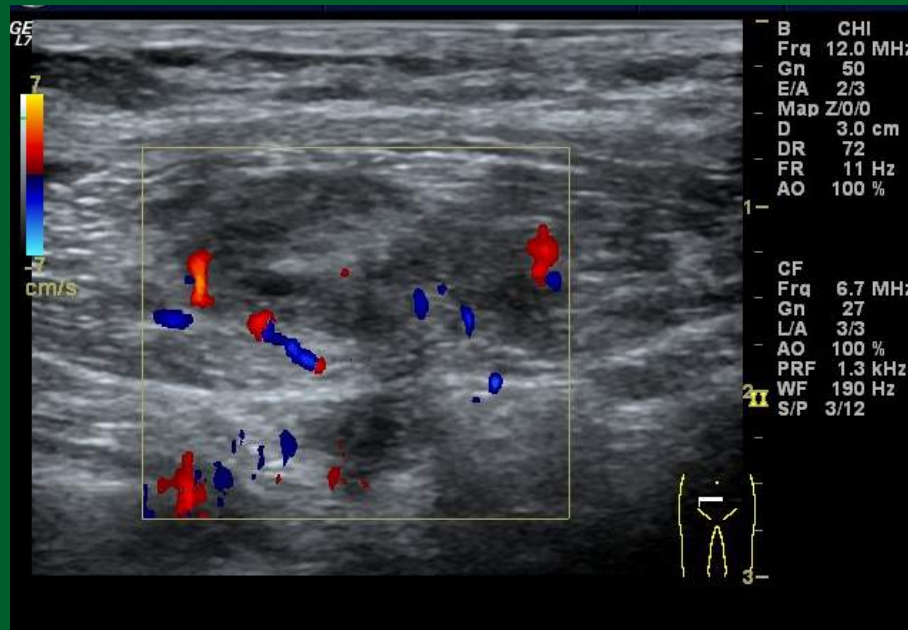


Probable hematoma, no therapy given

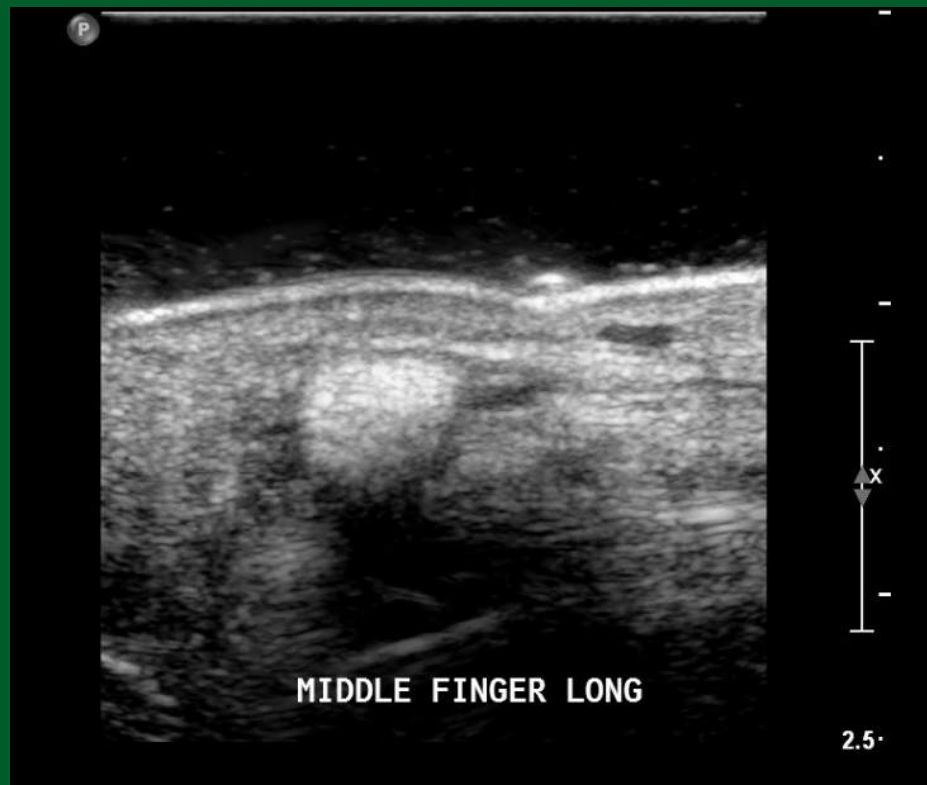
Abdominal wall mass in young woman, tender, near umbilicus



Abdominal wall mass at surgery: Endometrioma



62 yo cardiologist with painless lump 3rd DIP jt



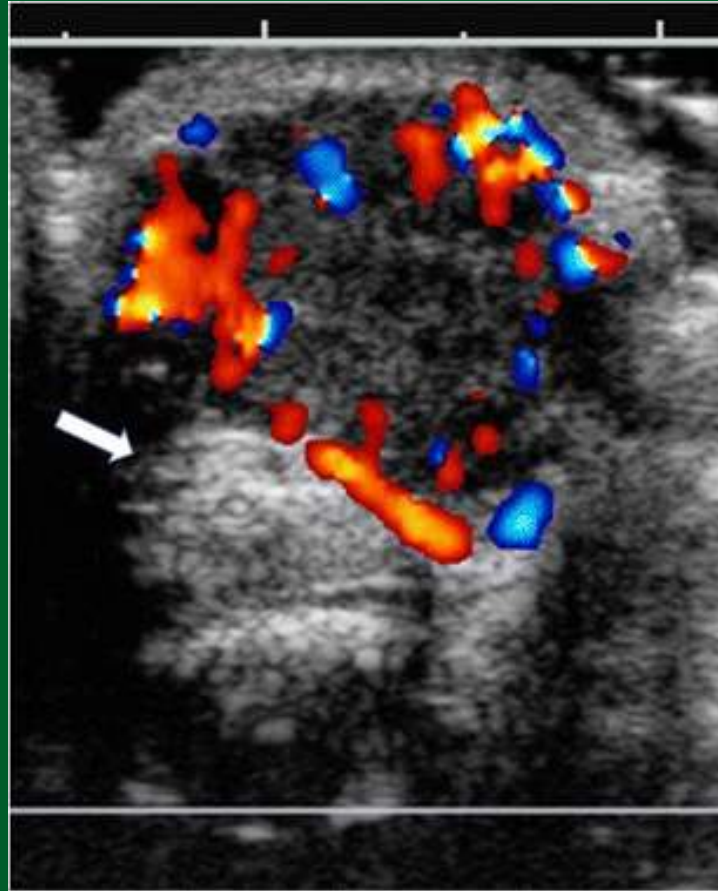
Lesson-use plain films – bony or Ca^{++}



Benign vs. Malignant ST Masses

- Benign much more statistically common (~ 50:1)
- No single US predictor very accurate
- Margins & Vascularity “important”
- Clinical hx important
- PE-not so important (cysts or LN can feel fixed and solid & malignancy feel somewhat soft, mobile!)

Giant Cell Tumor of Tendon Sheath



Looks malignant, path: benign!

Shah and Callahan, Pediatric Radiology 2013;

43:S23-40

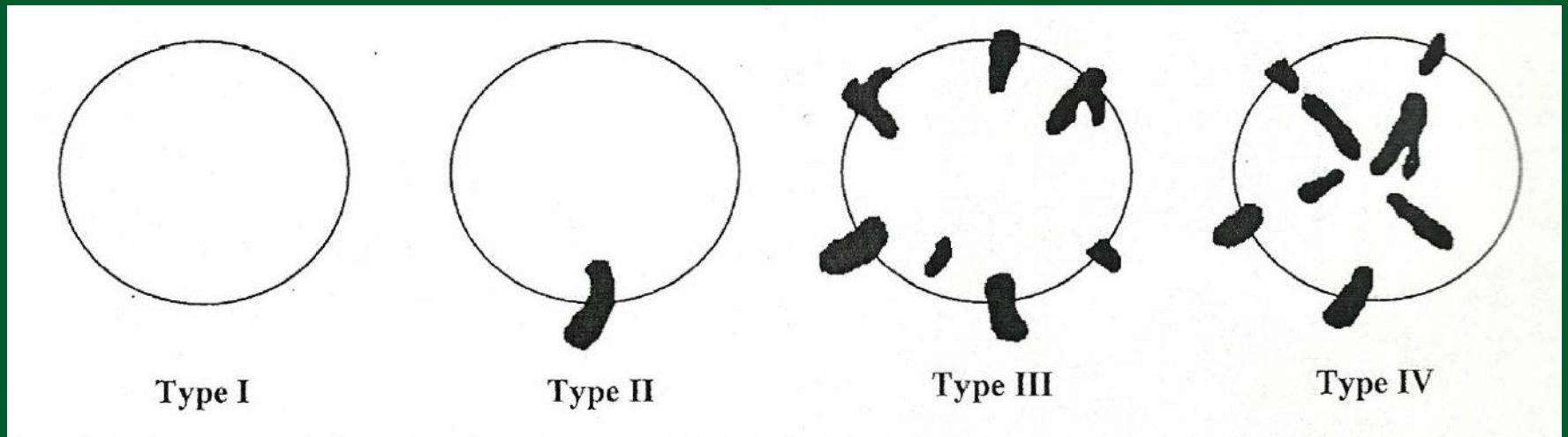
ST tumors: Malignant trending...

- Size > 5 cm., or intramuscular location
- Involvement of the deep fascial layers
- Lesion heterogeneity
- Poorly defined margins
- Increased vascularity +/-

Supporting Malignant Lesions:

- rapid growth
- clinical predisposition
- syndromes
- family history

Color Doppler grading scheme



Journal of Ultrasound in
Medicine, 1999, 18: 89-93

Color Doppler Discrimination: Benign vs. Malignant

N = 71 lesions
(39 benign, 32 malignant)

Type	Benign (total 100 %)	Malignant (total 100 %)
I	86	9
II	14	0
III	0	50
IV	0	41

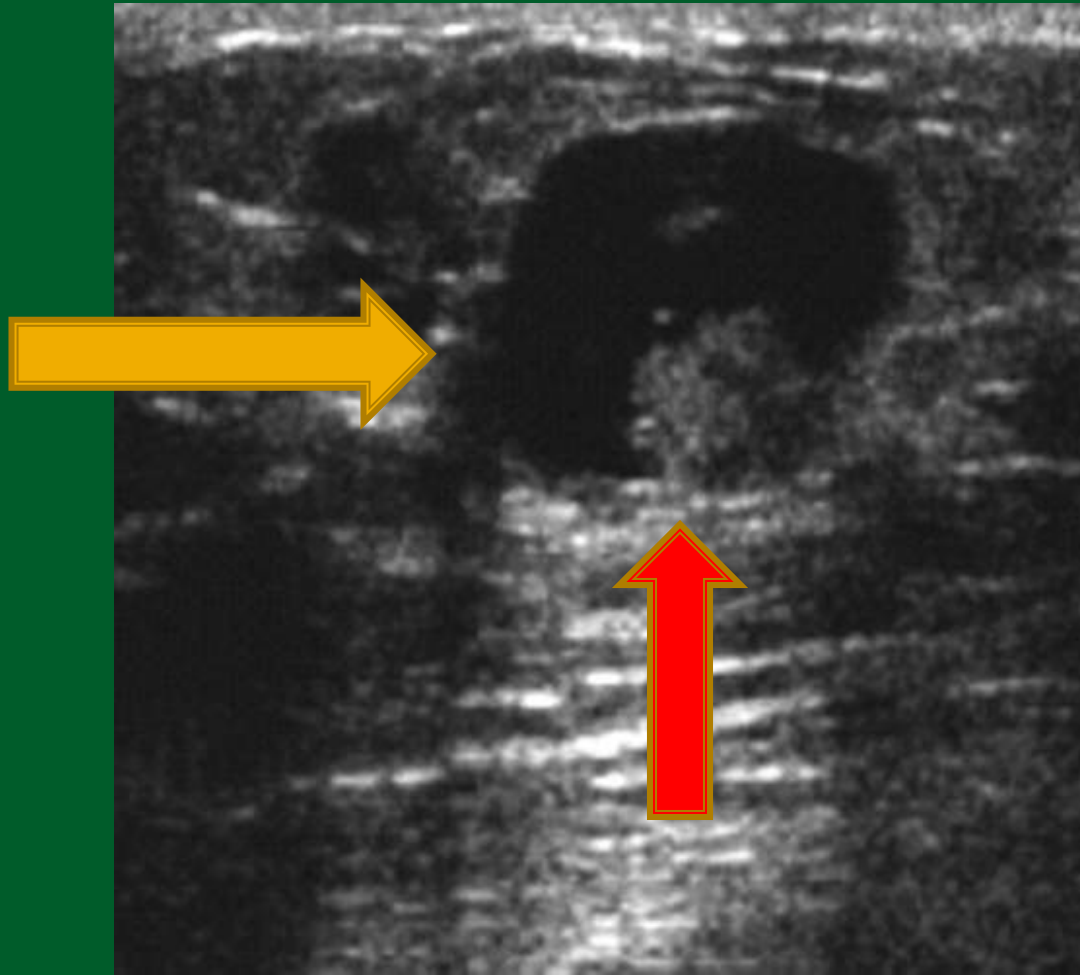
Malignant Soft tissue tumors

- Incidence - 1: 100 palpable soft tissue tumors in adults
- Uncommon in pediatrics

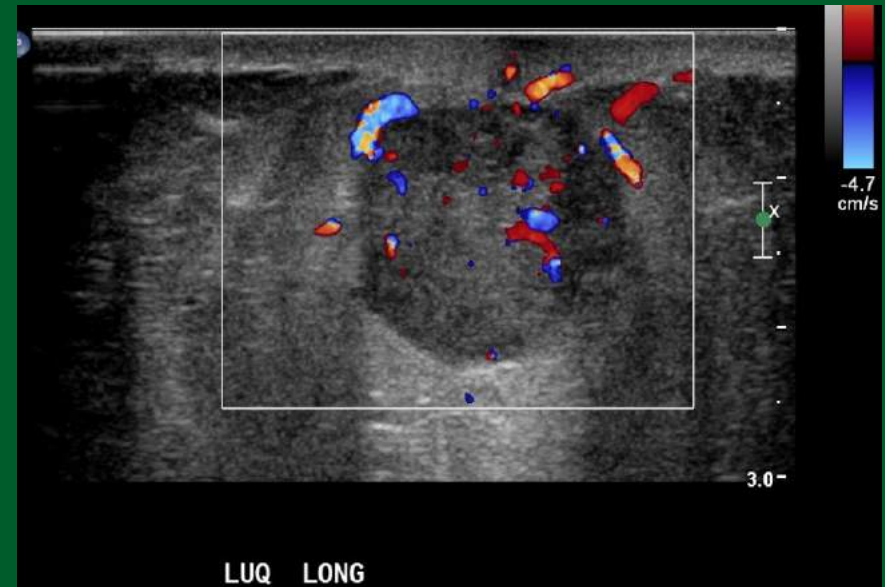
Malignant lymph node

- Height : Length > 0.5
- Loss of hilar fat sign
- Cortical thickening
- Hypervascularity

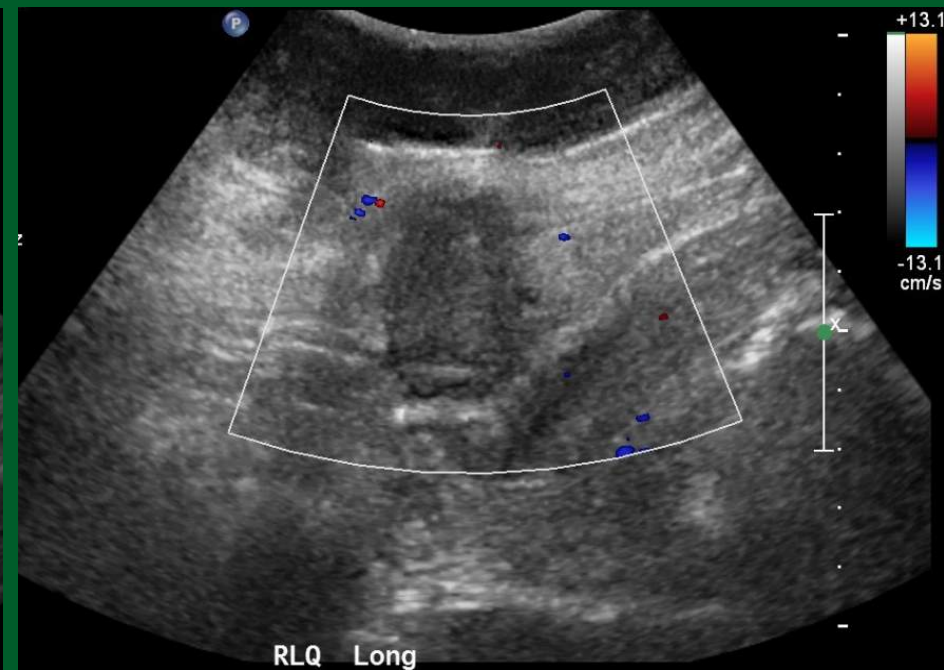
Metastases to axillary lymph node- male breast cancer



Subcutaneous carcinosarcoma metastasis upper abdomen



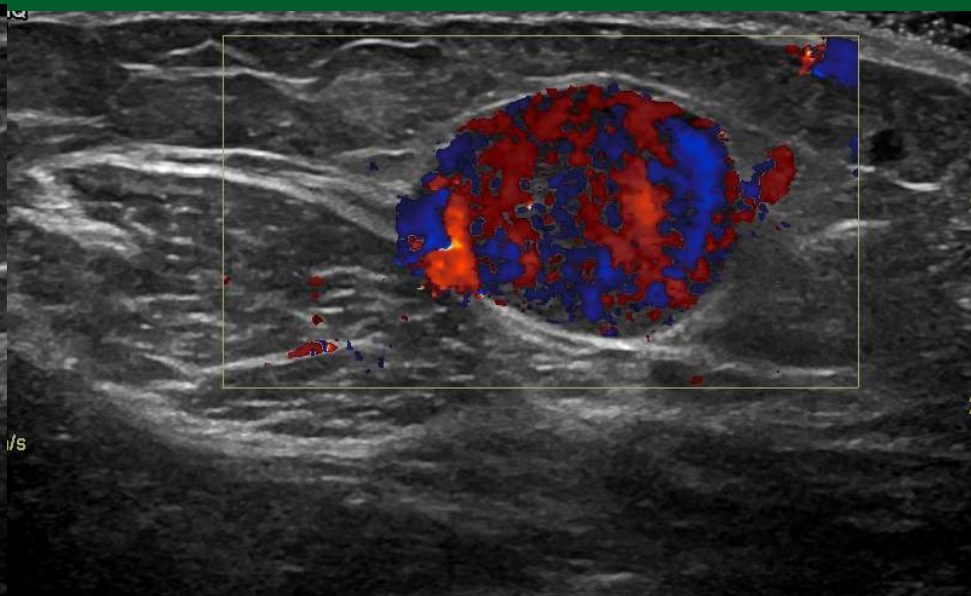
Carcinosarcoma pt-rectus hematoma—probably benign?



Sarcoma

- 1 percent of all adult malignancies and 12 percent of pediatric cancers
- 80 percent of sarcomas originate from soft tissue, and the rest from bone
- ~12,000 new cases of soft tissue sarcoma diagnosed each year in the United States, with 4,740 deaths
- Thigh, buttock, groin- ~ 50% cases

Sarcoma vs. dermatofibroma vs. desmoid tumor-57 yo man

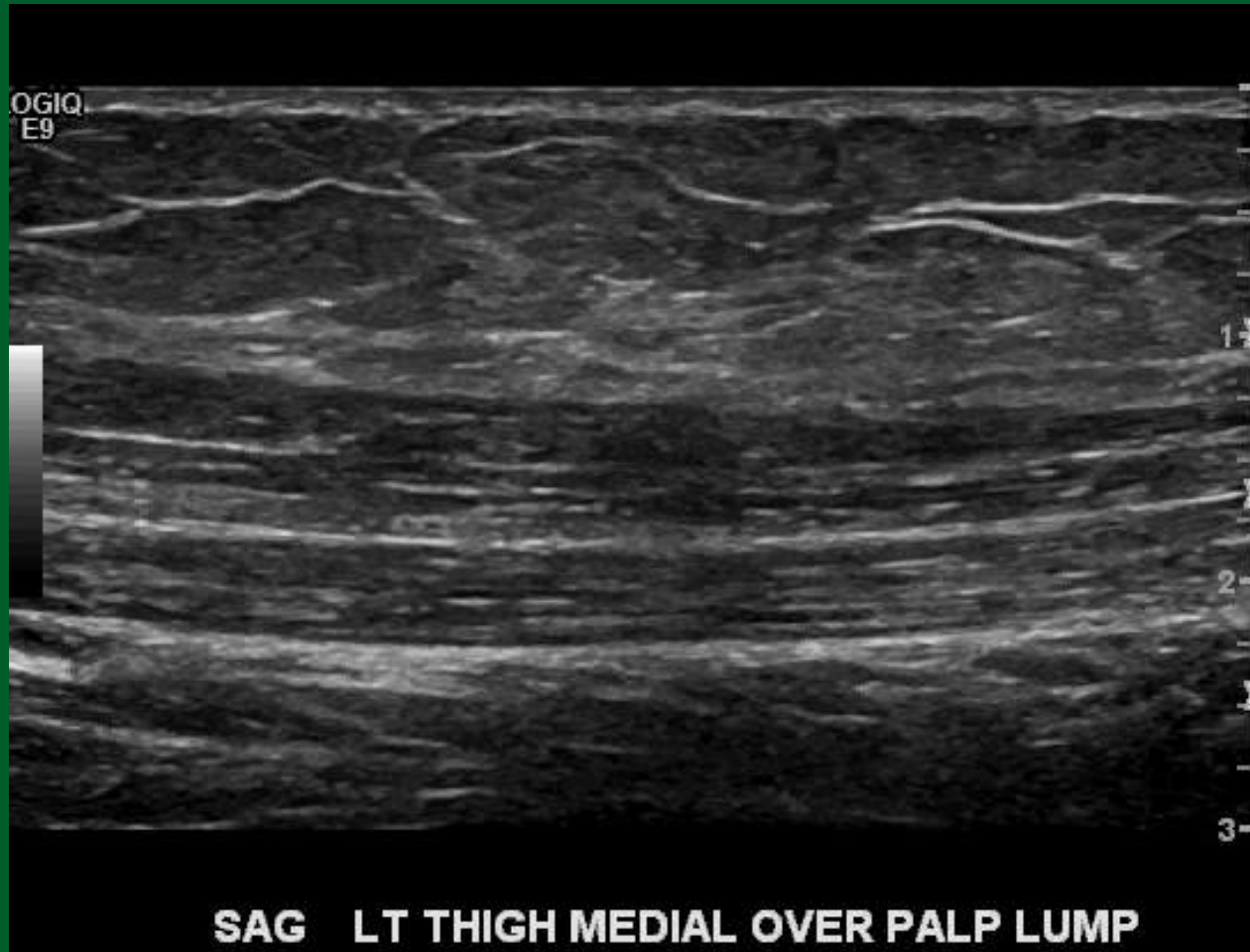


L 1.35 cm
L 1.19 cm

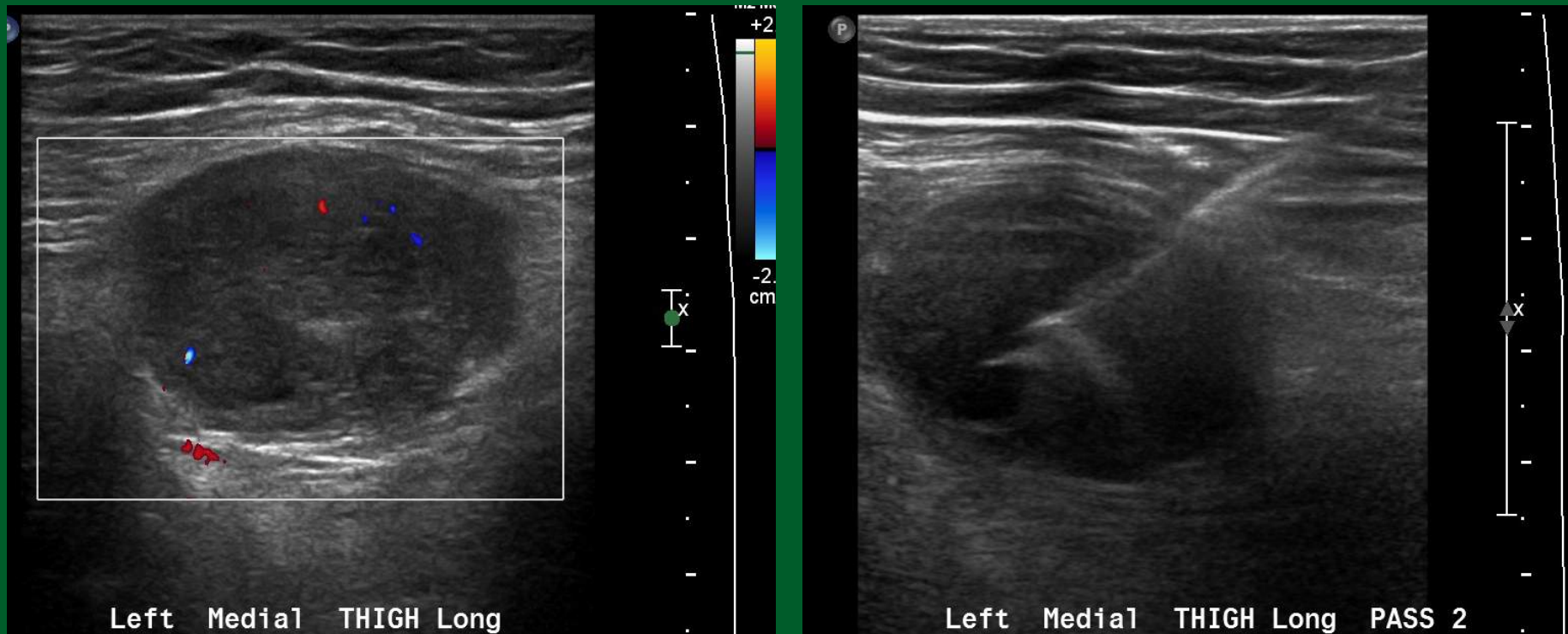
SAG LT THIGH MEDIAL OVER PALP LUMP

TRANS LT THIGH MEDIAL OVER PALP LUMP

Sarcoma or Desmoid tumor?



72 m-myxoid spindle cell tumor

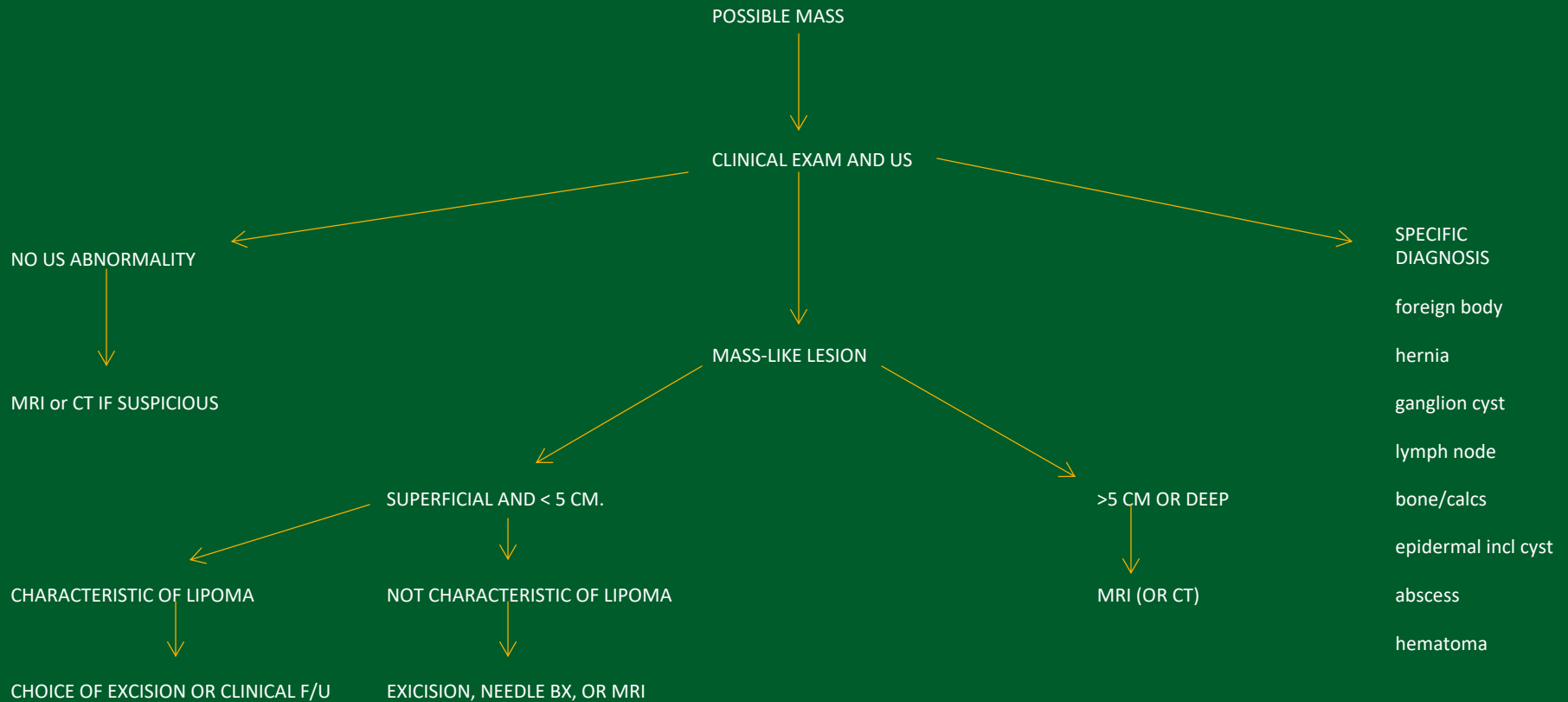


Surgery- intramuscular myxoma

Summary

- Superficial soft tissue bumps are common, malignancy rare (1-2%)
- Diff Dx based upon age, clinical hx, US appearance-get good history
- Know “leave-alone” lesions-fibromatosis coli, lipomas, cysts, hematomas
- Color Doppler very helpful- ~25% of lipomas may show Color Doppler flow
- Size > 5 cm. or deep location suggests malignancy (needs MRI or CT)
- If heavy Ca++ or bone, get plain films

Decision Tree for Lumps/ Bumps



The End-Questions?

Thank you for your
attention....