

POCUS

Point of Care UltraSound

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Disclosures

Radiologist at Pacific
Radiology

Radiologist at Nelson
Marlborough DHB



Ultrasound in Practice

- ▶ POCUS
 - ▶ v's Sonography Specialists – Sonographers and Sonologists
 - ▶ “Extension of clinical exam”
- ▶ When not done well.....
- ▶ What it may be useful for in GP/NP practice
- ▶ When to order US – MSK etc

Point of Care.

- ▶ Emergency Department – FAST, FBs, iv access
 - ▶ Extending to abdominal and pelvic?
- ▶ General Practice – GP, NPs
- ▶ Surgical Outpatients – vascular, breast, endocrine
- ▶ Mobile CNS/NP?
- ▶ Anaesthetics – i.v. access, nerve blocks

POCUS – Scope of Practice

- ▶ What body sites should be scanned in your practice?
- ▶ Who to do it? Few or all?
- ▶ How to get training and experience? Courses....
- ▶ Regulation – none, self
 - ▶ ED review session, College based regulation (ED/Surg)
- ▶ Accreditation – none (not just certificate from course)
- ▶ Ongoing QC
- ▶ Image review
- ▶ Images taken/stored?

Courses....

- ▶ The course includes over eight hours of hands-on scanning. Topics covered will include a History of Bedside Ultrasound, Physics and Instrumentation, FAST, Female Pelvis, Procedural, AAA, Renal, Hepatobiliary, DVT, IVC, Thoracic, QA issues, and virtually an entire day dedicated to Echocardiography.
- ▶ GENA718 Generalist Medical Ultrasound – 1 yr distance learning with 3 x 3 day residential periods
- ▶ These workshops are designed for clinician's with entry level to intermediate level scanning abilities. Our experienced faculty will provide two days of hands on scanning to gain extra confidence. – 6 hours of practical scanning sessions

Courses.....

- ▶ Gold Coast
 - ▶ ASUM accreditation
 - ▶ College accreditation
- ▶ FAST courses – college accreditation
 - ▶ Practice ***in scope***
 - ▶ Keep images and review with others – SMO/radiology
 - ▶ Ongoing revision

Sonographer Training

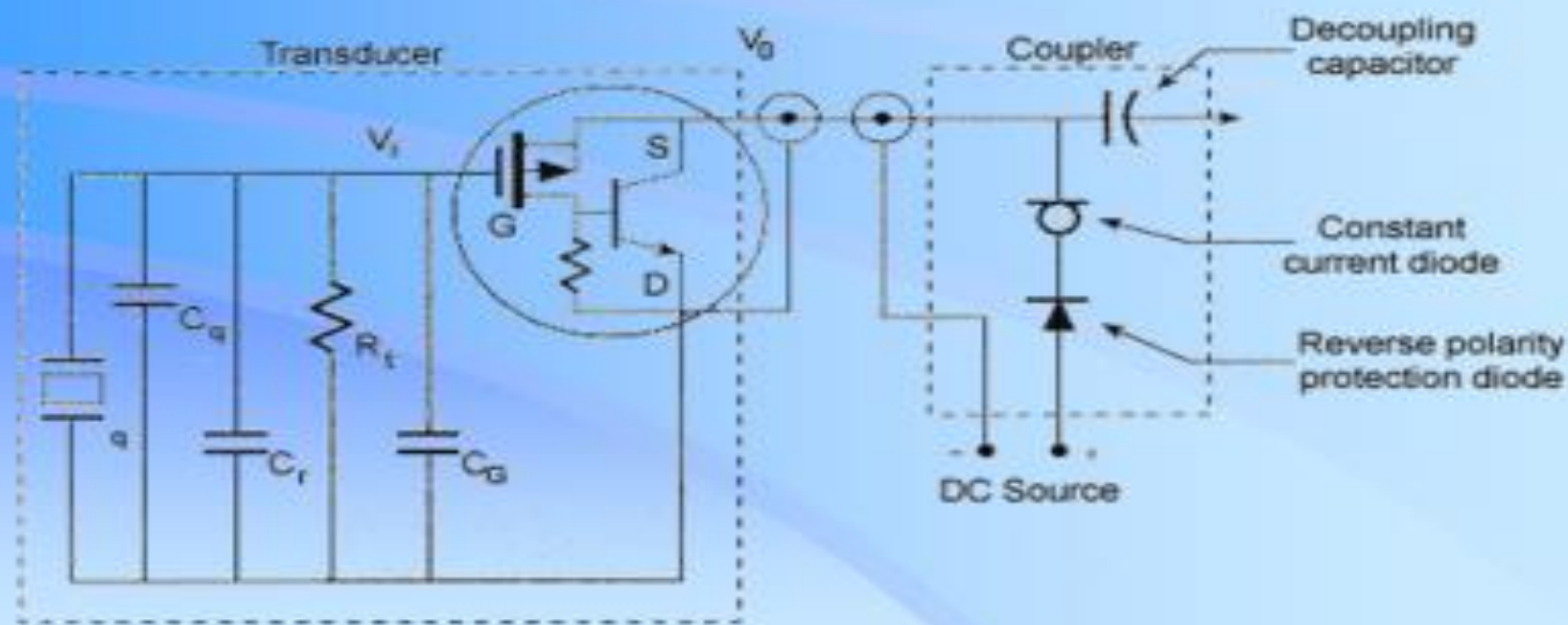
- ▶ 3 Years
- ▶ ASUM/NZMITB
- ▶ Anatomy and Physics
- ▶ Supervision
- ▶ Scrutiny
- ▶ Record Images
- ▶ Experience – 1000s of scans

Sonographer Training

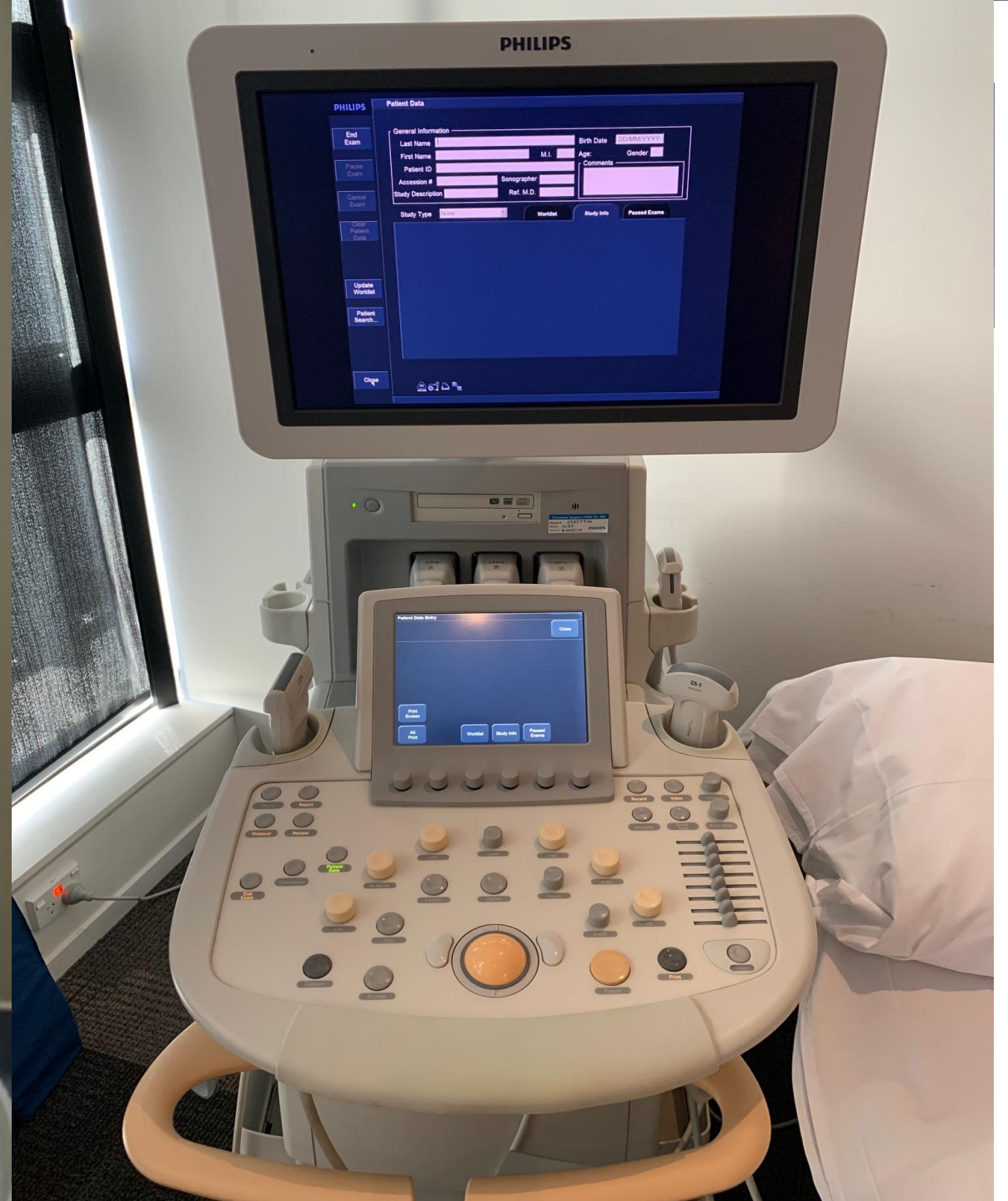
- ▶ 3 Years
- ▶ ASUM/NZMITB
- ▶ Anatomy and Physics
- ▶ Supervision
- ▶ Scrutiny
- ▶ Record Images
- ▶ Experience – 1000s of scans
- ▶ Nature of Ultrasound - still don't get right all the time.....

Physics of Ultrasound

$$\frac{V_o}{V_{in}} = \frac{2\pi f (TC)}{\sqrt{1 + [2\pi f (TC)]^2}} \quad \frac{1}{2\pi f (TC)} \cong 80 \sqrt{\frac{V_{in} - V_o}{V_{in}}}$$







Oops...

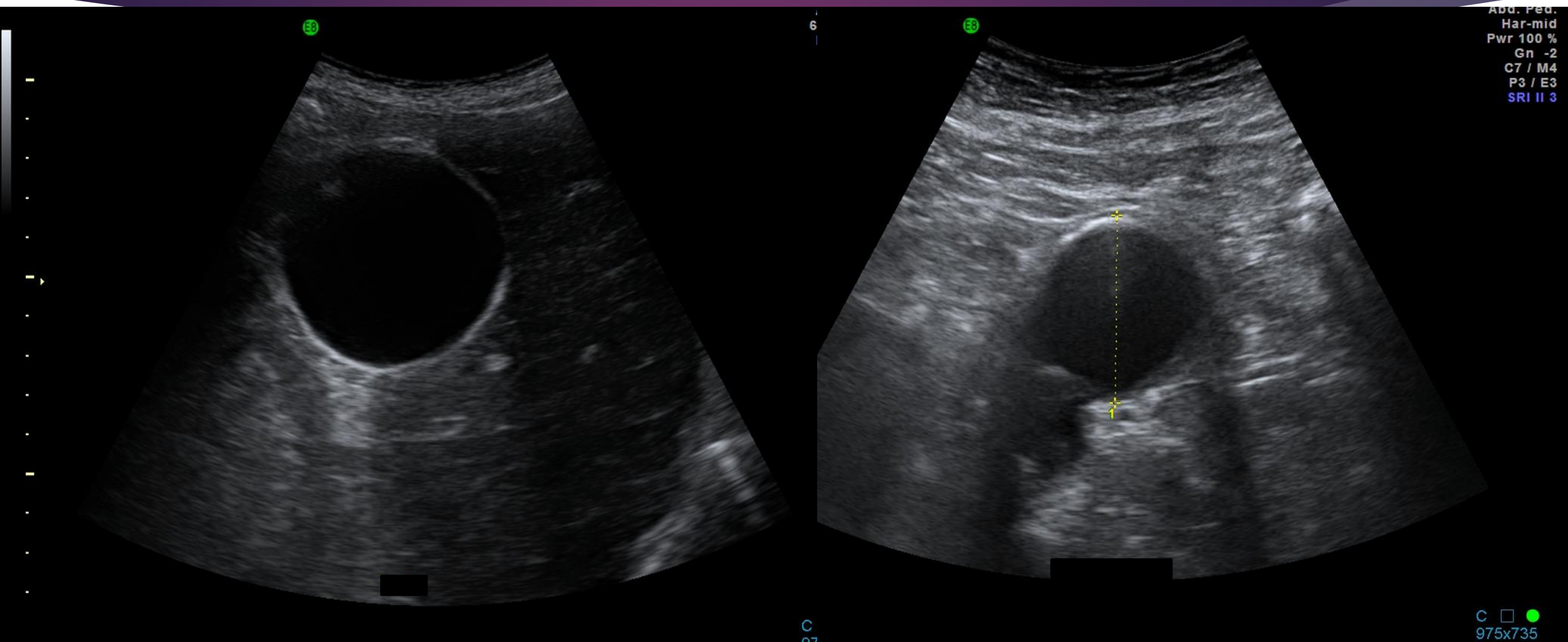
POCUS bloopers

- ▶ Main reasons for mistakes
- ▶ Learning curve
 - ▶ Registrar v SMO
 - ▶ All levels
- ▶ Outside scope
 - ▶ Abdominopelvic US
- ▶ Anatomy – what should be there
- ▶ Ultrasound Artifacts

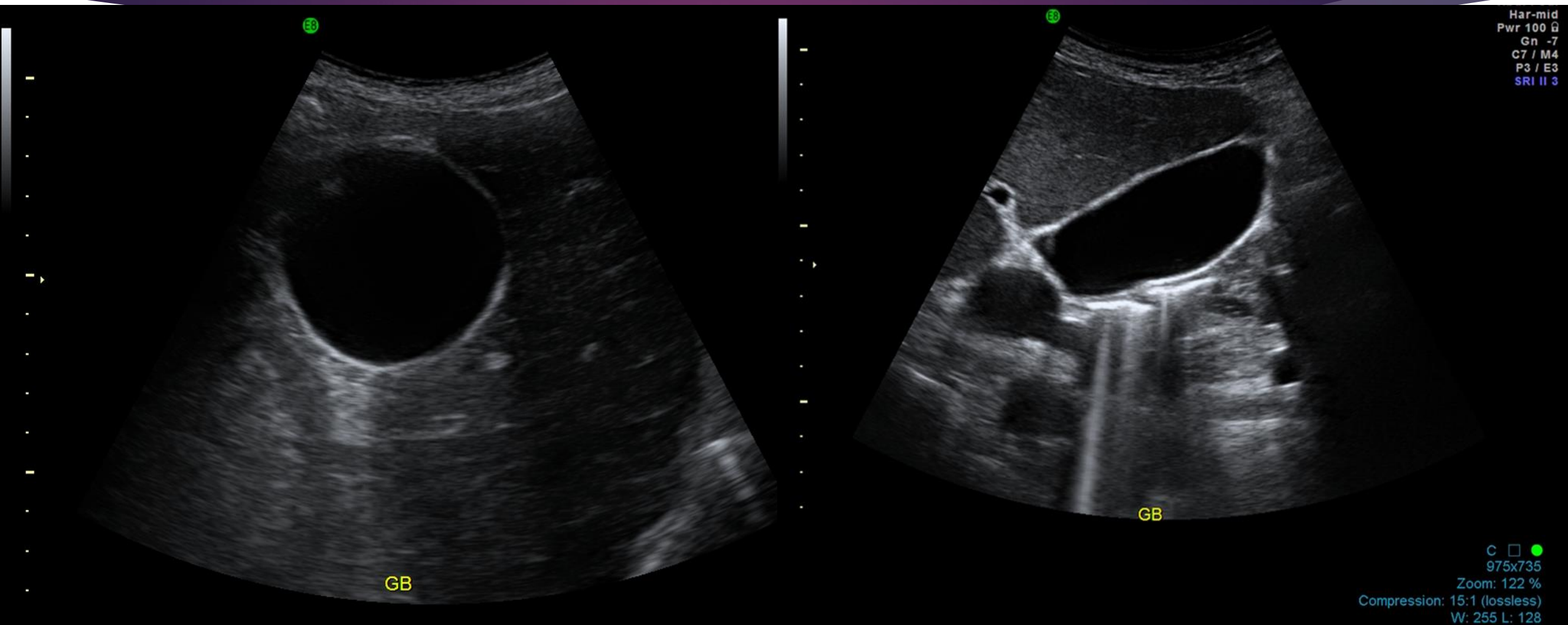
Oops.....

- ▶ Aorta – gall bladder
- ▶ Ectopic – intrauterine
- ▶ Classic free fluid- FAST
- ▶ Lymph node – thrombus
- ▶ Gall stones – there or not
- ▶ FBs - gas in wound
- ▶ Ovarian mass – “ovary not seen”

Aorta, not aorta....



Aorta, not aorta....



Ectopic?

- ▶ 25 yo pregnant with abdominal pain
- ▶ ED US - live intrauterine pregnancy
- ▶ D/w O+G – need repeat scan
- ▶ Delay in check scan - reassured by ED US findings

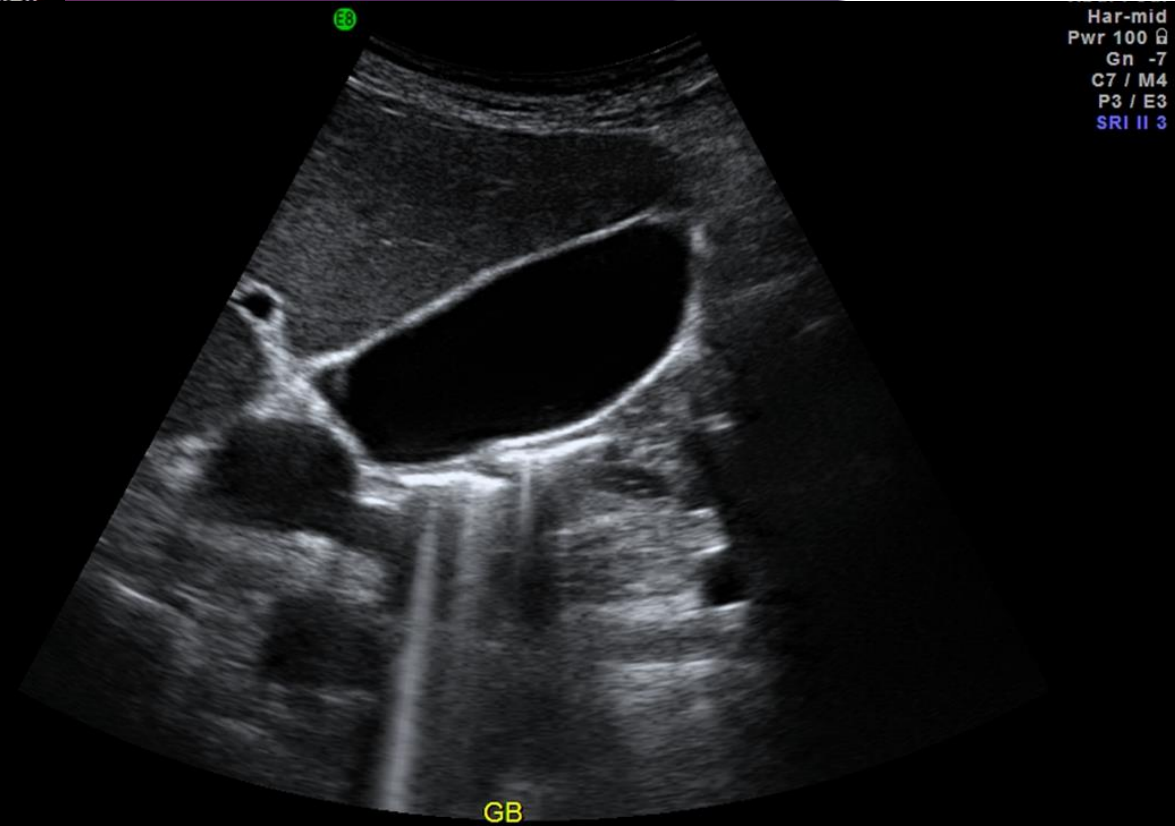
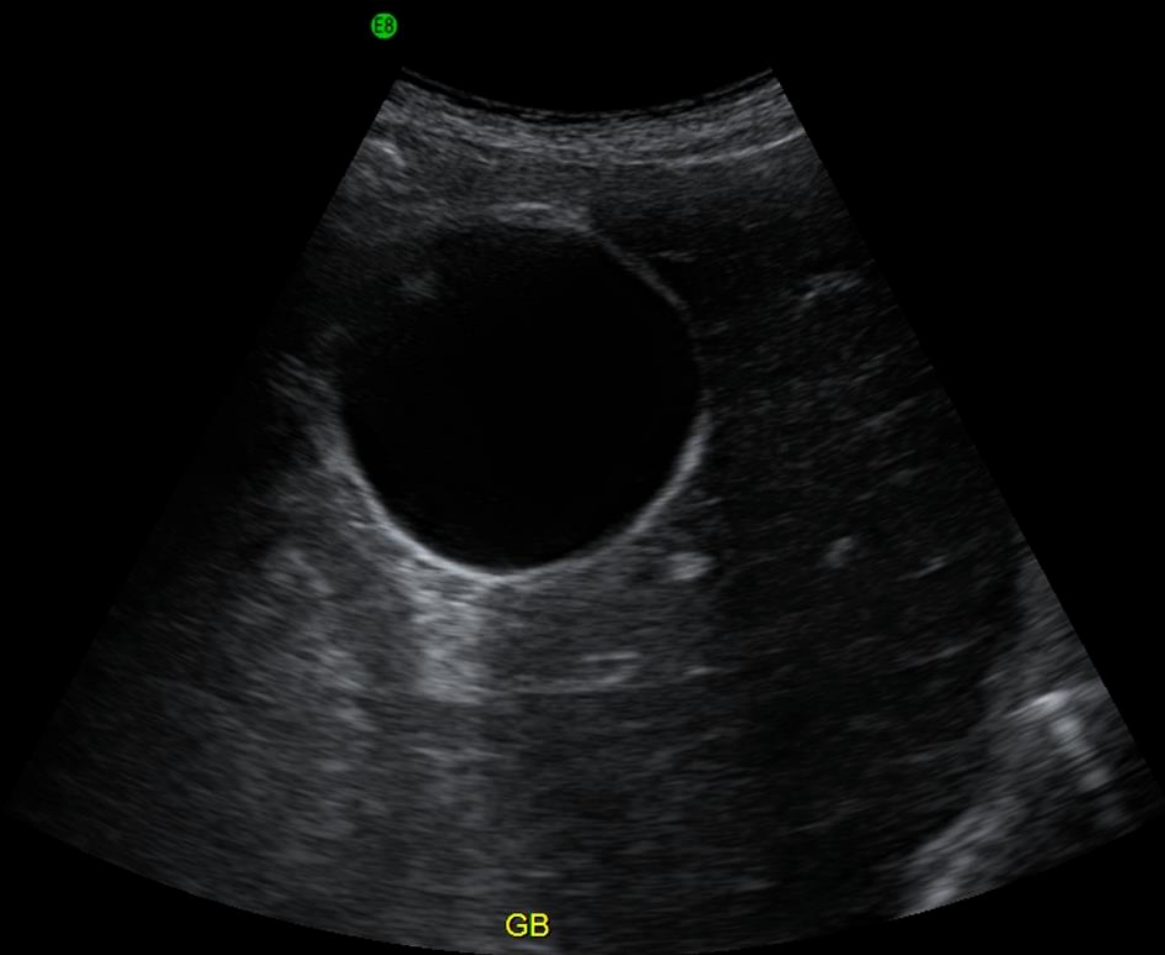
Ectopic?

- ▶ 25 yo pregnant with abdominal pain
- ▶ ED US - live intrauterine pregnancy
- ▶ D/w O+G – need repeat scan
- ▶ Delay in check scan - reassured by ED US findings
- ▶ Ectopic pregnancy – ED had not identified Uterus separately
 - ▶ Moderate volume of free fluid

Gallstones?

- ▶ Multiple episodes from ED
- ▶ Recent from Blenheim
- ▶ GP referral for abdo US for pain
 - ▶ In practice US, no gallstones, normal GB
 - ▶ ? Other cause for pain

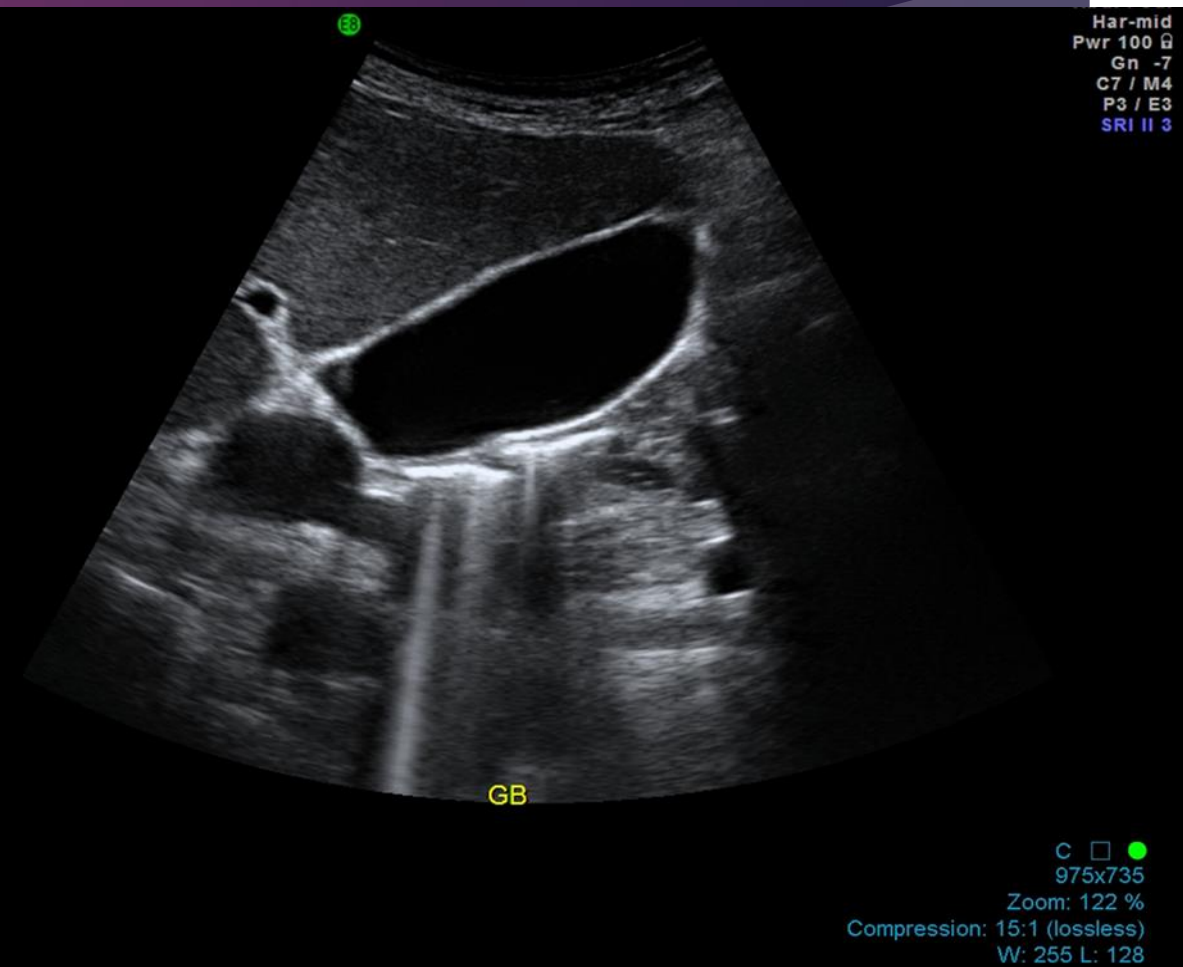
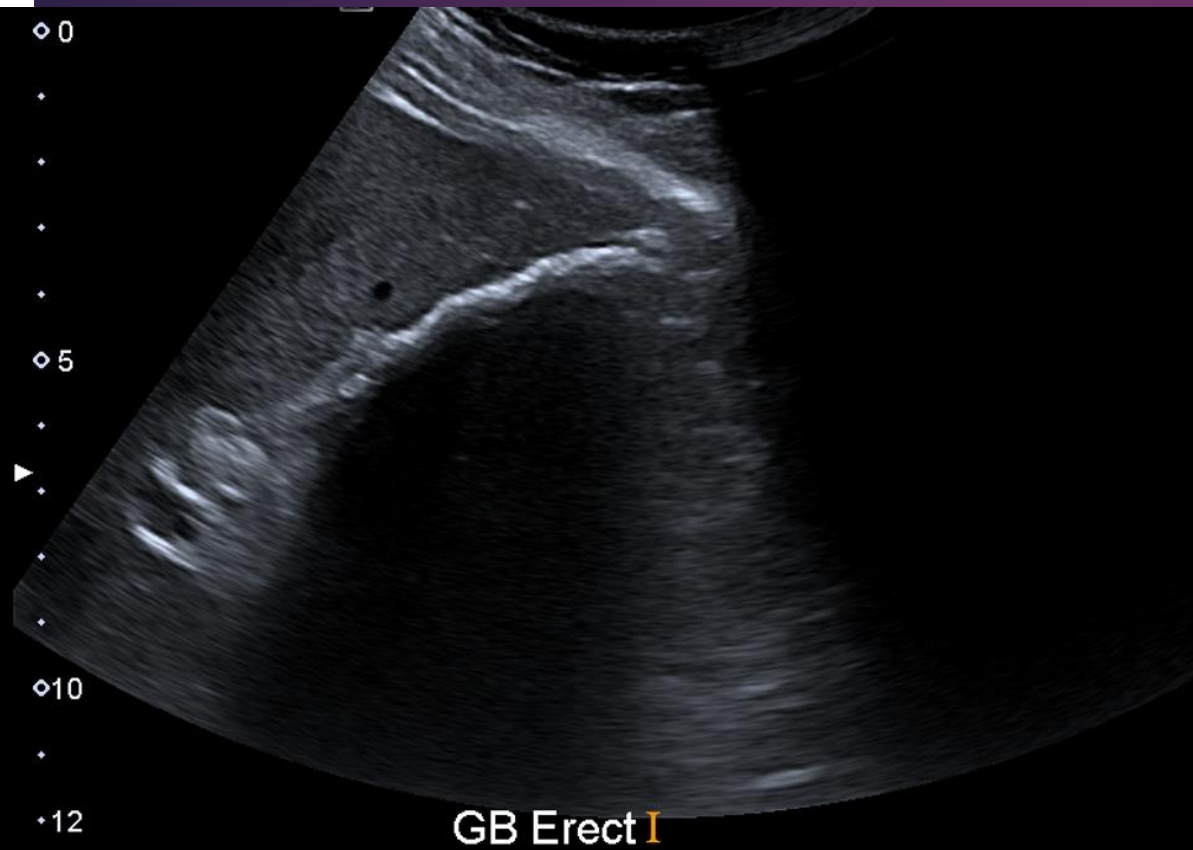
Normal Gall Bladder



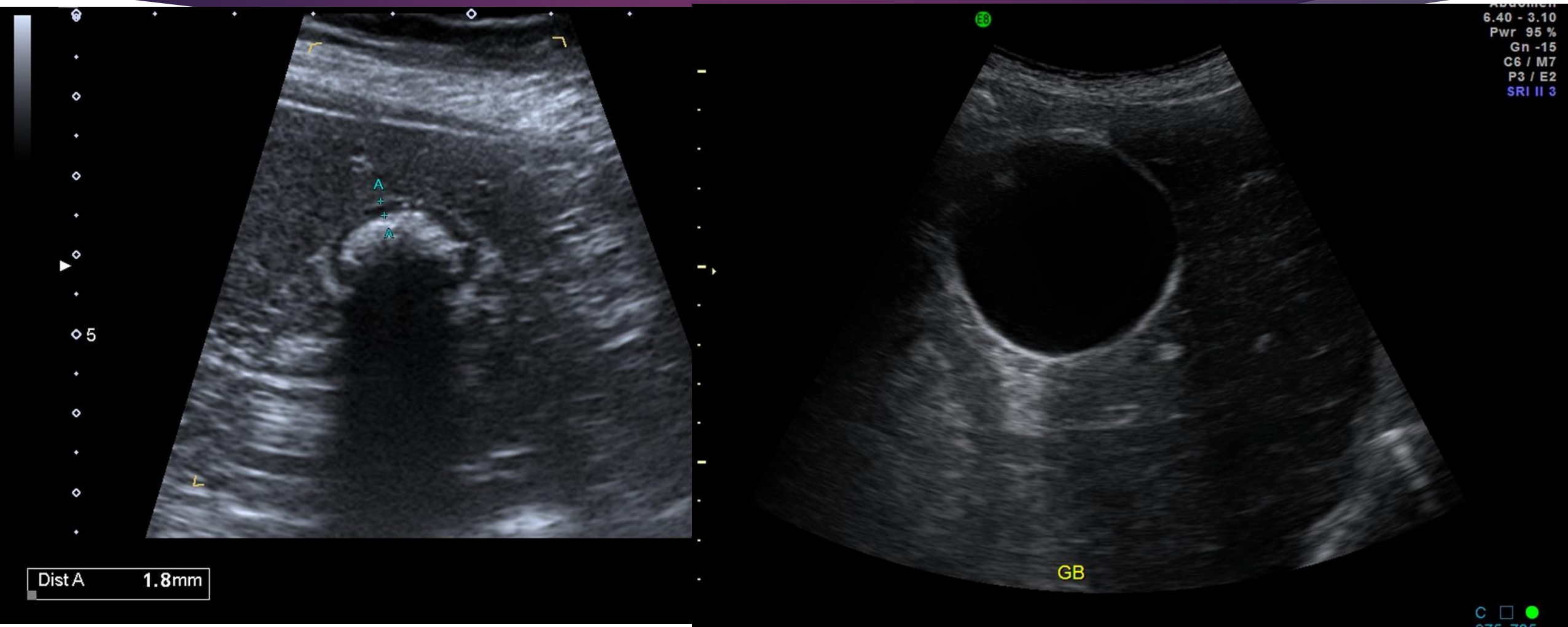
Har-mid
Pwr 100 dB
Gn -7
C7 / M4
P3 / E3
SRI II 3

C ☐ ☒
975x735
Zoom: 122 %
Compression: 15:1 (lossless)
W: 255 L: 128

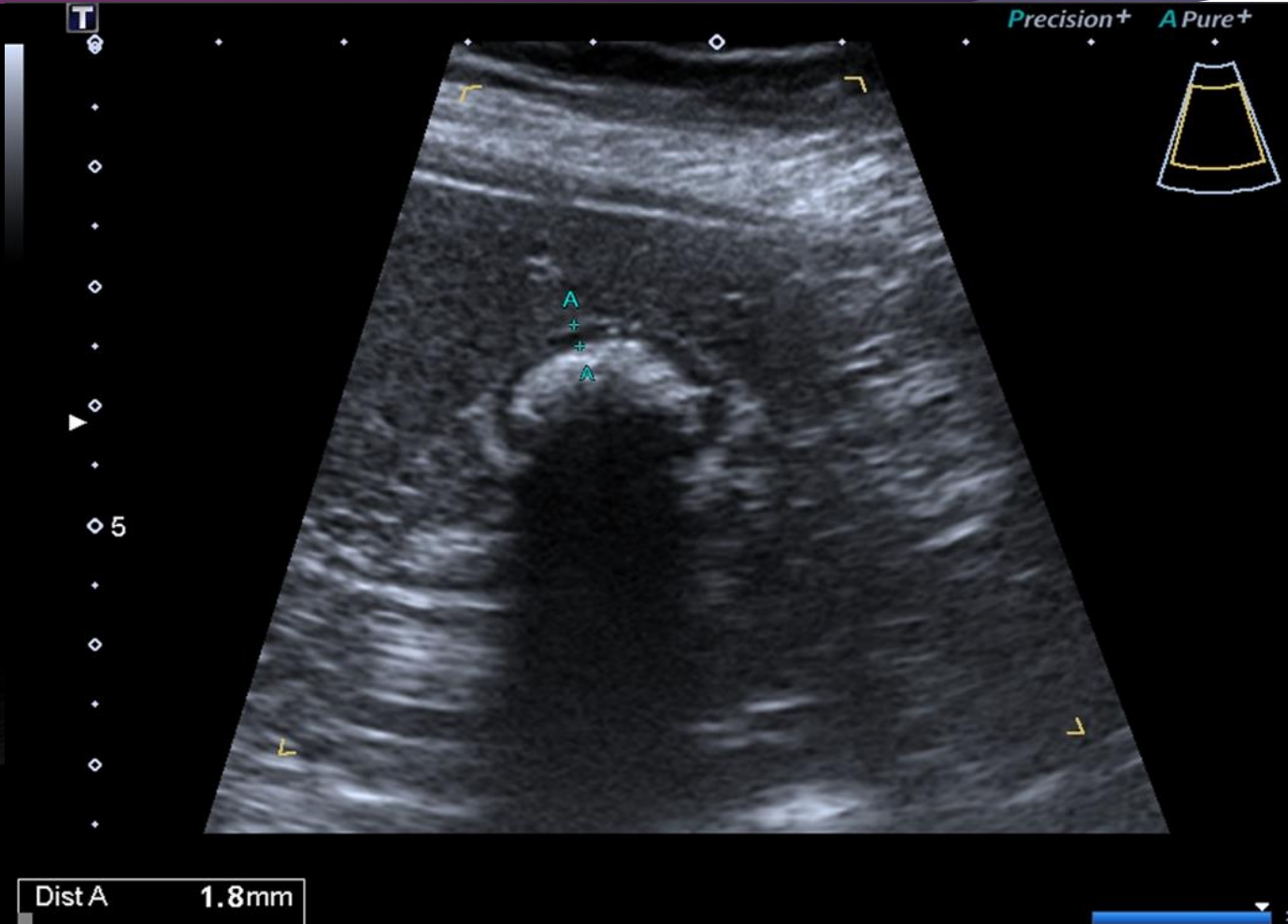
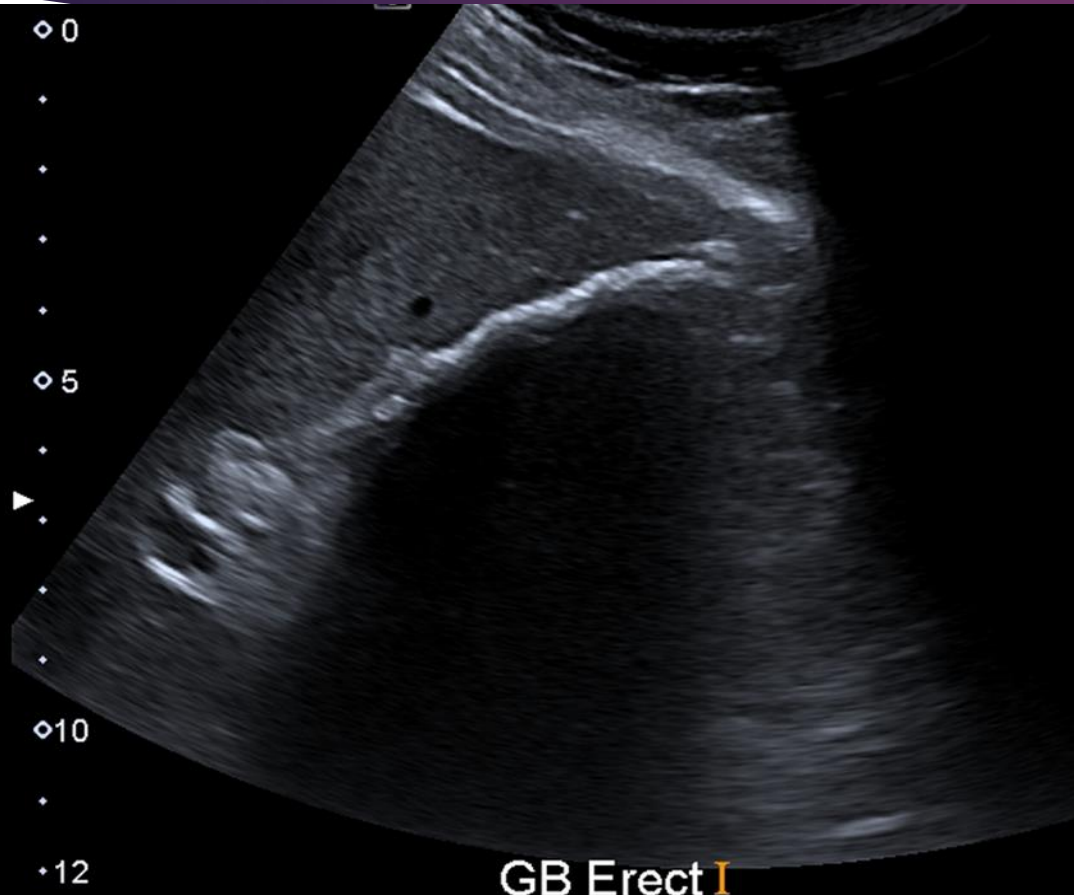
What we found...



Wall-Echo-Shadow Sign



Chronic Cholecystitis – Wall-Echo-Shadow



What did they see??

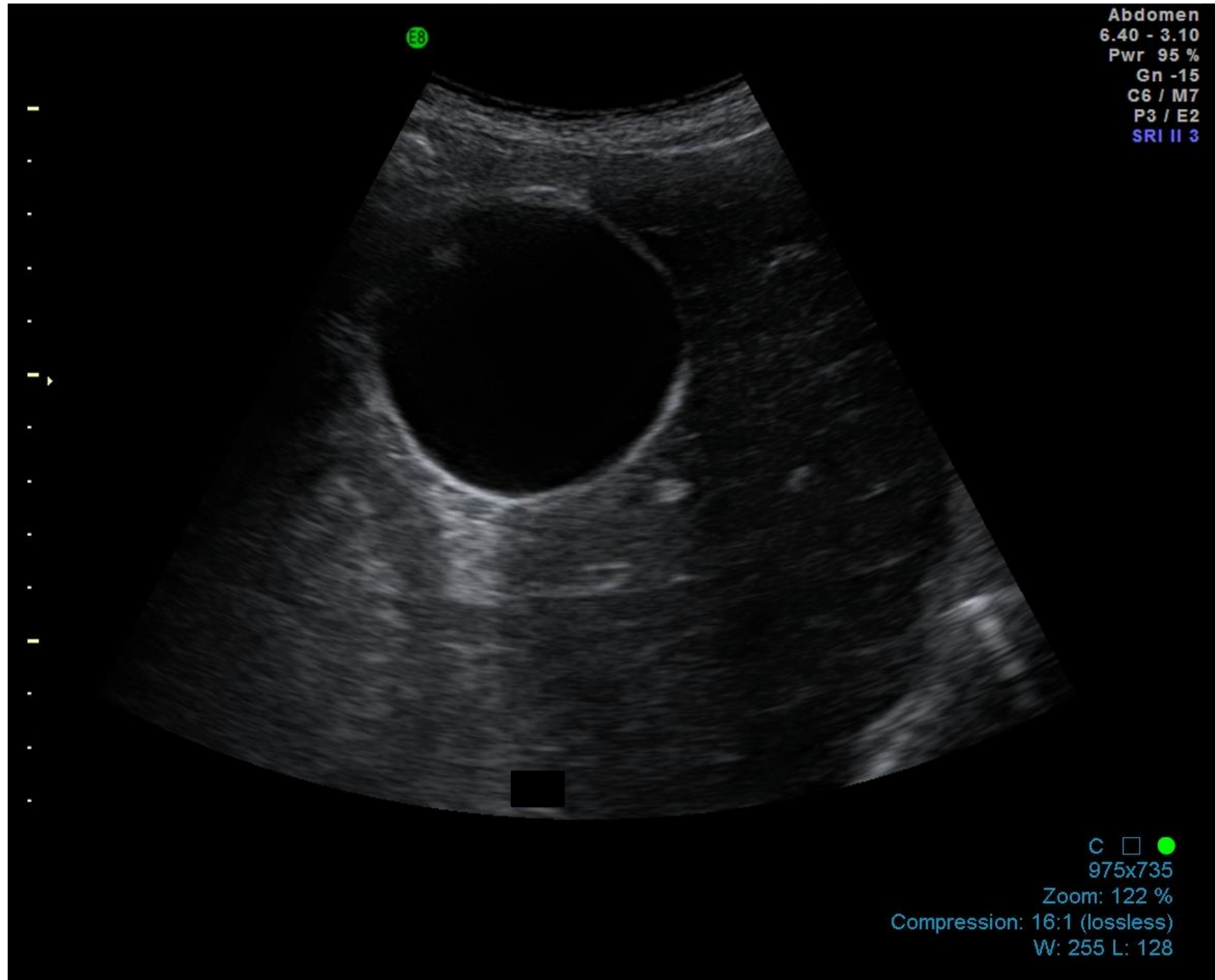
- ▶ Images kept?
- ▶ Review discordants - with who?
- ▶ Was referred on – for correct reasons?

Oops.....

- ▶ Aorta – gall bladder
- ▶ Ectopic – intrauterine
- ▶ Gall stones – there or not
- ▶ Classic free fluid- FAST
- ▶ Lymph node – thrombus
 - ▶ ED referral – “Proximal DVT found. Please complete scan”
 - ▶ Leg with cellulitis and lymphadenopathy
- ▶ FBs - gas in wound
- ▶ Ovarian mass – “ovary not seen”

Problem.... coming into ultrasound

- ▶ Don't know what you see
- ▶ Don't know what you don't see
- ▶ Don't know what should be there....

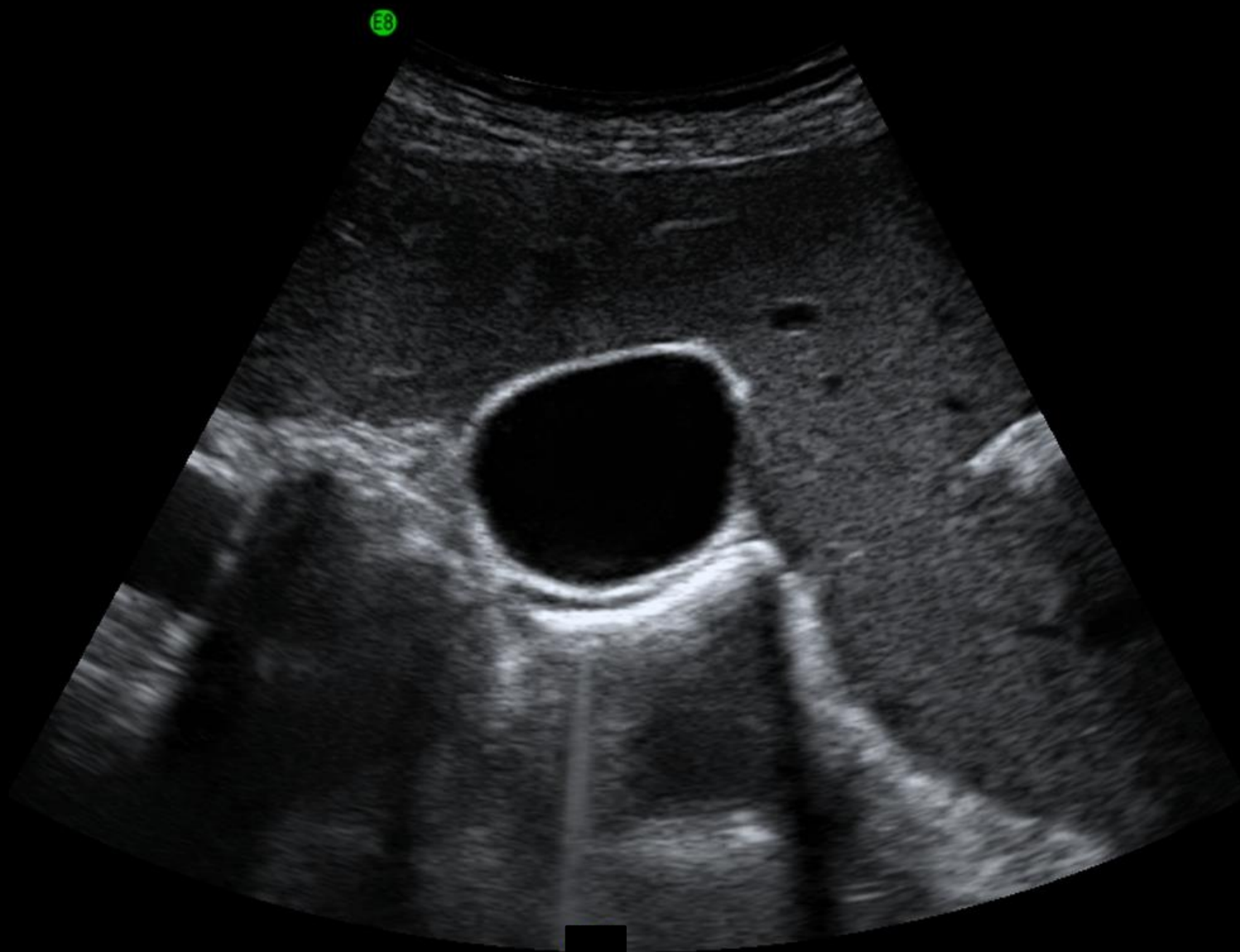


E8

Abdomen
6.40 - 3.10
Pwr 95 %
Gn -15
C6 / M7
P3 / E2
SRI II 3

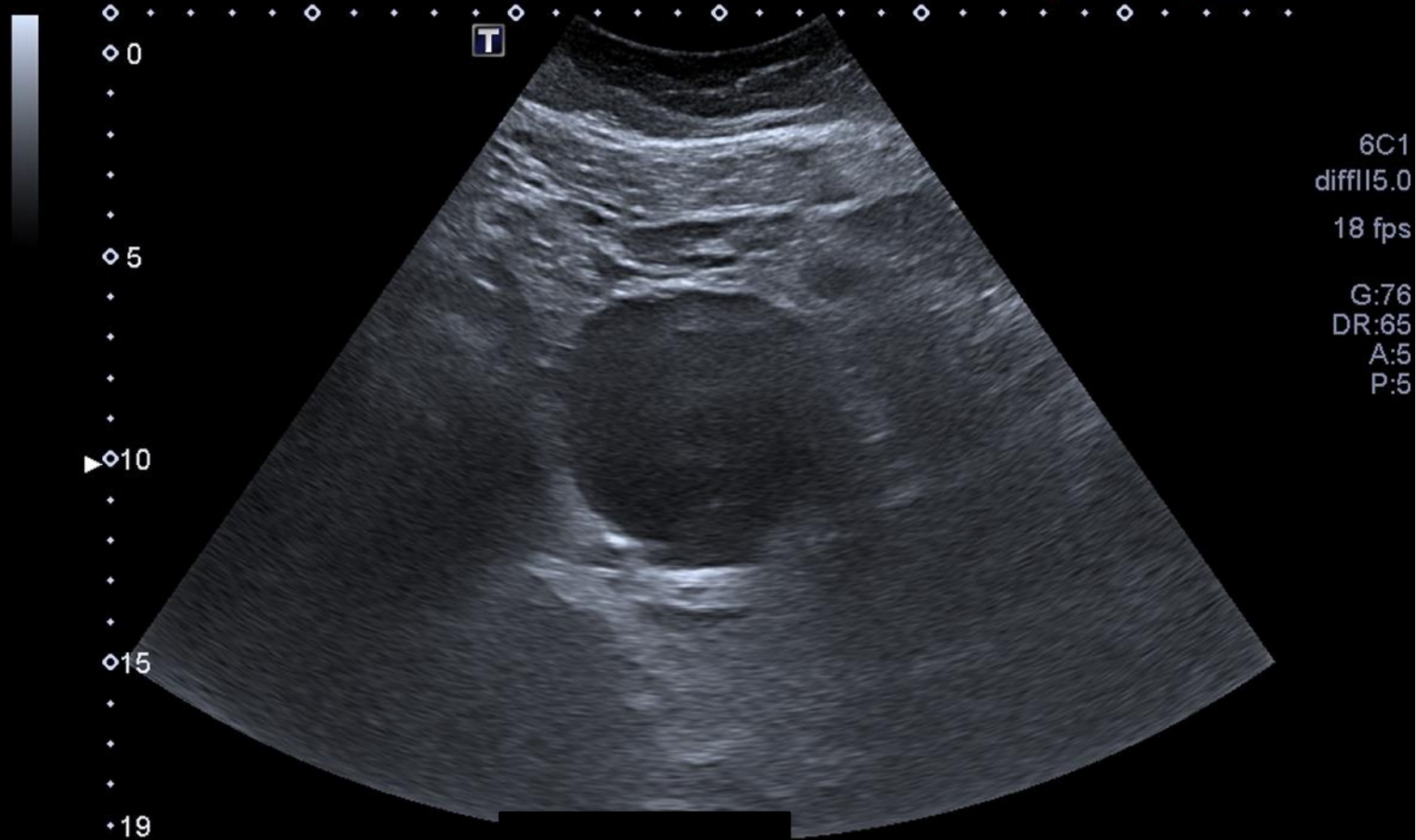
C ☐ ●
975x735
Zoom: 122 %
Compression: 16:1 (lossless)
W: 255 L: 128

Abd. Ped.
Har-mid
Pwr 100 Q
Gn -7
C7 / M4
P3 / E3
SRI II 3



C ■ ●
975x735
Zoom: 122 %
Compression: 14:1 (lossless)
W: 255 L: 128

Precision A Pure+



6C1
diff115.0
18 fps

G:76
DR:65
A:5
P:5

156

C ☐ ☒
960x720

Zoom: 124 %

Compression: 11:1 (lossless)

W: 255 L: 128

E8

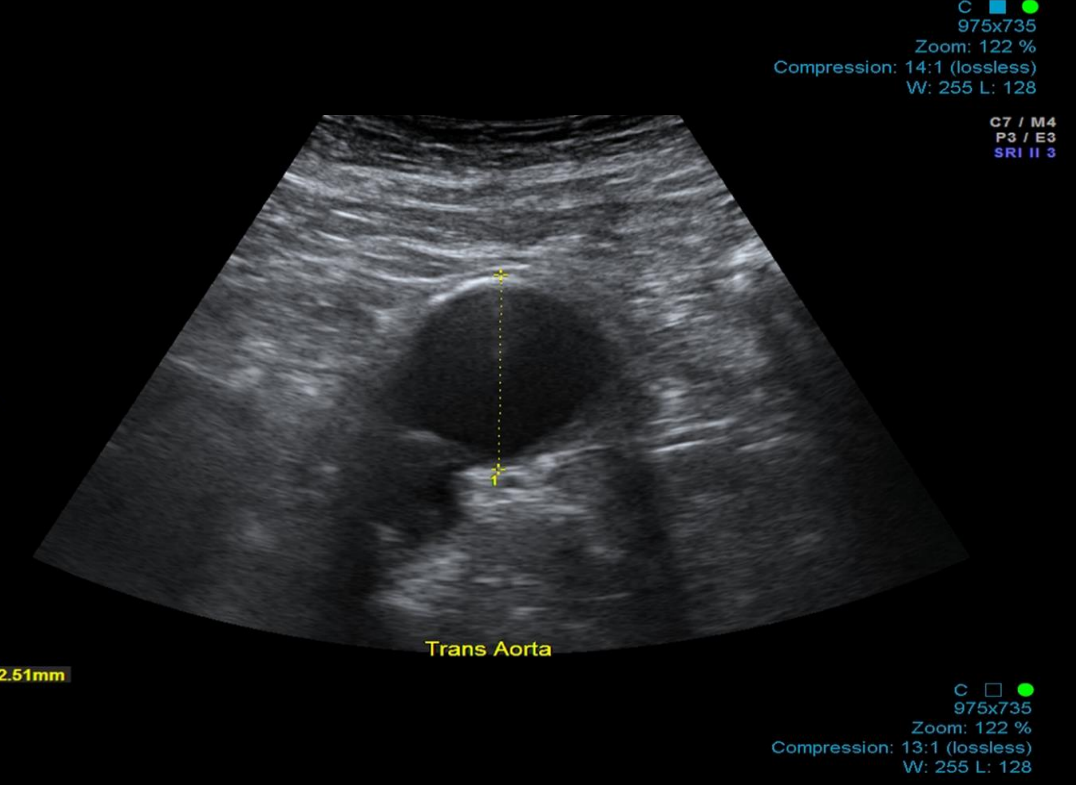
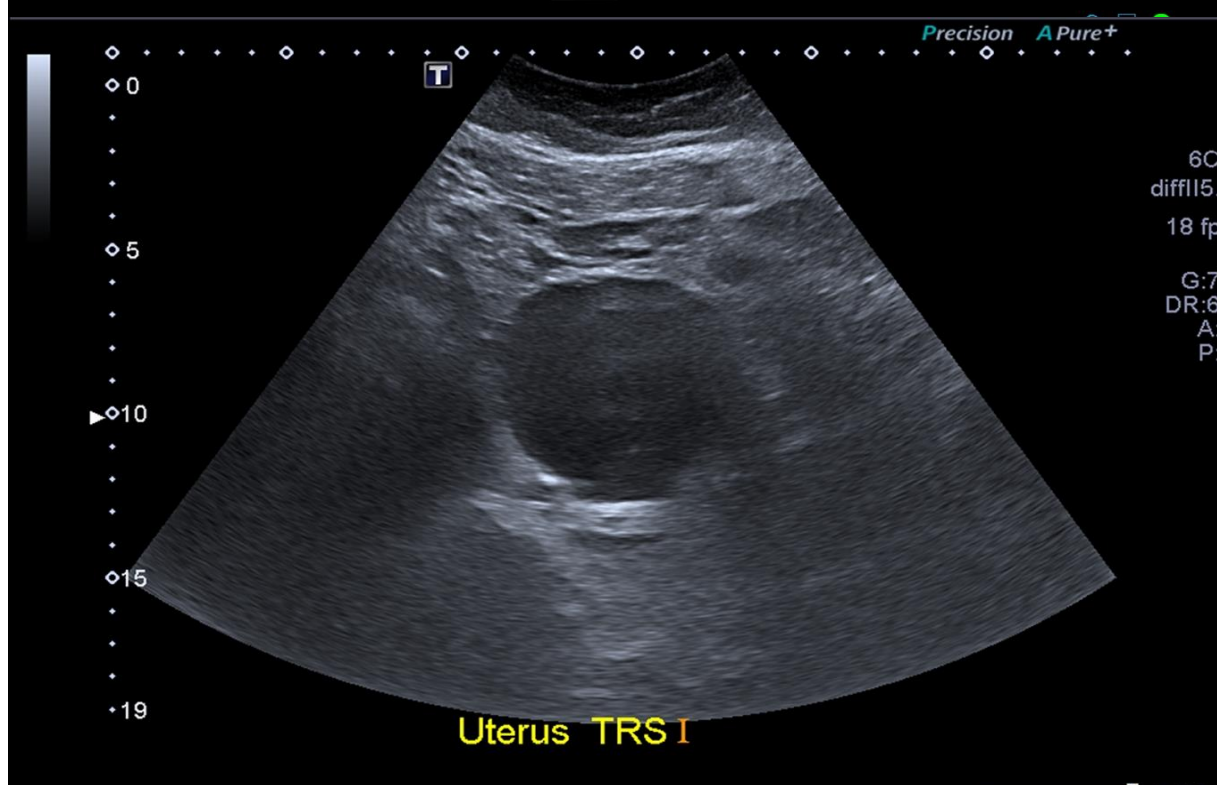
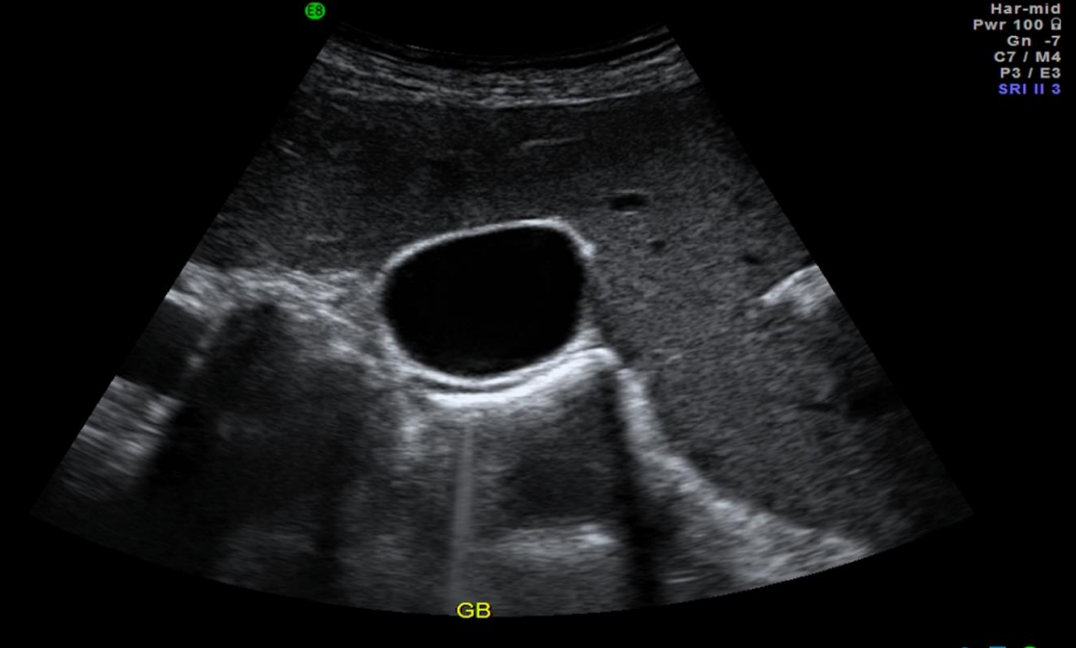
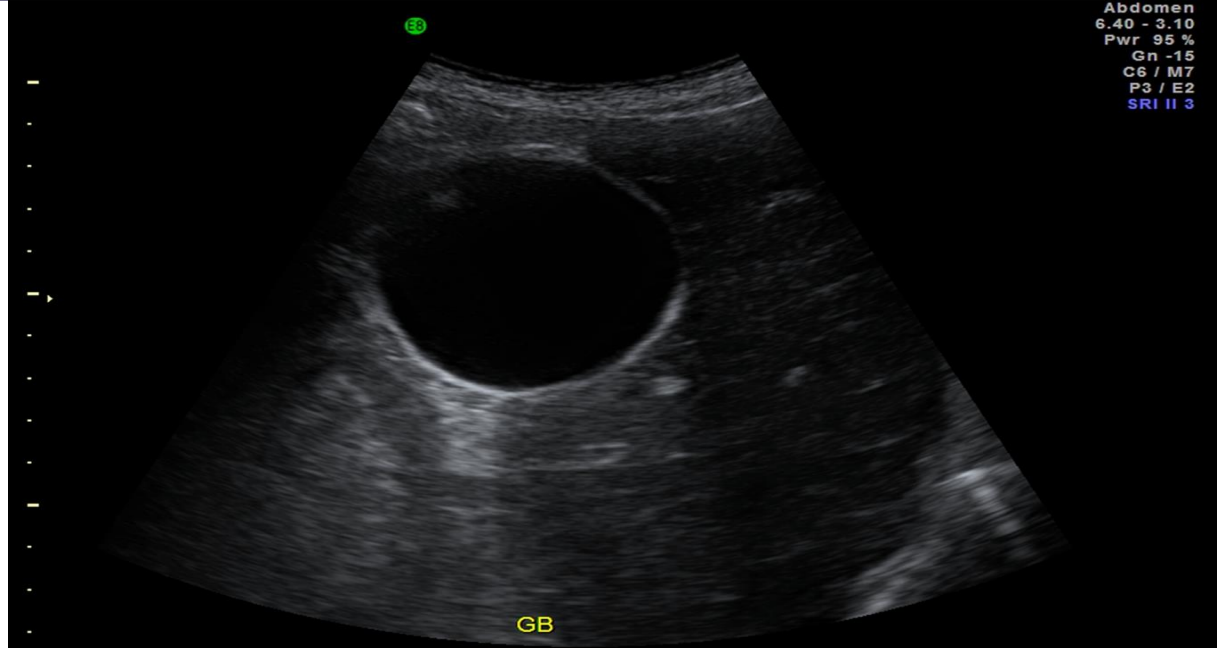
Abd. Ped.
Har-mid
Pwr 100 %
Gn -2
C7 / M4
P3 / E3
SRI II 3

1 D 42.51mm

C ☐ ●
975x735
Zoom: 122 %
Compression: 13:1 (lossless)
W: 255 L: 128

What do I use to help determine?

- ▶ Anatomy – know where I am, what I should see in this position
- ▶ Teaching – know what it should look like
- ▶ Always look in two planes!



In Practice POCUS

- ▶ Foreign bodies – probably the best indication for POCUS. Aid removal
 - ▶ Watch for artefacts
- ▶ Vascular – Ankle-Brachial index
 - ▶ Doppler mainly
- ▶ Superficial Lumps – be very careful as solid v's cystic can be difficult
 - ▶ Refer on to US service
 - ▶ Not all cysts are nice – avoid breast US except in Surg OPD situation
- ▶ Anything else – according to work situation

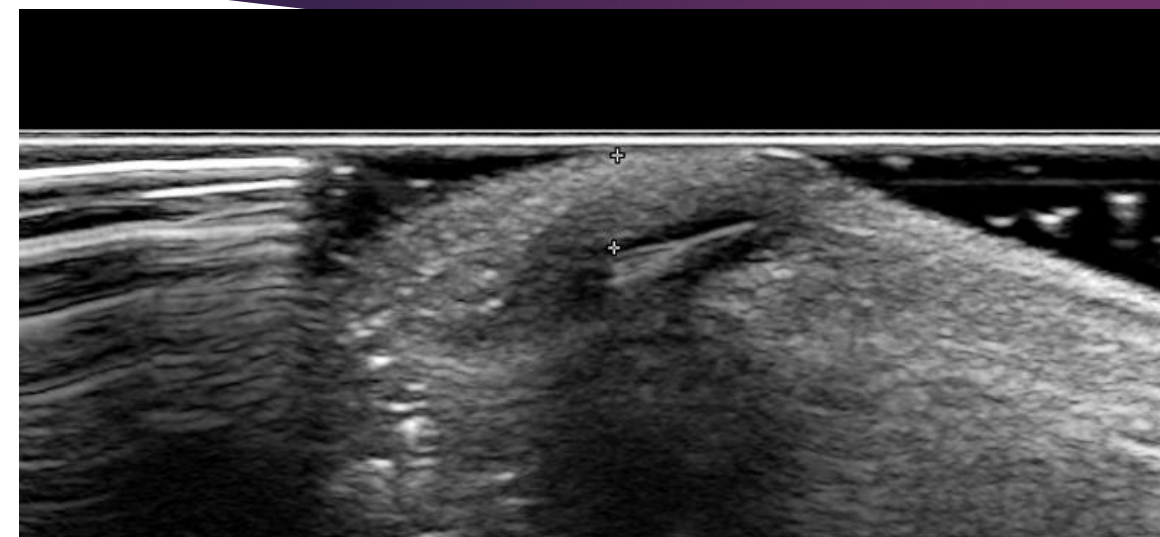
When US good to order ?

- ▶ MSK – US excellent for many MSK sites and situations
 - ▶ Often guide orthopaedic referral and surgery
- ▶ Shoulders – plain films not enough. Not for POCUS
- ▶ Knees – limited indication for US. What will it change?
- ▶ Acute Abdo – don't touch. Refer on to sonography or radiology. US or CT
- ▶ OBGYN – don't touch. Refer on – US excellent for pelvic imaging
- ▶ Lumps – care needed. Usually refer on. Often misdiagnosed

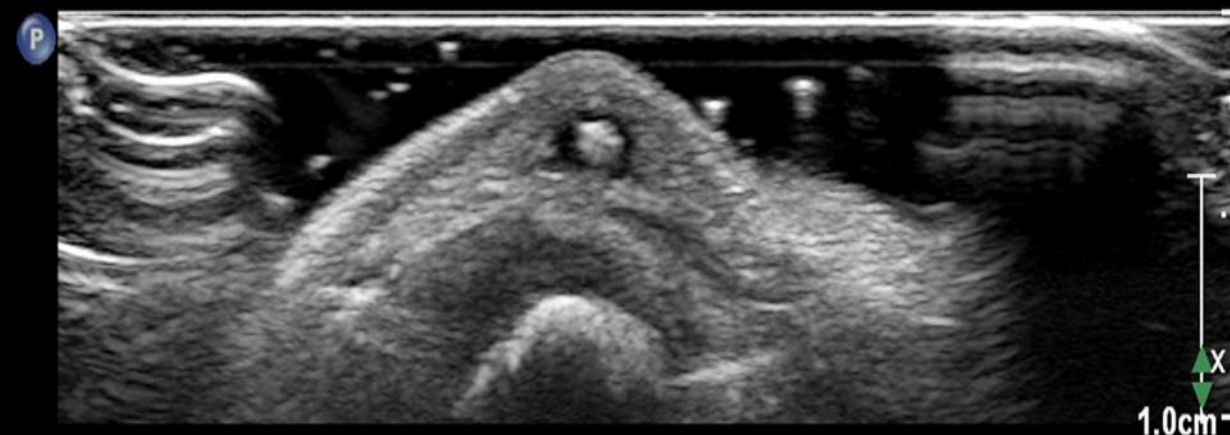
Foreign Bodies

- ▶ Superficial site
- ▶ Often associated fluid or oedema
- ▶ Many densities – light wood to concrete
- ▶ Degradation over time
- ▶ Look for –
 - ▶ FB
 - ▶ Entry site relationship
 - ▶ Distance deep to skin
 - ▶ Size

Phoenix palm?

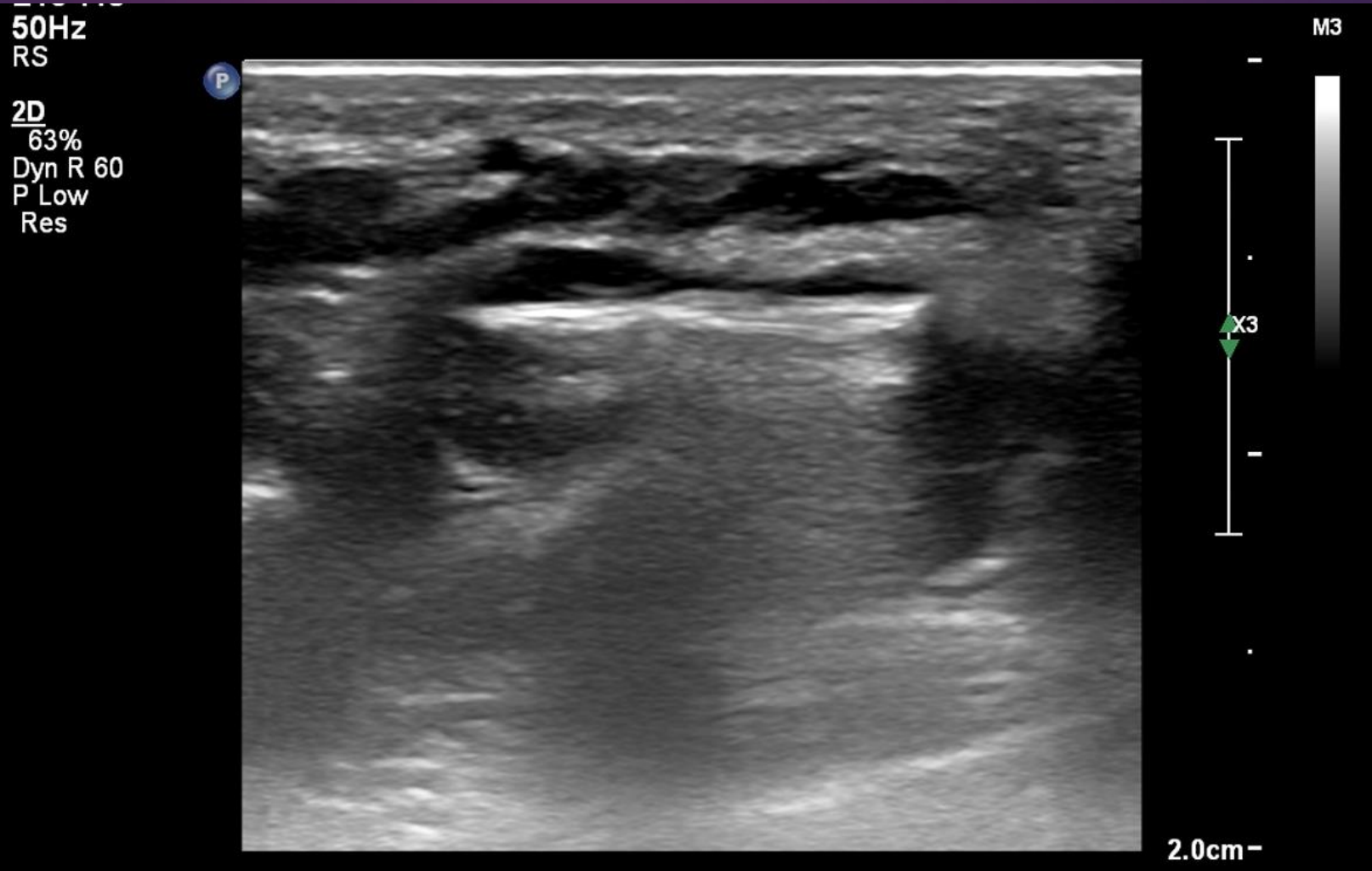


2.8 cm
BASE OF THUMB



BASE OF THUMB TRV

Bone/Mineralised - ?entry point



? Foreign or ossified structure?



Musculoskeletal

- ▶ Shoulder US – complement plain film
 - ▶ Other causes of pain (OA)
 - ▶ Characterise calcifications (ACT) – soft/hard
- ▶ Replace plain film in many cases
- ▶ Specialist exam so refer on

R1

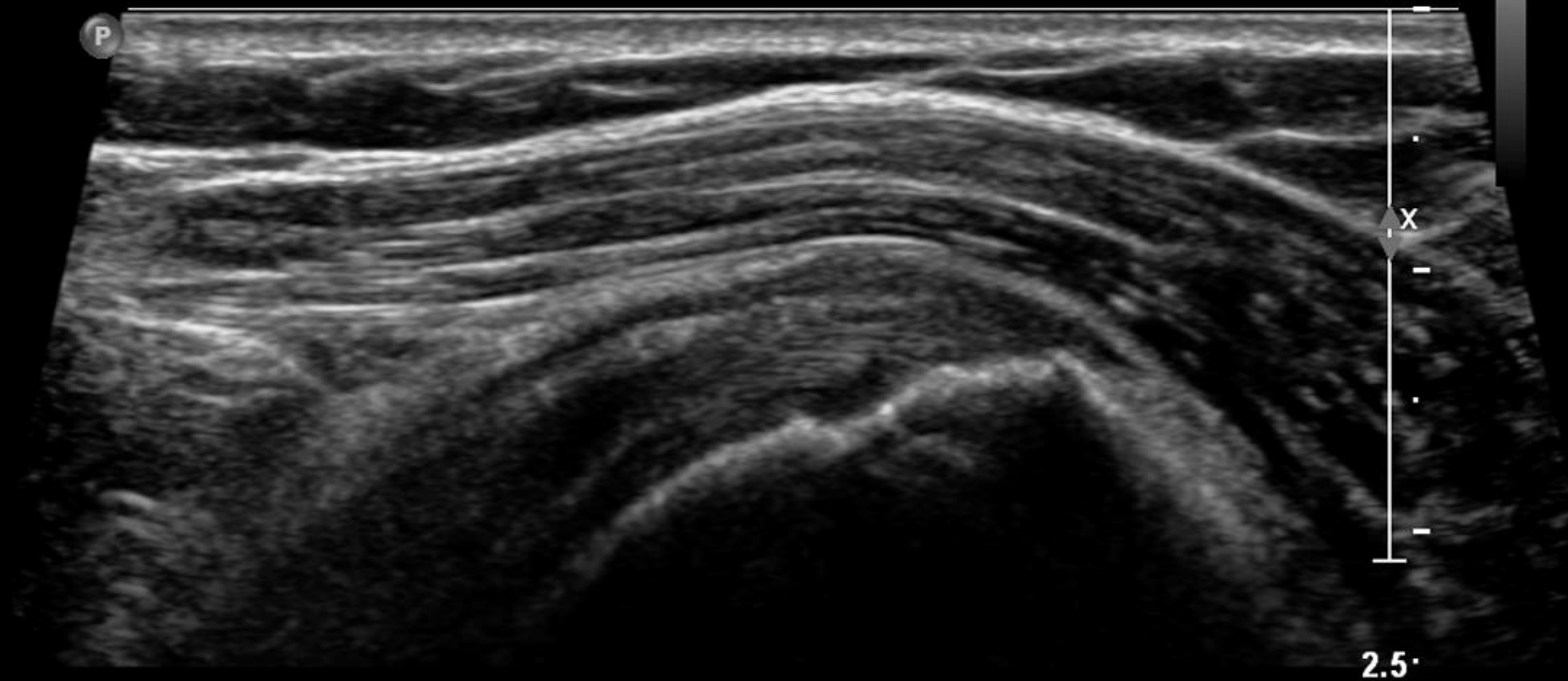
2D

56%

C 53

P Med

Res



Left Supraspinatus Internal Rotation Ant

C ☐ ☒

1024x768

Zoom: 116 %

R1

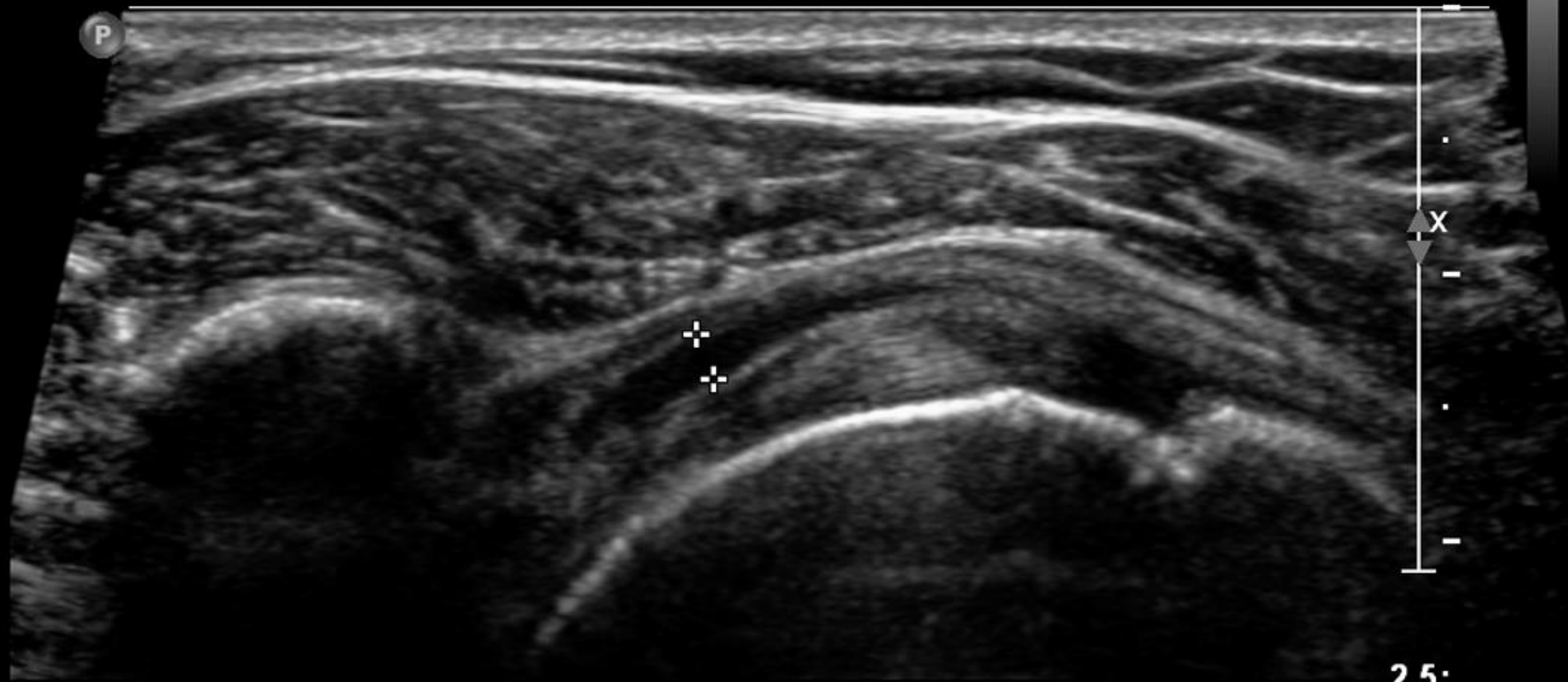
2D

56%

C 53

P Med

Res



Dist 0.180 cm

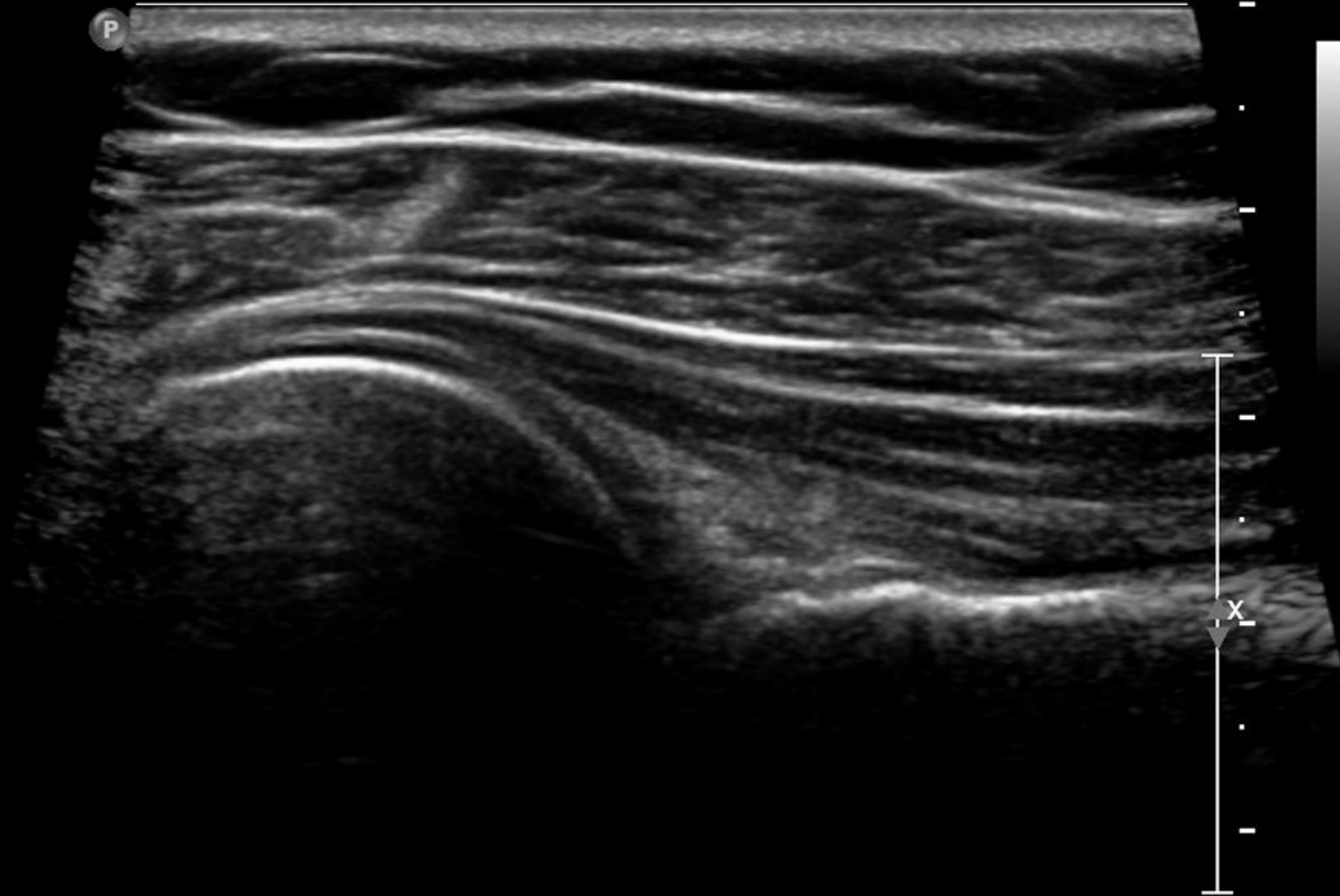
Left Bursa ADD

FR 23Hz
R1

2D
62%
C 53
P Med
Res

P

AGC M2



Left Posterior Labrum

5.0-

C ☐ ☒

1024x768

Zoom: 116 %

Compression: 10:1 (lossless)

Musculoskeletal - Elbow

- ▶ Elbows – limited indications
- ▶ Joint effusion – indeterminate plain film ? Fracture
- ▶ Very good for Biceps – tear v rupture
 - ▶ Length of retraction

ELBOW

L18-5

45Hz

RS

2D

49%

Dyn R 60

P Med

Res

TIS0.1 MI 1.0

M3

X3

Ant Elbow Joint Long



ELBOW
L18-5
45Hz
RS
2D
49%
Dyn R 60
P Med
Res

TISO.1 MI 0.8

P

M3

X3



Musculoskeletal - Knee

- ▶ Knees – limited indications
- ▶ Plain film better in most instances – OA, trauma, see effusions
- ▶ Menisci not well assessed unless bulging out
- ▶ ACL/PCL not assessed on US
- ▶ Ligament injury requires experience and correlation
- ▶ Good for patellar or quads tendons
- ▶ Bakers cyst – and then?

KNEE

L12-5

76Hz

RS

2D

35%

Dyn R 56

P Med

Res

TIS0.0

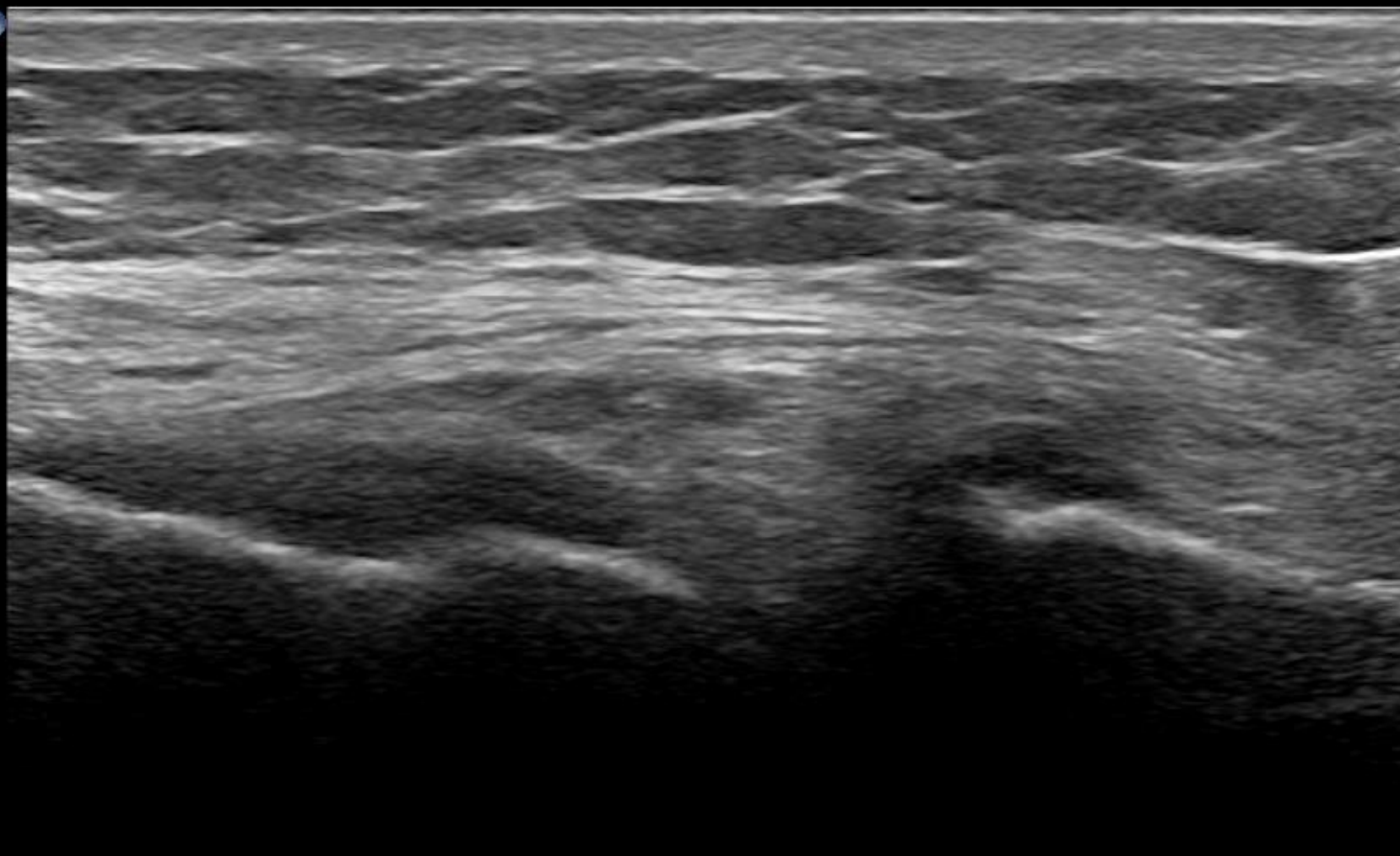
MI 0.6

M3

x3

Left Medial Knee Long Medial Meniscus

3.5cm

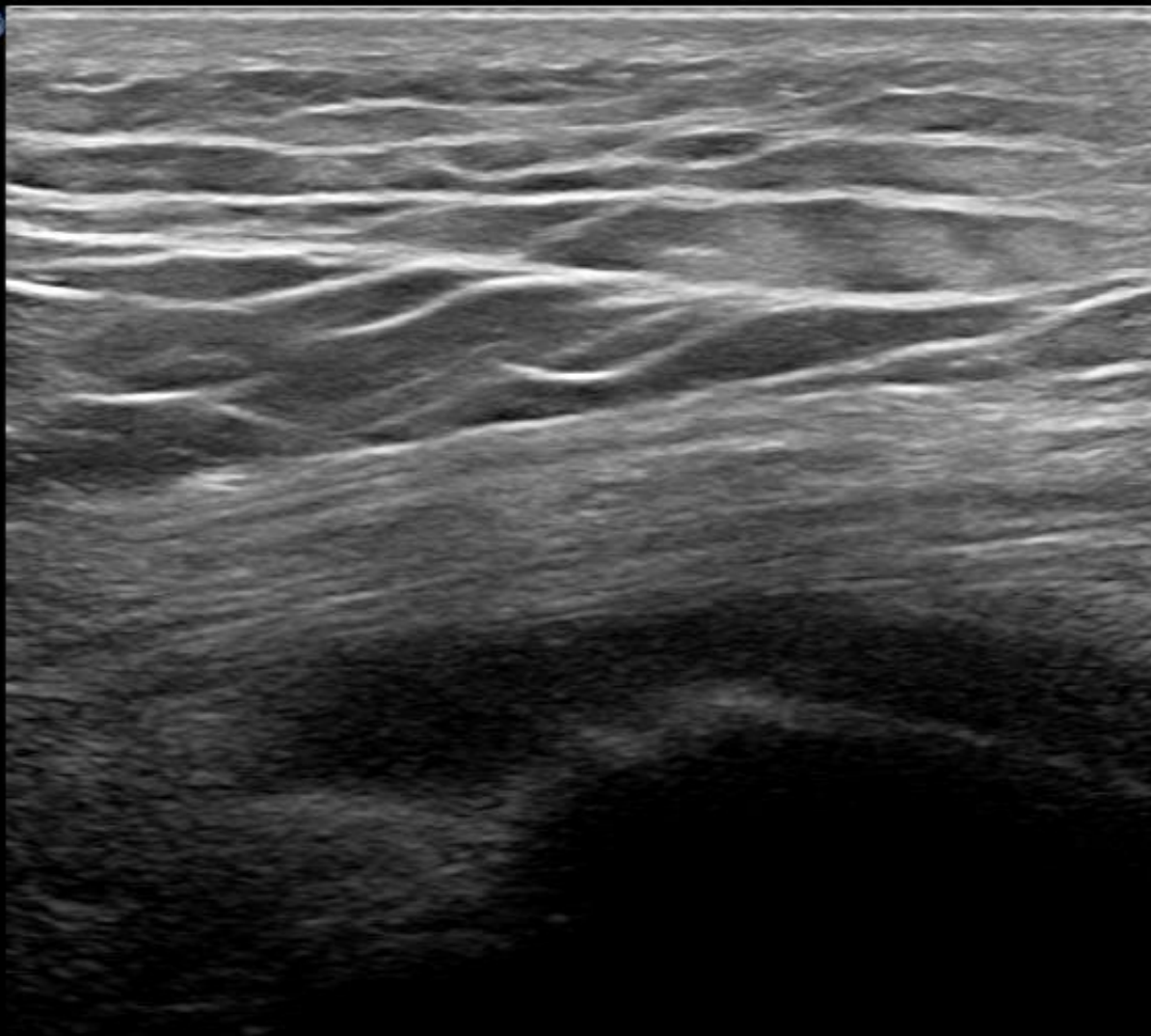


-5

Z

%
R 56
ed

P



Left Suprapatellar Recess Long.

F# 66

M3

x3

5.0cm

Summary

- ▶ POCUS – overall limited GP application in current form
- ▶ Long learning curve
- ▶ Whoopsies – most POCUS sites
- ▶ Best for Foreign Bodies – and removal
- ▶ Refer on for MSK, Abdominopelvic, O+G

If going to do it.....?

- ▶ Longer course with long hours of hands on.
- ▶ Learn anatomy
- ▶ Take and store pictures – we all have to
- ▶ Regular consistent use
- ▶ Regular back up and hands on with US provider
- ▶ Regular review of images with US provider
- ▶ Self regulation – stick to your knitting

Thank You!

Dr Paul Dukes
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APRIL 2019

