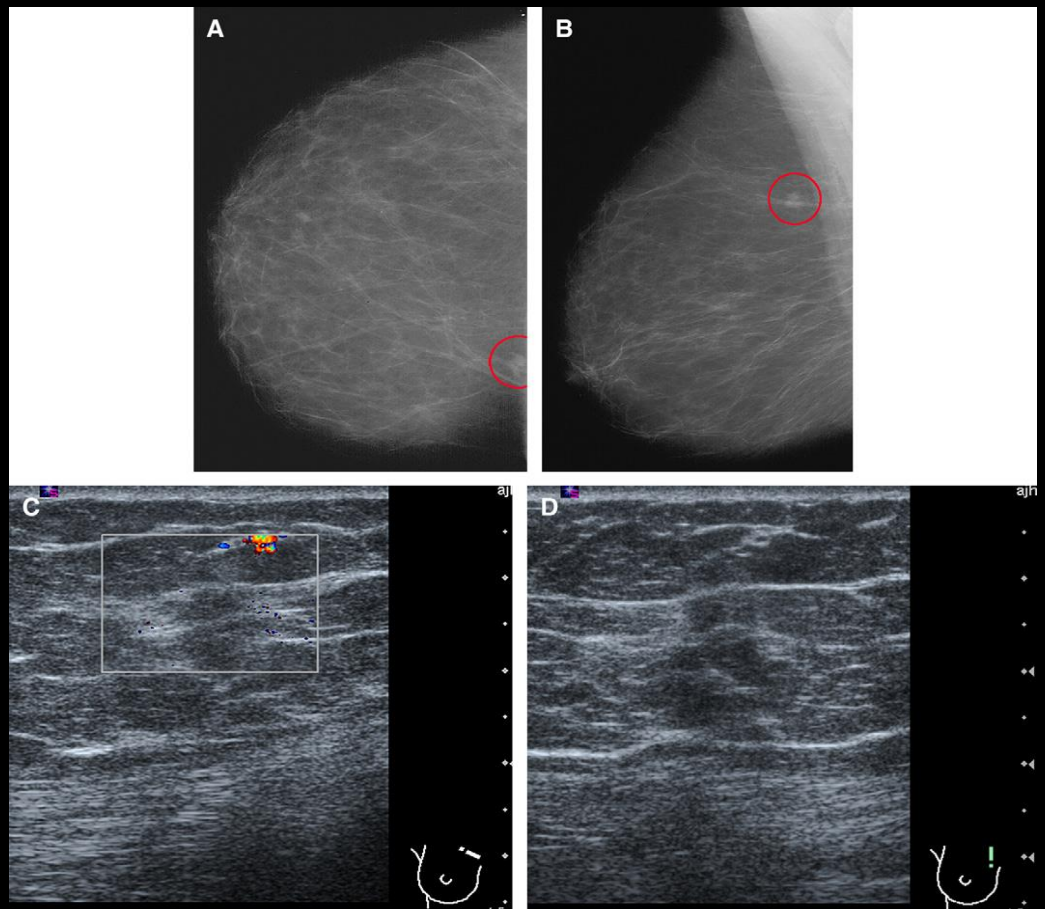
INDETERMINATE AND ECHOGENIC LESIONS ON BREAST ULTRASOUND

MISSED/MISINTERPRETED LESIONS IN BREAST ULTRASOUND

- Efficiency of ultrasound in imaging and intervention
- Depends on many variables
- Nature of lesion
- Location
- Correlation with other imaging modalities
- Operator skill assuming ideal technical parameters

PROBLEMS ENCOUNTERED

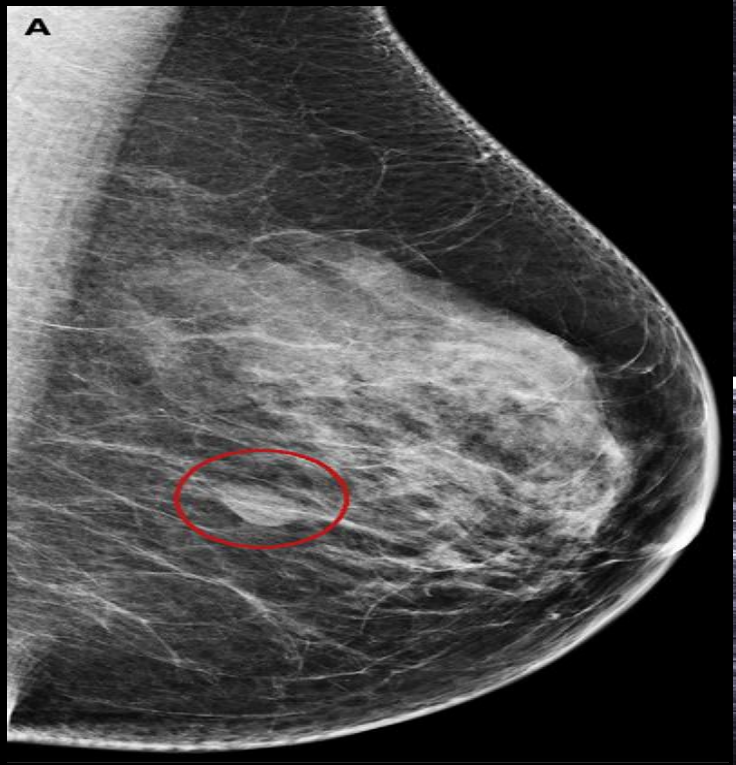
- Very small lesions <5mm difficult to find and characterise . Isoechoic only see cf mammo.

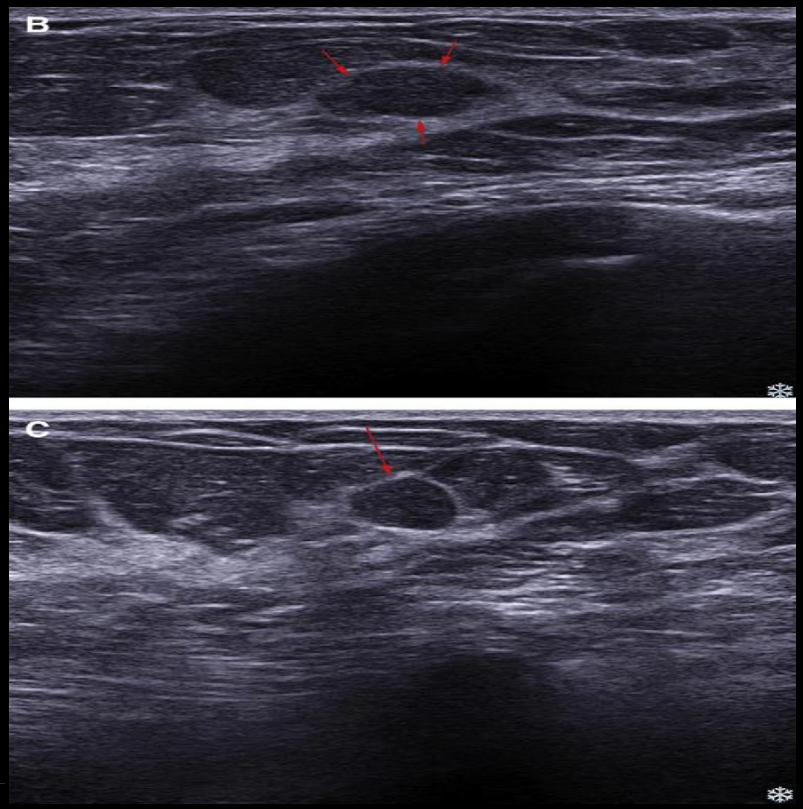


- Be aware of small lesions which have developed since previous mammogram especially if suspicious/spiculated
- Most malignant lesions show high density relative to size on the mammogram.
- Density maybe low if necrosis or mucin formation
- Beware post menopausal female.

Heterogenous echoic lesions in a heterogenous background

- Challenging- look for mass effect
- Deformation of surrounding tissue,
- Feel on movement over lesion
- Discontinous edge
- Optimal compression – Coopers ligaments
- Light compression and single plane scanning
- Subareolar angled scan /stand off gel pad


A


B
C

Evaluate full depth of breast

- NB Large breasts-evaluate full depth
- Most probes high resolution near field imaging +-7 MHZ-
- LOCALISATION -Incorrect localisation between different imaging modalities = missed lesion.
- Identify the quadrant
- Depth of lesion and distance from nipple
- NB mammo patient upright /US=supine

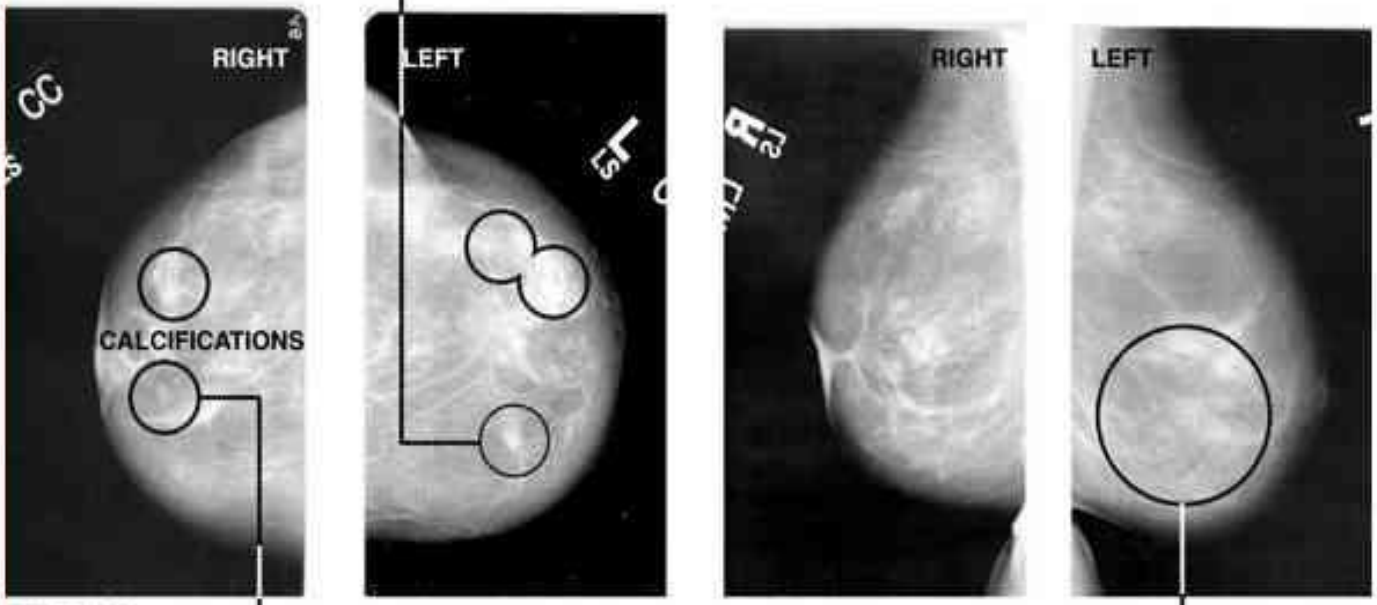
Misinterpretation/ missed cancers

- Dense parenchyma
- Poor positioning /technique
- Perception error –incorrect interpretation of a suspect finding
- Subtle features of malignancy
- Slow growth of a lesion
- Location of a lesion
- Diffuse nature
- Negative findings / malignant lesion with benign features

- Meticulous examination margin - Do not ignore ill-defined or microlobulated margins
- Internal echogenicity
- Do not ignore a developing growing lesion
- Suspicious mammogram

Commonly Missed Breast Cancers

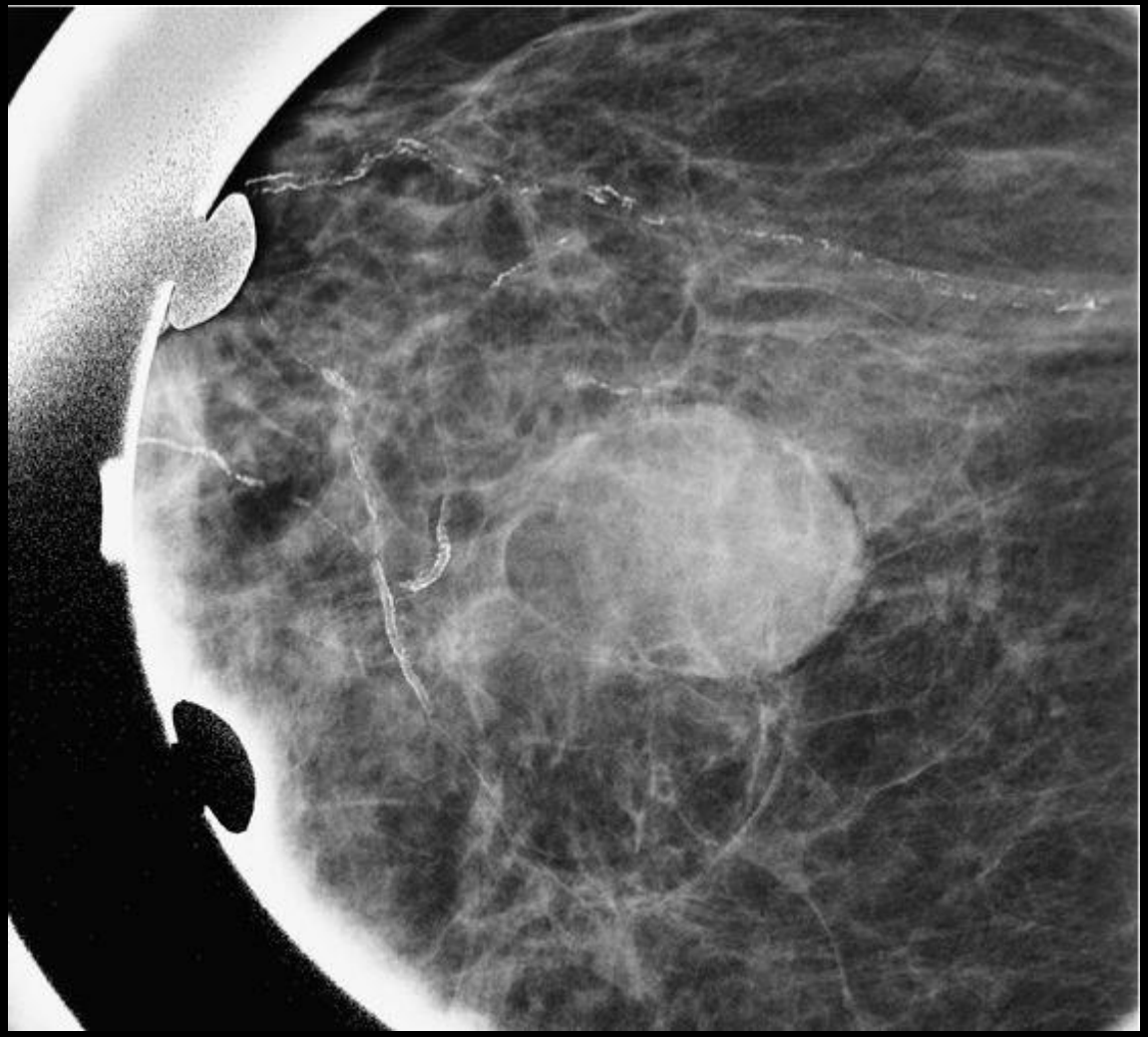
CANCER It was missed by 70 percent of the doctors.



THE CANCER WAS HARD TO SEE BECAUSE:

1. The doctor gets distracted by multiple calcifications on both breasts and by scars from breast-reduction

2. The cancer can't be seen on the other view of the same breast, and the cancer looks like normal tissue.

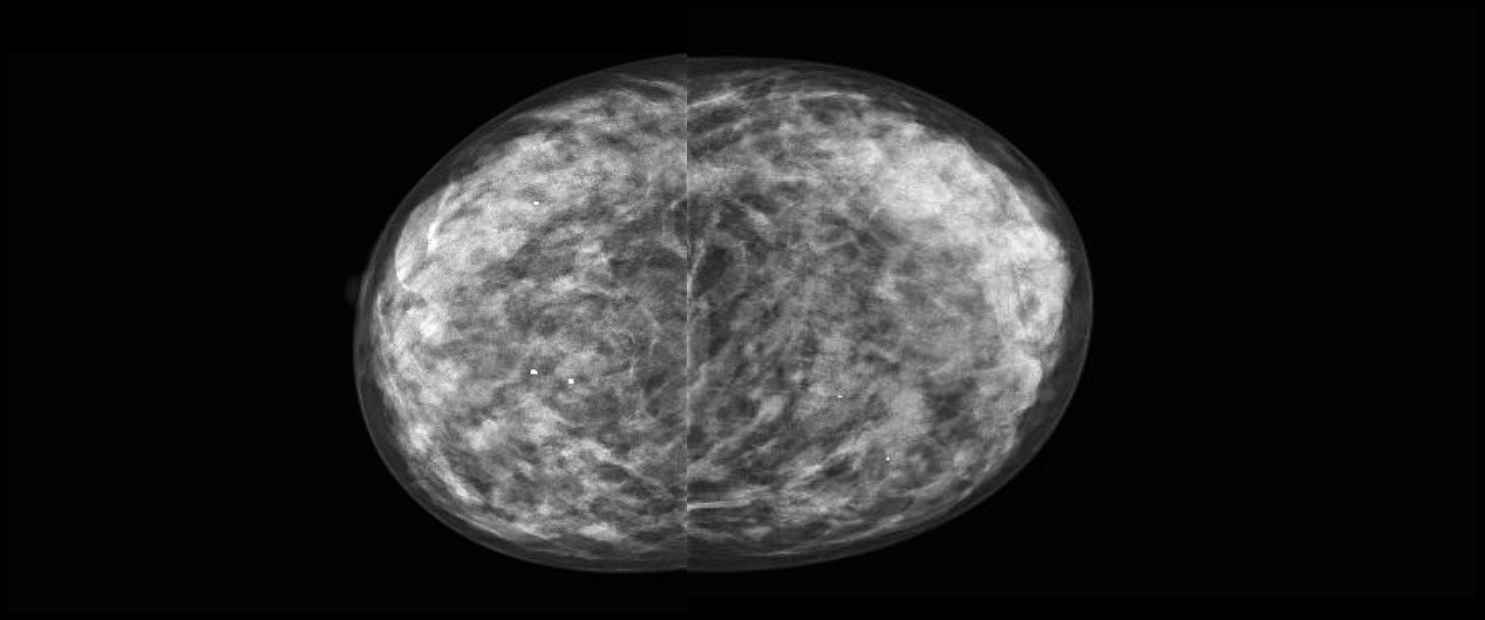


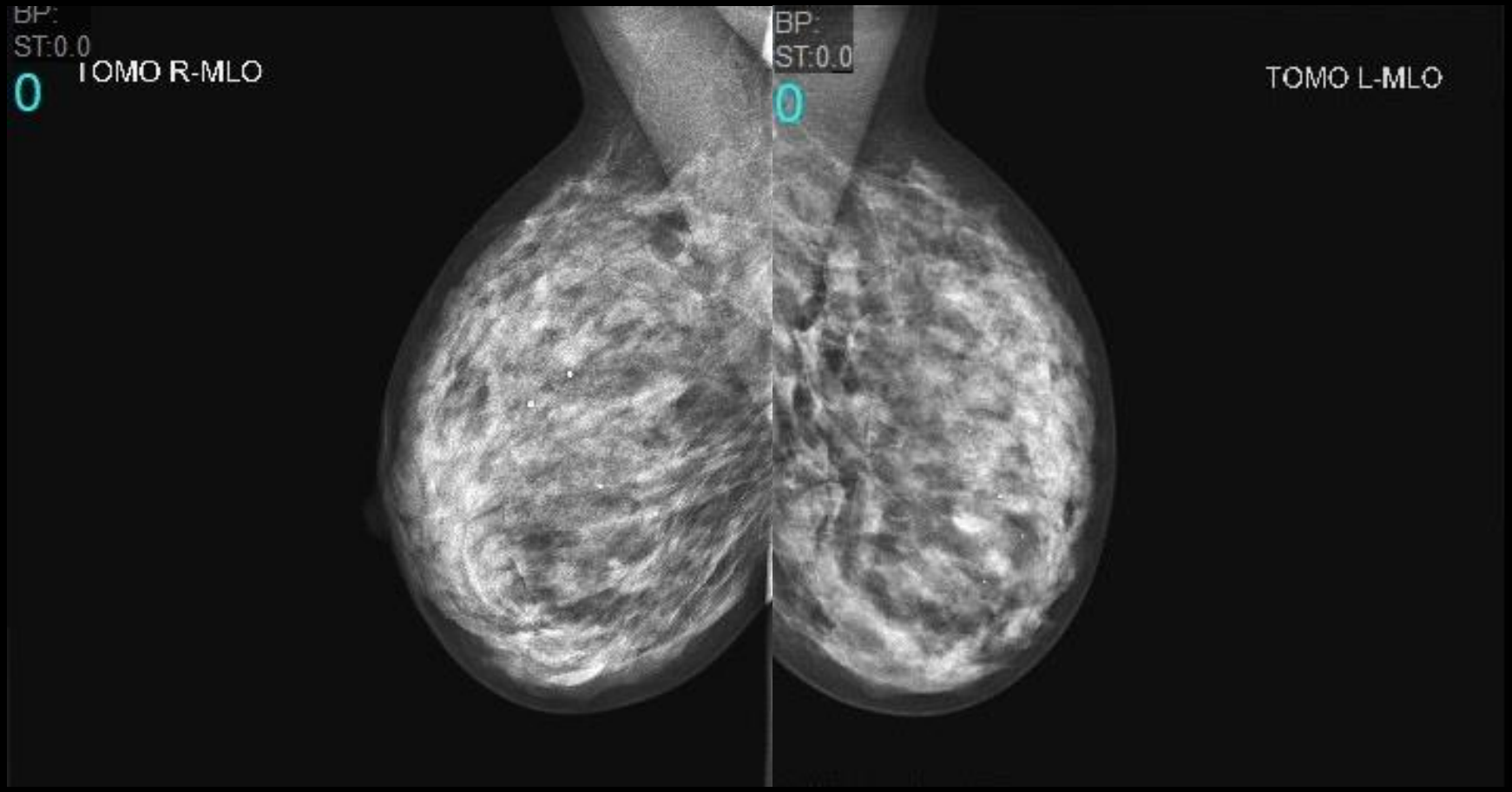

RT BREAST
10:00
8CM FR NIPPLE
ANTI RADIAL
T
Qscan
83
DR
55
14L7
T14.0
16 fps

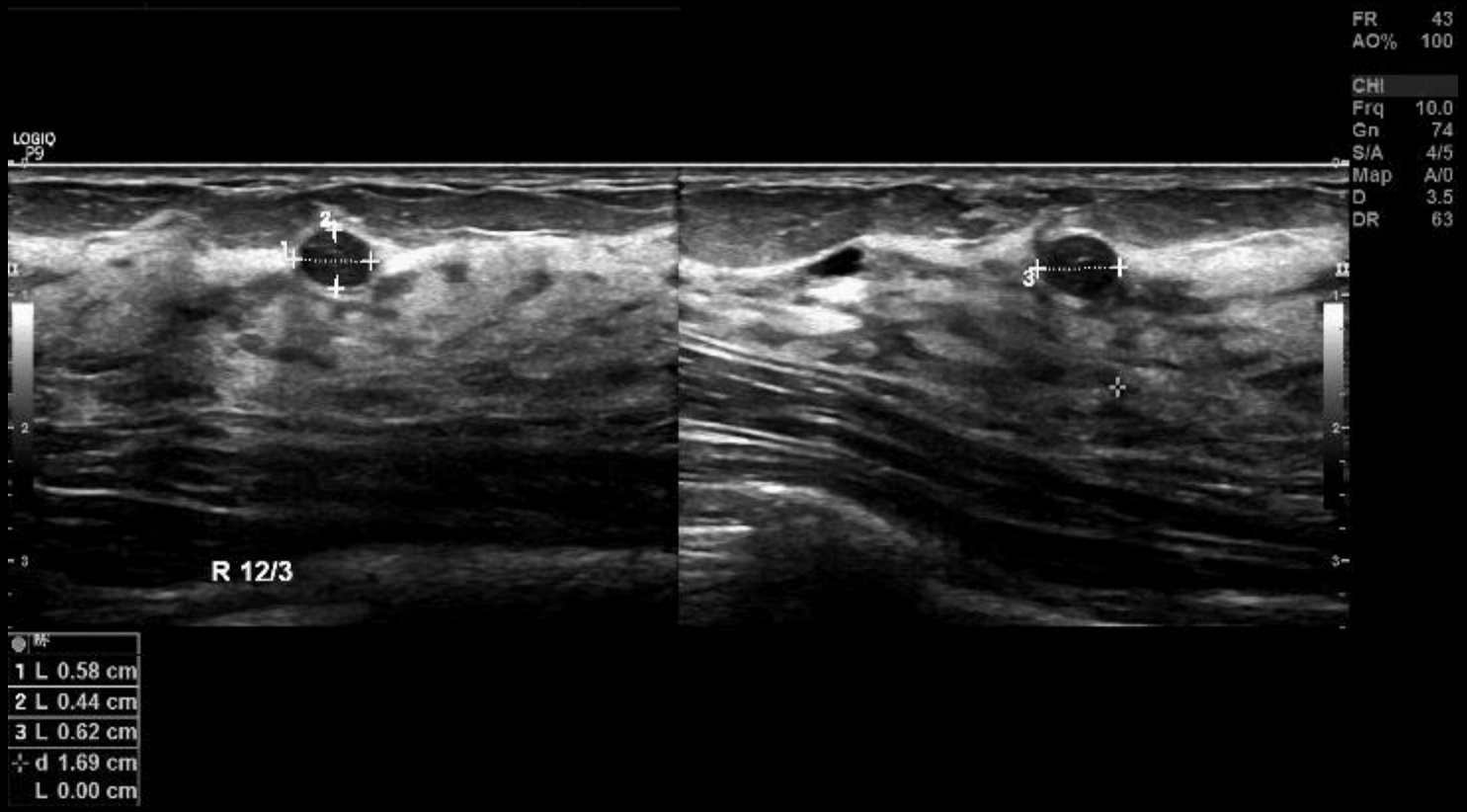

RT BREAST
10:00
8CM FR NIPPLE
ANTI RADIAL
T
3.9
Qscan
83
DR
65
CG
36
PRF
20.1k
Filter
5
14L7
T14.0
CF 6.1
17 fps

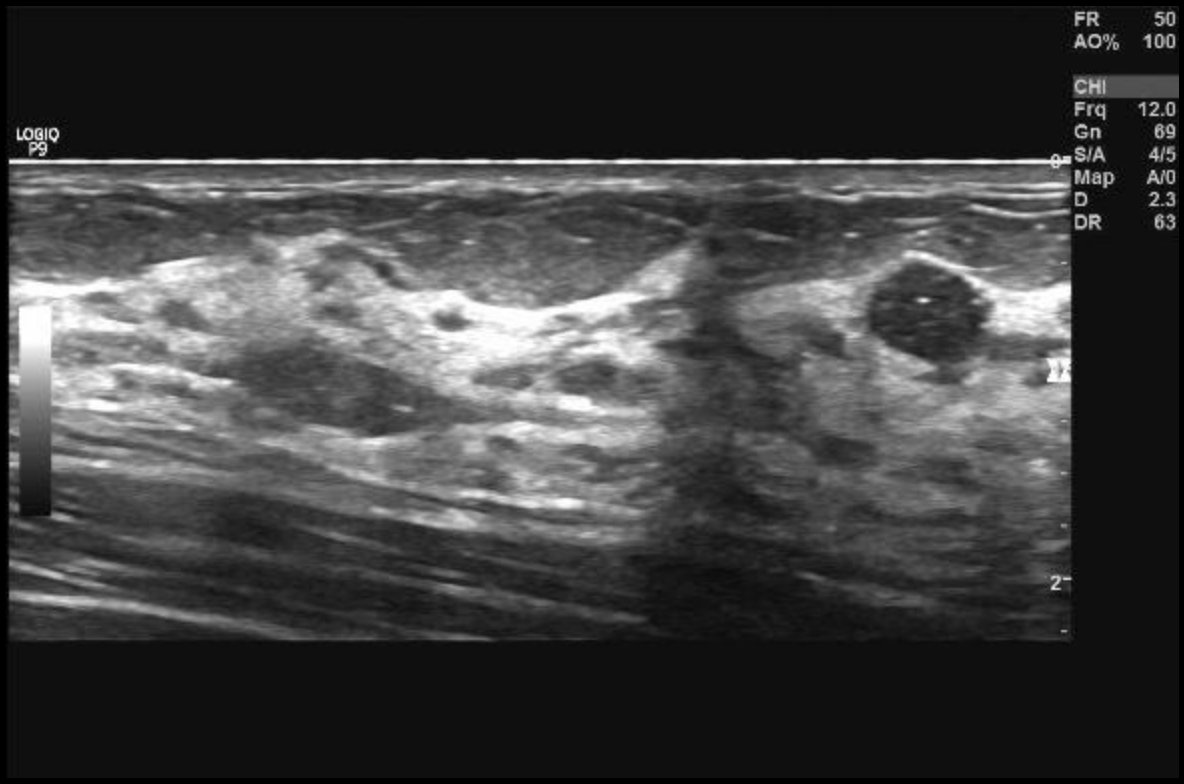
Pearls

- "Circumscribed mass" can still be found in malignancies. Particularly,
- Triple-negative cancers
- Mucoid carcinomas
- Colloid Carcinoma




BP:
ST:0.0
0
TOMO R-MLO
BP:
ST:0.0
0
TOMO L-MLO


LOGIQ
P9
FR 43
AO% 100
CHI
Frq 10.0
Gn 74
S/A 4/5
Map A/0
D 3.5
DR 63
R 12/3
1 L 0.58 cm
2 L 0.44 cm
3 L 0.62 cm
d 1.69 cm
L 0.00 cm


LOGIQ
P9
FR 50
AO% 100
CHI
Frq 12.0
Gn 69
S/A 4/5
Map A/0
D 2.3
DR 63
0
2

Echogenic Lesions

- Hyperechogenicity classically reported to be in favour of a benign breast lesion
- Hyperechoic lesion defined by echogenicity greater than subcutaneous fat
- 1- 6% breast masses hyperechoic
- Great majority benign

- Stavros 1995 750 breast nodules 42 hyperechoic -All benign
- Hyperechogenicity US parameter of a benign lesion . 100%neg. predictive value
- Linda et al 2011 4511 biopsied lesions 25 hyperchoic (0.6%) 9 malignant (0.4%)
- All that glitters is not GOLD
- Differential diagnosis depends on clinical setting, morphology and comparison with mammography or MR

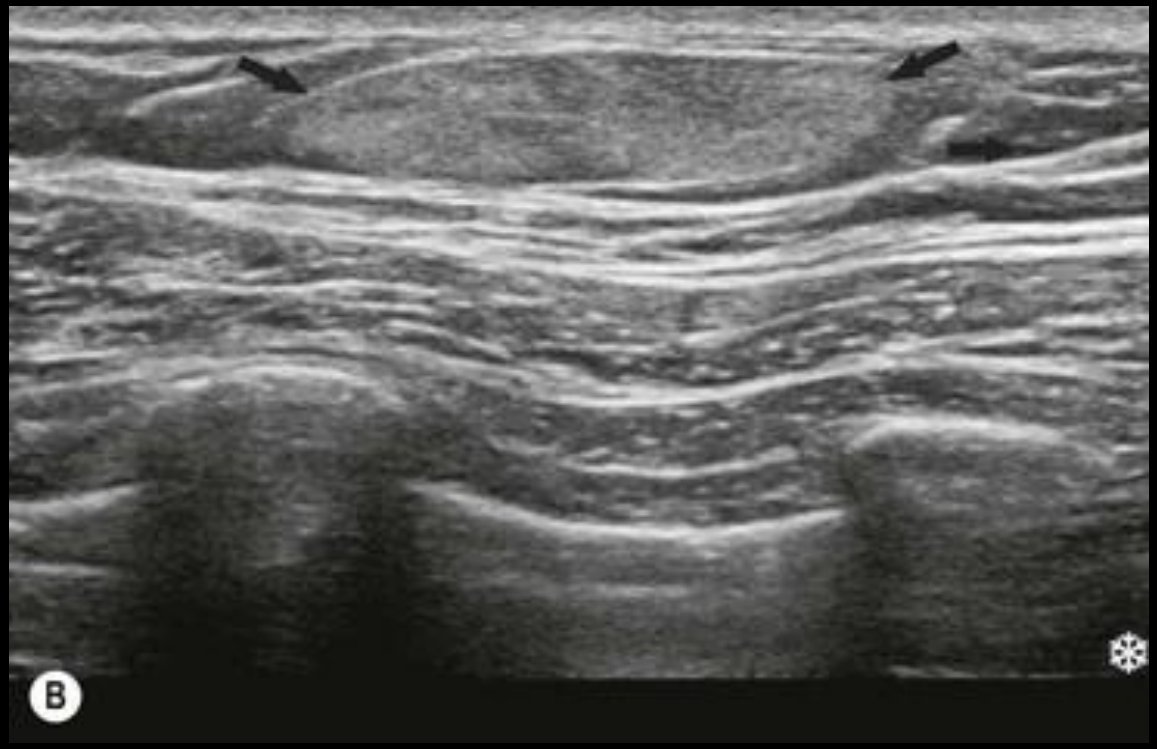
BENIGN HYPERECHOIC LESIONS

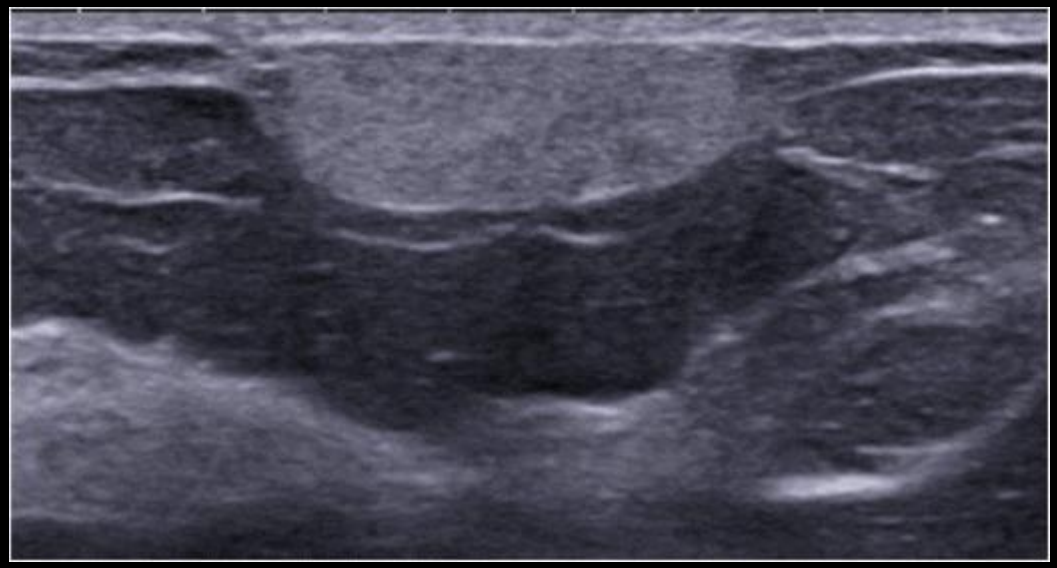
- Lipoma – mature adipocytes with fine fibrous capsule often unilateral /solitary
- Angiolipoma lipoma with small narrow lumen vessels
- Fat necrosis – variable appearance – complex
- Haematoma ultrasonic appearance dependent on stage –hyperechoic at chronic
- Hamartoma ,glandular, adipose and connective tissue – oval mass with halo and pseudocapsule 12-43%hyperechoic

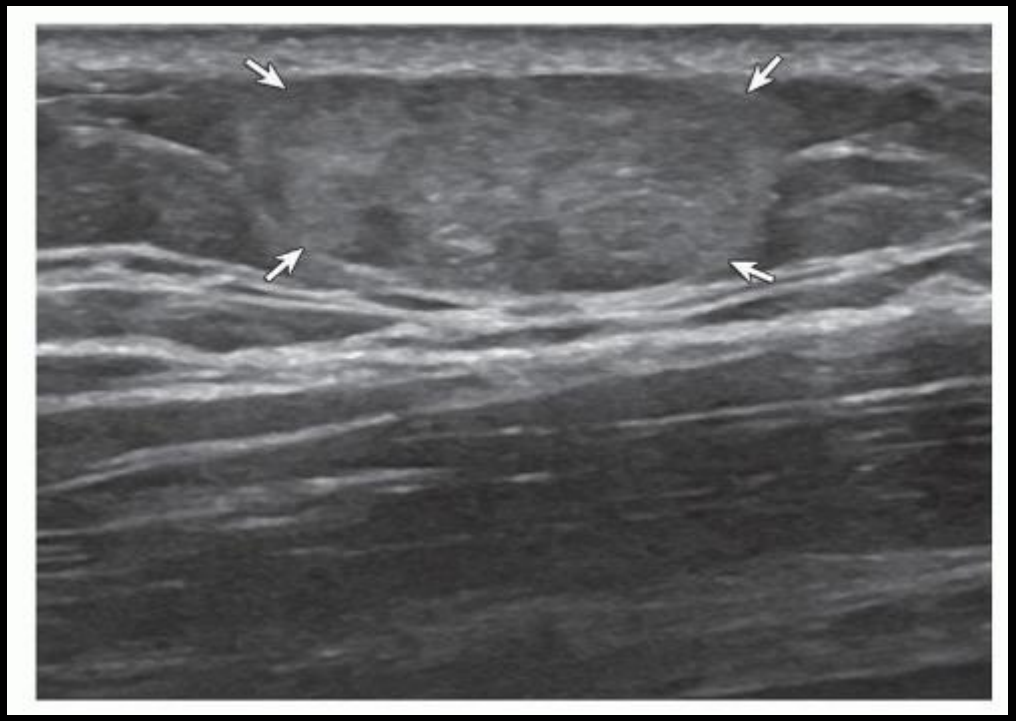
LIPOMA

Lipoma – mature adipocytes with fine fibrous capsule often unilateral or solitary

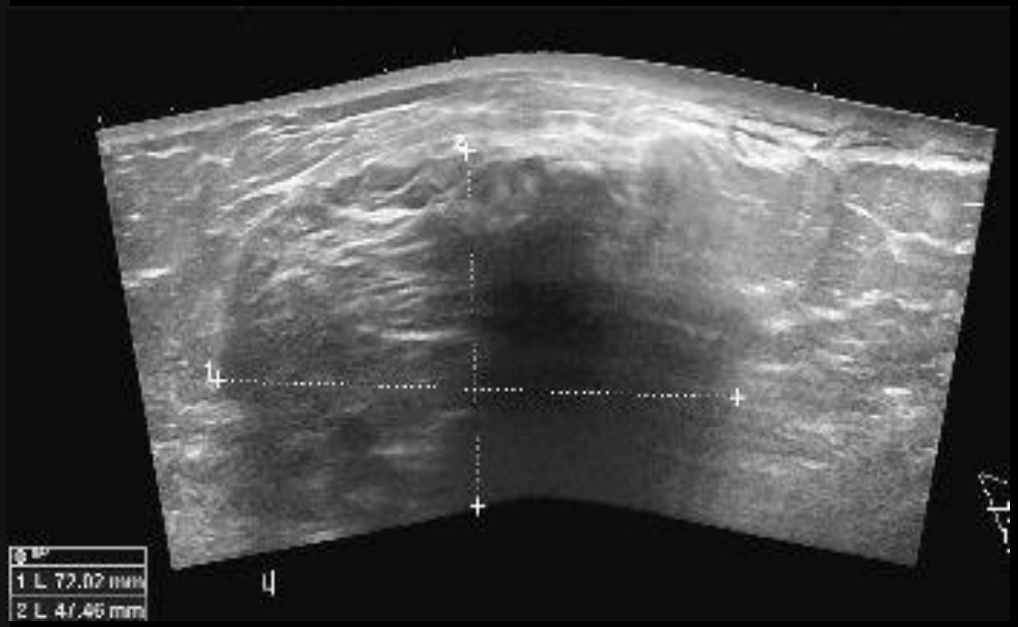
Angiolipoma lipoma with small narrow lumen vessels


B

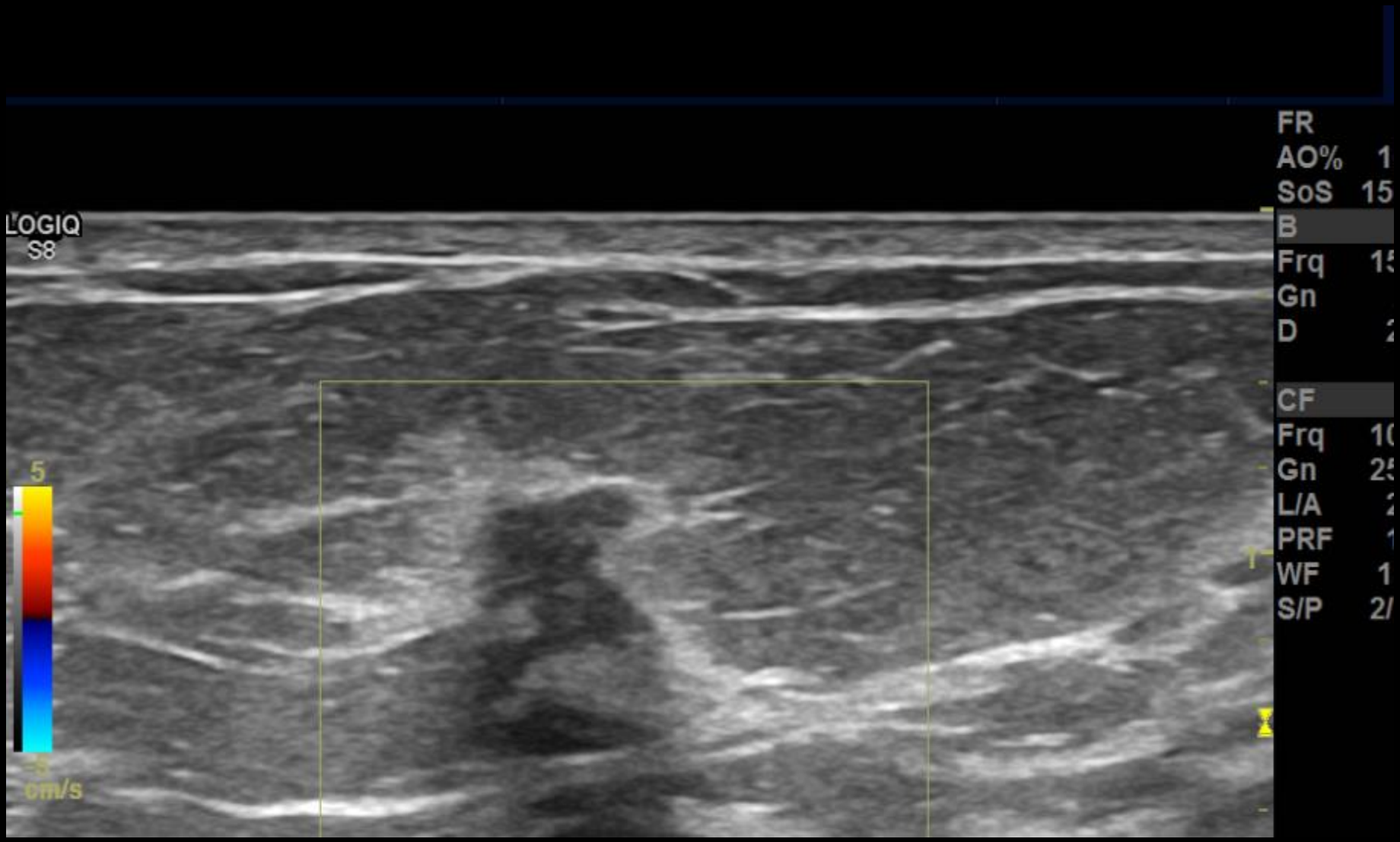


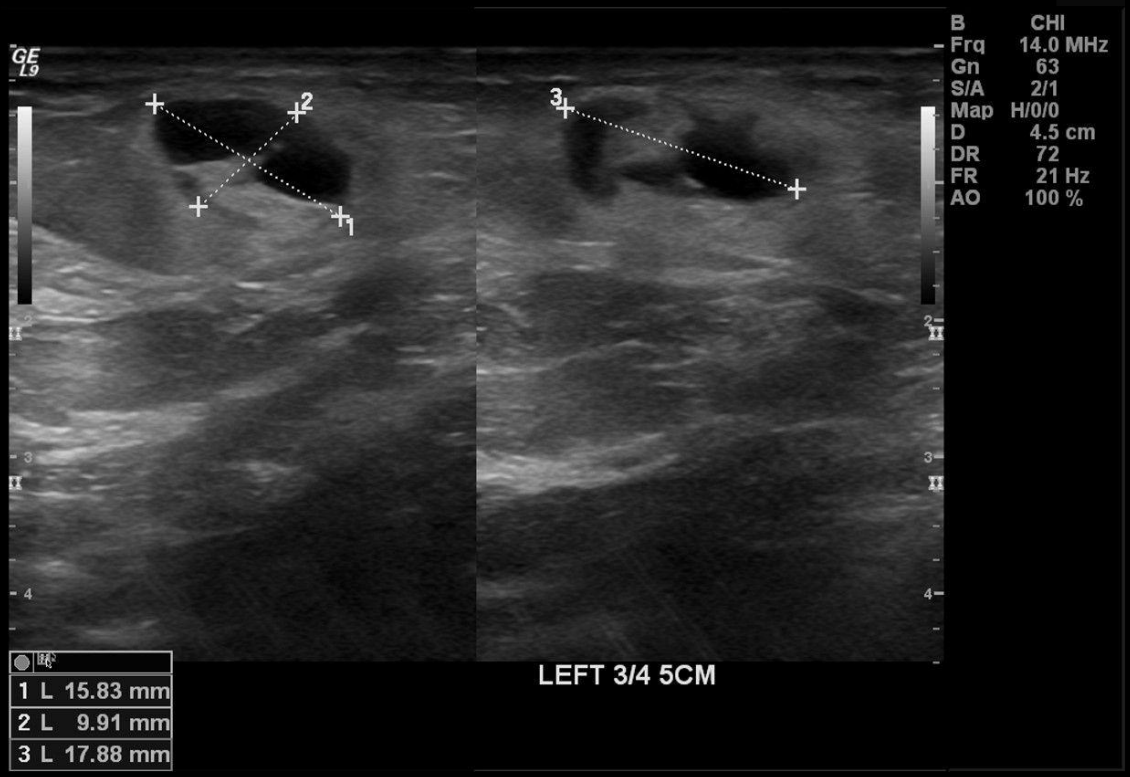



ST:0.0
4
L-MLC
FOV: 238.0x298.0mm
2800x3506
Zoom:0.1
FOV: 298.0


1 L 72.02 mm
2 L 47.46 mm

- FAT NECROSIS– variable appearance – complex
- Result of trauma. Infection or radiation.
- Can mimic malignancy


LOGIQ
S8
5
cm/s
FR
AO%
SoS
B
Frq
Gn
D
CF
Frq
Gn
L/A
PRF
WF
S/P

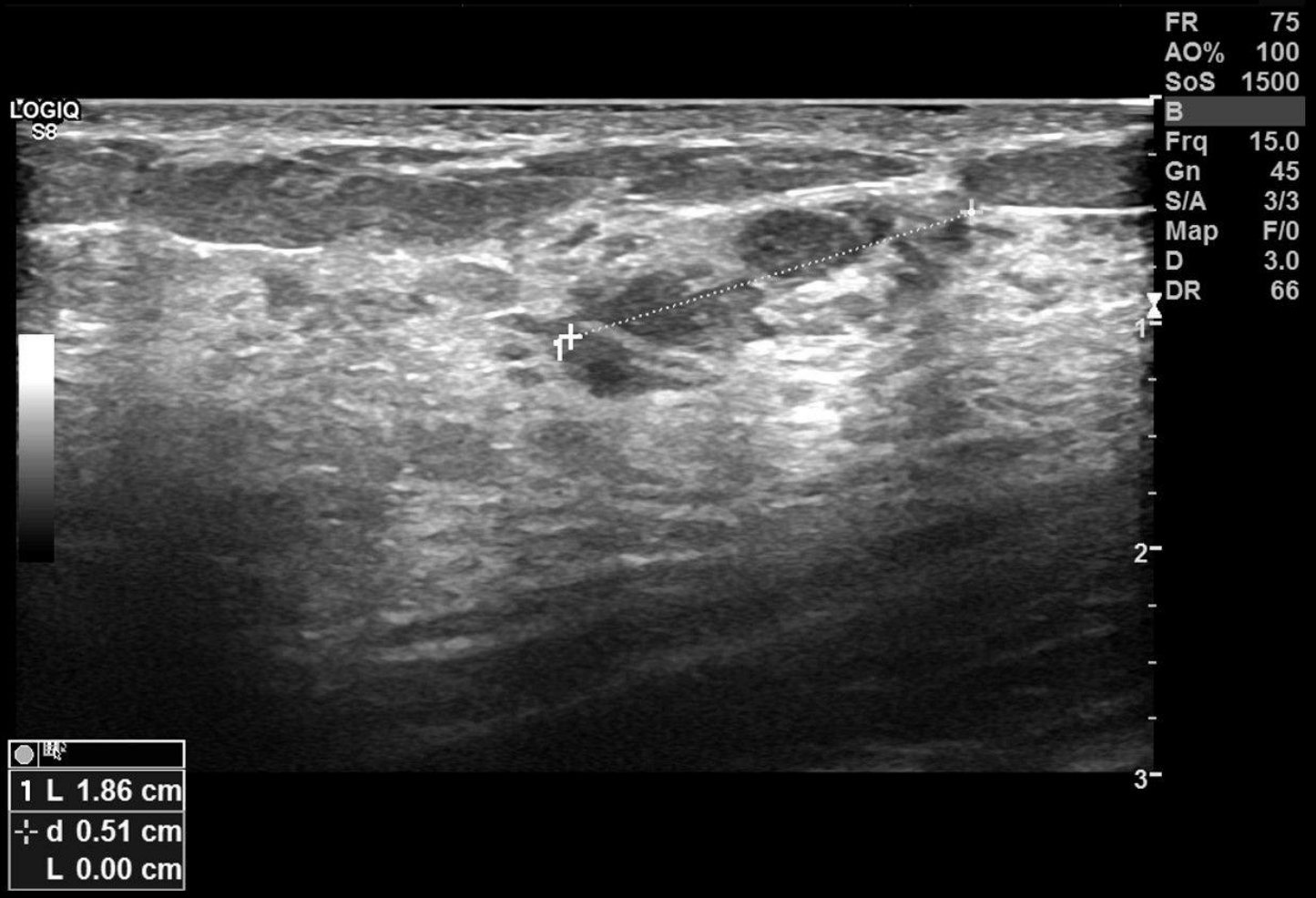

GE
L9
B CHI
Frq 14.0 MHz
Gn 63
S/A 2/1
Map H/0/0
D 4.5 cm
DR 72
FR 21 Hz
AO 100 %
1 L 15.83 mm
2 L 9.91 mm
3 L 17.88 mm
LEFT 3/4 5CM

HAEMATOMA

Haematoma ultrasonic appearance dependent on stage –hyperechoic at chronic

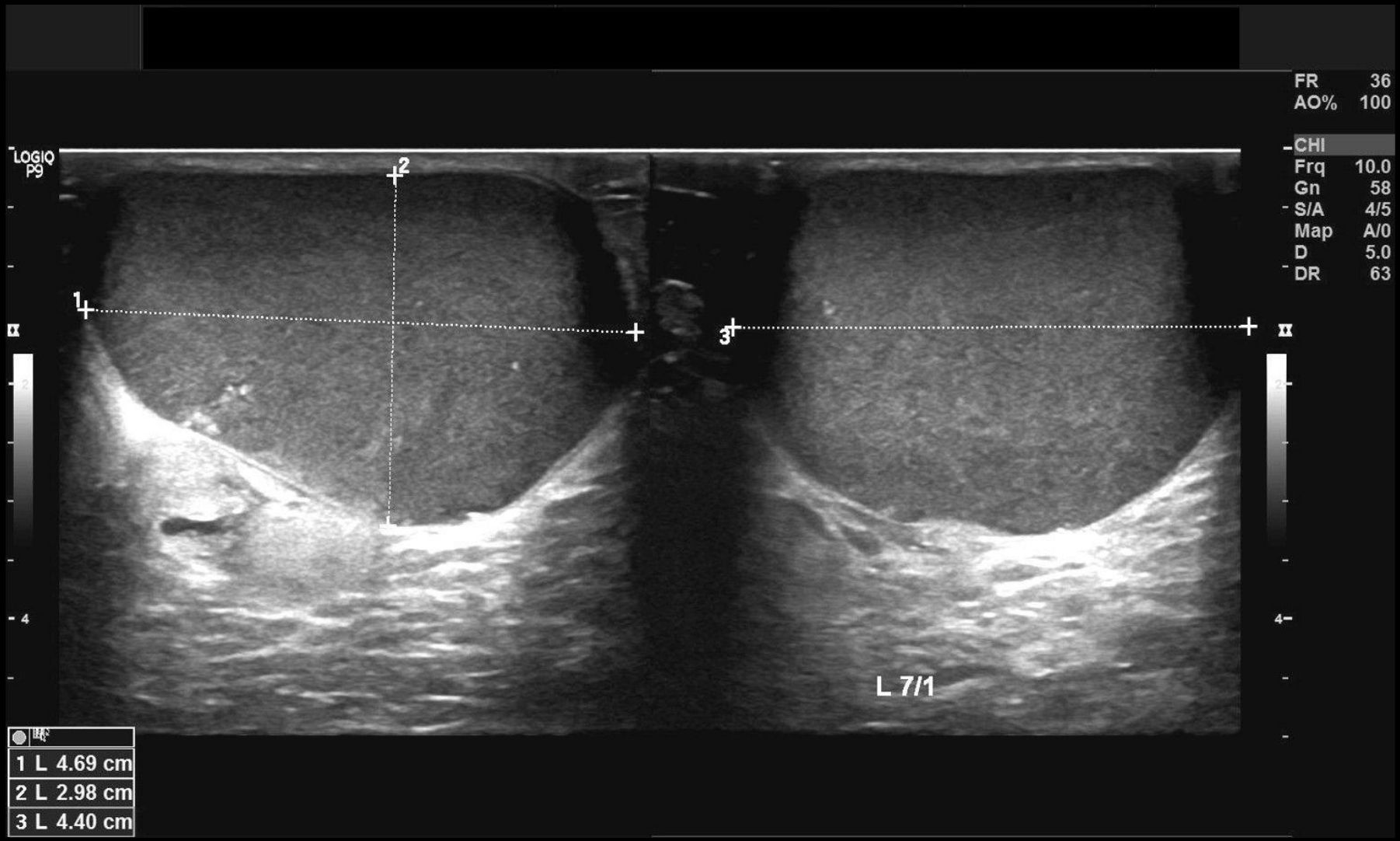
FIBROADNOLIPOMA

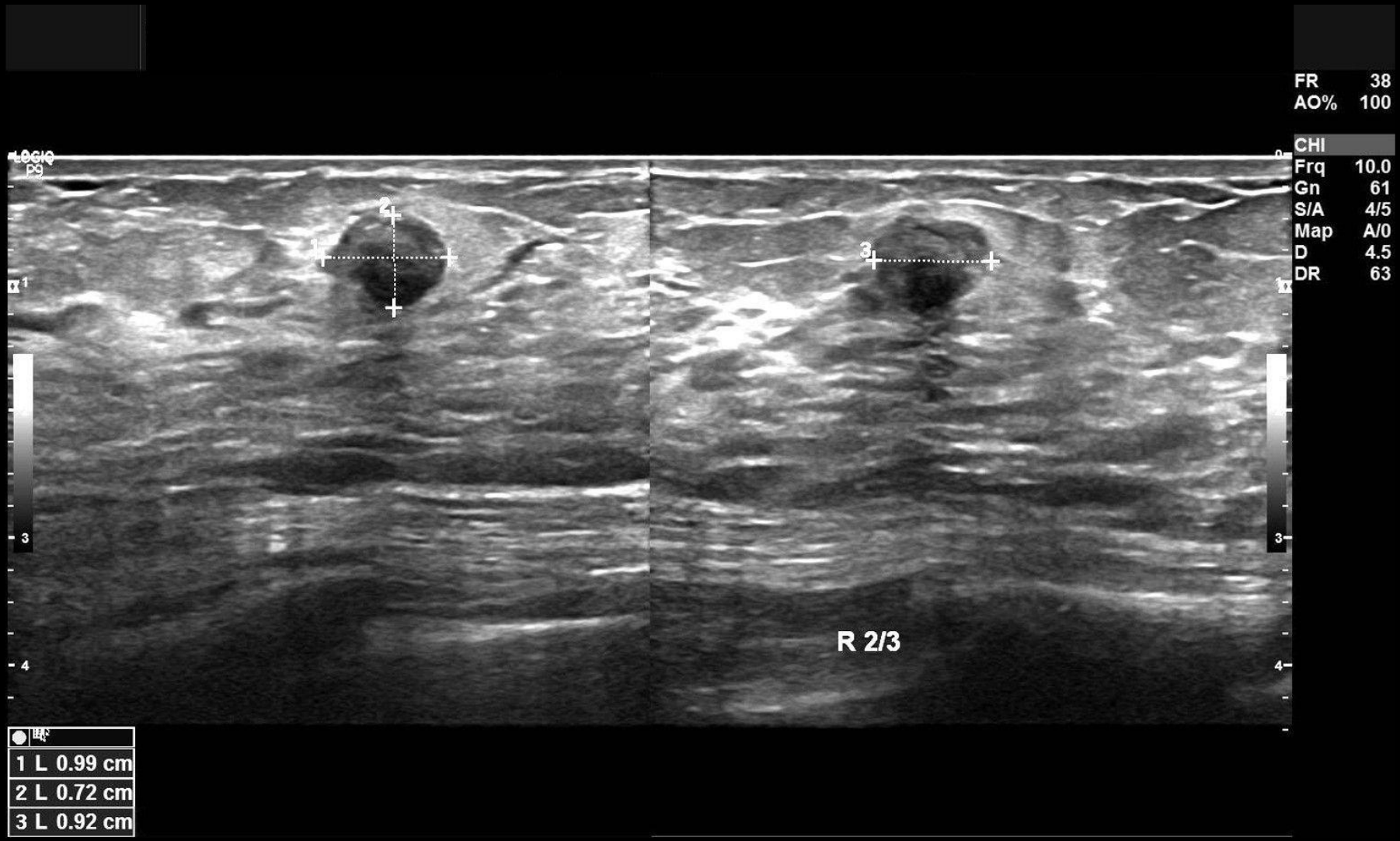
Hamartoma ,glandular, adipose and connective tissue – oval mass with halo and pseudocapsule 12-43%hyperechoic


LOGIQ
S8
FR 75
AO% 100
SoS 1500
B
Frq 15.0
Gn 45
S/A 3/3
Map F/0
D 3.0
DR 66
1
2
3
1 L 1.86 cm
d 0.51 cm
L 0.00 cm

GALACTOCOELE

- Galactocoele- milk retention in dilated lactiferous ducts proximal to obstruction .maybe be fat lucent on mammo ,hyperchoic on us .. Neuroleptic drugs
- Lactating adenoma
  - Pseodoangiomatous stromal hyperplasia PASH –benign mesenchymal .Premenopausal or on HRT-simulates vascular tumour but collagen –oval heterogenous mass
- Breast abscess /mastitis appearance depends on stage . Failure to respond to treatment non lactating female beware inflammatory breast cancer


LOGIQ P9
FR 36
AO% 100
CHI
Frq 10.0
Gn 58
S/A 4/5
Map A/0
D 5.0
DR 63
1
2
3
L 7/1
1 L 4.69 cm
2 L 2.98 cm
3 L 4.40 cm


FR 38
AO% 100
CHI
Frq 10.0
Gn 61
S/A 4/5
Map A/0
D 4.5
DR 63
R 2/3
1 L 0.99 cm
2 L 0.72 cm
3 L 0.92 cm


Lactating Adenoma

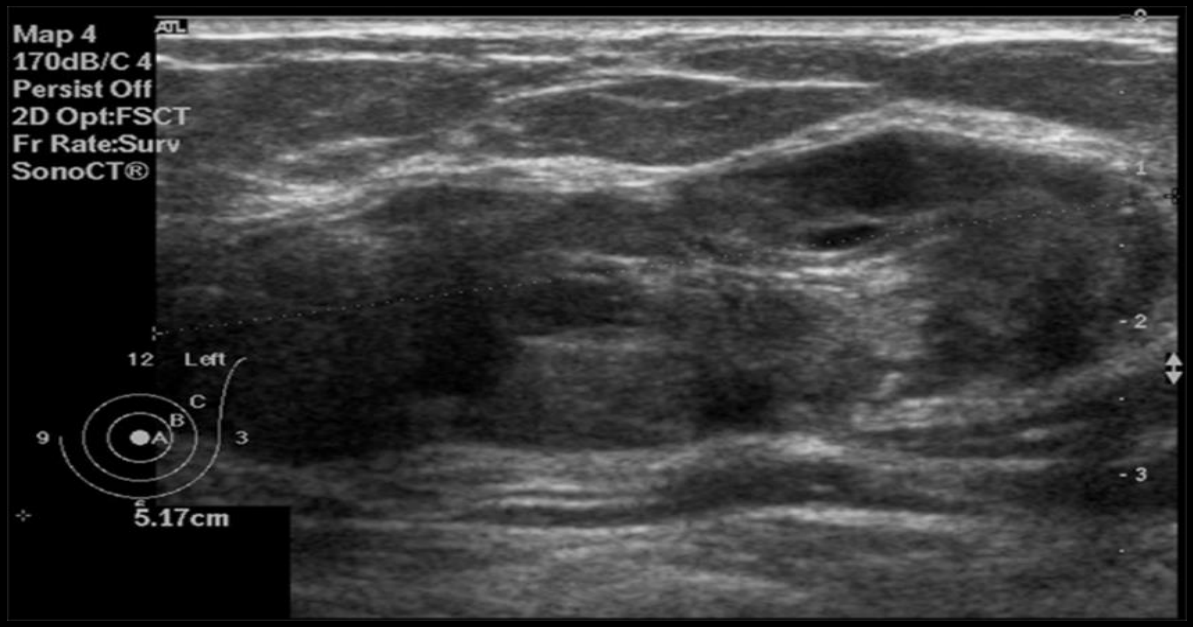
LACTATING ADENOMA

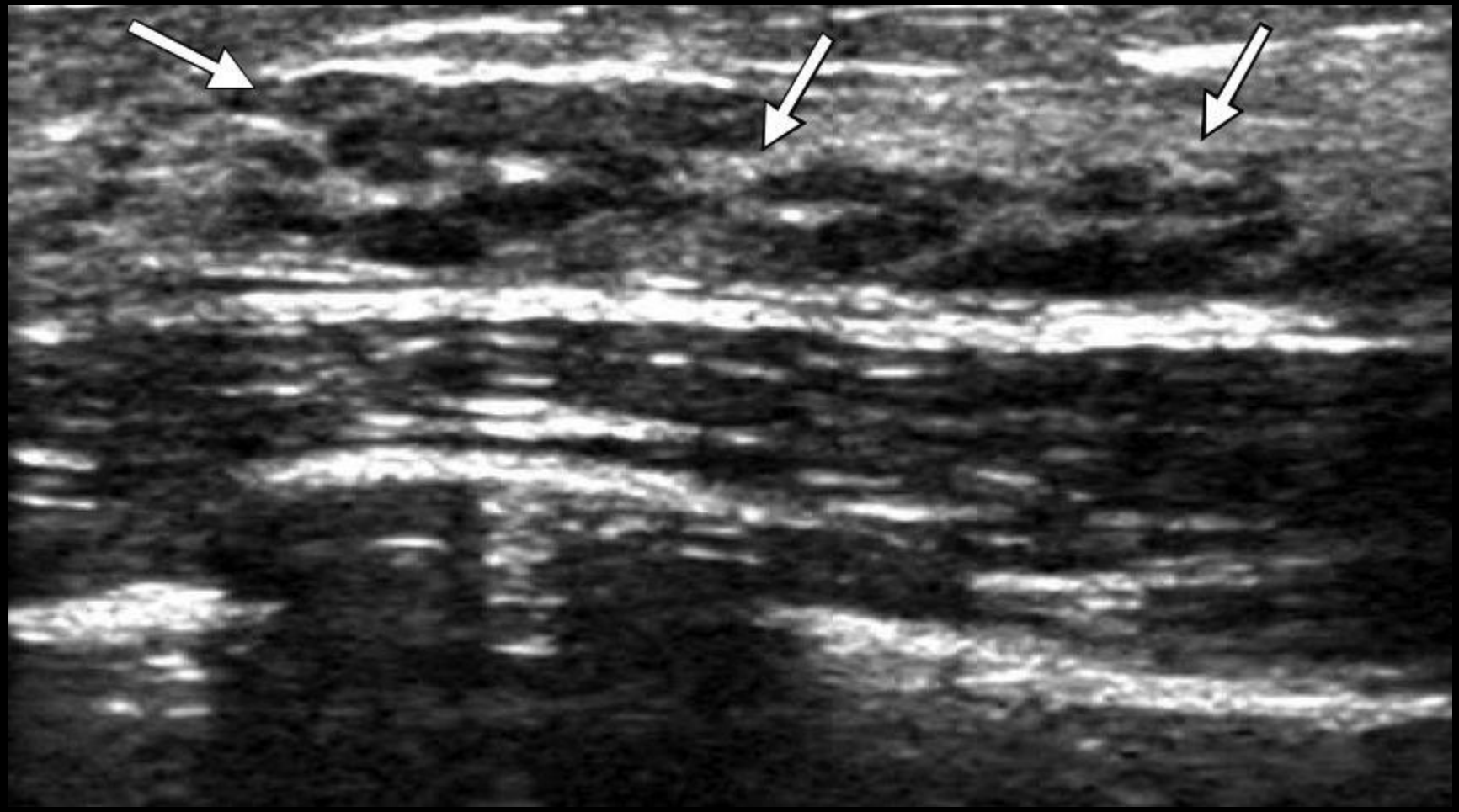
Last trimester of pregnancy

Dilated tubular structures forming alveoli

Resolves spontaneously on stopping breastfeeding

- Pseudoangiomatous stromal hyperplasia PASH
- –benign mesenchymal myofibroblast proliferation induced by progesterone.Premenopausal or on HRT-simulates vascular tumour , anastomostic channels in collagen stroma



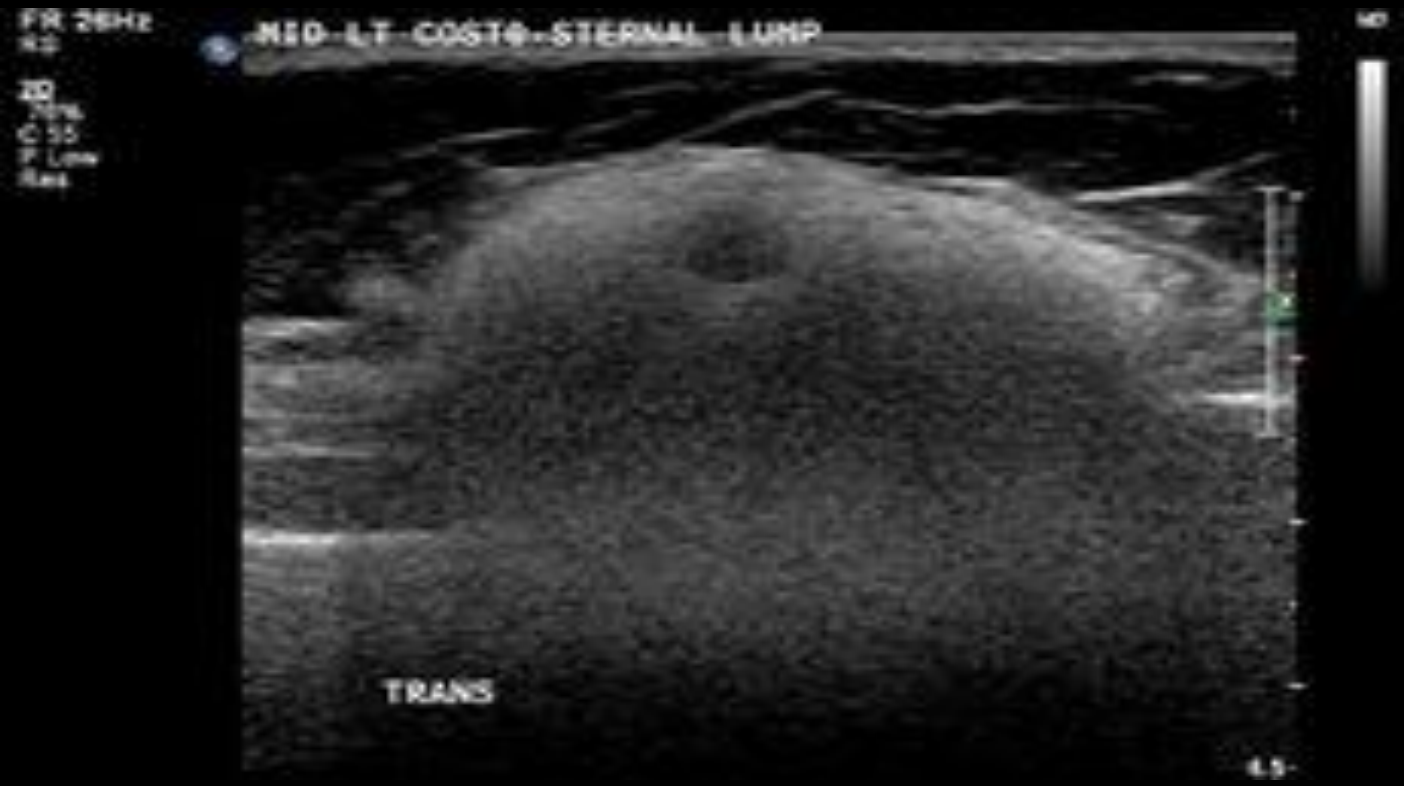


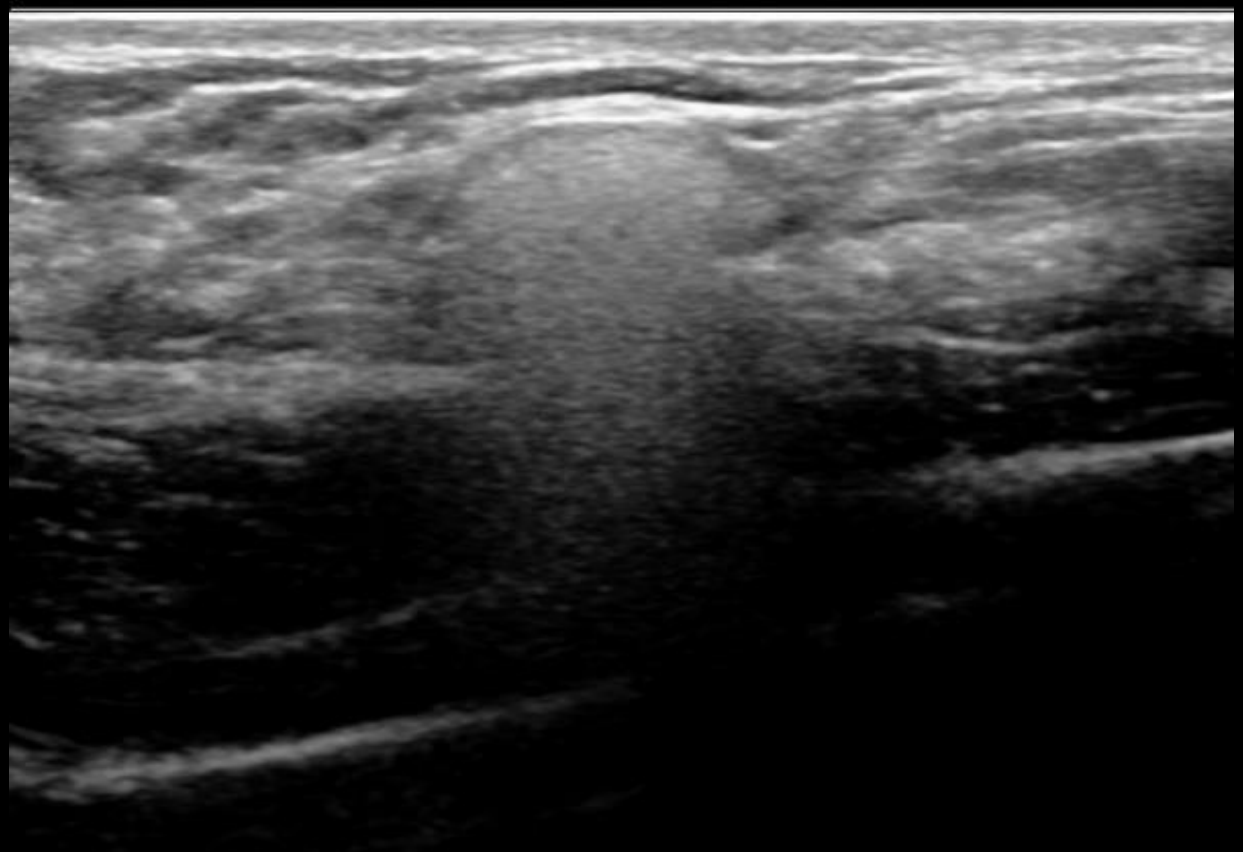

Pseudoangiomatous Stromal
Breast Hyperplasia

SILICONOMA

Inflammatory resorption granuloma ;

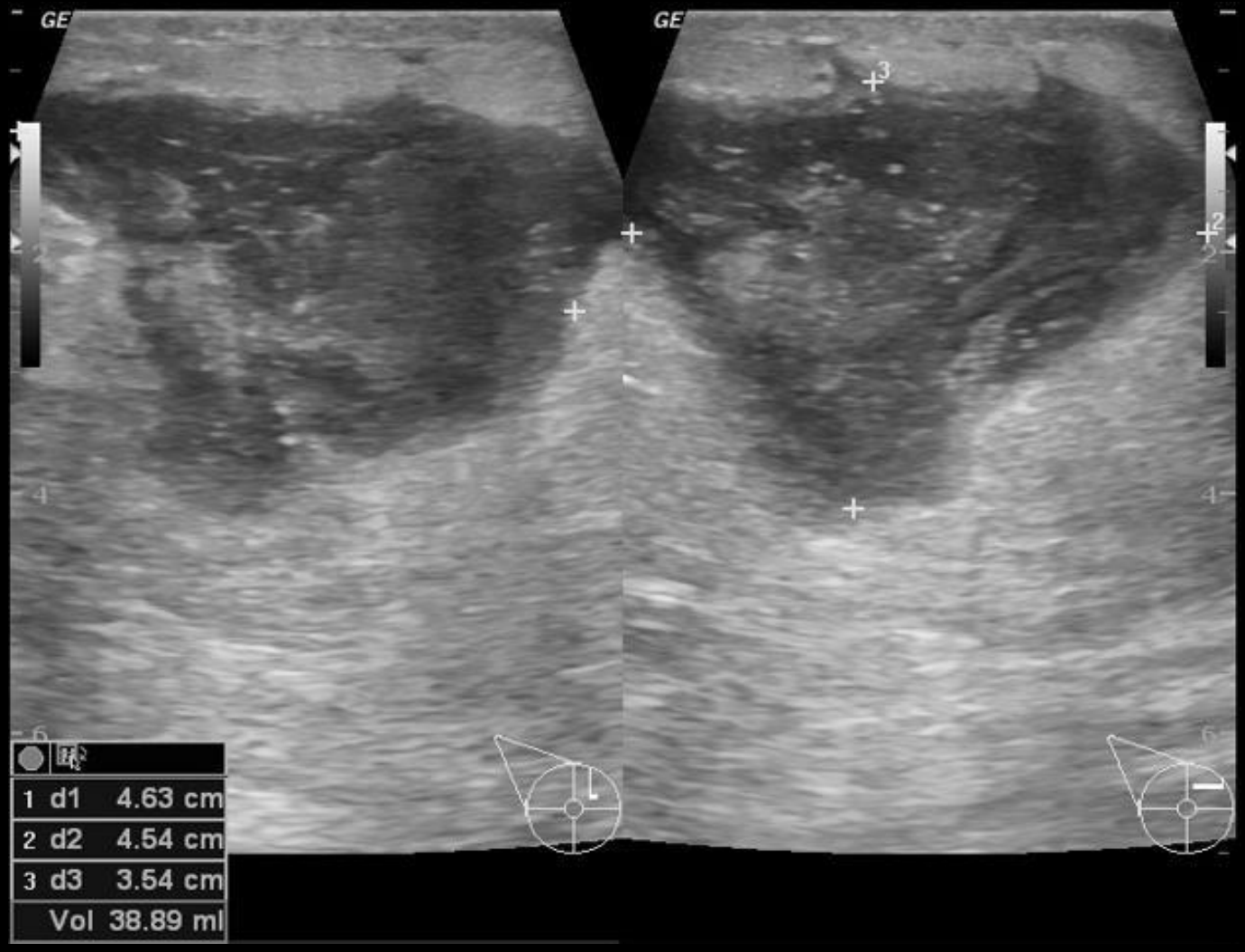
Arising from droplets of free silicone gel –snowstorm appearance

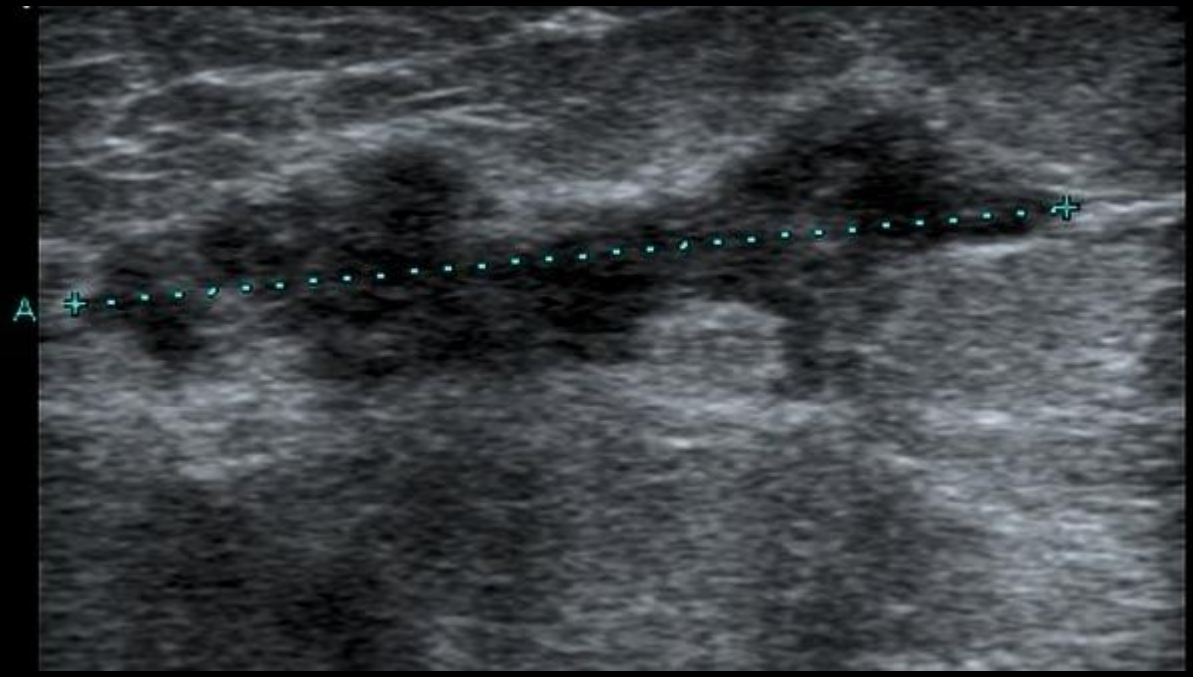

MID-LT COSTO-STERNAL LUMP
TRANS

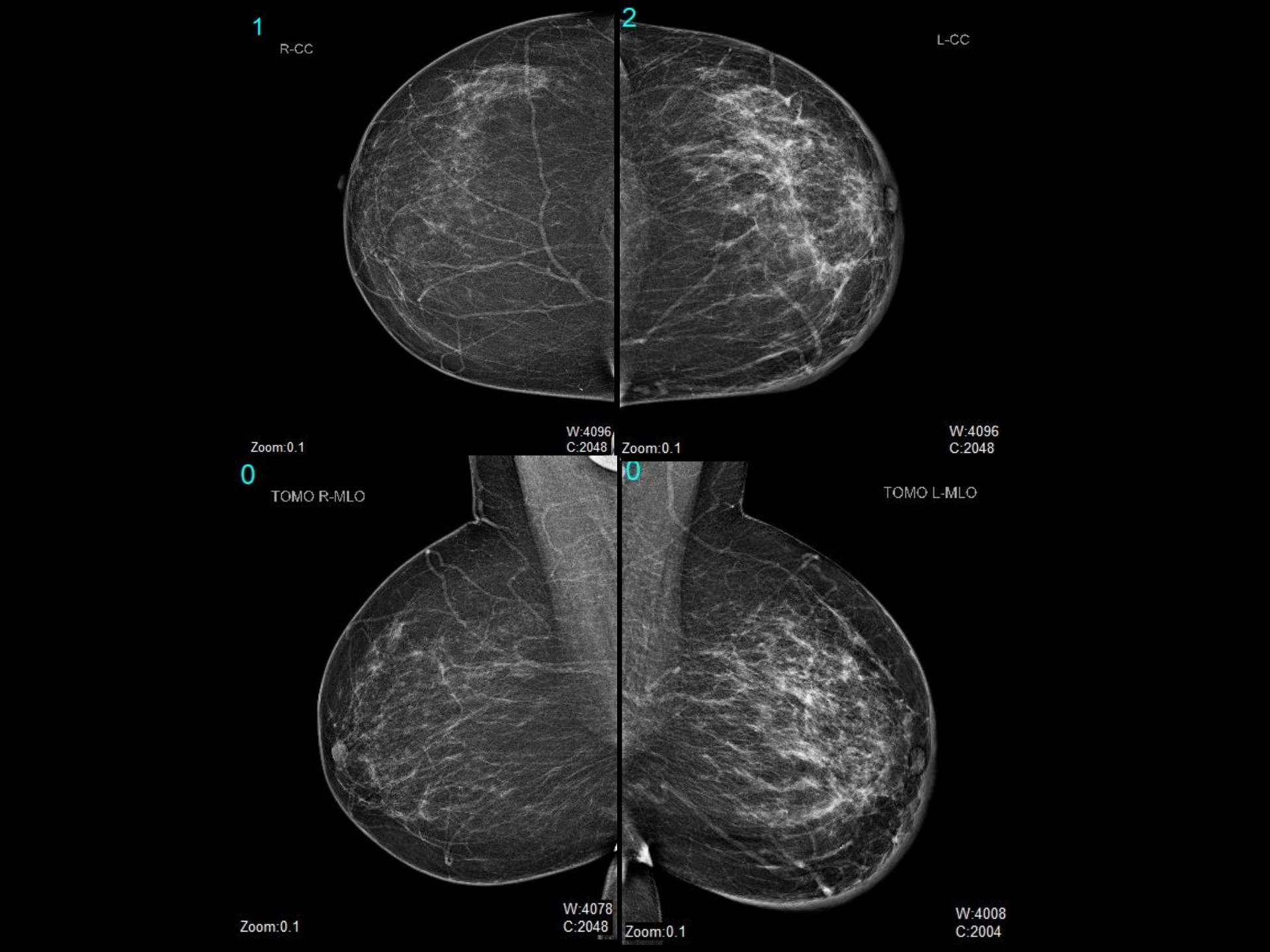

9 OClock PALP ROI LATERAL ASPECT

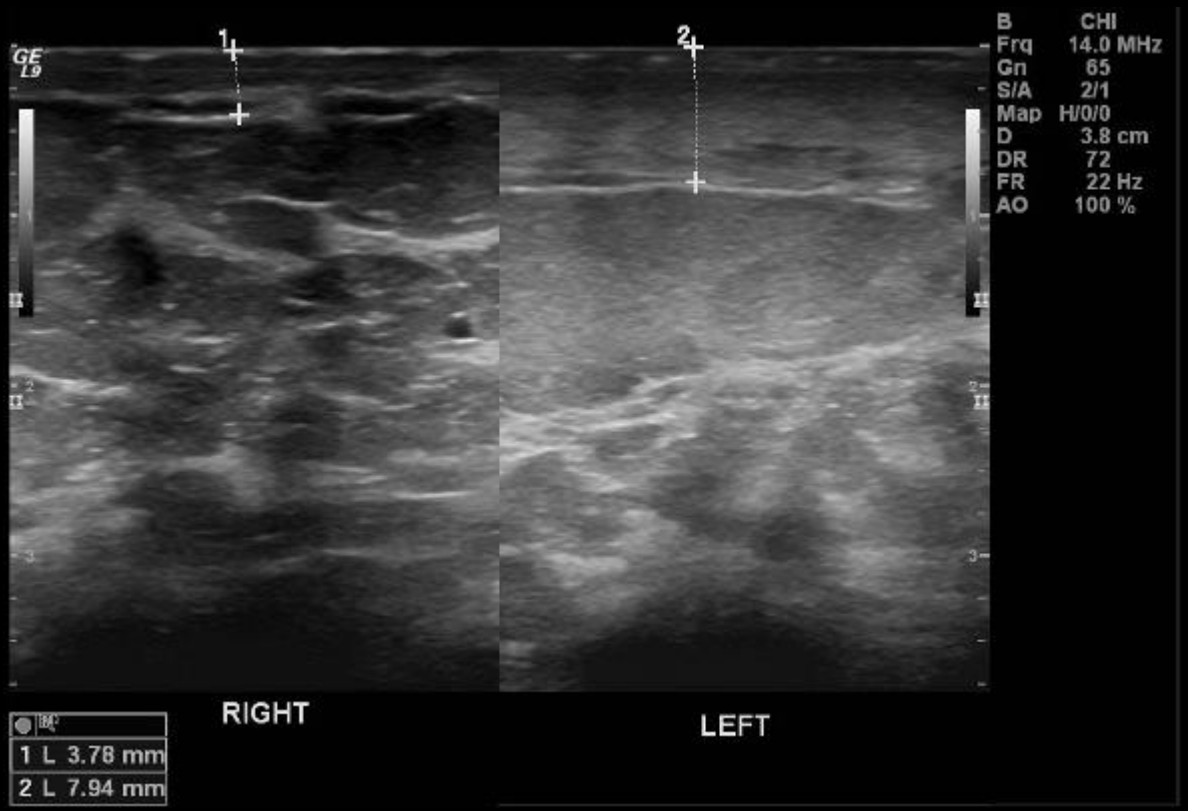
- Breast abscess /mastitis appearance depends on stage
- Failure to respond to treatment in non lactating female -beware inflammatory breast cancer

Breast Abscess




A


1
R-CC
Zoom:0.1
W:4096
C:2048
2
L-CC
Zoom:0.1
W:4096
C:2048
0
TOMO R-MLO
Zoom:0.1
W:4078
C:2048
0
TOMO L-MLO
Zoom:0.1
W:4008
C:2004


GE
L9
1
2
B CHI
Frq 14.0 MHz
Gn 65
S/A 2/1
Map H/0/0
D 3.8 cm
DR 72
FR 22 Hz
AO 100 %
1 L 3.78 mm
2 L 7.94 mm
RIGHT
LEFT

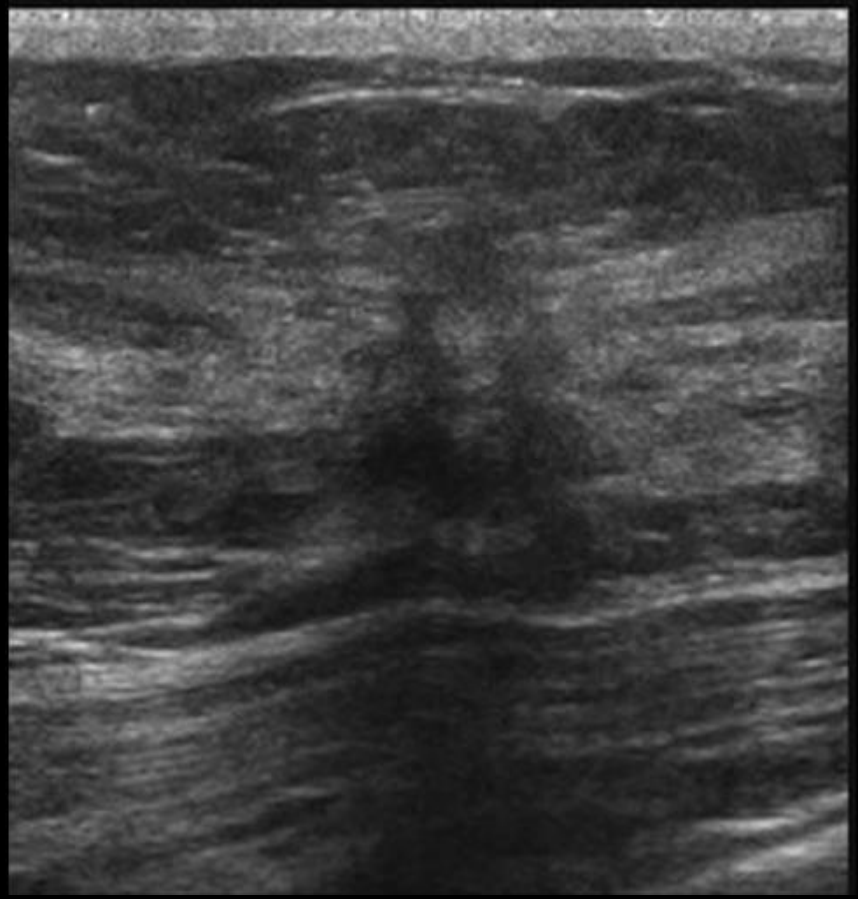
COMPLEX SCLEROSING LESION

Benign breast lesion

Radial scar is a a sclerosing lesion with a fibroelastic centre surrounded by a proliferative radial crown of cystic lobules and ductules

30%associated with ductal ca in situ or tubular ca

Always biopsy



ADENOSIS

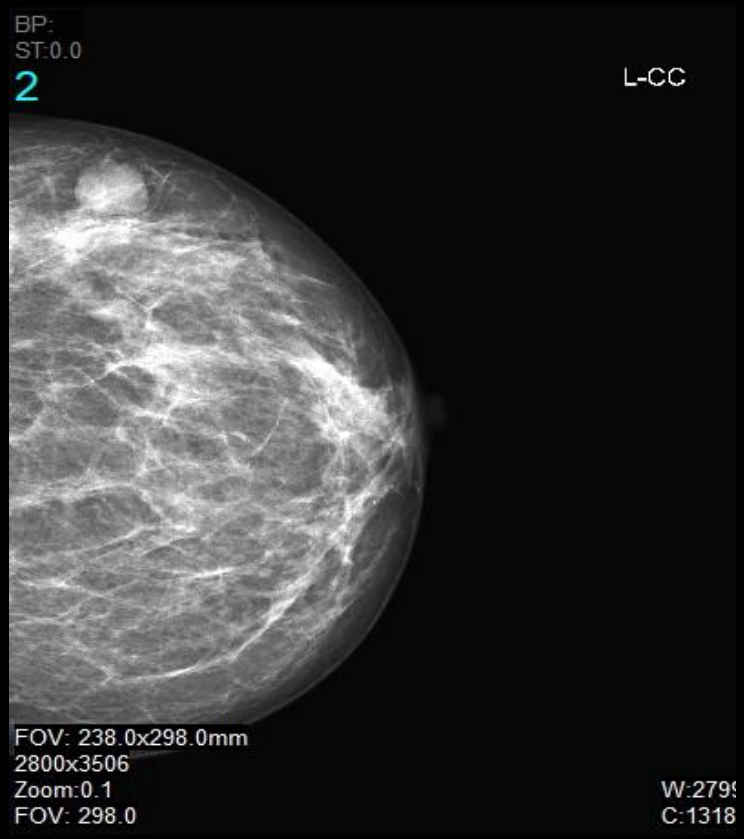
HYPERPLASIA OF ALL CONSTITUENTS OF THE TERMINAL DUCTAL UNIT

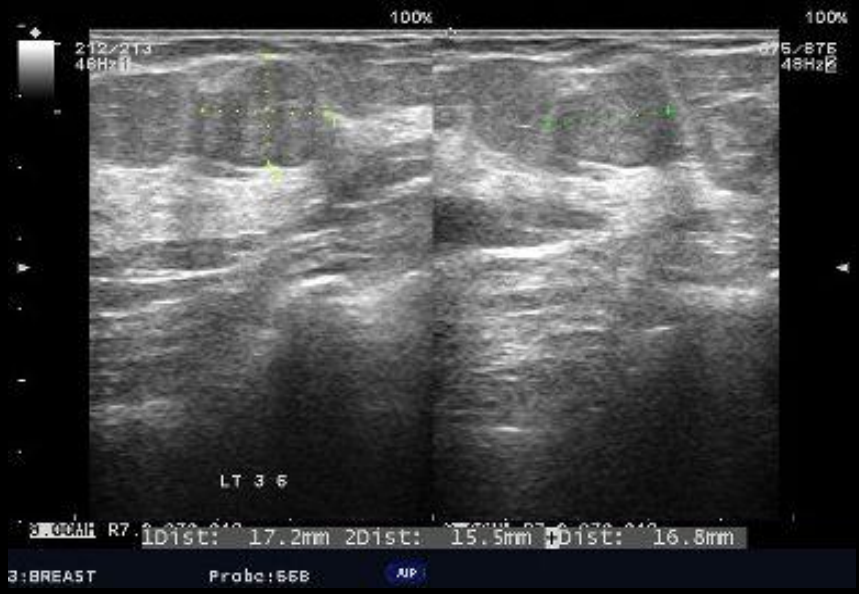
SIZE AND NUMBER OF LOBULES

VARIABLE ECHOGENICITY WITH IRREGULAR MARGINS

SIMPLE ADENOSIS IS PRESERVATION OF BREAST ARCHITECTURE

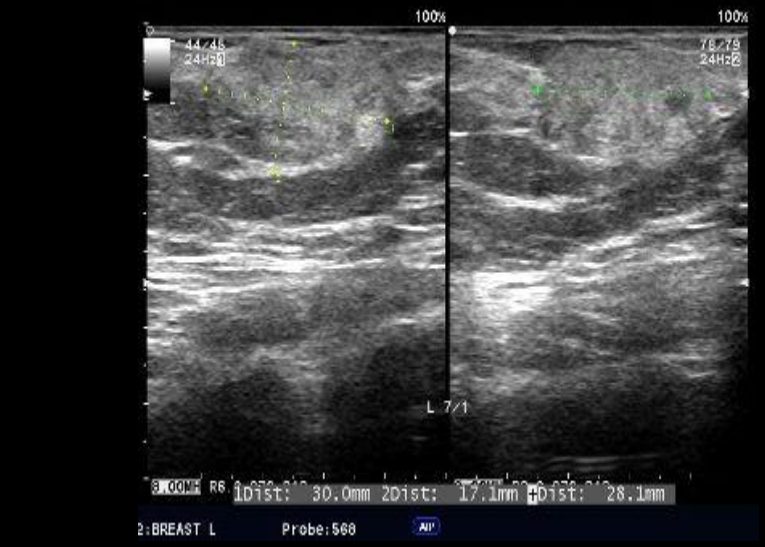
SCLEROSING FORM =ARCHITECTURAL DISTORTION AND ASSOCIATED PROLIFERATIVE LESIONS SUCH AS FIBROADENOMA AND INTRADUCTAL PAPILLOMA.


BP:
ST:0.0
2
L-CC
FOV: 238.0x298.0mm
2800x3506
Zoom:0.1
FOV: 298.0
W:279
C:1318

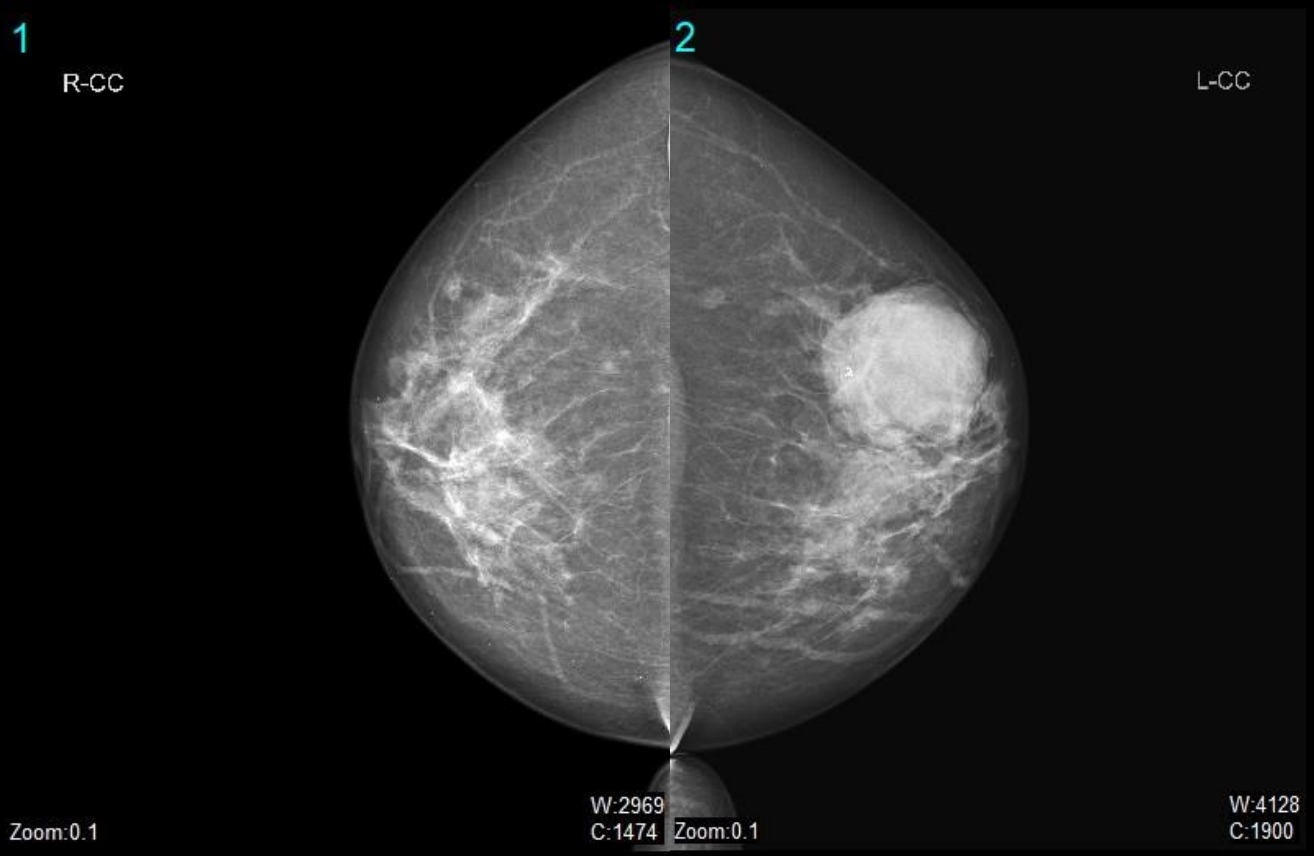

100%
100%
LT 3 6
1Dist: 17.2mm 2Dist: 15.5mm 3Dist: 16.8mm
3:BREAST
Probe:56B

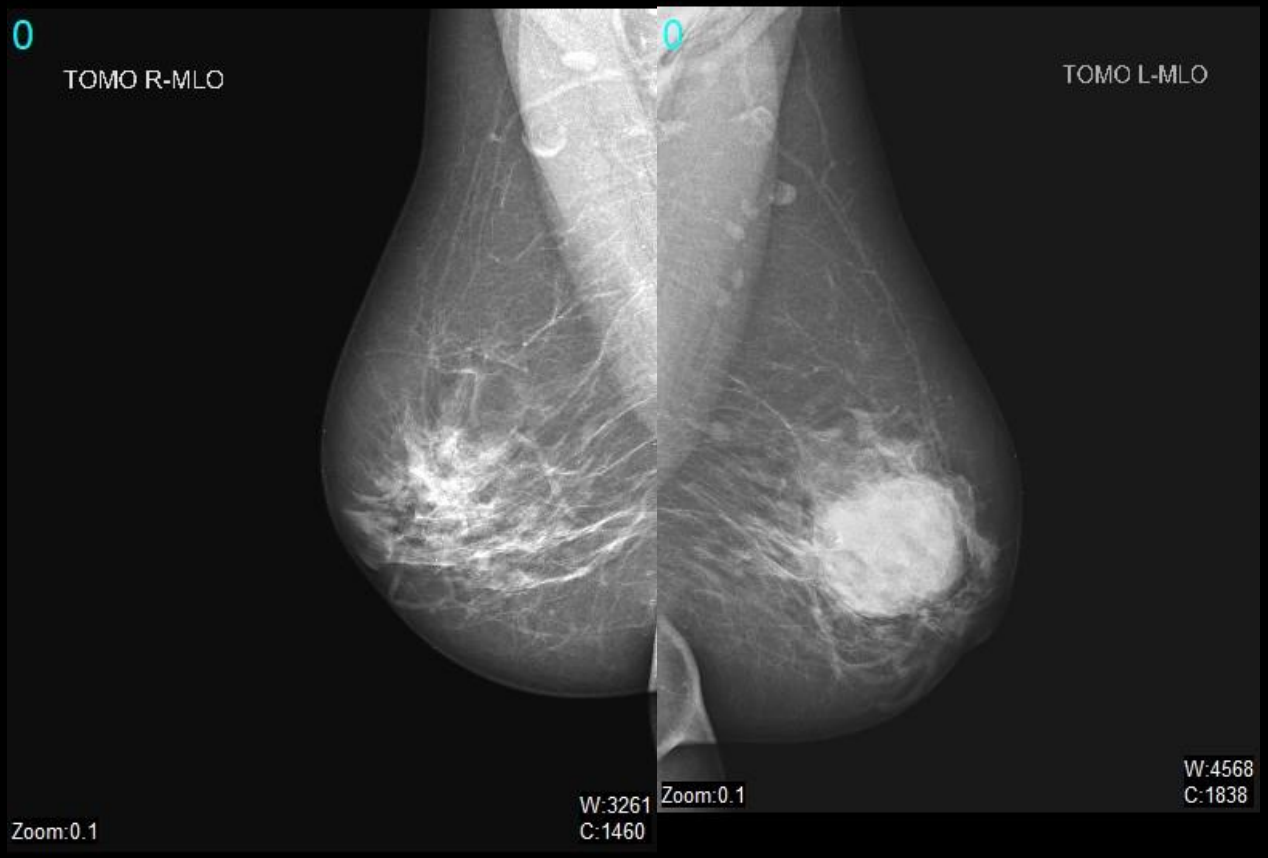
CELLULAR FIBROADENOMA

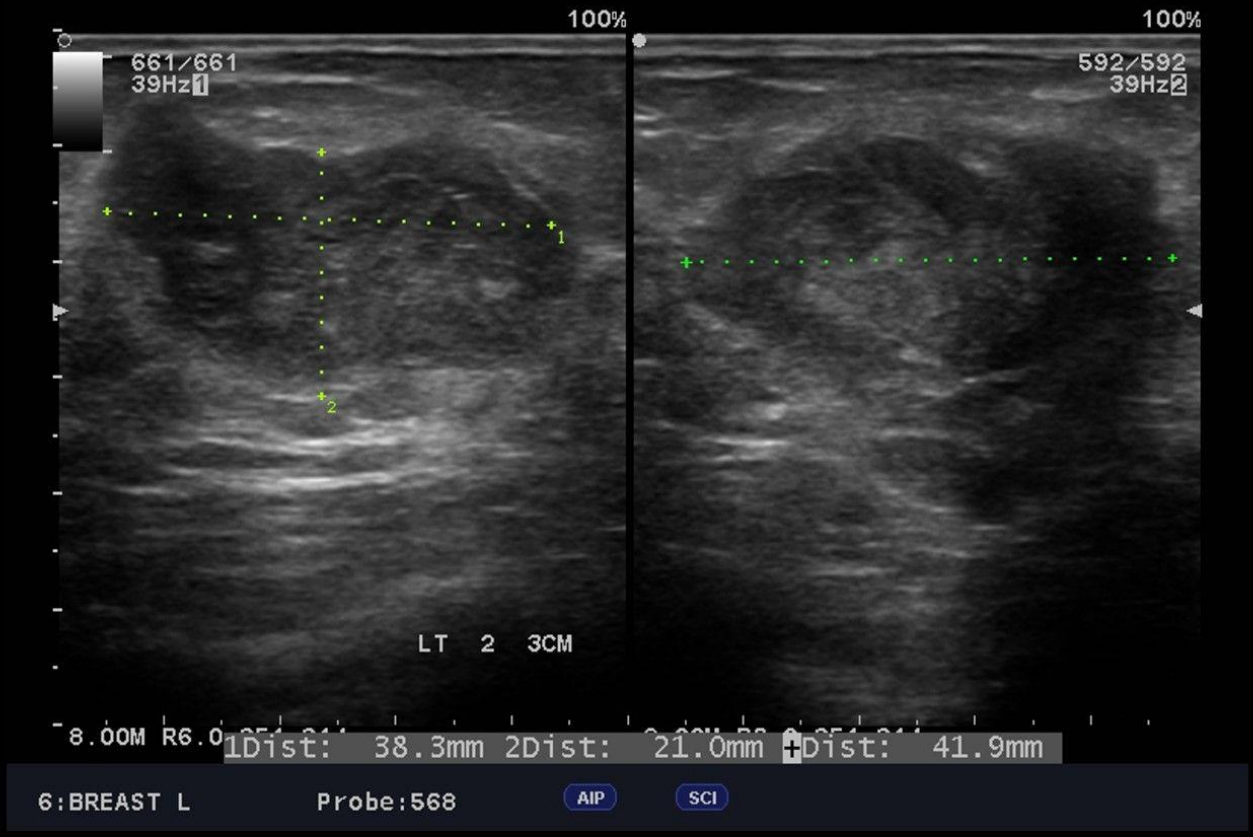

R-MLO
BP:
ST:0.0
4
FOV: 238.0x298.0mm
2800x3506
W:2448
C:1299
Zoom:0.1
FOV: 298.0


L-MLO
100%
100%
L 7/1
1Dist: 30.0mm 2Dist: 17.1mm 3Dist: 28.1mm
2:BREAST L
Probe:568

FIBROADENOSIS


1
R-CC
2
L-CC
Zoom:0.1
W:2969
C:1474
Zoom:0.1
W:4128
C:1900


0
TOMO R-MLO
Zoom:0.1
W:3261
C:1460
0
TOMO L-MLO
Zoom:0.1
W:4568
C:1838


100%
661/661
39Hz1
100%
592/592
39Hz2
LT 2 3CM
8.00M R6.0
1Dist: 38.3mm 2Dist: 21.0mm +Dist: 41.9mm
6:BREAST L
Probe:568
AIP
SCI


62
F52
96%
32/32
17Hz1
5.00M R6.0 G56 C14
6:BREAST L
Probe:568
AIP
SCI

PHYLLOIDES TUMOUR

Well defined fast growing mass with lobulated margins sometimes cystic component – can be malignant

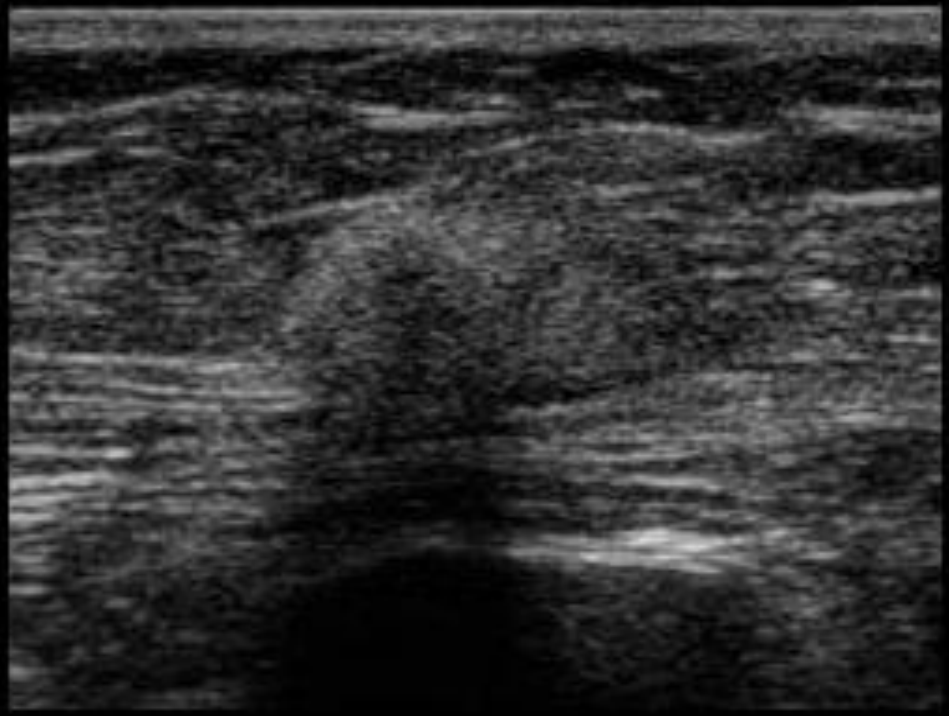
Hypercellular fibromyxoid tumour with large epithelial lined spaces = fern leaf appearance

Possibly hyperchoic malignant lesions

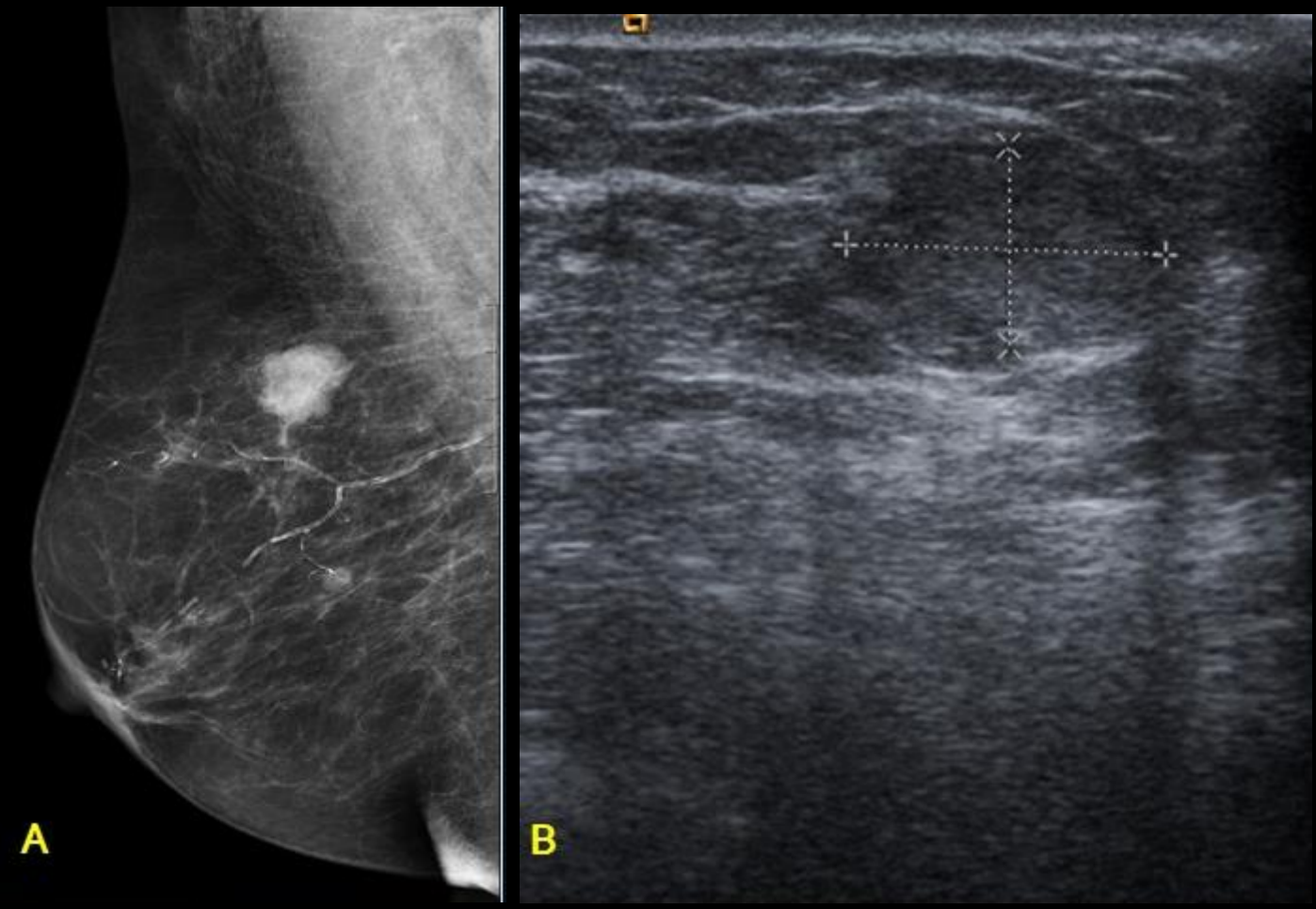
- Invasive ductal carcinoma can be mixed echogenicity
- Mucinous Carcinoma 1-7% ^with age well circumscribed lobular/microlobular mass rarely hyperechoic
- Invasive lobular ca invades parenchyma seperately or in chains ,usually spiculated mass but asymmetric density and architectural disorganisation frequent with no clearly defined mass or hyperchogenicity10 x more frequent in ILC than IDC

Recurrent Ductal carcinoma in Situ


X



Mucinous Carcinoma



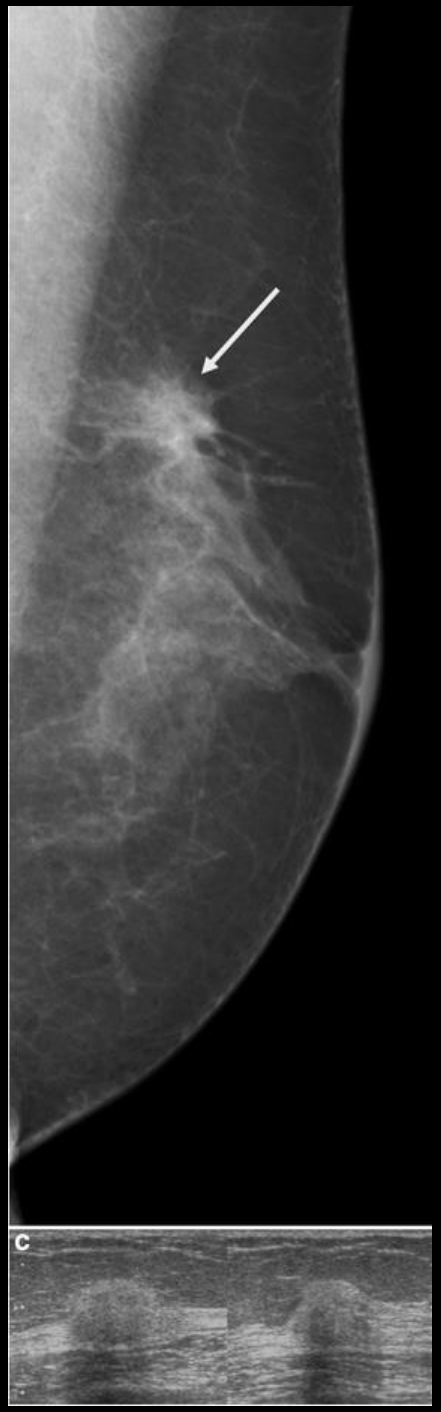
A. Mammogram. Well-circumscribed, dense mass.

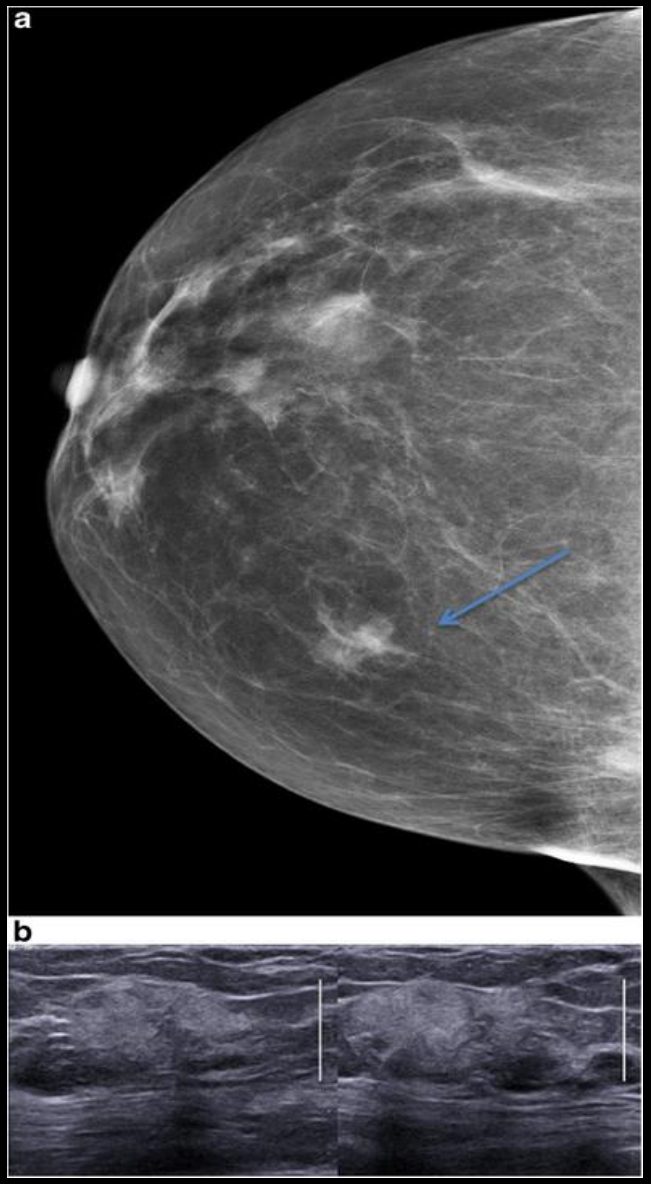
B. US. Predominantly solid lesion with hyperchoic areas.

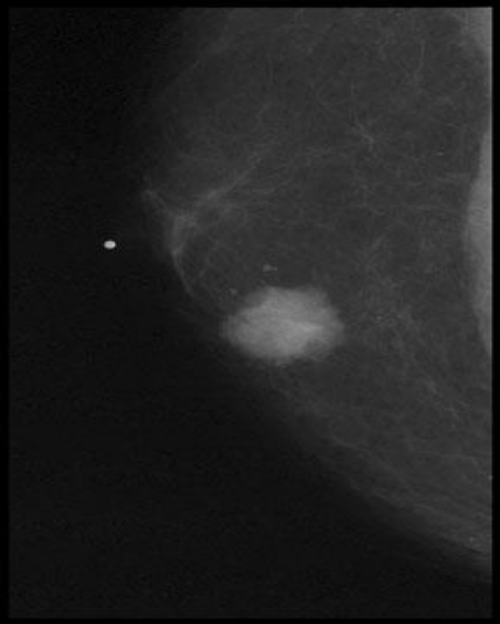
INVASIVE LOBULAR CARCINOMA

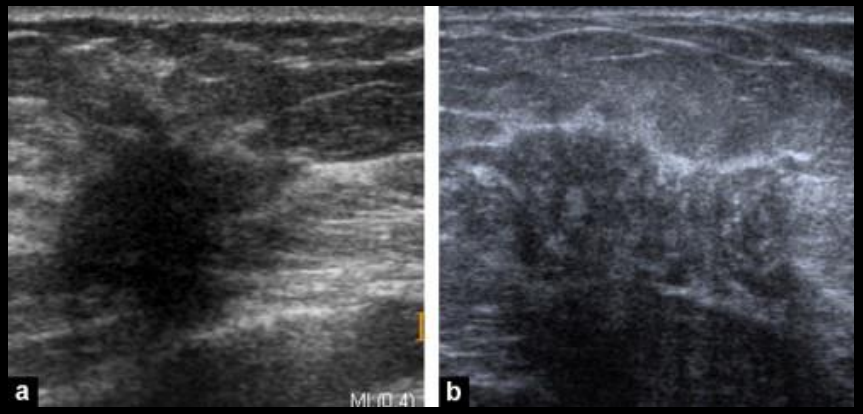
Invasive lobular ca invades parenchyma separately or in chains ,usually spiculated mass but asymmetric density with architectural disorganisation- frequently with no clearly defined mass

Hyperchogenicity10 x more frequent in ILC than IDC


C


a
b

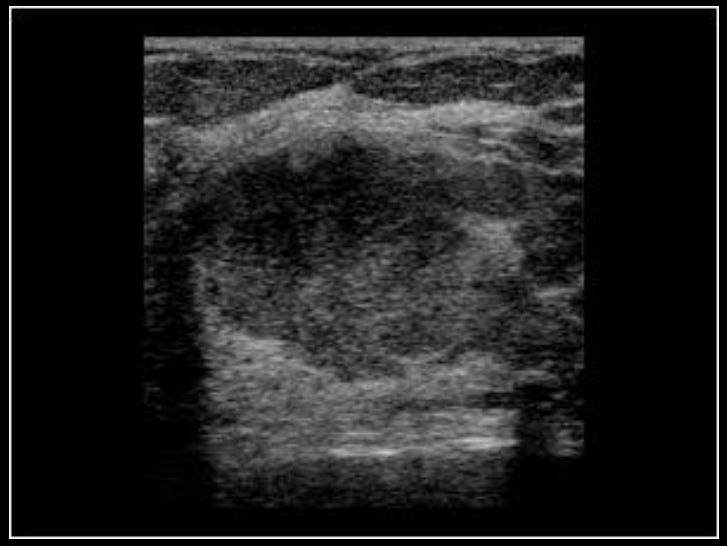



a
b


RIGHT BREAST
10:00 PALP ROI TRANS

- Angiosarcoma
- Metastases- lung,malignant melanoma, ovarian, thyroid, lymphoma and rhabdomyosarcoma . Well circumscribed, non spiculated masses ,can be hyperechoic
- Lymphoma –primary rare, Secondary associated with extra-mammary involvement .Palpable painful mass with local inflammation +nodes. Multiple masses hypochoic , peripheral hyperechogenicity and hypervascular

METASTASES

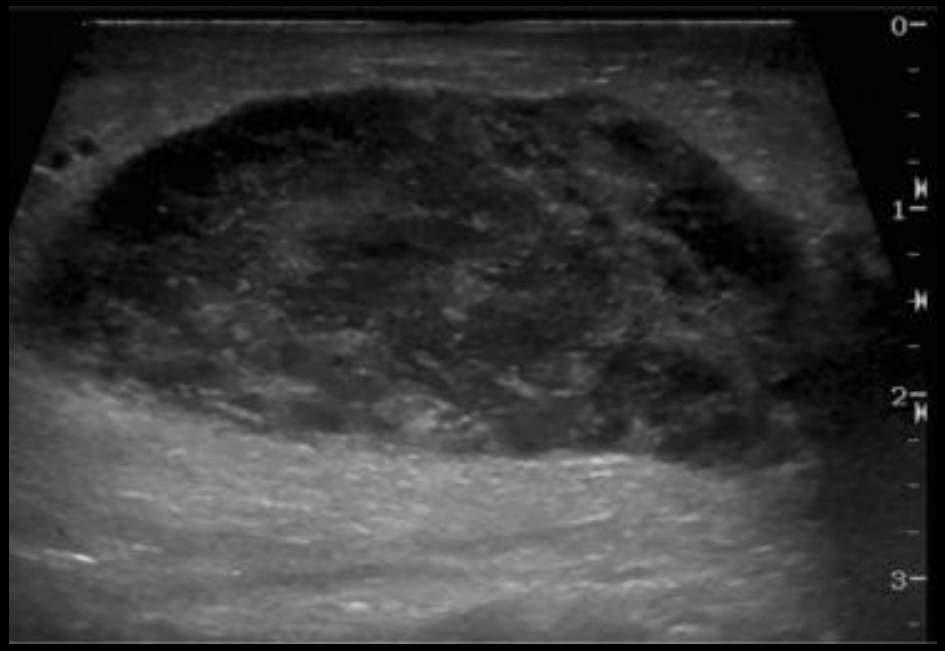


Melanoma metastasis

LYMPHOMA

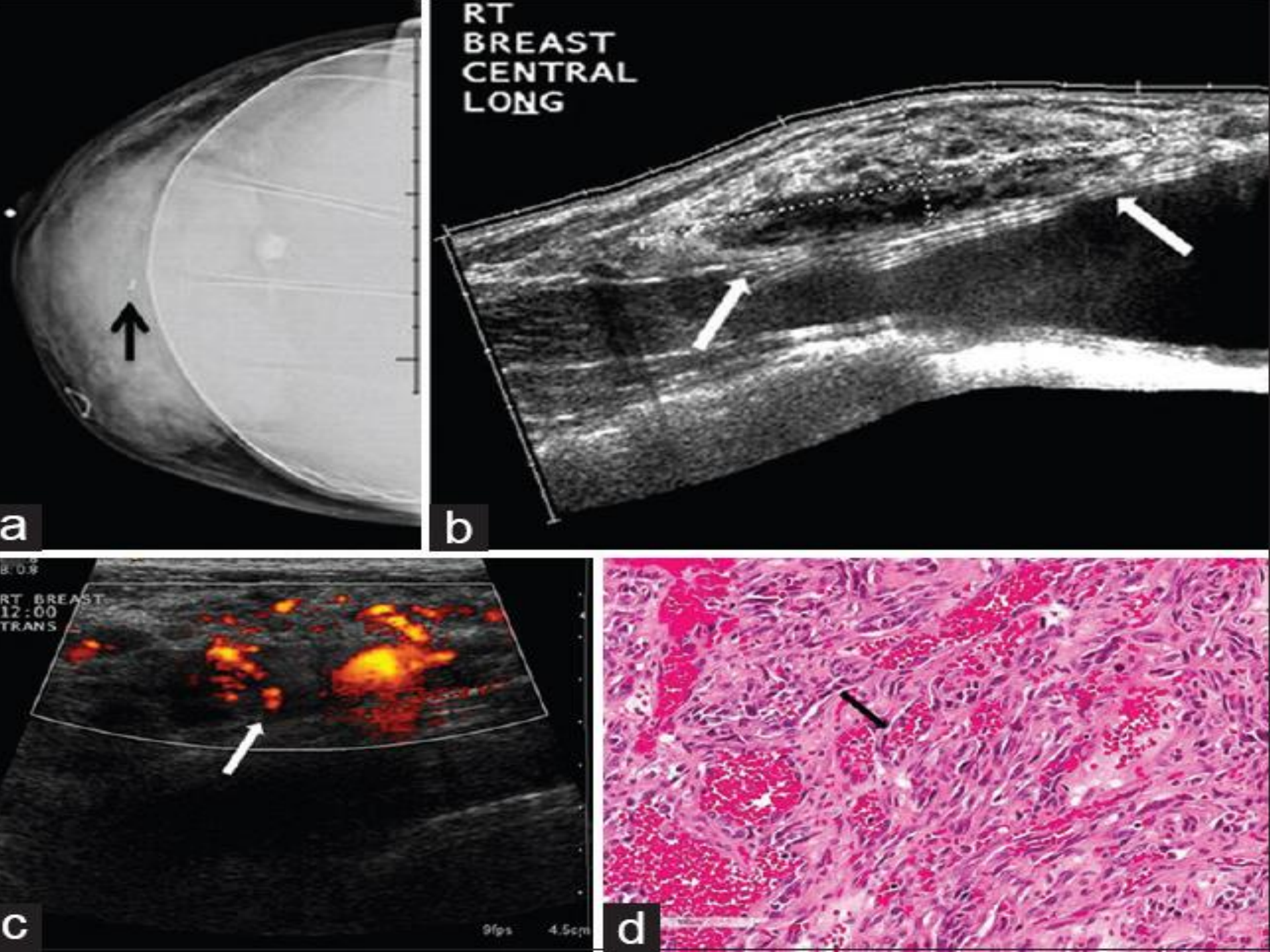
Diffuse B cell

- Lymphoma –primary rare, Secondary associated with extra-mammary involvement .Palpable painful mass with local inflammation +nodes.
- Multiple masses hypochoic , peripheral hyperechogenicity and hypervascular

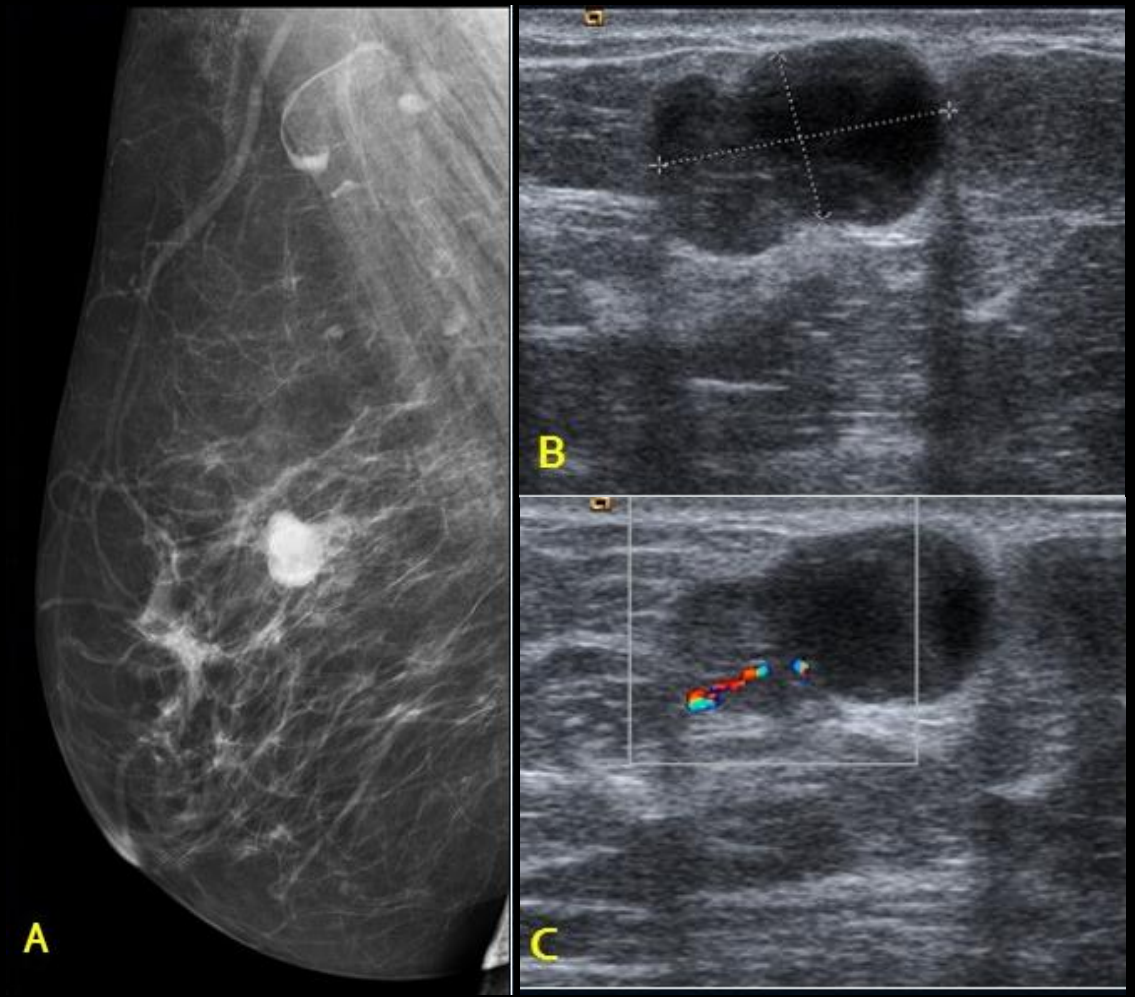

0
1
2
3

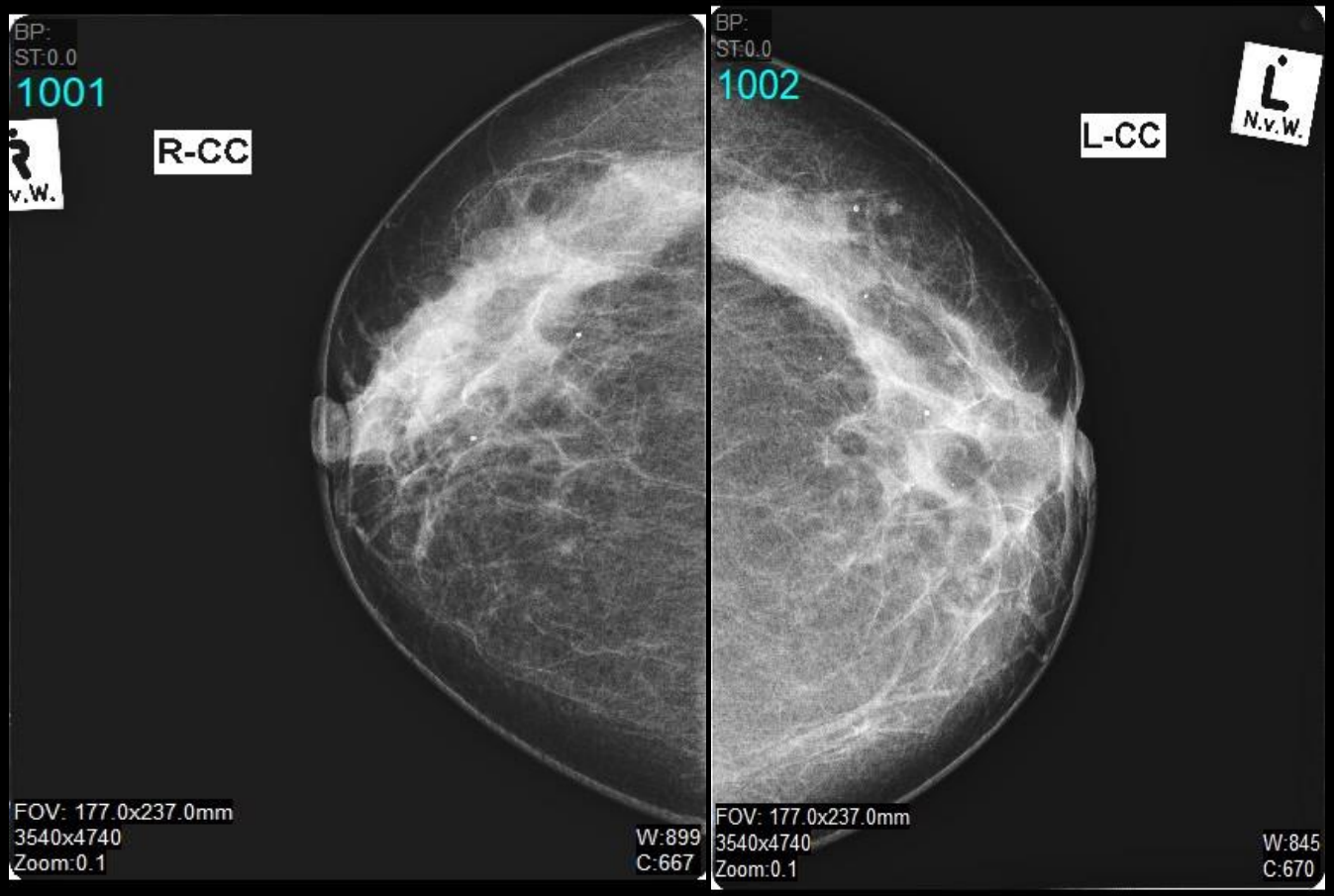
ANGIOSARCOMA

Aggressive malignant tumour
Young woman and in the irradiated breast
Large ill defined hypervascular mass
44% hyperechoic


RT
BREAST
CENTRAL
LONG
a
b
RT BREAST
12:00
TRANS
9fps
4.5cm
c
d

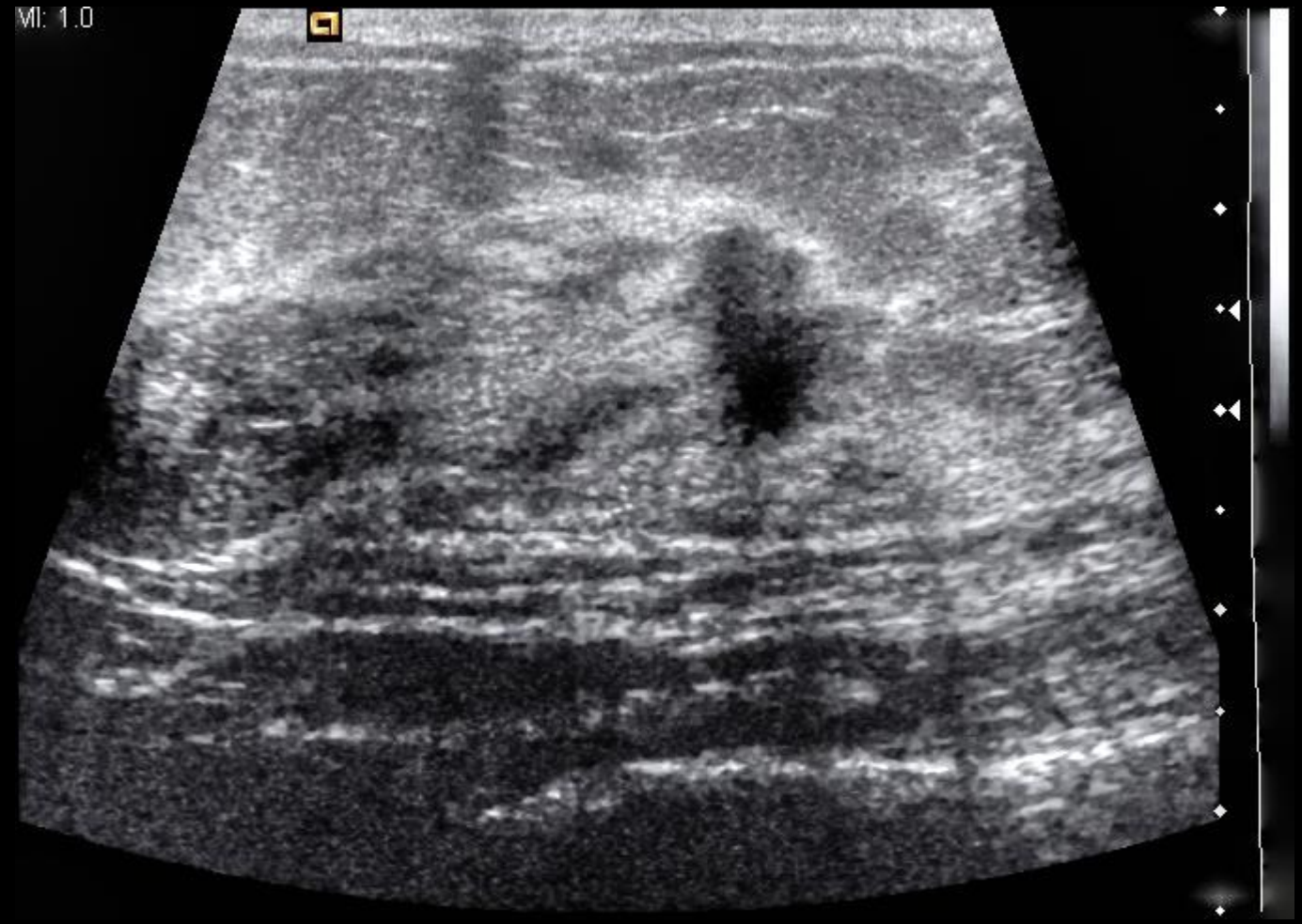
Papillary Carcinoma

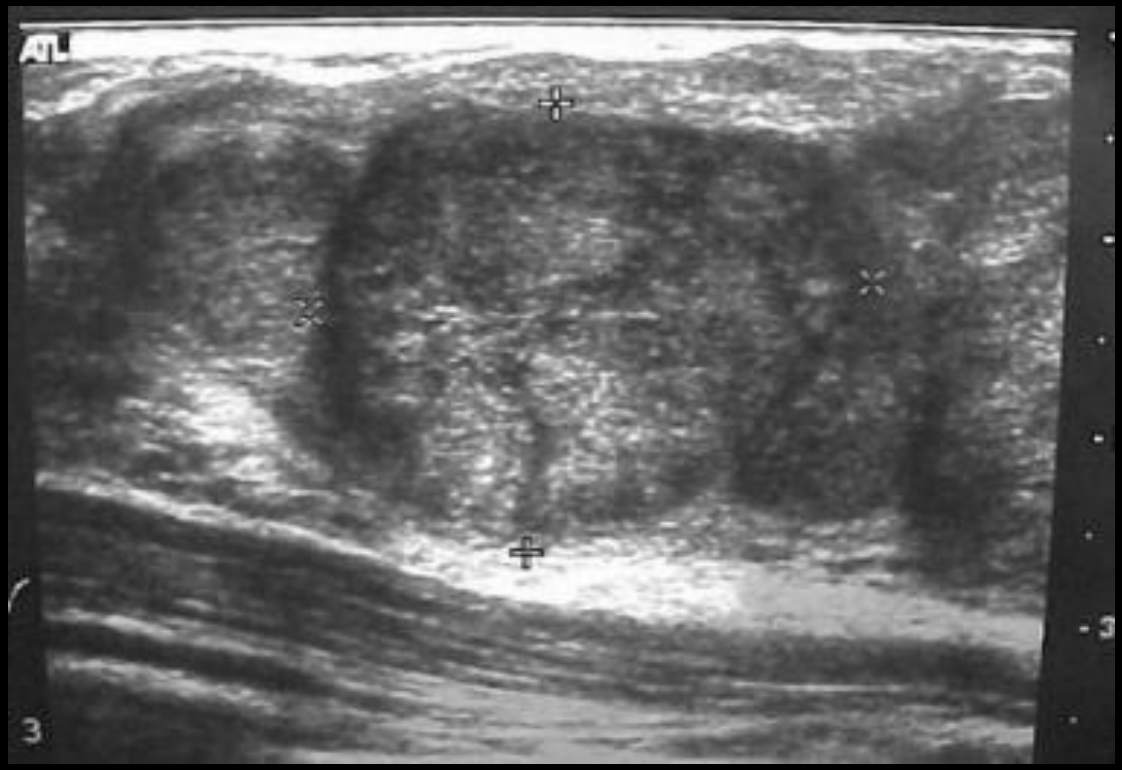



BP:
ST:0.0
1001
R-CC
FOV: 177.0x237.0mm
3540x4740
Zoom:0.1
W:899
C:667
BP:
ST:0.0
1002
L-CC
N.V.W.
FOV: 177.0x237.0mm
3540x4740
Zoom:0.1
W:845
C:670


BP:
ST:0.0
1003
R
N.v.W.
MLO
FOV: 177.0x237.0mm
3540x4740
Zoom:0.1
W:891
C:674
BP:
ST:0.0
1004
L
N.v.W.
MLO
FOV: 177.0x237.0mm
3540x4740
Zoom:0.1
W:861
C:678


100%
RETRO NIP
Dist: 8.1mm
3:BREAST
Probe:568
100%
503/504
32Hz
3:BREAST
Probe:568


MI: 1.0


ATL
3

RHABDOMYOSARCOMA

CONCLUSION

- Most hyperechoic masses are benign but malignant lesions be hyperechoic or of mixed echogenicity.
- Always look for other signs of malignancy , more vertical axis, irregular shape , spiculated margins , posterior acoustic shadowing or hypervascularisation
- Remember the usefulness of ultrasound and the many variables that can effect the efficiency of this modality . Understand the causes and solutions to problems frequently encountered