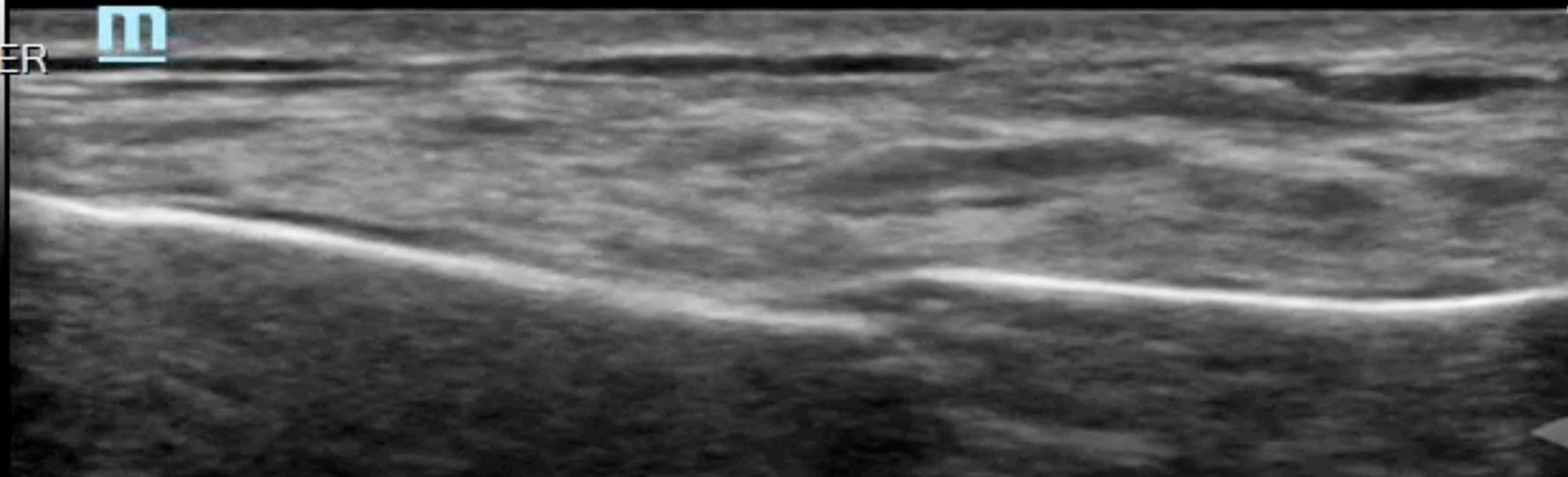


12.45 AP 96.6% MI 0.91 TIS 0.1

24/08/07  
~13.0  
19007BER



# POCUS FOR FRACTURE



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[POCUSacademy.com](http://POCUSacademy.com)

mm  
19007BER  
OV:

SE  
IM  
K  
ms  
AL

# 陳國智 醫師 / POCUSacademy.com



台灣疼痛醫學會專科醫師  
急診超音波臨床評核醫師  
醫用超音波學會指導醫師  
WINFOCUS director / instructor  
Certified Interventional Pain Sonologist

**急診 / 重症 / 介入 / 急性疼痛**

經歷

新光急診超音波訓練中心主任  
西園醫院急診醫學科主任  
急診醫學會超音波委員會主委  
台灣疼痛醫學會大體模擬手術講師  
急救加護醫學會重症超音波負責人

[juice119@gmail.com](mailto:juice119@gmail.com)



**Core Applications (2023 ACEP Emergency Ultrasound Guidelines)**  
**15項急診超音波核心應用**

陳國智醫師

Aorta  
 DVT  
 Trauma  
 Thoracic/Airway  
 Cardia/HD assessment

Procedural Guidance  
 US-guided NB  
 Testicular  
 Ocular  
 Skin & Soft tissue

Hepatobiliary  
 Urinary tract  
 Pregnancy  
 Bowel  
 MSK

# POCUS FOR BEGINNERS

The best procedures for point-of-care ultrasound (POCUS) beginners are impactful for the patient, easy to perform (require a small number of quickly obtained views), simple to interpret (limited diagnostic endpoints), and low liability for patient and physician.

## POCUS MULTI-ORGAN SCANS

Name	Clinical use	Diagnostic targets
EFAST (Extended Focused Assessment with Sonography for Trauma) <sup>1</sup>	Blunt trauma of the abdomen and chest	Free fluid in the abdomen and pelvis, pericardial fluid, and pneumothorax and pleural fluid
Labor and delivery <sup>2</sup>	Late third trimester exams and labor and delivery	“5 Ps” of pregnancy: <ul style="list-style-type: none"><li>• Parity (number)</li><li>• Pulse (fetal heartbeat)</li><li>• Pocket (fluid)</li><li>• Placenta (location)</li><li>• Presentation (cephalic vs. breech)</li></ul>
RUSH (Rapid Ultrasound for Shock and Hypotension) <sup>3</sup>	Undifferentiated hypotension or signs of shock	Multi-organ protocol to assess for etiology of shock and hypotension
CLUE (Cardiopulmonary Limited Ultrasound Exam) <sup>4</sup>	Cardiopulmonary dysfunction	Heart, inferior vena cava, and lung views to determine heart failure physiology
PEARLS (Parasternal, Epigastric, Anterior lung, Right upper quadrant, Left upper quadrant, and Suprapubic) <sup>5</sup>	Core physical exam for generalist (routine inpatient or outpatient use)	A layered, window-based approach to teaching and learning core ultrasound exam



# POINT-OF-CARE ULTRASOUND USES



<b>POCUS uses</b>	<b>Scope of use</b>	<b>Example questions</b>
Physical exam extension	Focused	"Is this palpable mass a cystic or solid structure?"  "Is the baby in the cephalic or breech presentation?"
Procedural	Focused	"Where is the best location to insert a needle?"  "Where is the foreign body?"
Diagnostic	Focused	"Are there stones in the gallbladder?"  "Is there a pregnancy in the uterus?"
Multi-organ scans	Extended	"Is the patient's hypotension due to sepsis, heart failure, or acute blood loss?"  "What is causing the patient's dyspnea?"

解剖

Anatomy

形態

Pattern

診斷

Diagnosis

# HOLISTIC ULTRASOUND

## Holistic medicine

Treatment that deal with the whole person,  
not just the injury or disease

# POCUS應用/學習模板: I-AIM

## Indication

Point / 掃描目的



**Acquire**  
取得影像

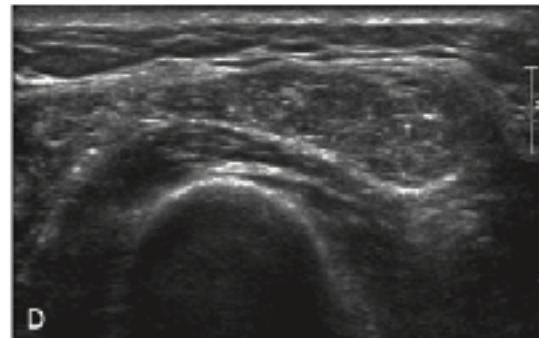
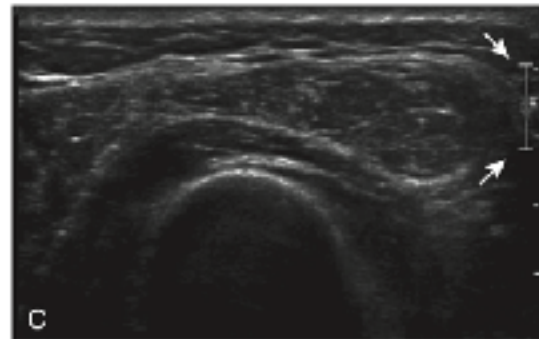
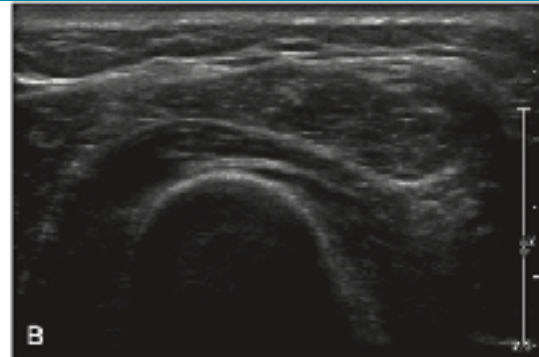


**Interpret**  
判讀影像



**Make decision**  
臨床決策

# 優化影像三大手法



深度/Depth

焦點/Focus

亮度/Gain



# Steady Hand



探頭

操作者的手

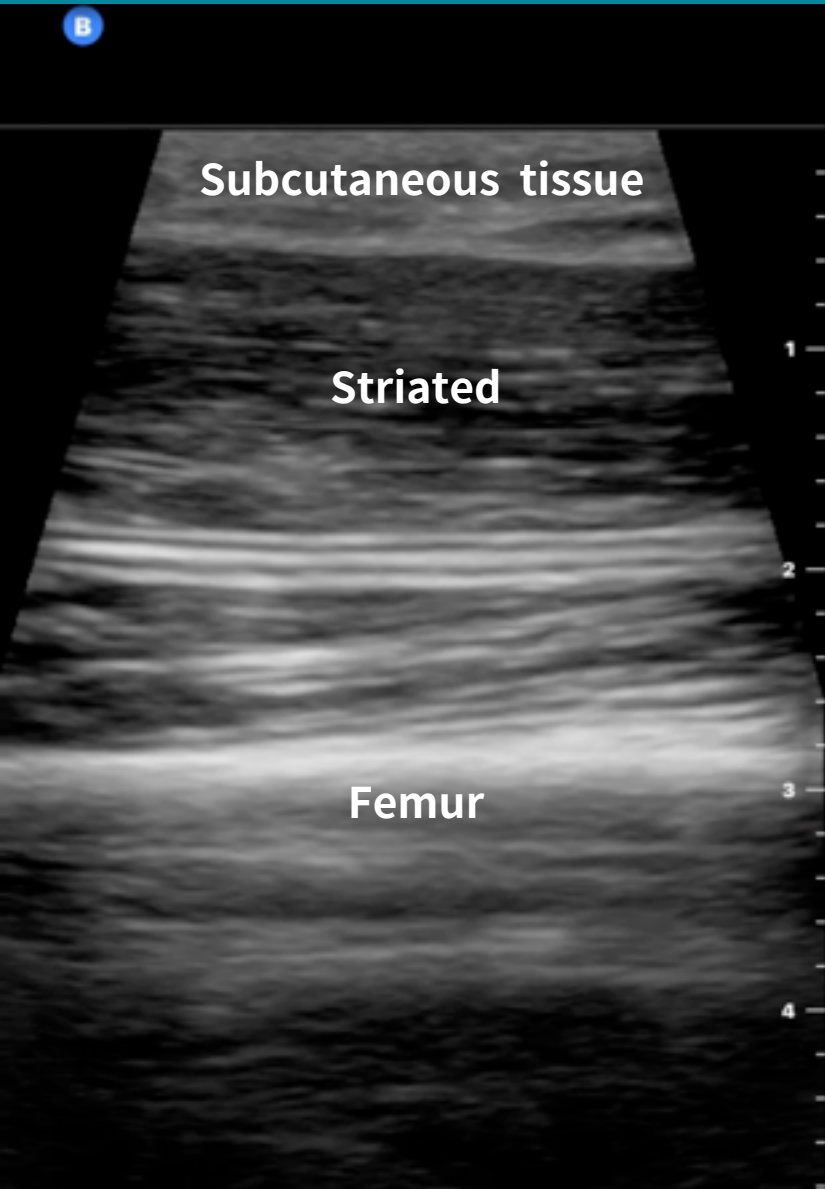
皮膚



A

B

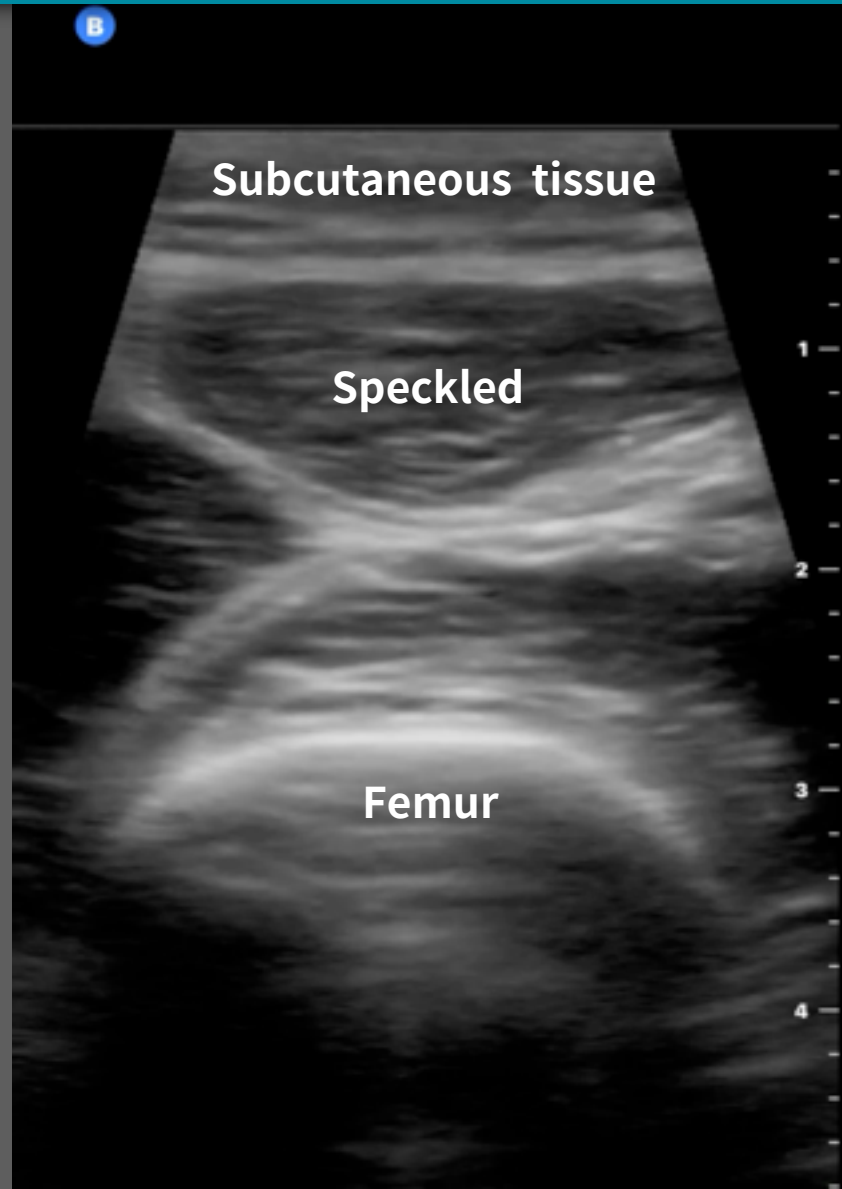
# MSK的重要三界線(白線)



皮膚

筋膜

骨頭





# MSK掃描原則

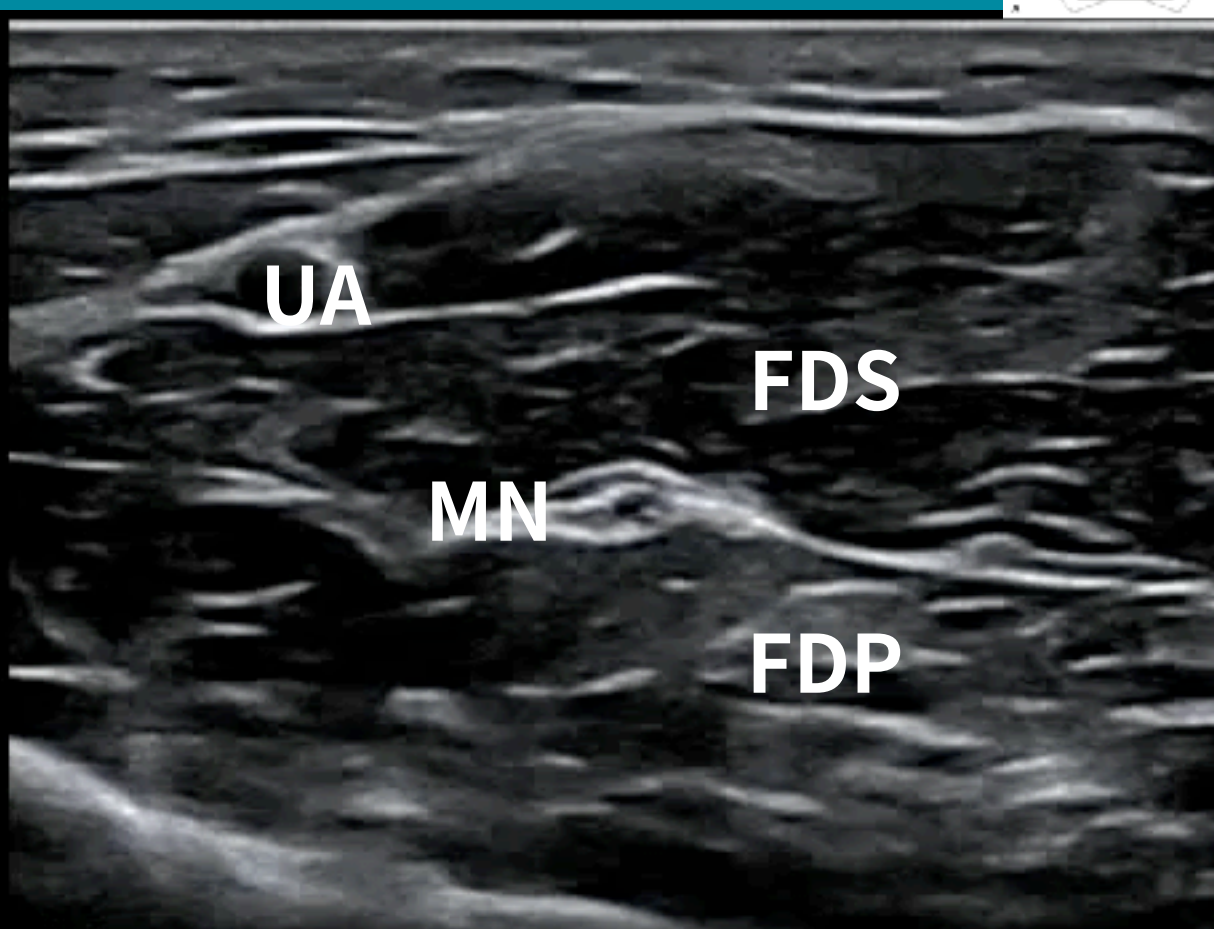
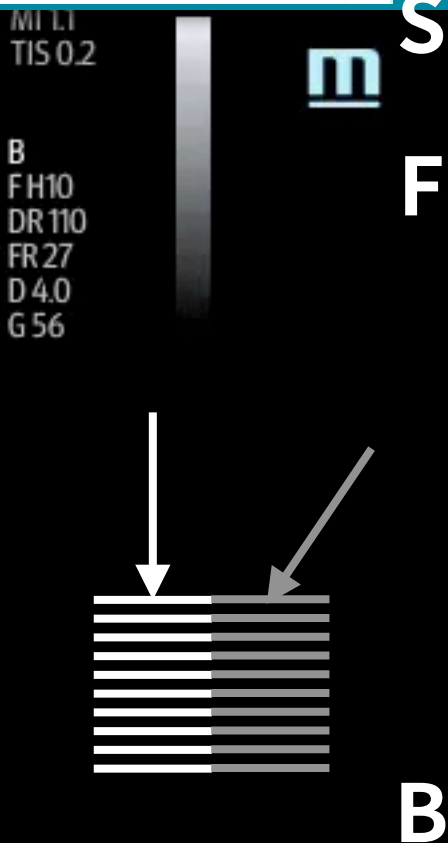
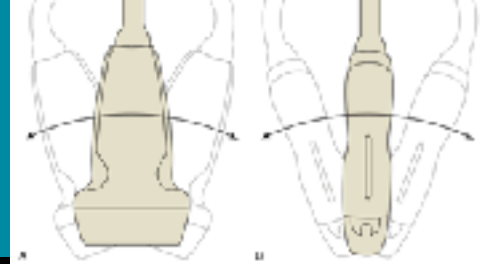
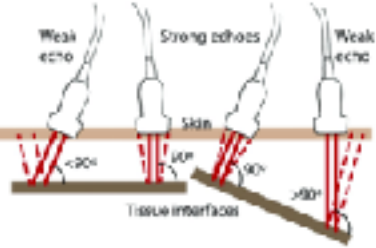


**管狀構造橫掃優先**

**先找外在明顯定位**

**確認內在明顯標的**

# Anisotropy



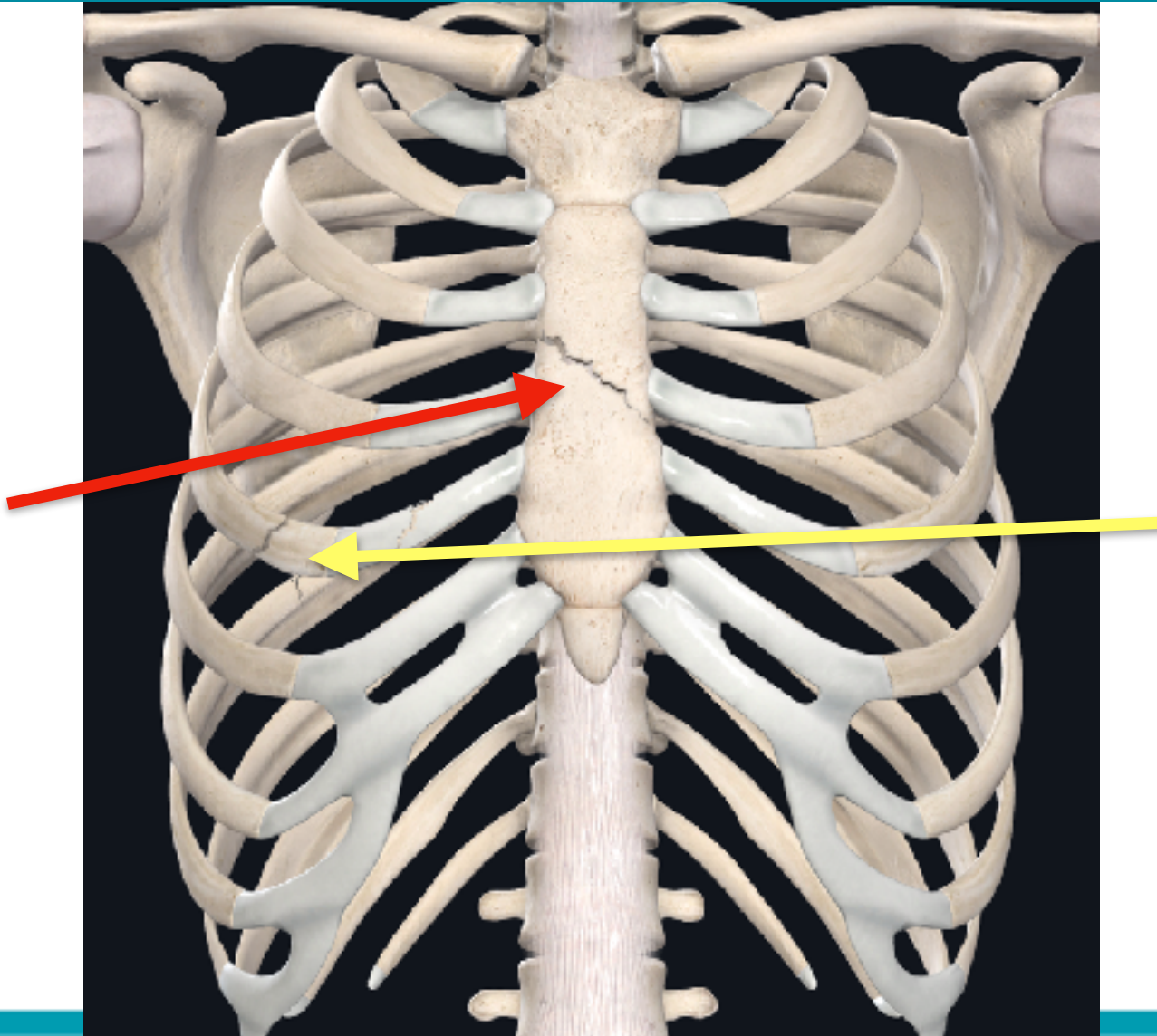
Tendon

Nerve

Muscle

# POCUS FOR FRACTURE

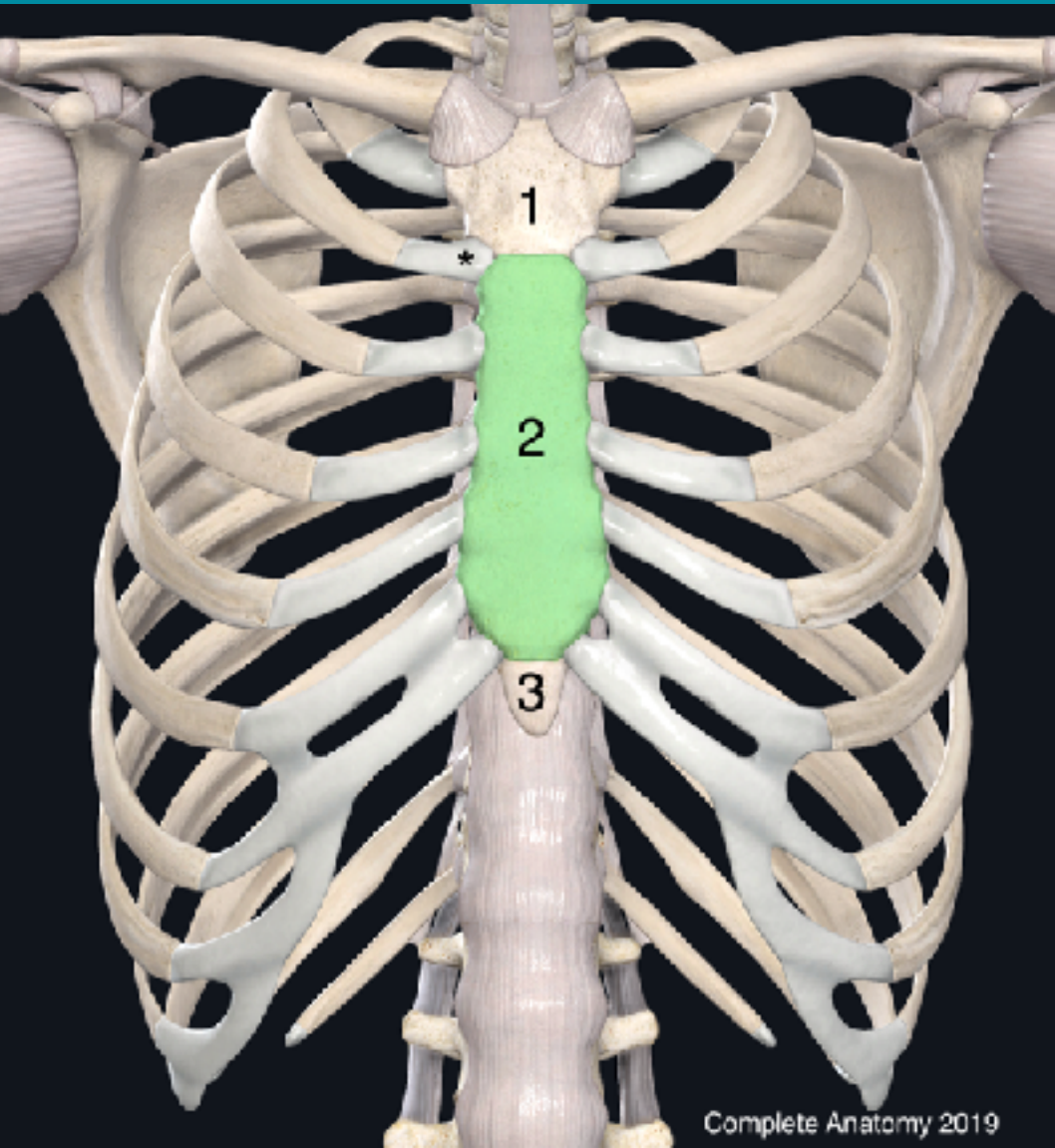
胸  
骨  
骨  
折



肋  
骨  
骨  
折



# STERNUM



胸骨柄

胸骨體

劍突

# STERNUM

PHILIPS TemporaryID-20190311170310  
19-03-11-170310

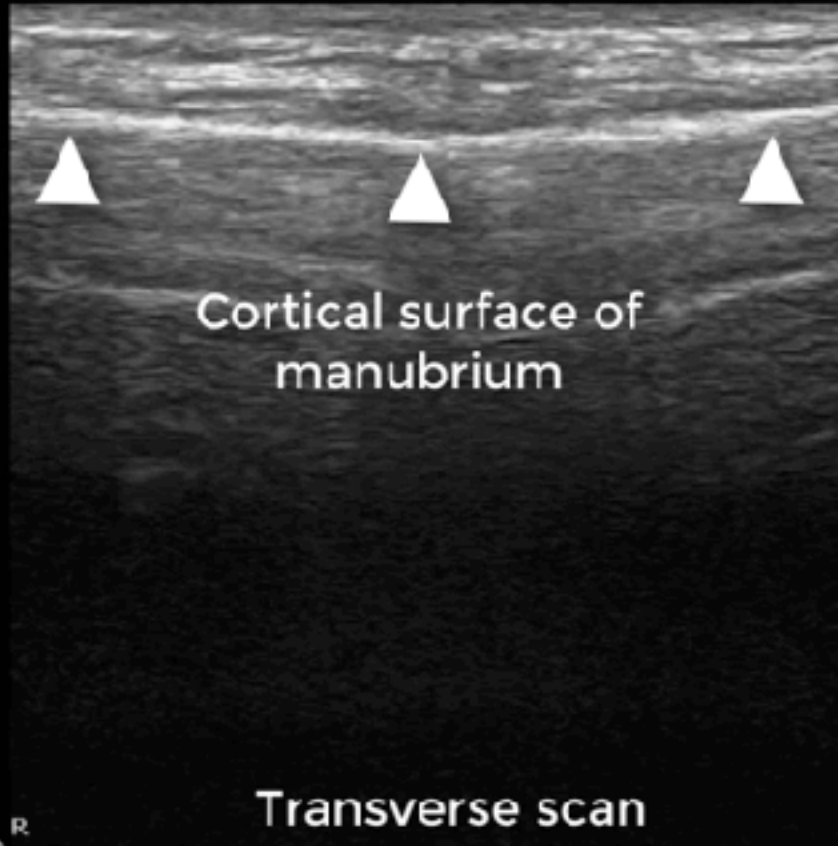
SKH ER

MI 0.9 3/11/2019  
TIS 0.2 5:39:49 PM

MSK Gen  
L12-4  
42 Hz  
3.5cm

2D  
Res  
Gn 100  
58  
4/3/4

Right



Left



G  
D R  
4.0 12.0

3.5cm

# STERNUM (橫向掃描)

PHILIPS TemporaryID-20190311170310  
19-03-11-170310

SKH ER

MI 0.9 3/11/2019  
TIS 0.2 5:39:49 PM

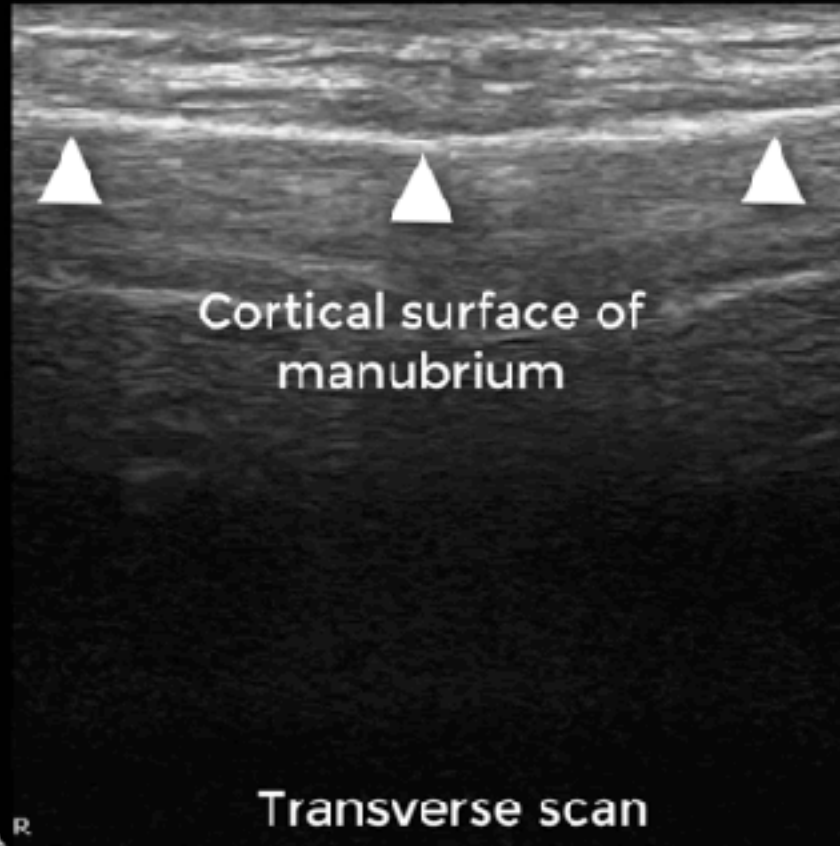
MSK Gen  
L12-4  
42 Hz  
3.5cm

2D  
Res  
Gn 100  
58  
4/3/4

Right



G  
P R  
4.0 12.0



Transverse scan

from junction to xyphoid process

Left

2-

3.5cm



# STERNUM (縱向掃描)

19-03-11-170310

SKH ER

TIS 0.2

5:47:26 PM

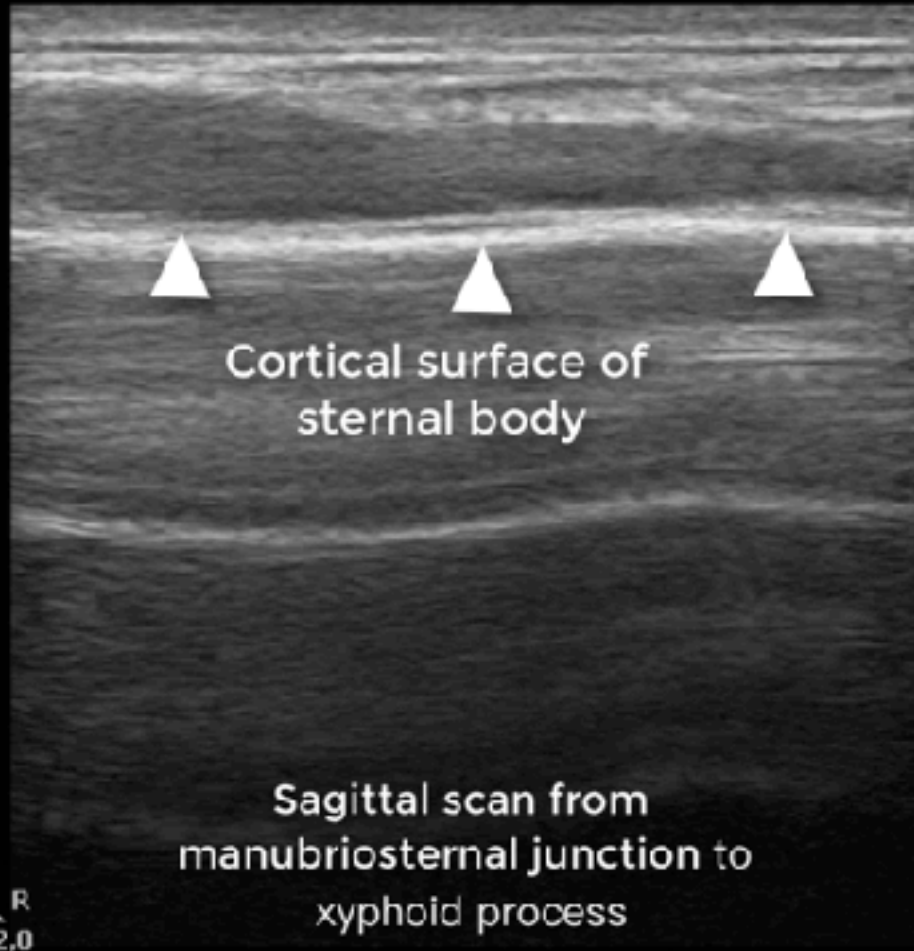
MSK Gen  
L12-4  
42 Hz  
3.5cm

2D  
Res  
Gn 100  
58  
4/3/4

Cephalad



G  
P R  
4.0 12.0



Cortical surface of  
sternal body

Sagittal scan from  
manubriosternal junction to  
xyphoid process

Caudal

3.5cm

# STERNUM TO 2ND RIB

19-03-11-170310

SKH ER

TIS 0.2

5:40:55 PM

MSK Gen  
L12-4  
42 Hz  
3.5cm

2D  
Res  
Gn 100  
58  
4/3/4

Cephalad

Cortical surface of  
manubrium

Caudal



P G R  
4.0 12.0

Sagittal scan on  
manubriosternal junction to right side

3.5cm

# 86歲老太太撞到前胸，好痛喔！！



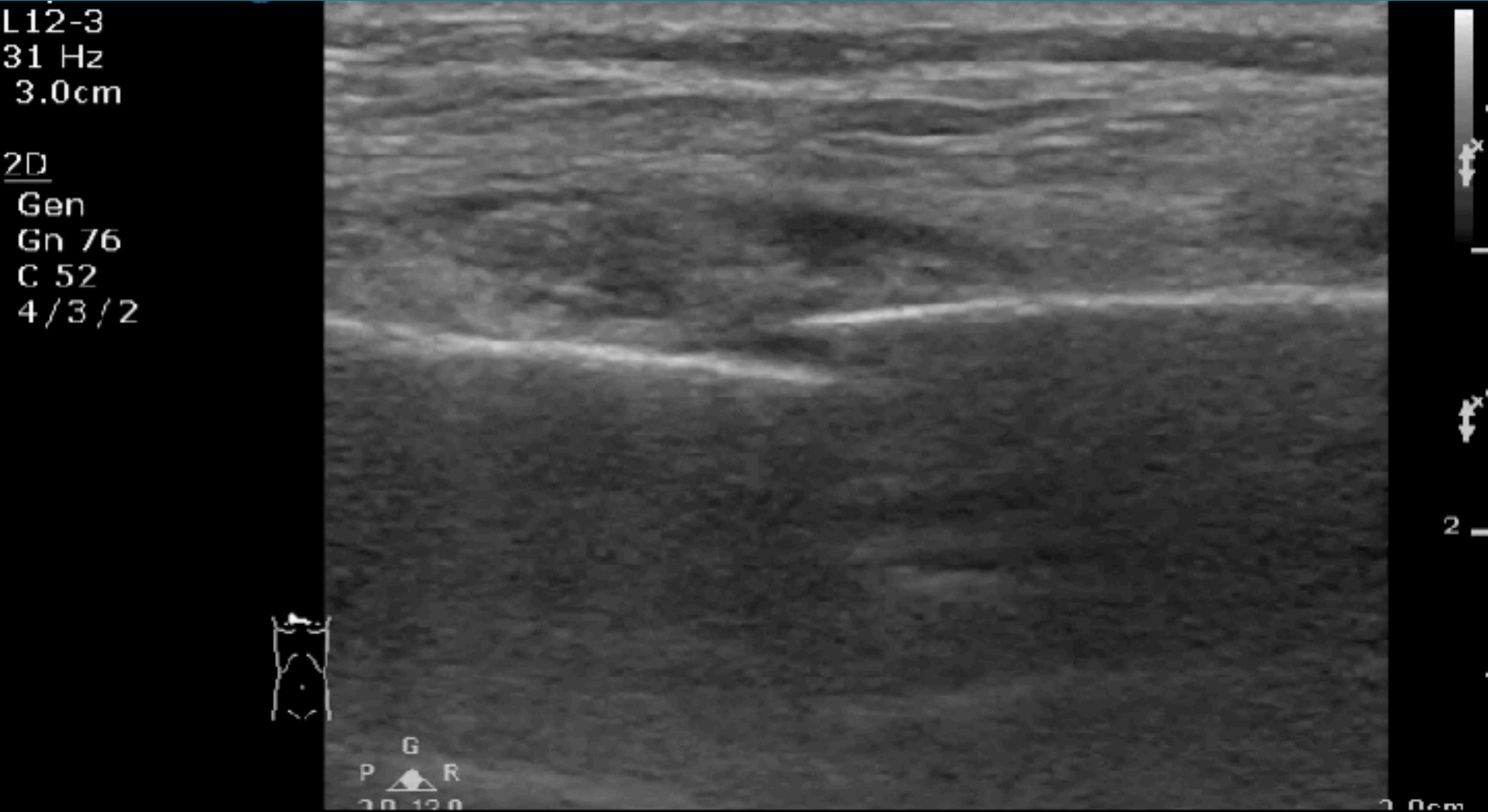
# STERNUM (橫向掃描-高低差)



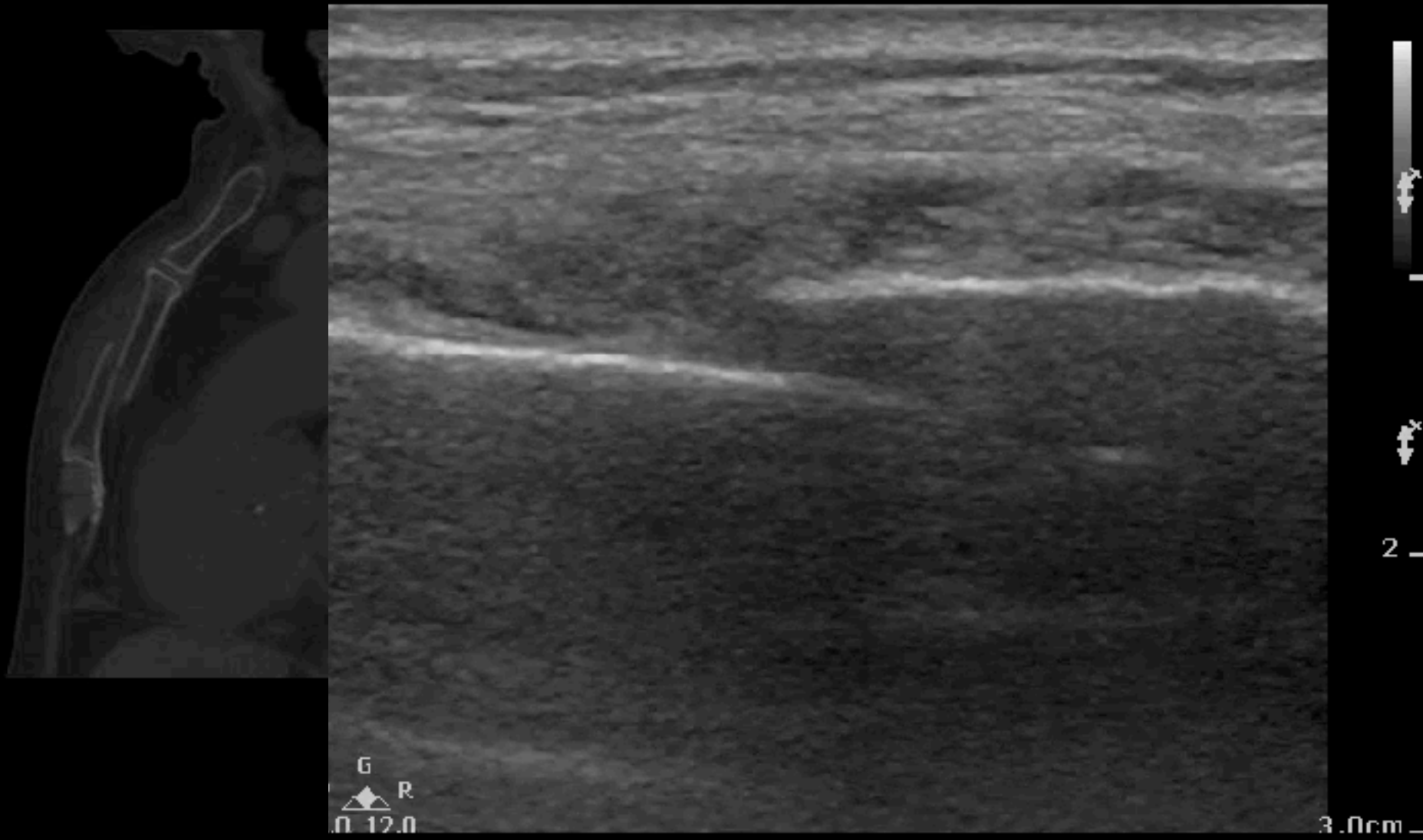
G  
P R  
3.0 12.0

3.0cm

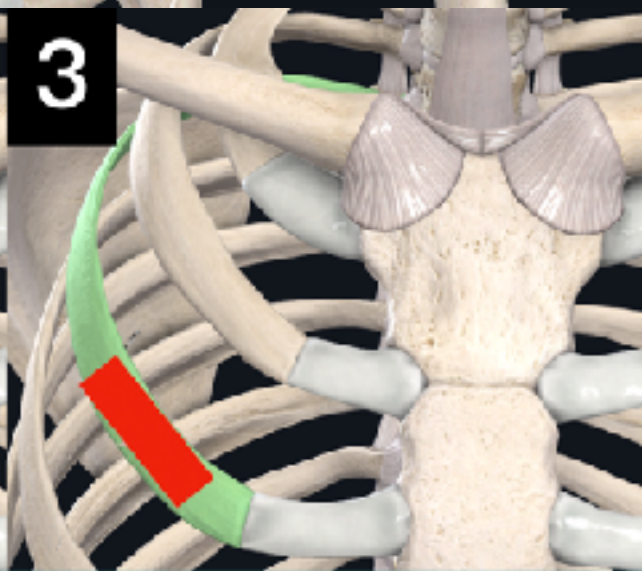
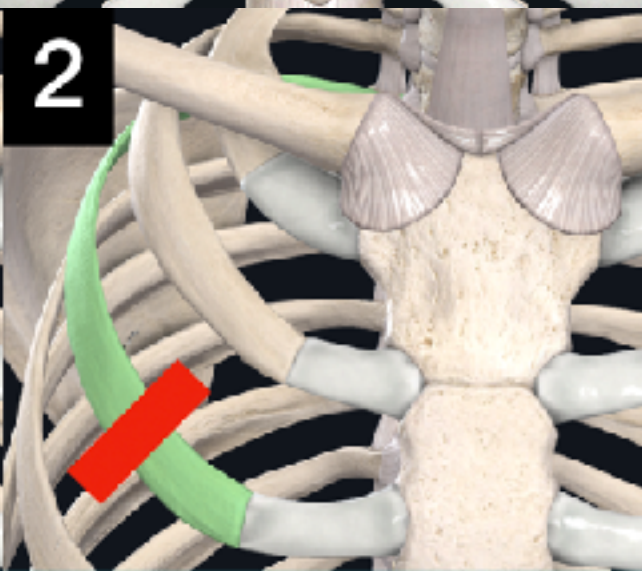
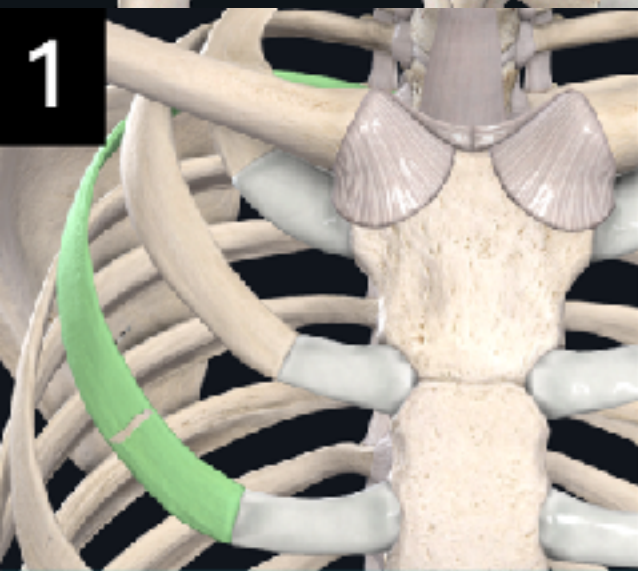
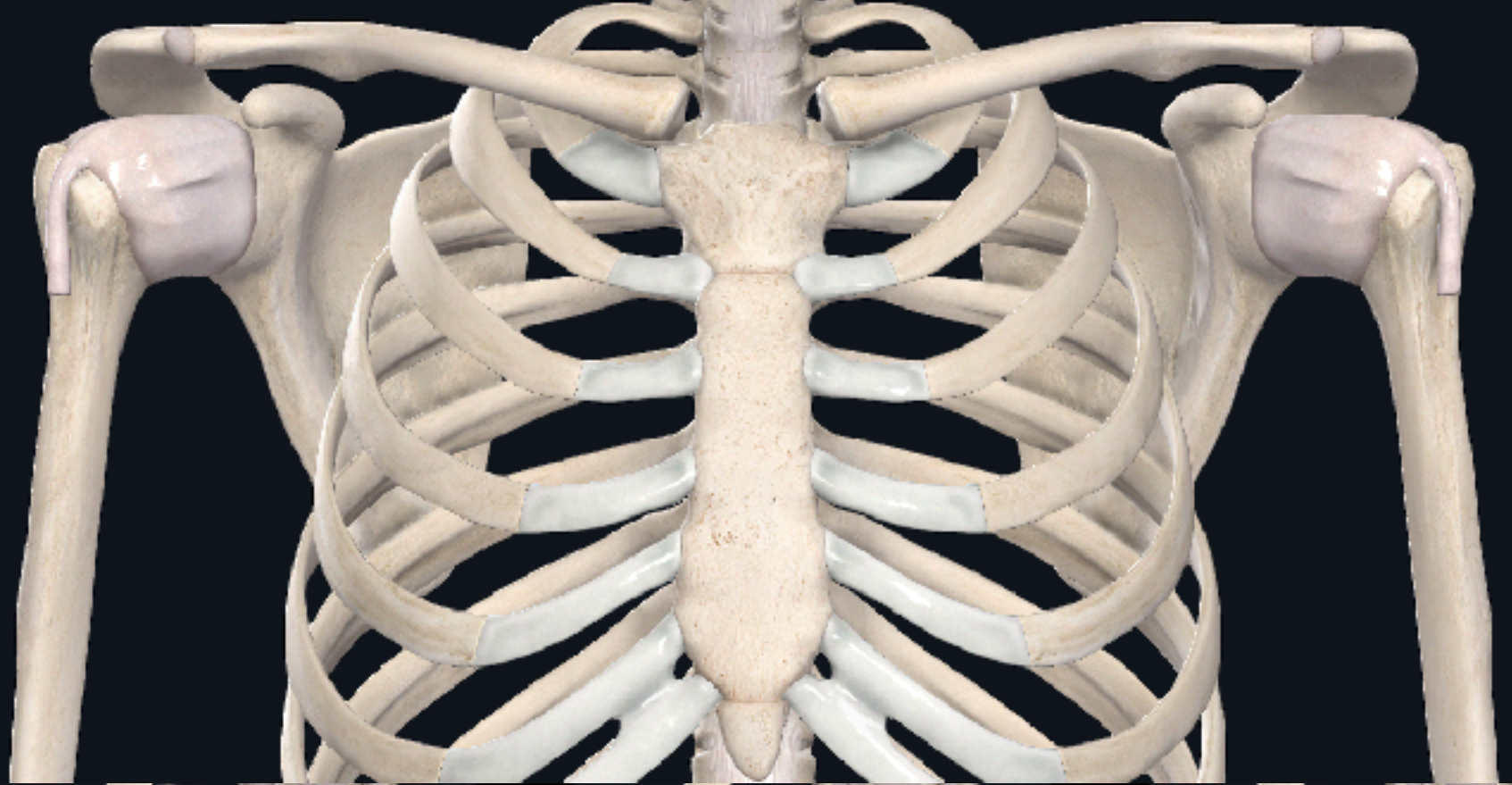
# STERNUM (橫向轉縱向)



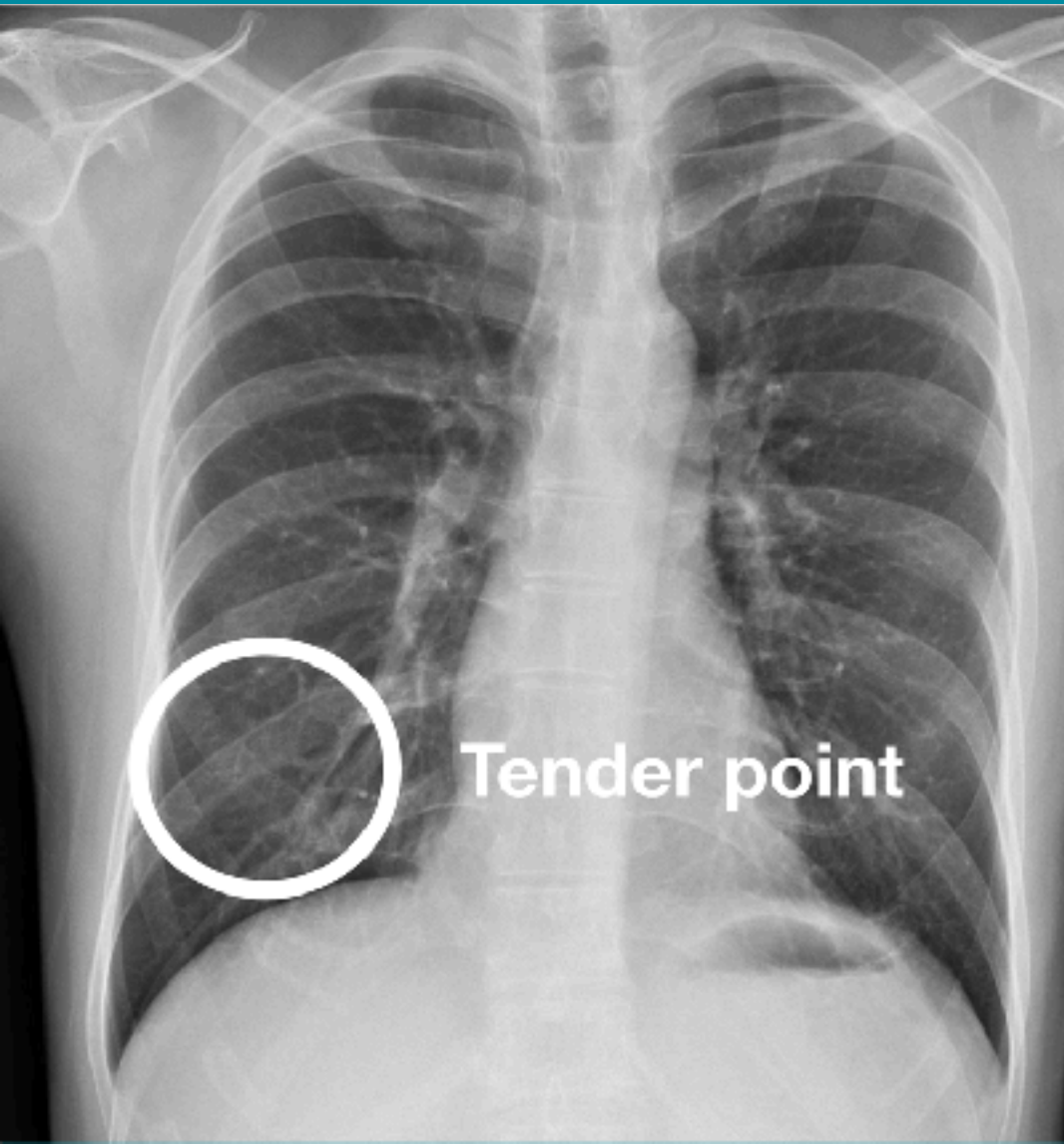
# STERNUM (縱向掃描-不連續/血腫)







# 35歲男性摔車滑倒受傷後胸痛，X光沒看到骨折咗





# RIB (橫向掃描-高低差)

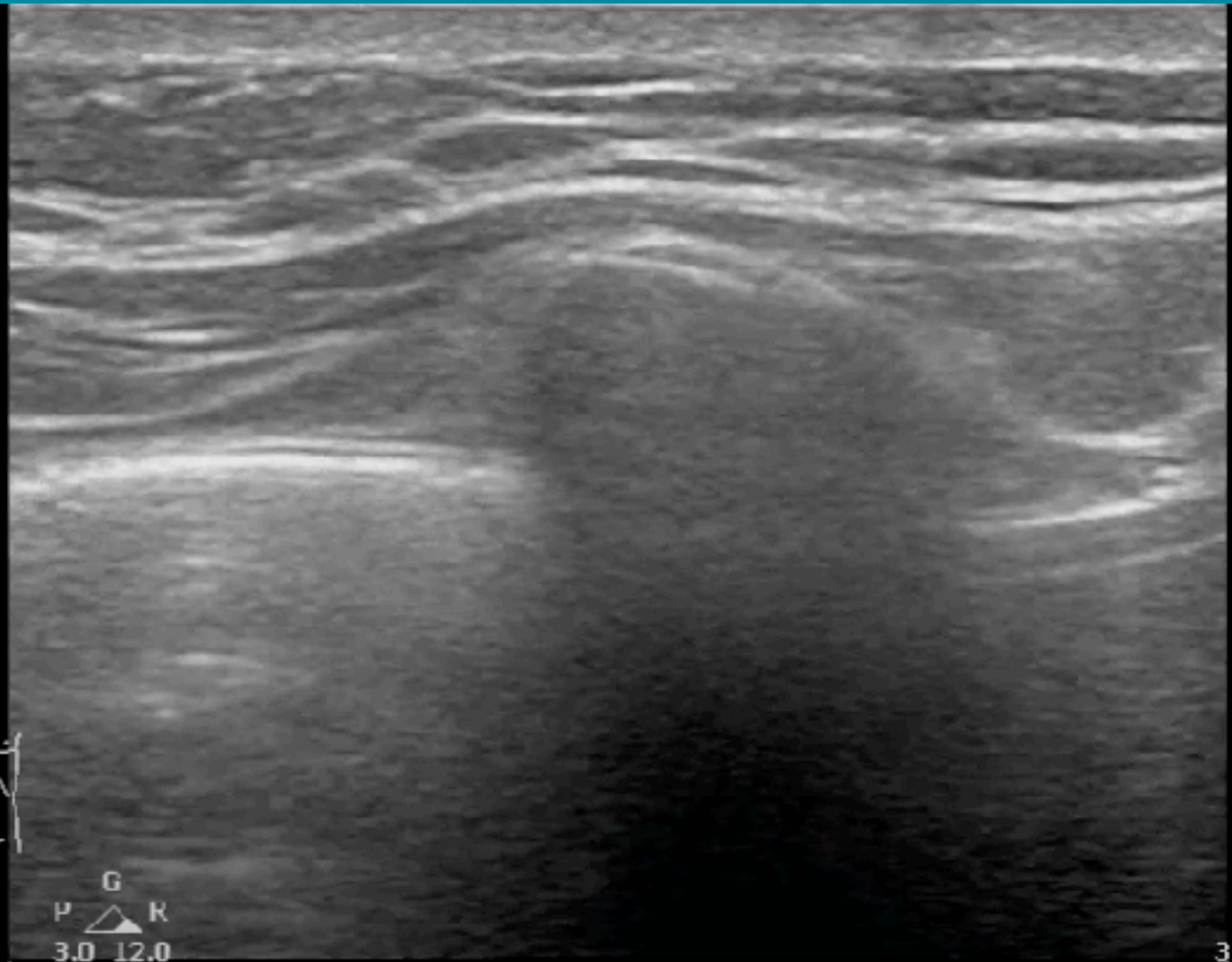
Superficial  
L12-3  
46 Hz  
3.0cm

2D  
Res  
Gn 96  
C 56  
3/2/1



G  
P  $\triangle$  R  
3.0 12.0

3.0cm



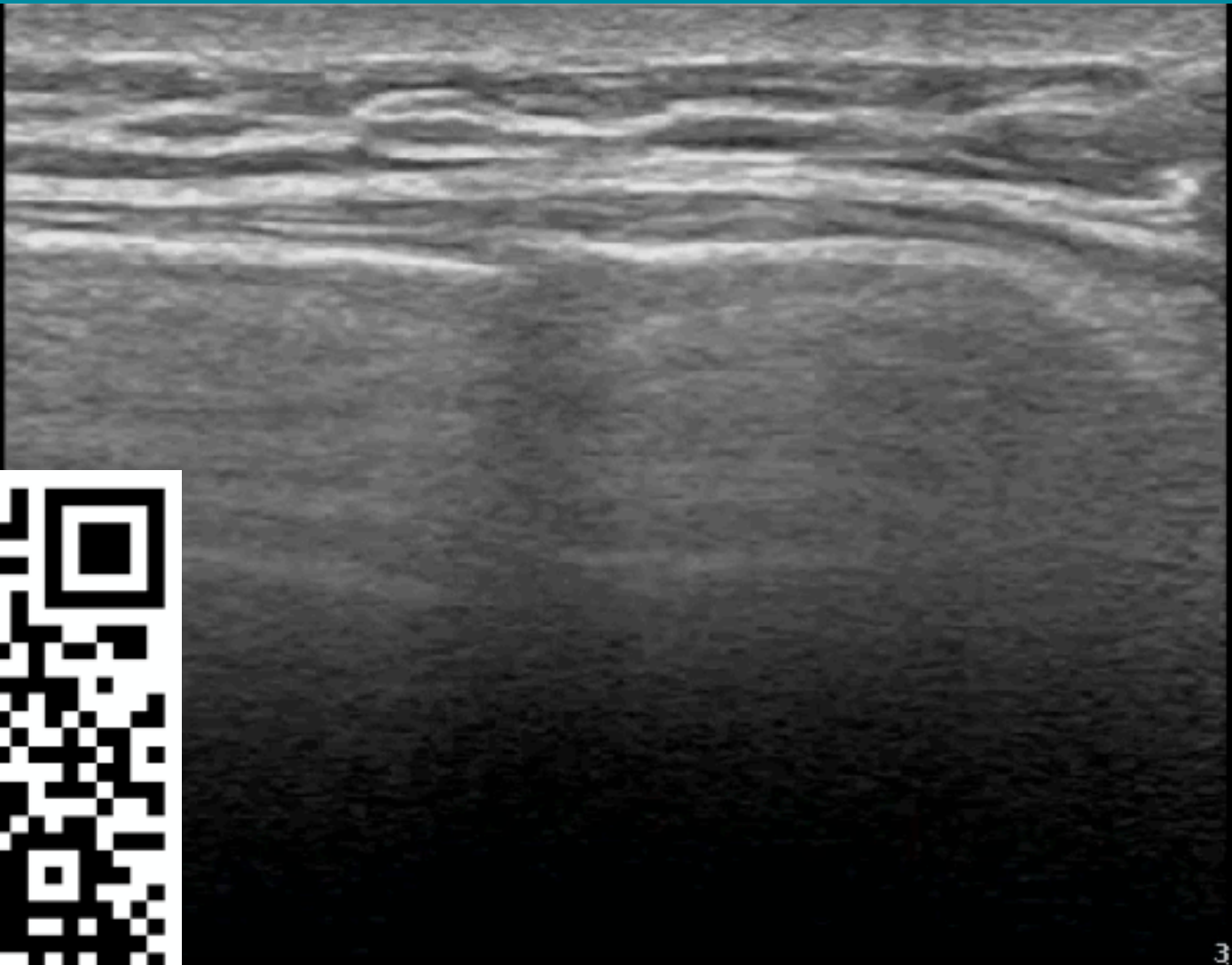
2

# RIB (縱向掃描-不連續/血腫)

Superficial P  
L12-3  
46 Hz  
3.0cm

2D

Res  
Gn 96  
C 56  
3/2/1

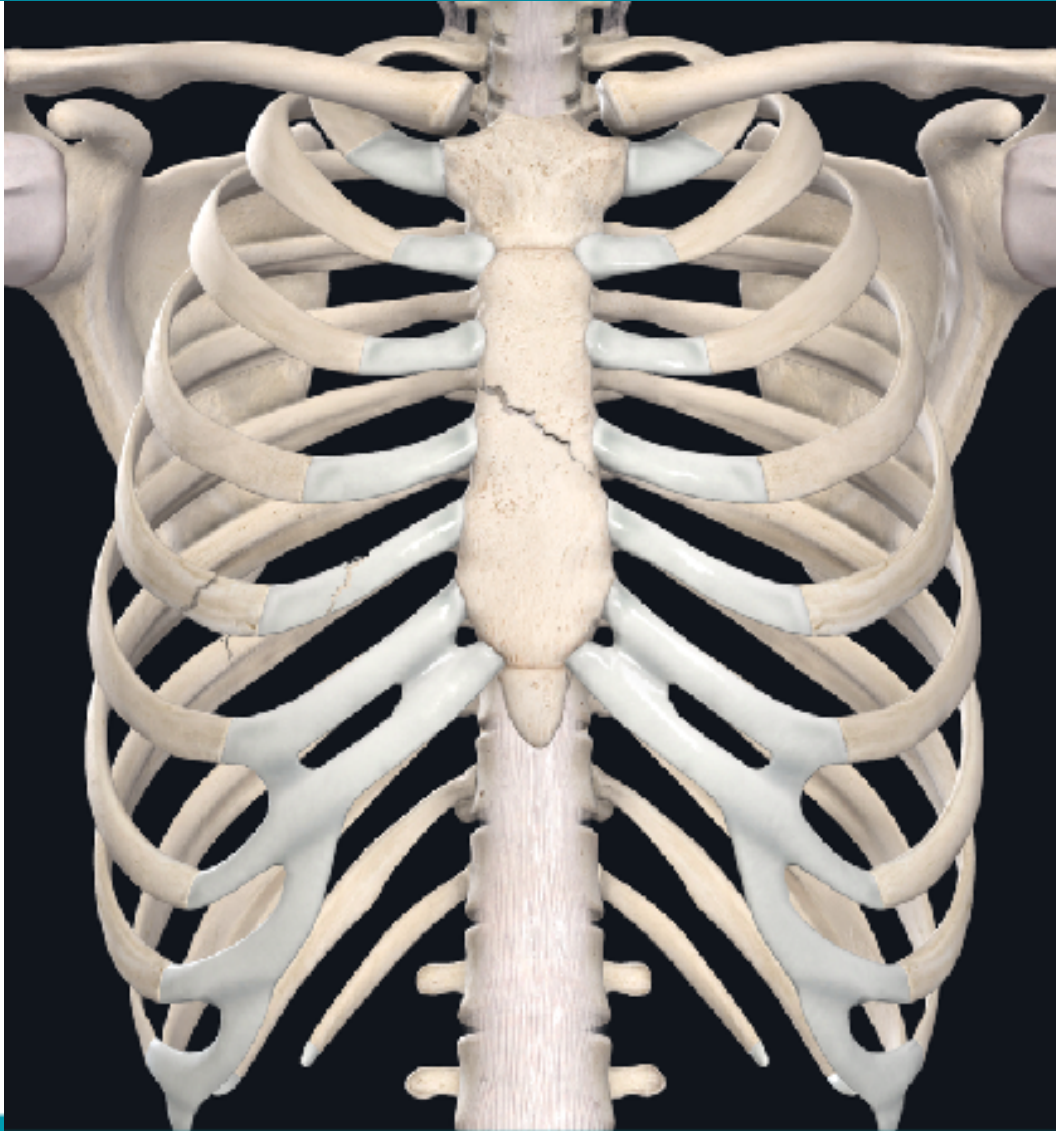


2

3.0cm



# 骨折診斷三要點



高低差

不連續

有血腫

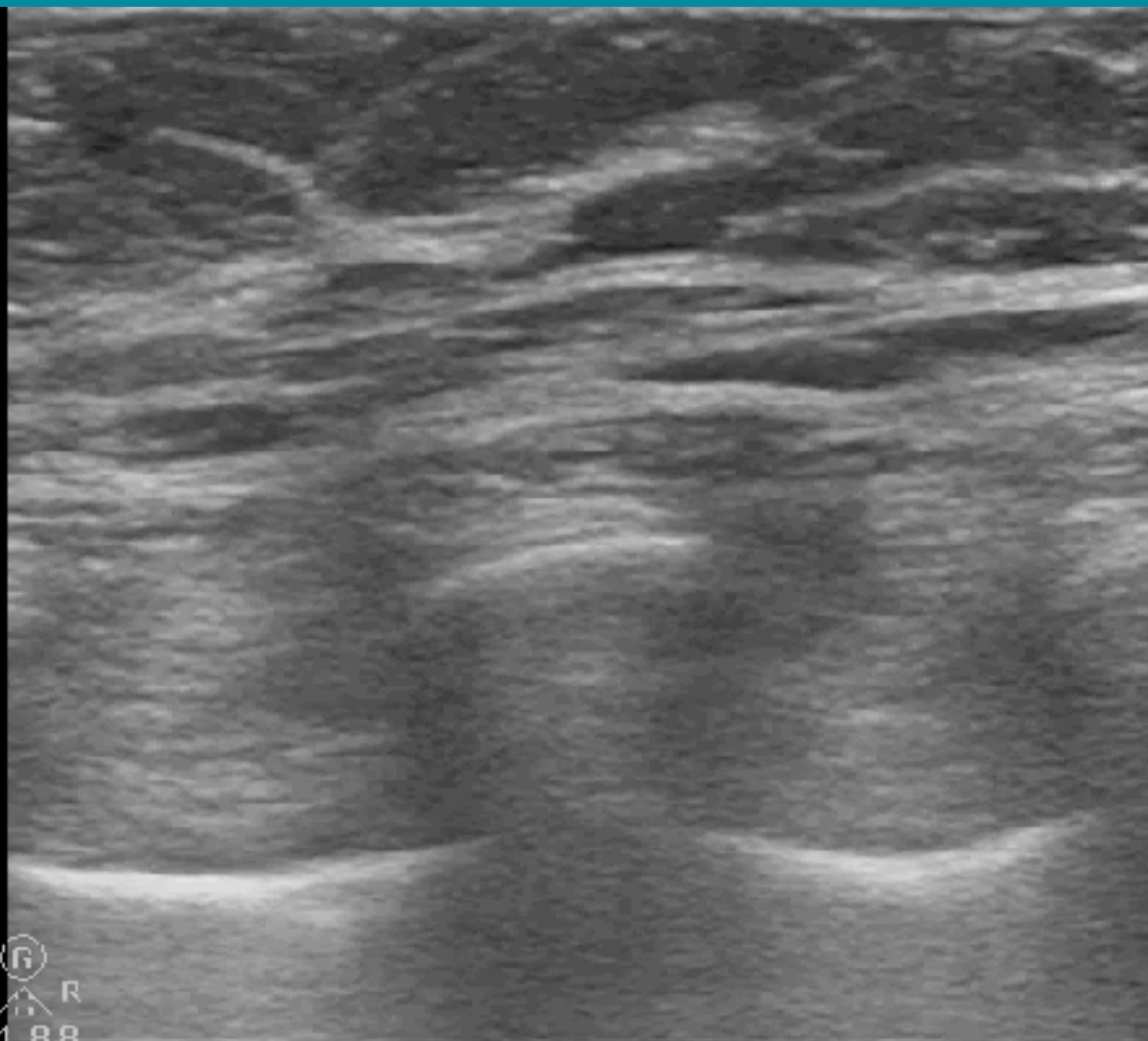
# FRACTURE ?

HPG Gen  
L12-3  
42 Hz  
3.5cm

2D  
HGen  
Gn 74  
C. 56  
3/3/4



P R  
1.1 8.8



3.5cm

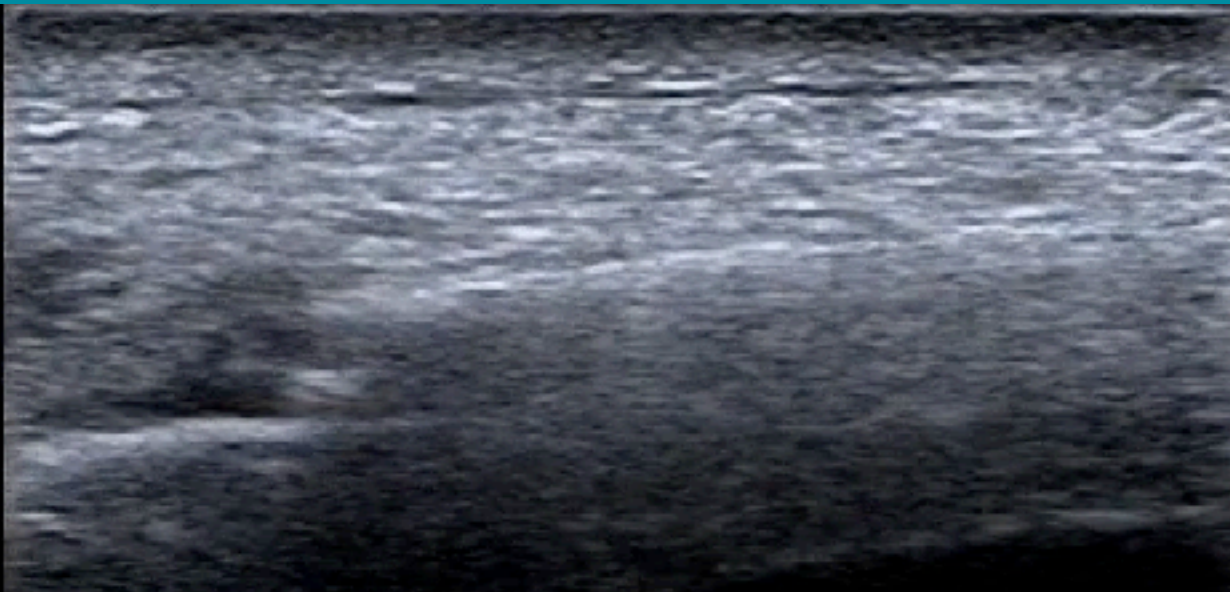


# FRACTURE ?



# FRACTURE ?

T



MI  
1.5  
11L4  
diffT9.0  
30 fps  
G:86  
DR:60  
A:6  
P:3

1



2

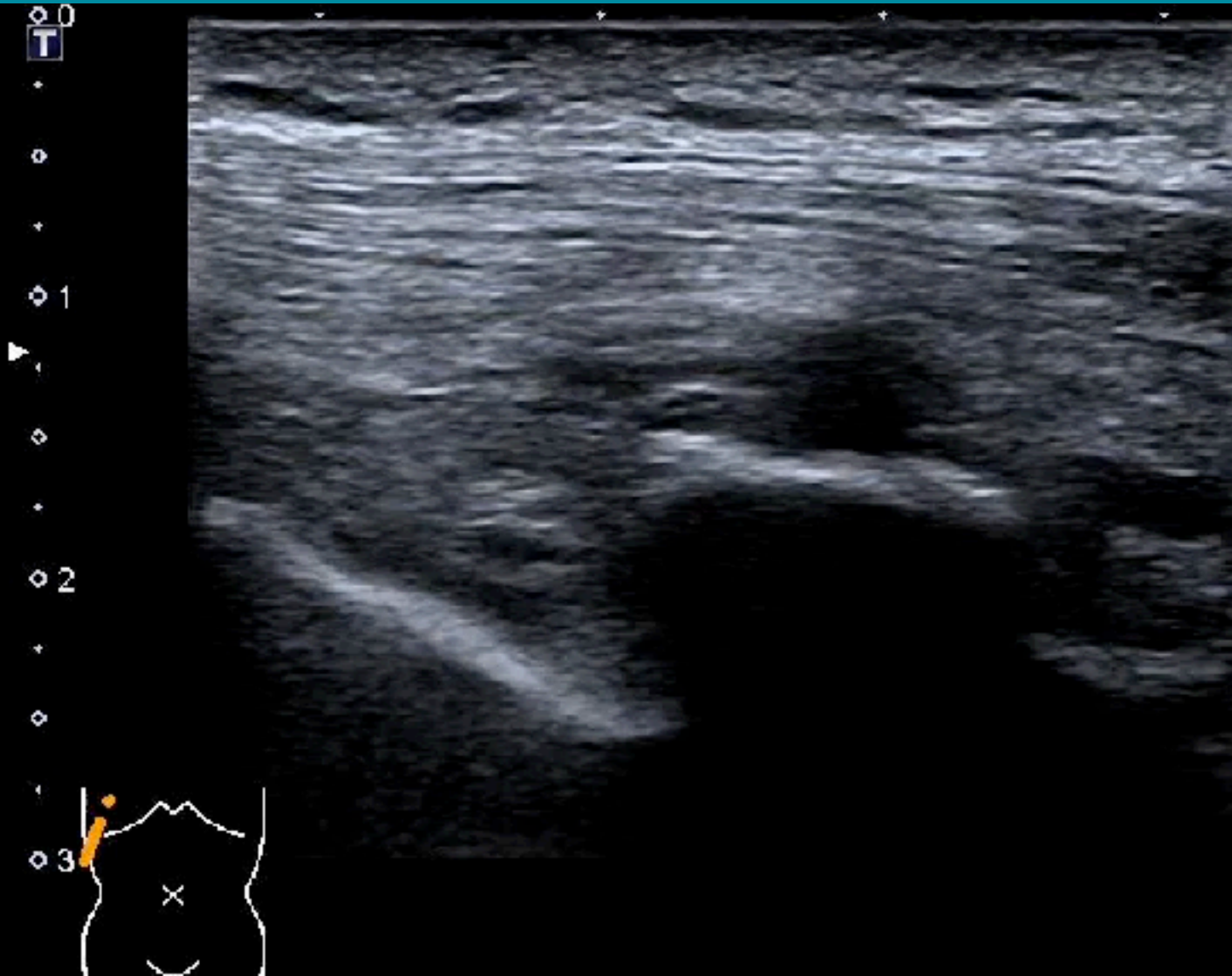
2

3



3

# NEW OR OLD FRACTURE ?



MI  
1.5  
11L4  
diffT9.0  
30 fps  
G:88  
DR:55  
A:6  
P:3

# NEW OR OLD FRACTURE ?





# FRACTURE ?

MSK Gen  
L12-1  
44 Hz  
3.0cm

P

2D  
Res  
Gn 62  
58  
4/3/4



P  
R  
1.0 12.0

3.0cm



# FRACTURE ?

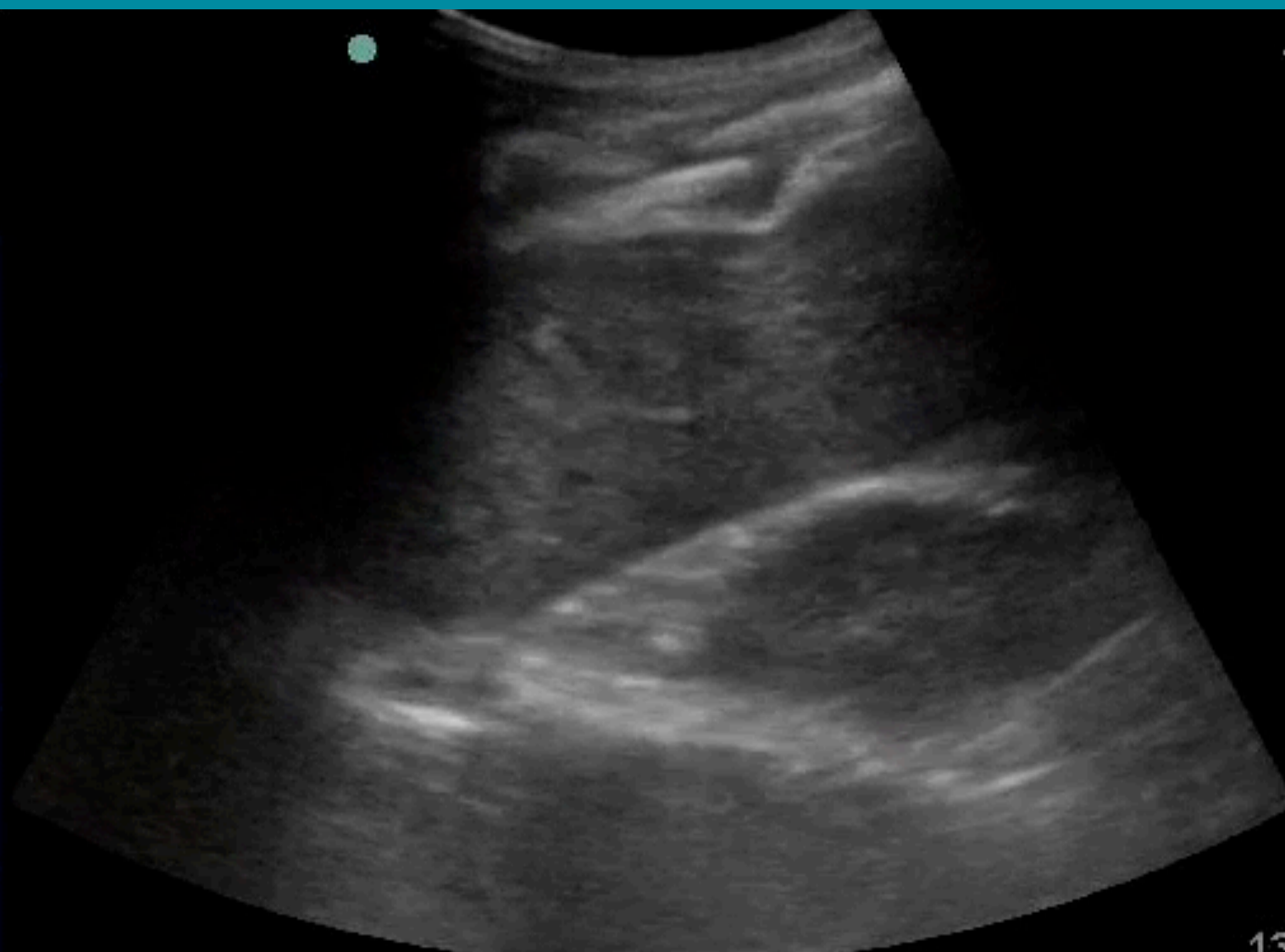
Superficial  
L12-3  
50 Hz  
2.5cm

2D  
Res  
Gn 100  
C. 58  
3/2/1



# RIGHT LOWER CHEST INJURY

SCENTH MD



ABD  
- C60  
[Battery icon]  
[Printer icon]  
88%  
MI  
1.0  
TIS  
0.1

- [Person icon] Patient
- [Graph icon] Auto Gain
- [Waveform icon] Gen
- [Clipboard icon] Clip
- [Document icon]

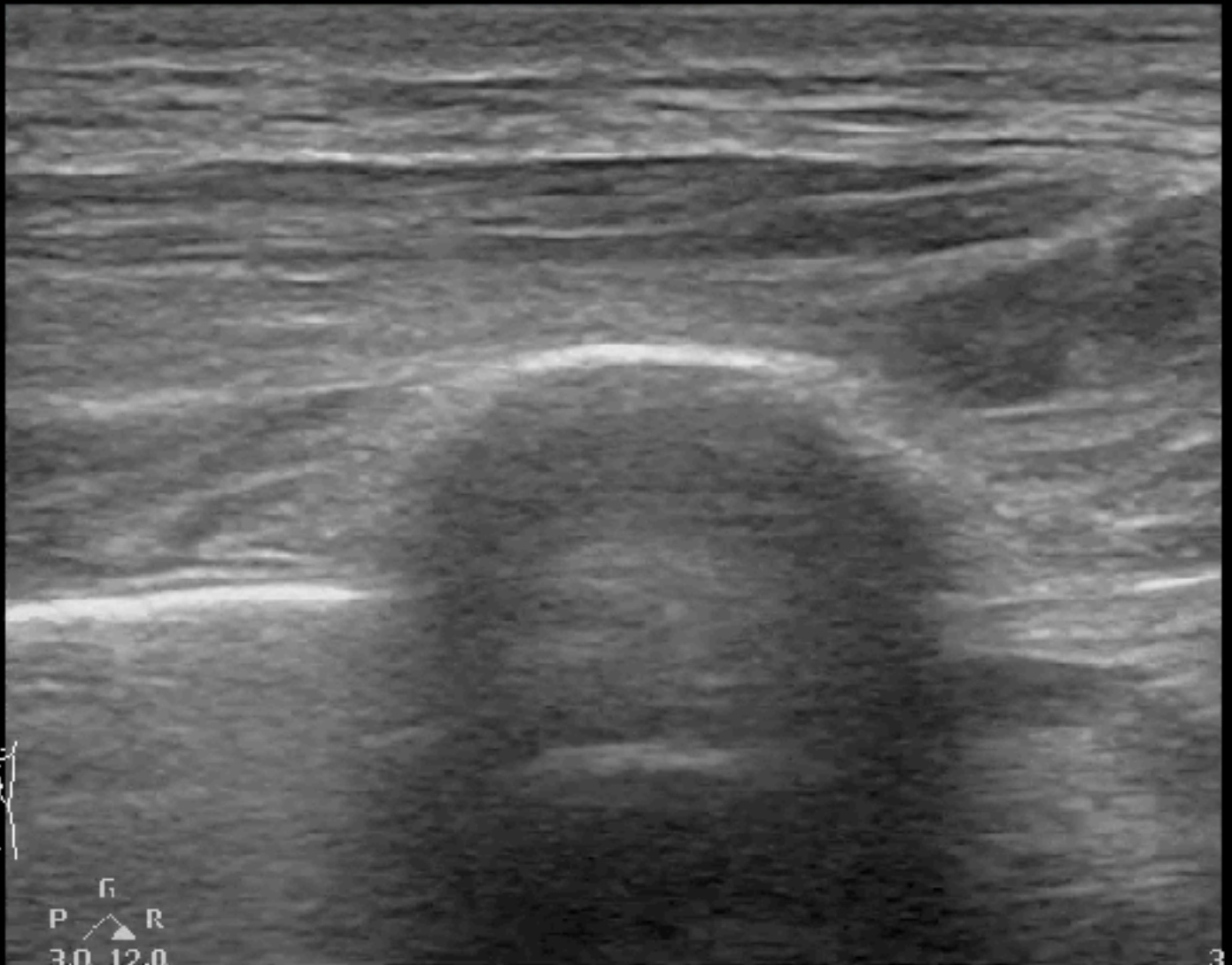


# FRACTURE ?

Superficial  
L12-3  
46 Hz  
3.0cm

P

2D  
Res  
Gn 100  
C. 58  
3 / 2 / 1



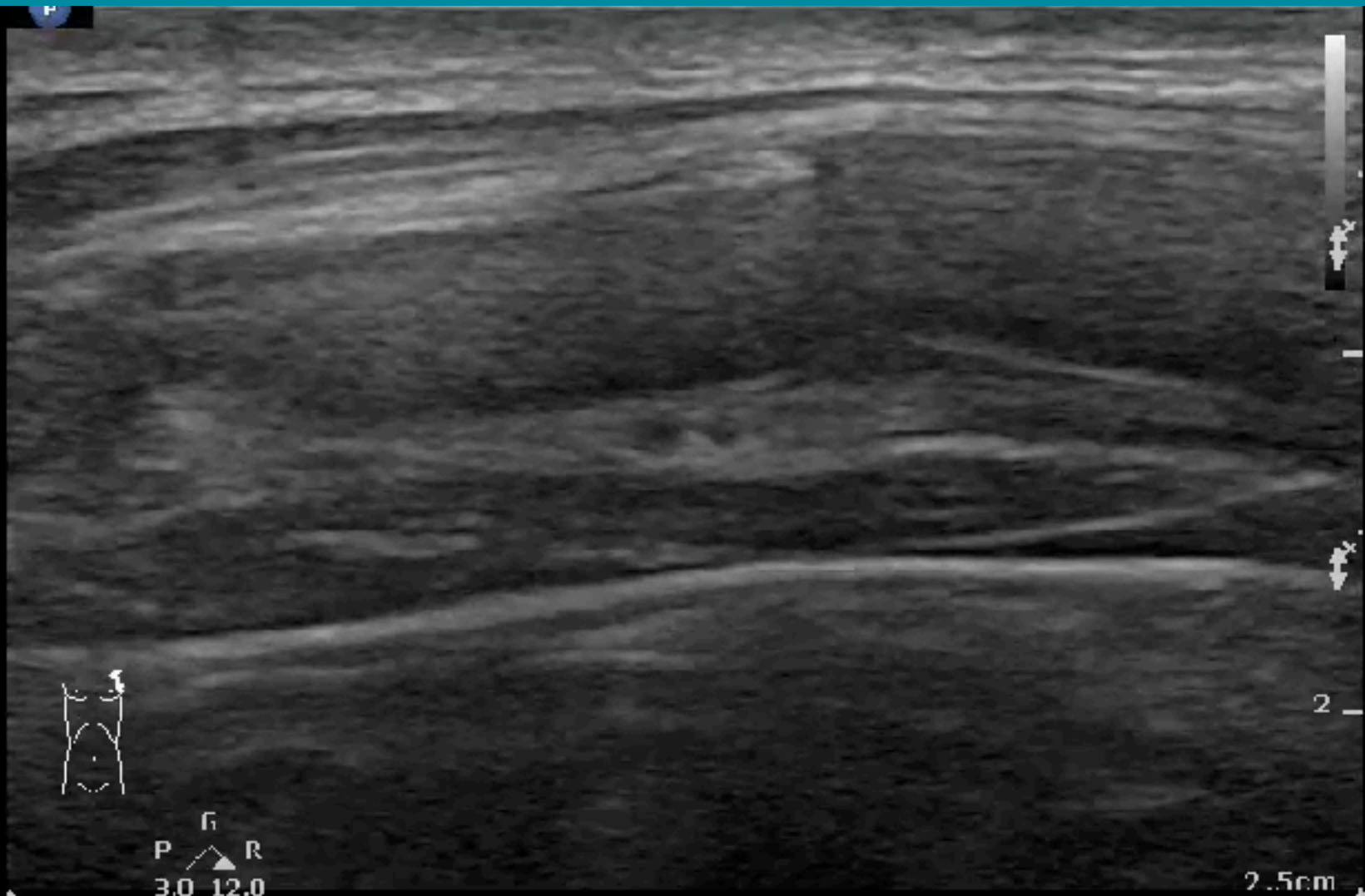
P R  
3.0 12.0

3.0cm

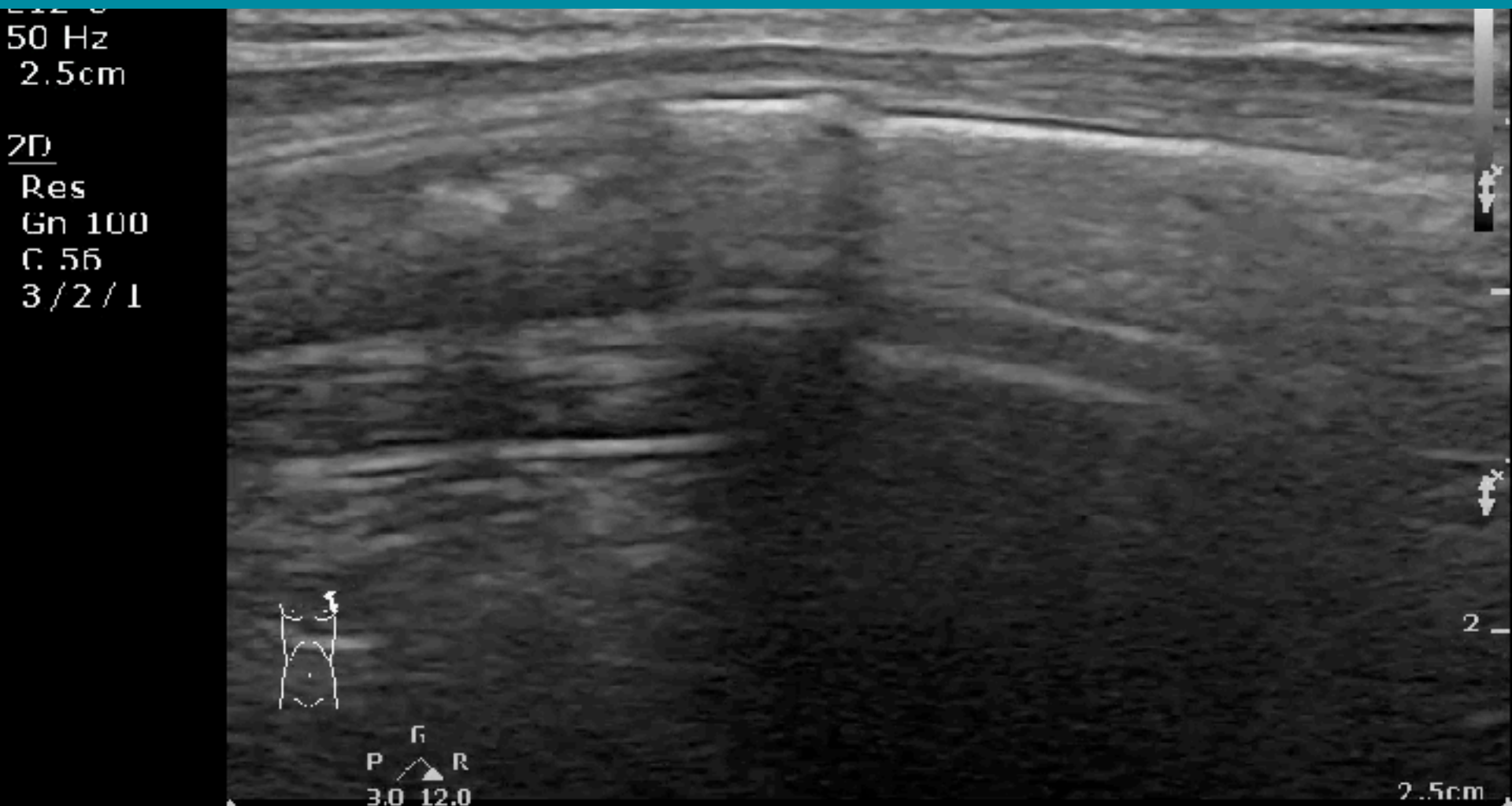
# FRACTURE ?

Superficial  
L12-3  
50 Hz  
2.5cm

2D  
Res  
Gn 100  
C. 56  
3 / 2 / 1



# FRACTURE ?





# FRACTURE ?

Superficial

P

L12-3

46 Hz

3.0cm

2D

Res

Gn 100

C. 56

3 / 2 / 1



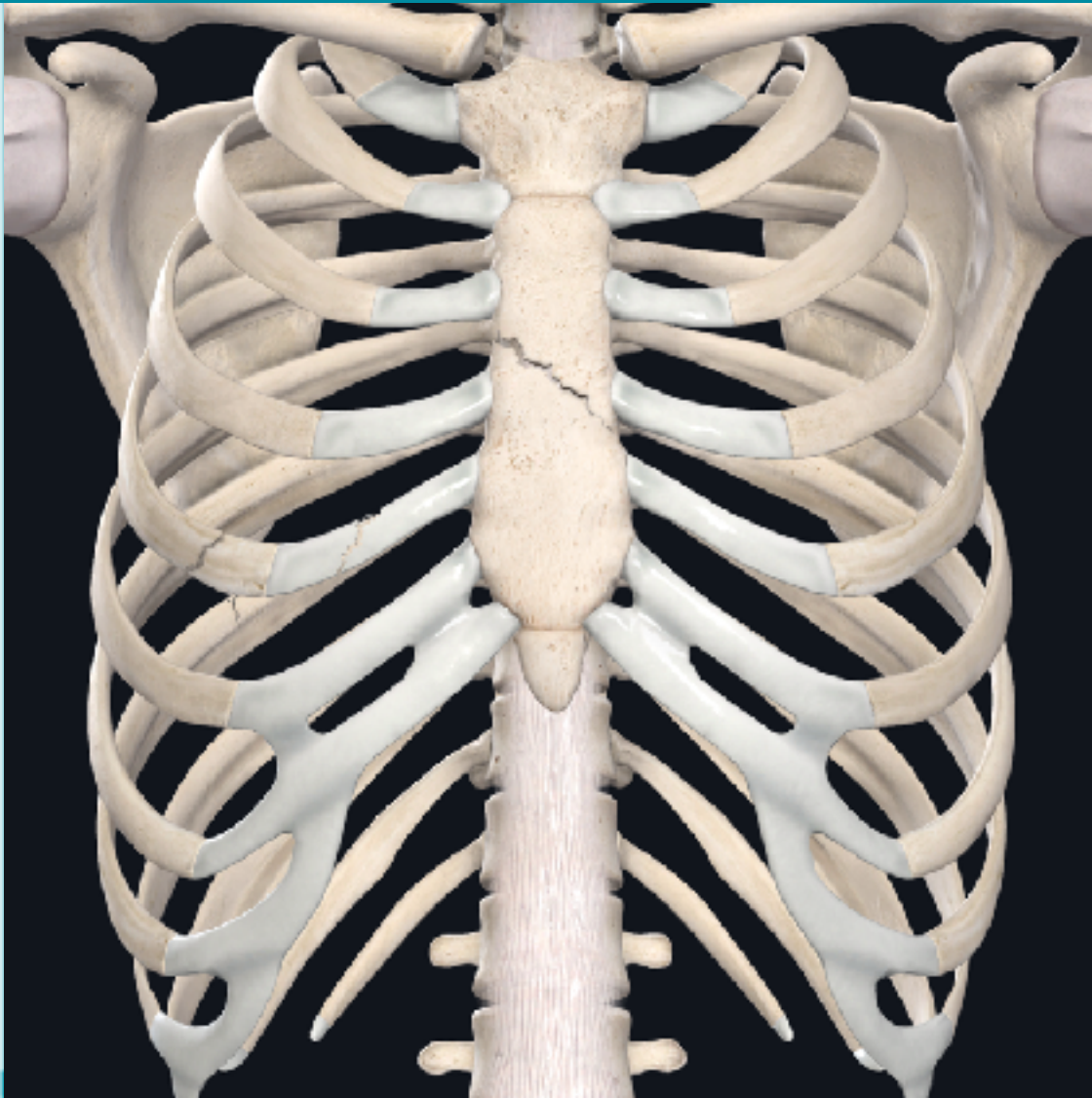
F  
P     R  
3.0 12.0

3.0cm



# POCUS FOR FRACTURE

平/長骨優先 & Pain-oriented

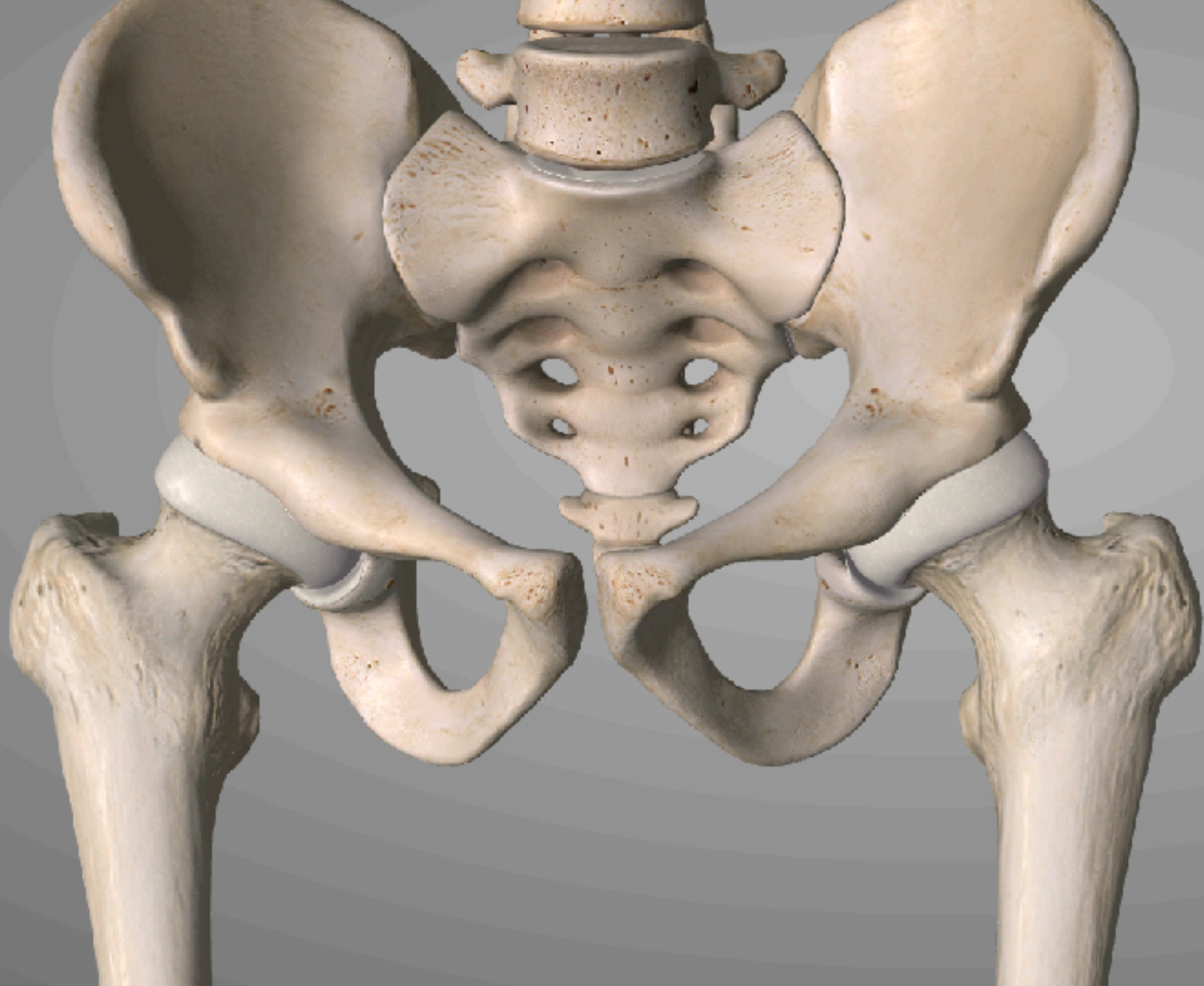


**Sternal fracture**

**Rib fracture**

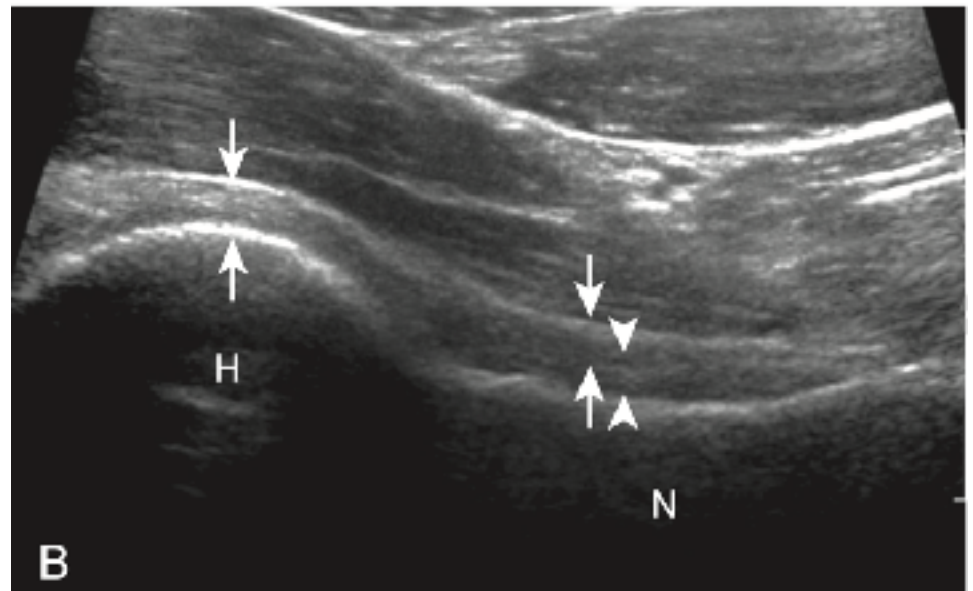
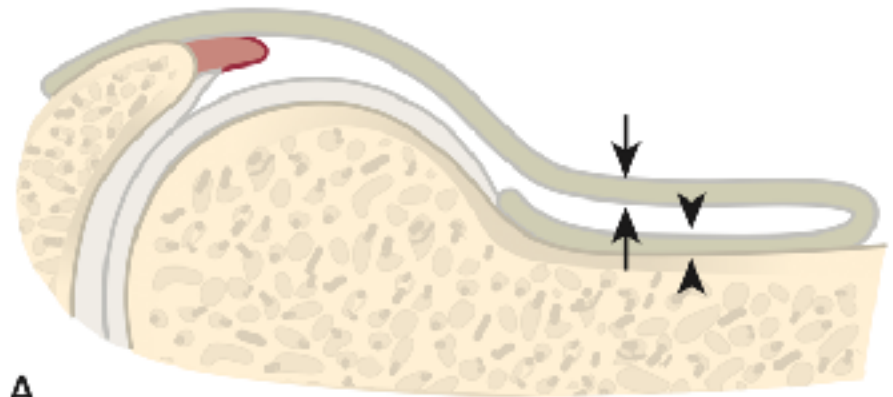
**Cartilage fracture**

**Separation**





# Anterior hip joint recess



# Anterior hip joint recess





# Anterior hip joint recess

20210708  
FH5.0  
DR 115  
DE19007BER  
PR 25  
D 8.0  
G 50



0  
.  
.  
.  
.  
.  
.  
.  
.  
5  
.  
.  
.  
.

iNeedle

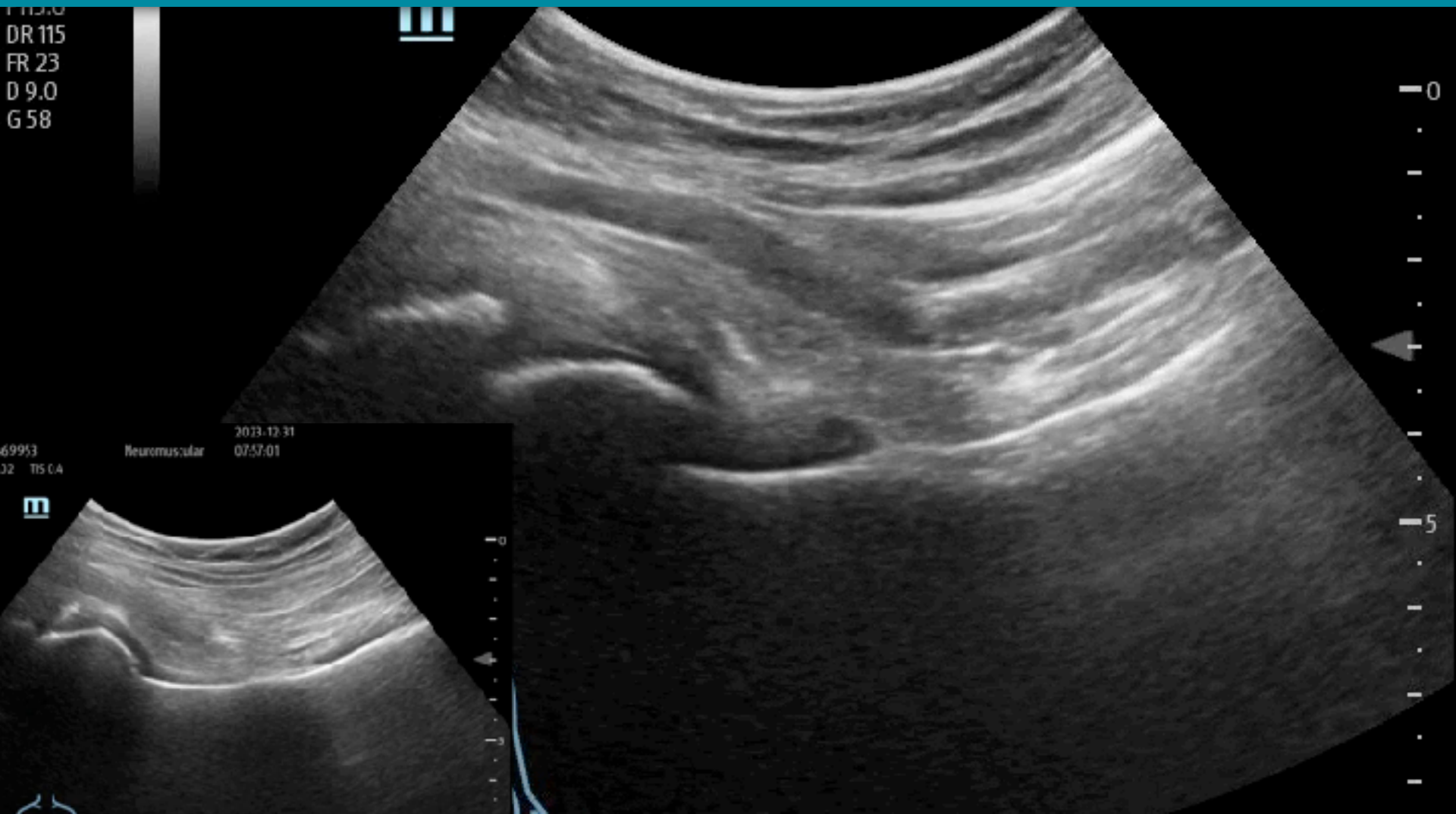
iTouch

thk: mm

# 86F, 廁所出來跌倒，左髌疼痛



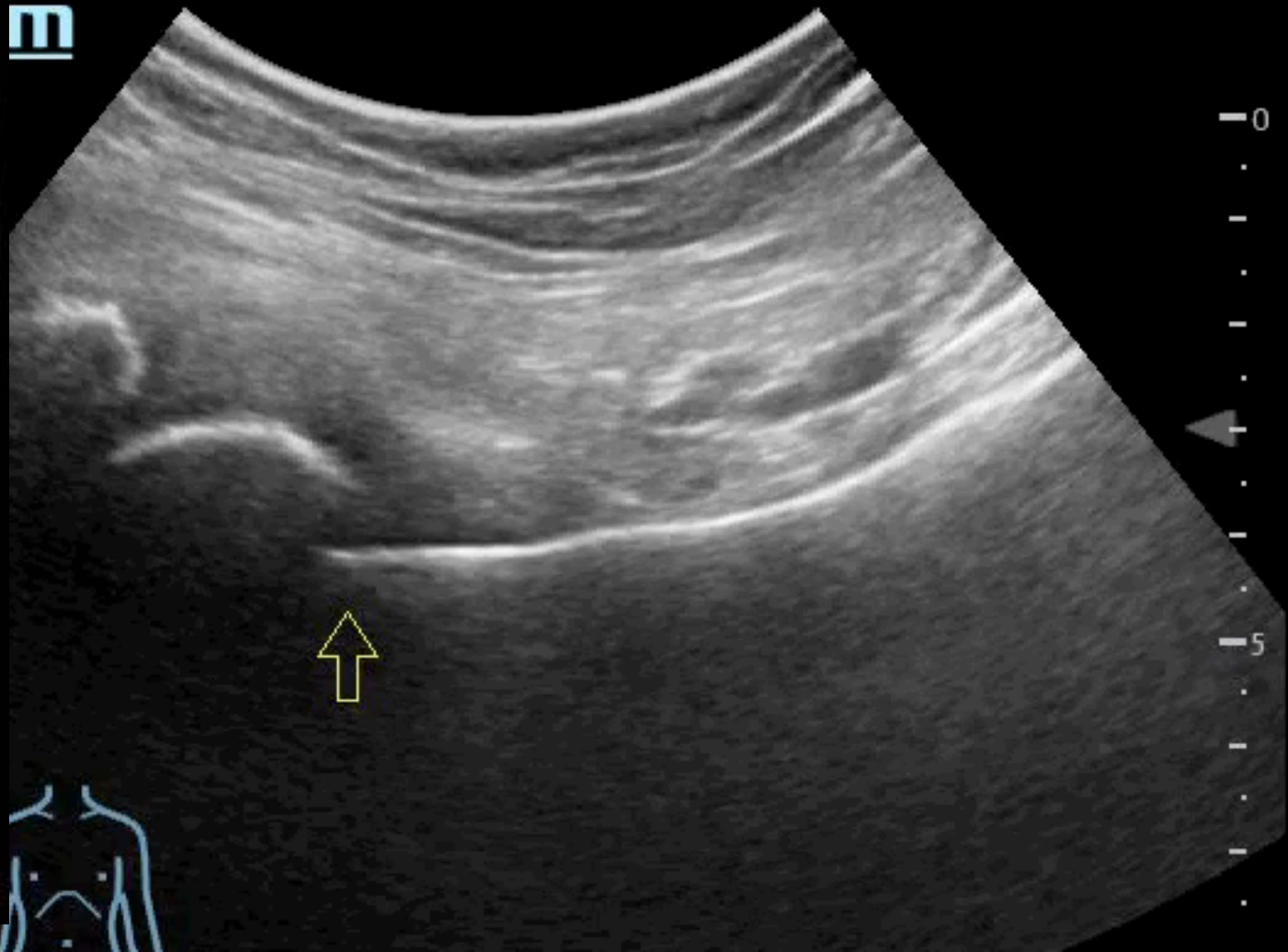
# 86F, 廁所出來跌倒，左髌疼痛



# Femoral neck fracture



m

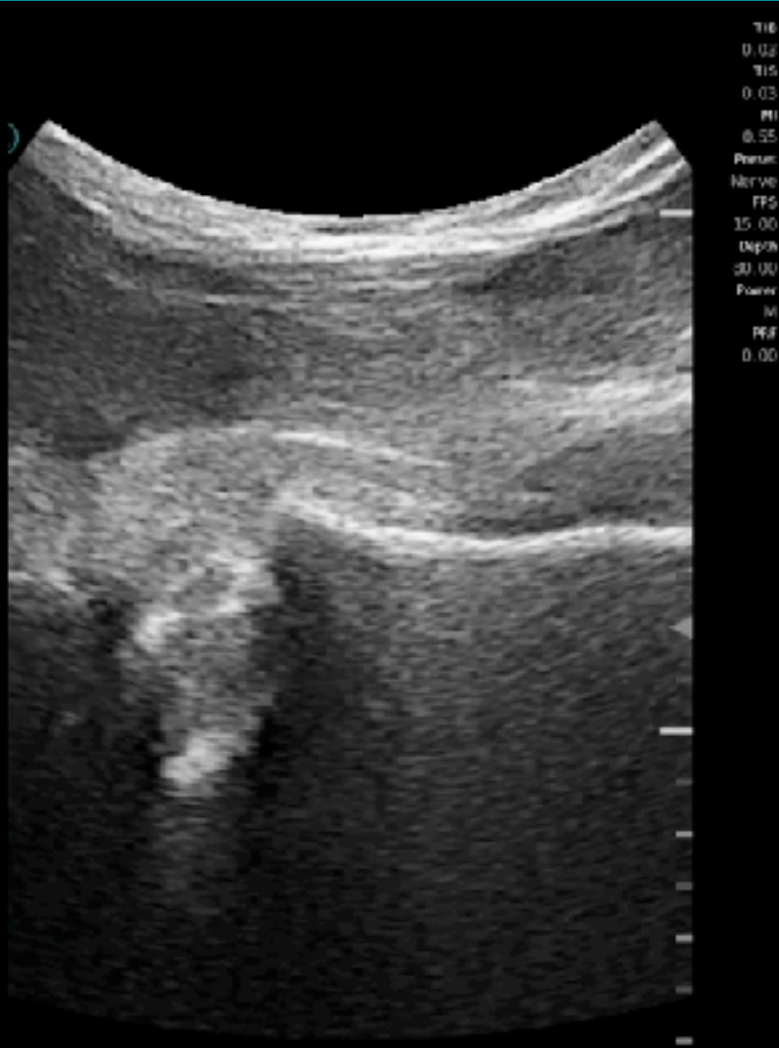


# 73F, COVID, L hip pain



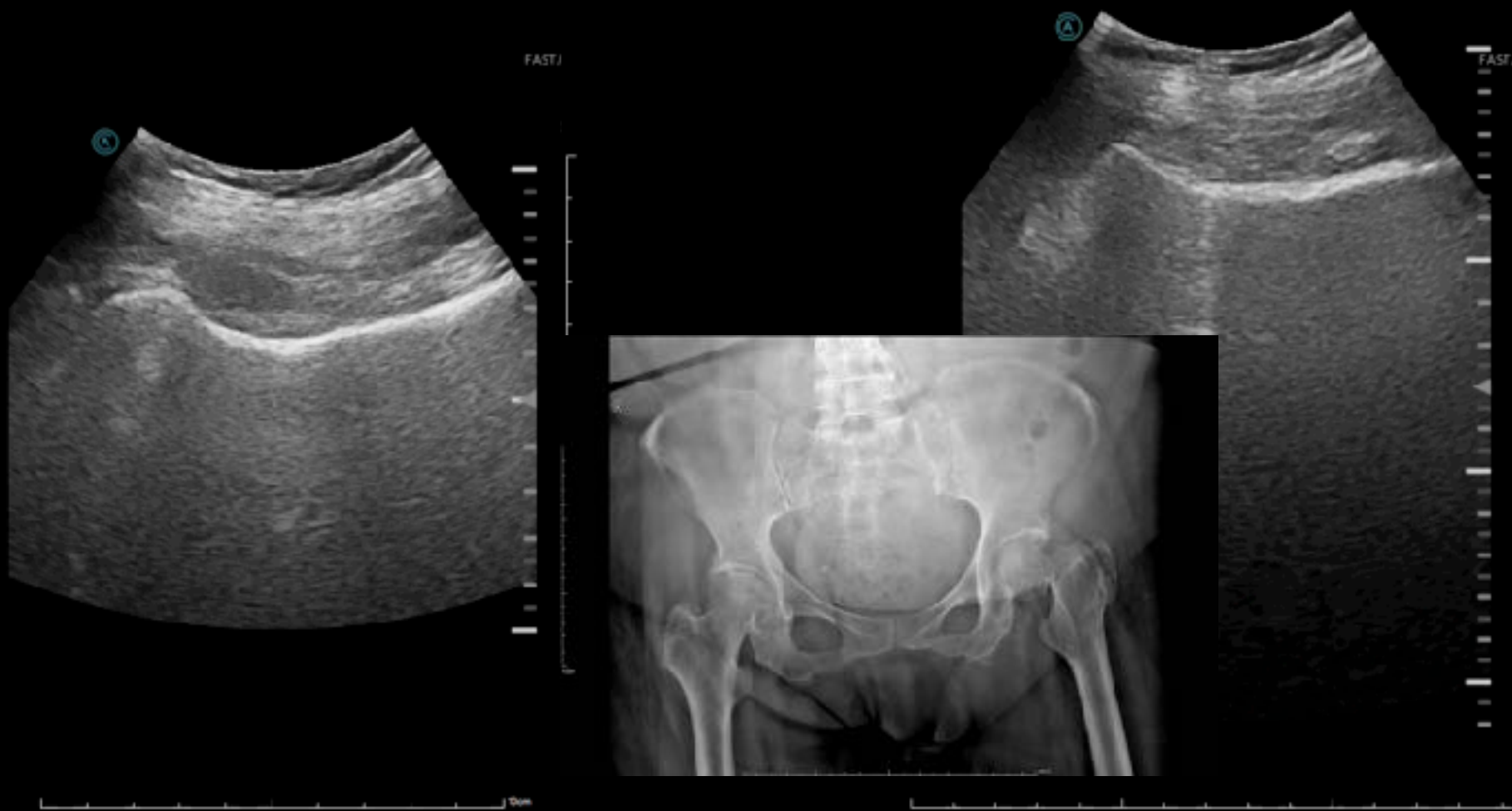


# 73F, COVID, L hip pain





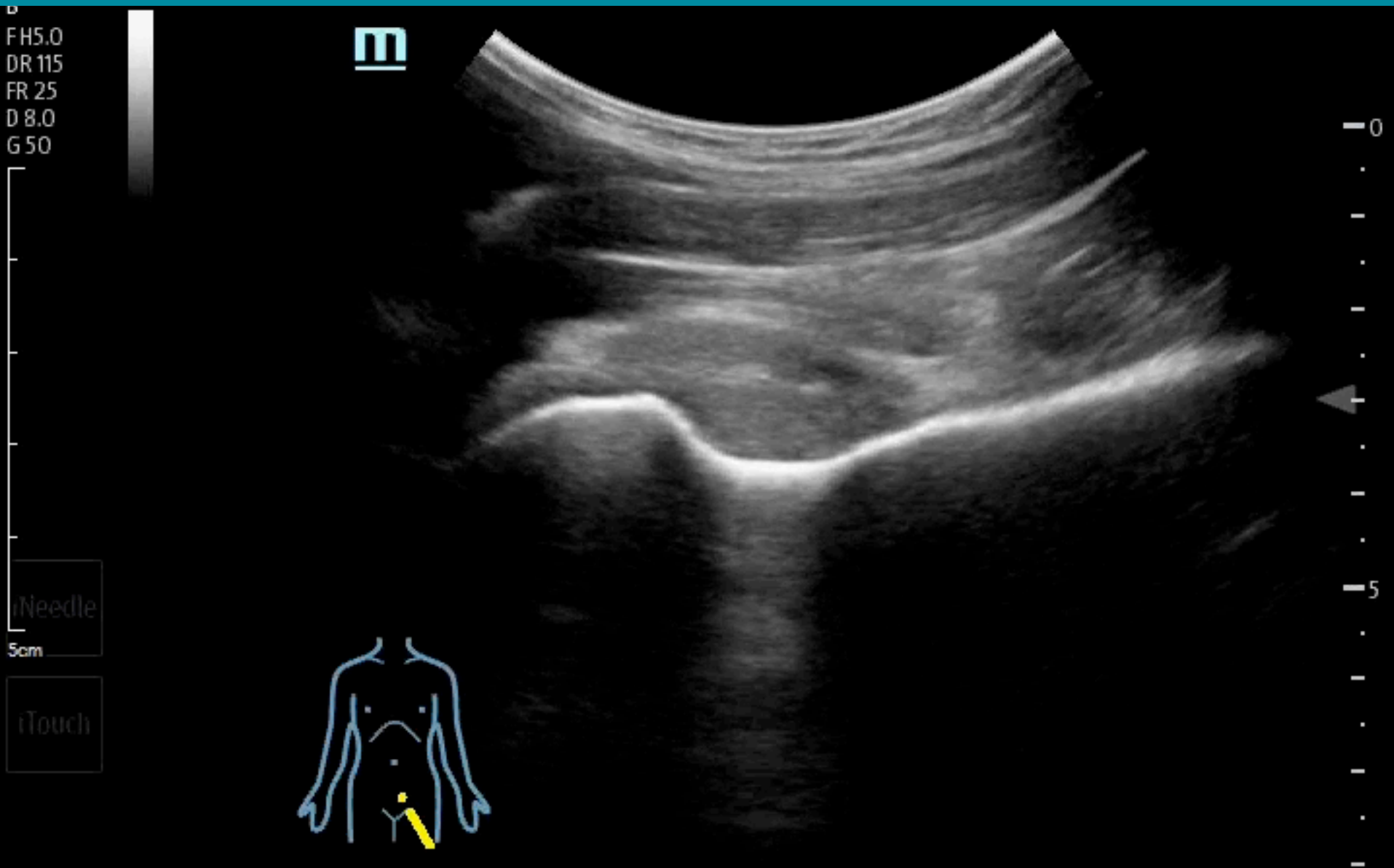
# 64F, 樓梯跌倒，左髌疼痛



76M, 椅子上滑到撞到左髌部，愈來愈痛，今天就沒法走了

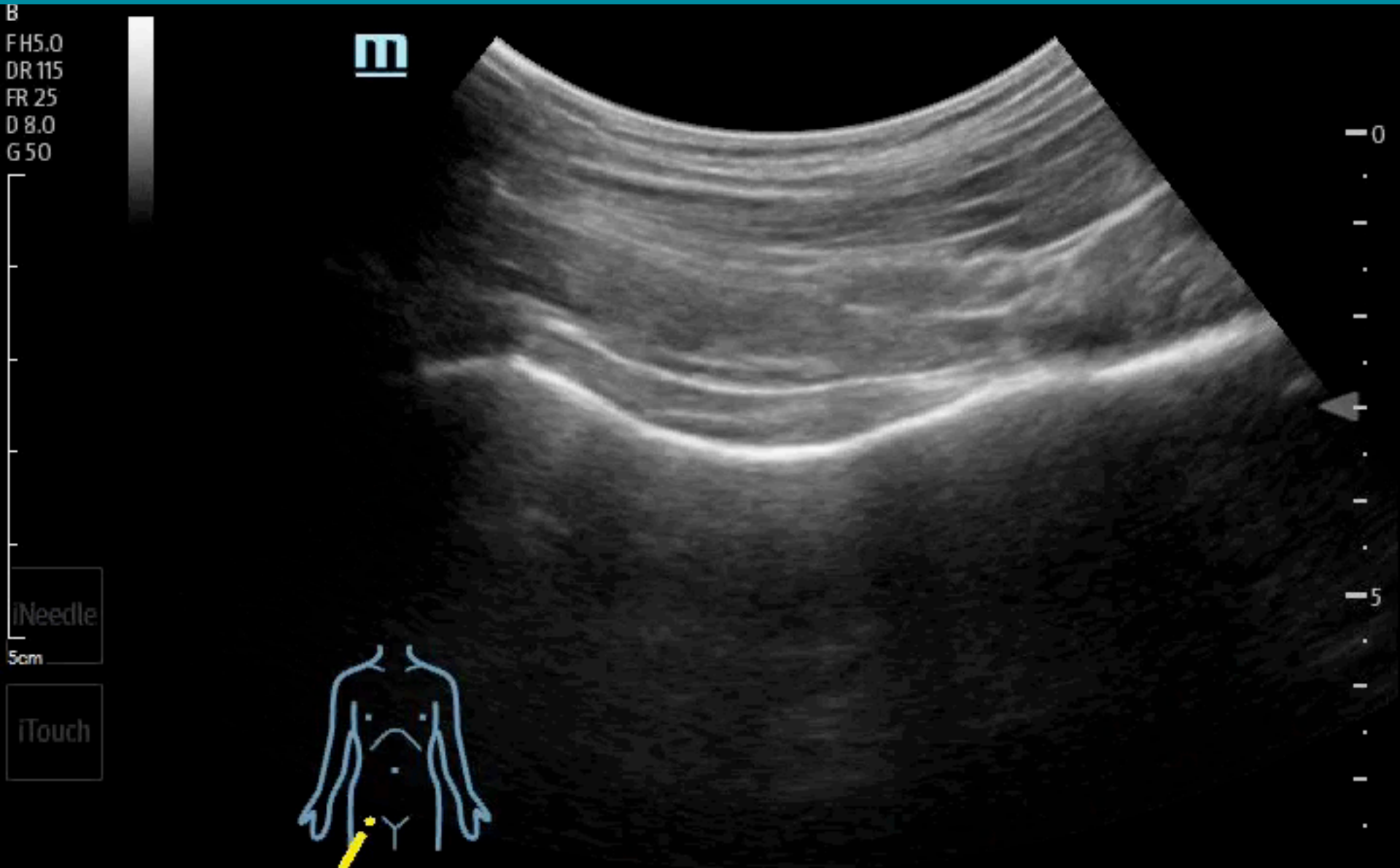


# L HIP SCAN

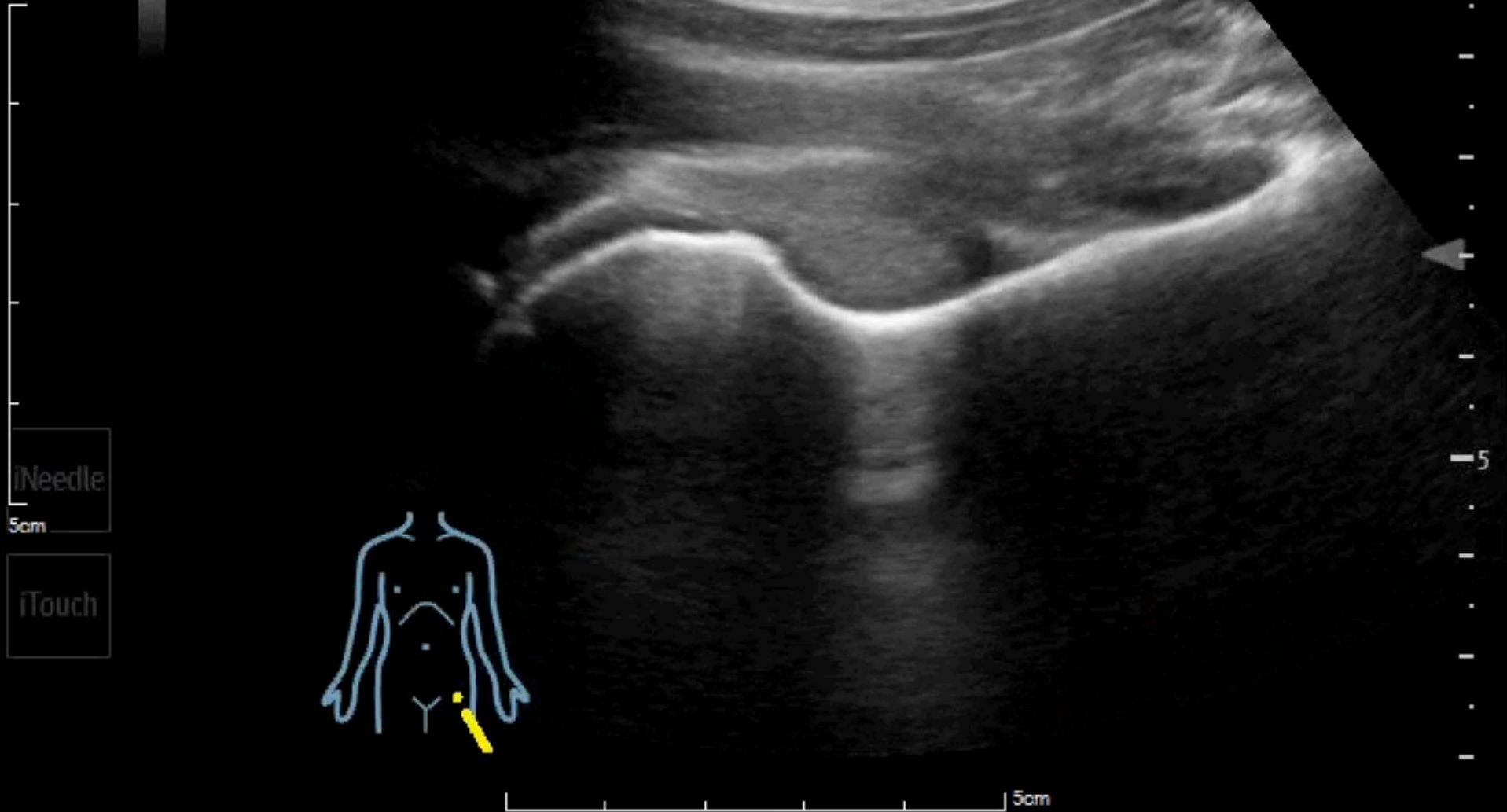




# R HIP SCAN

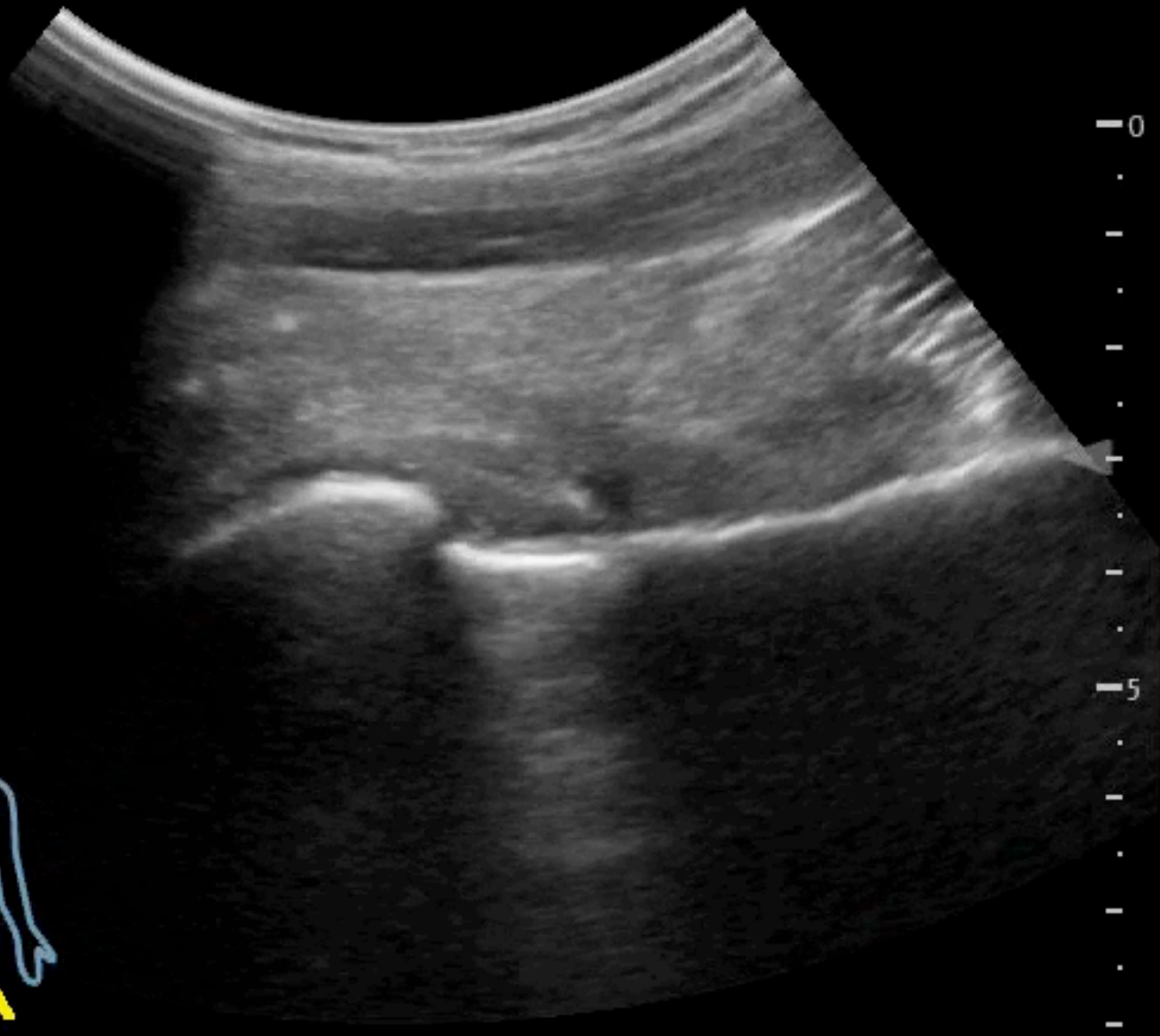


# L HIP SCAN



# L HIP SCAN

FH5.0  
DR 115  
FR 25  
D 8.0  
G 50



iNeedle  
5cm

iTouch



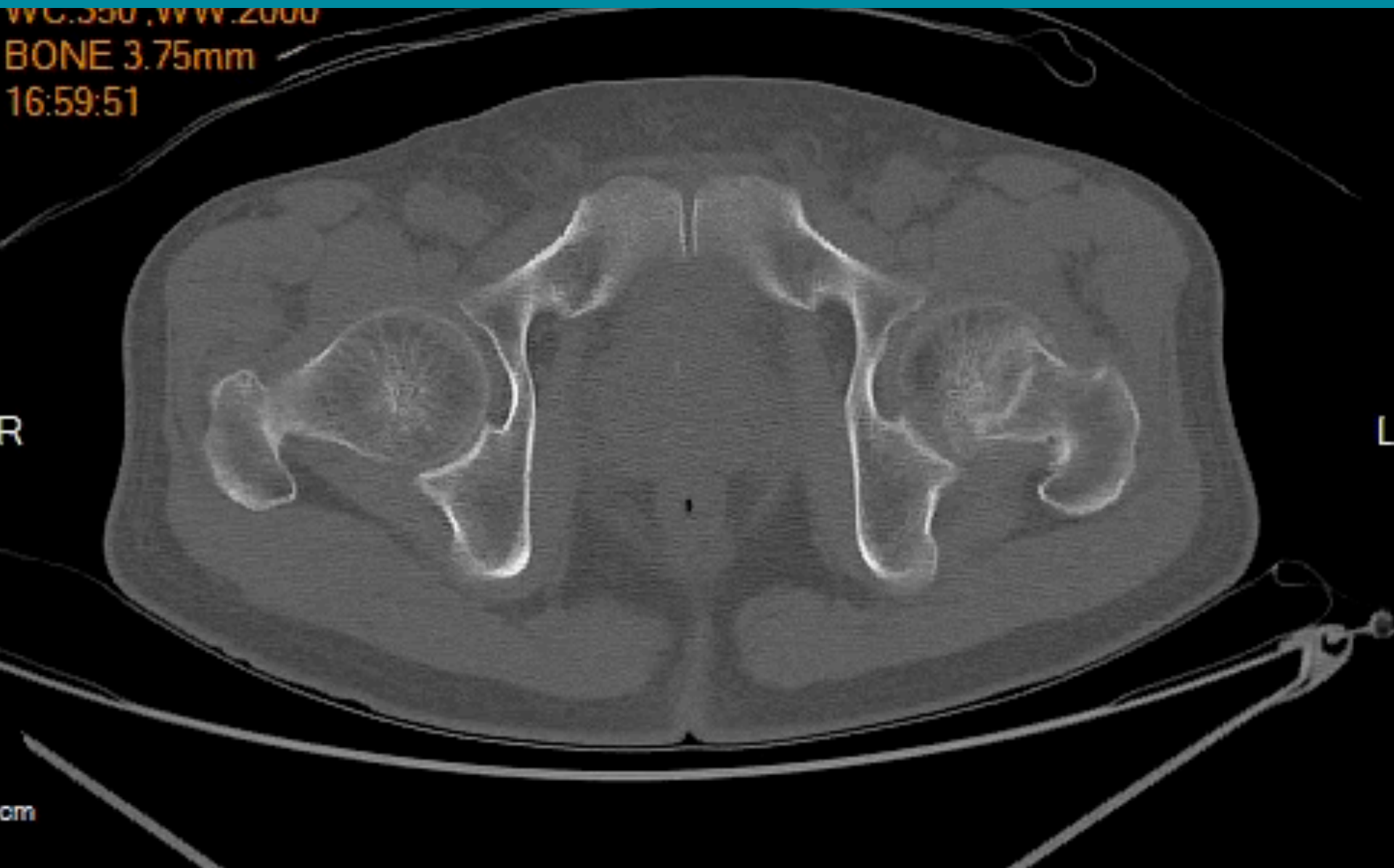
# L HIP SCAN

WVC.550 , WWW.2000  
BONE 3.75mm  
16:59:51

R

L

cm

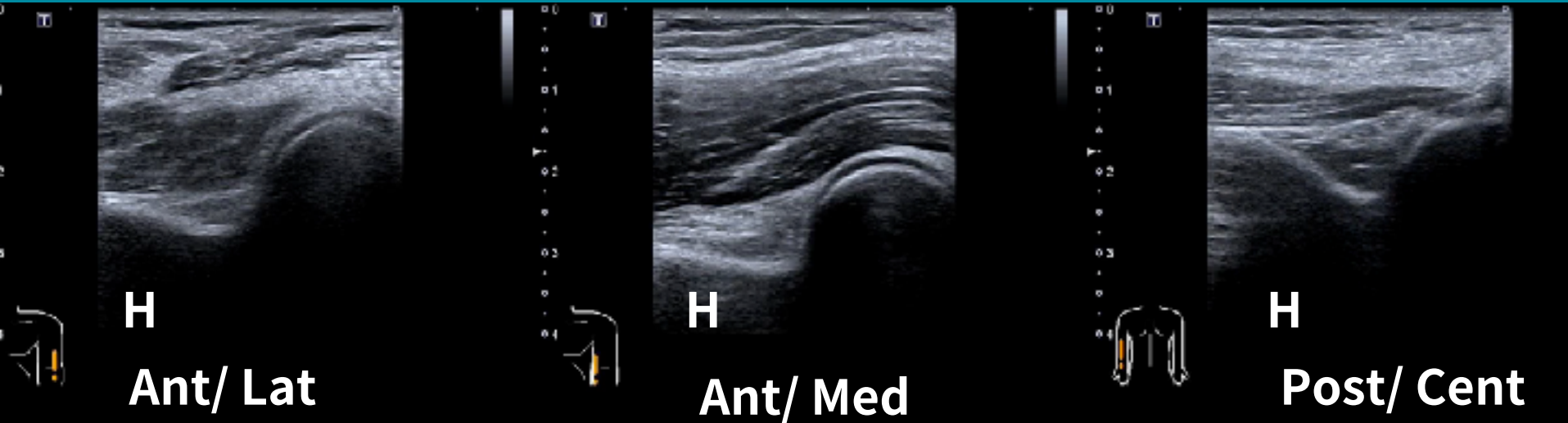


# L FEMORAL NECK FRACTURE





# Elbow Goal : Effusion



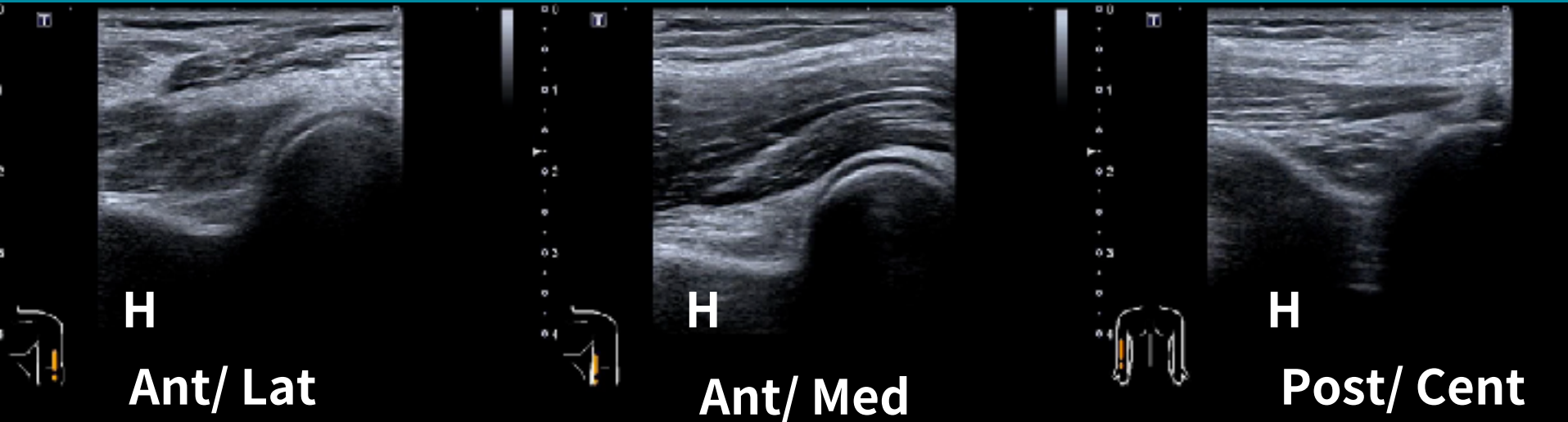
Radial fossa

Coronoid fossa

Olecranon fossa



# Elbow effusion



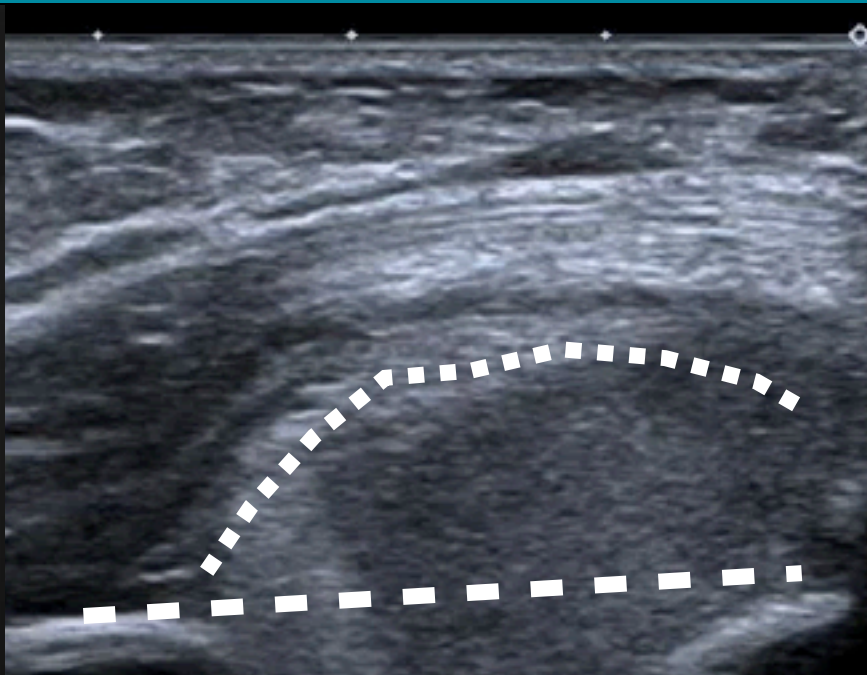
Radial fossa

Coronoid fossa

Olecranon fossa



# Elevated fat pad sign

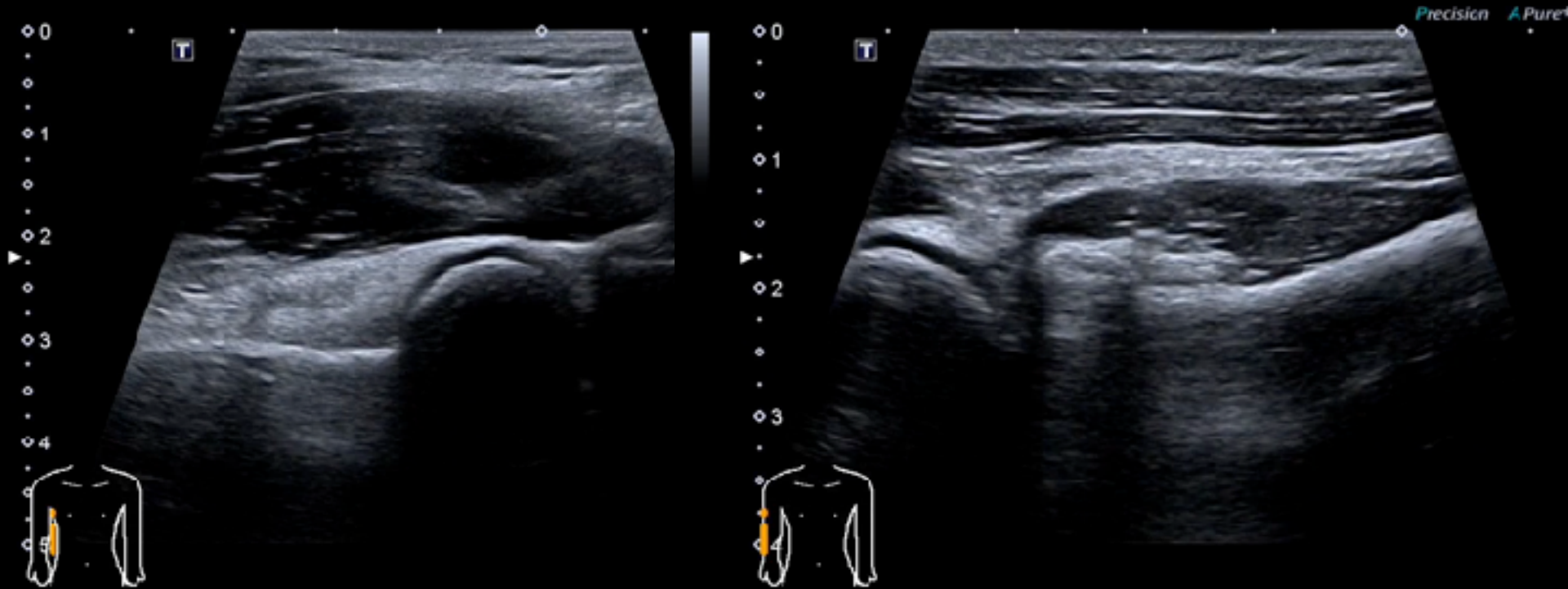


# M/18, 機車車禍，致右手肘疼痛



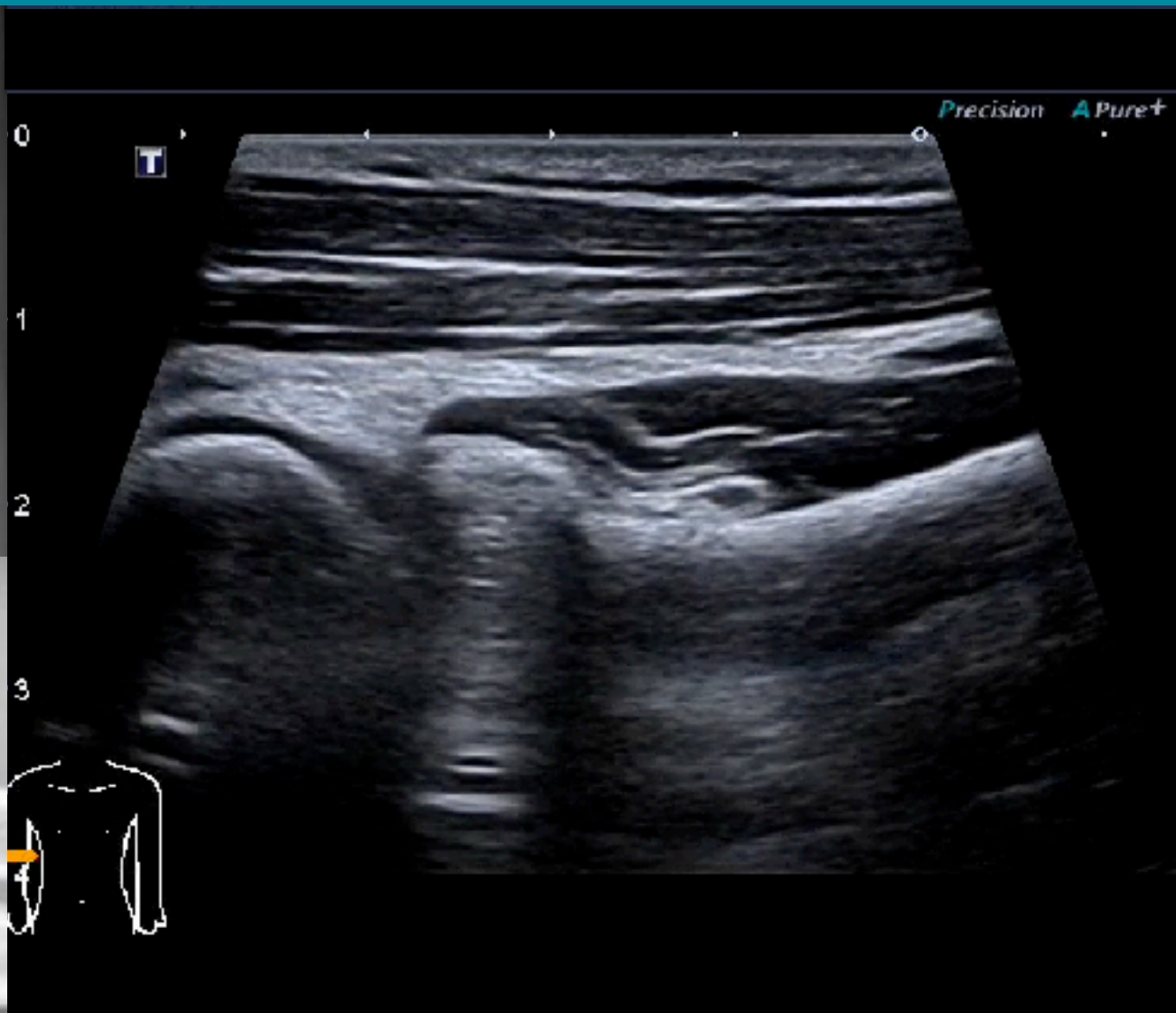


# M/18, 機車車禍，致右手肘疼痛





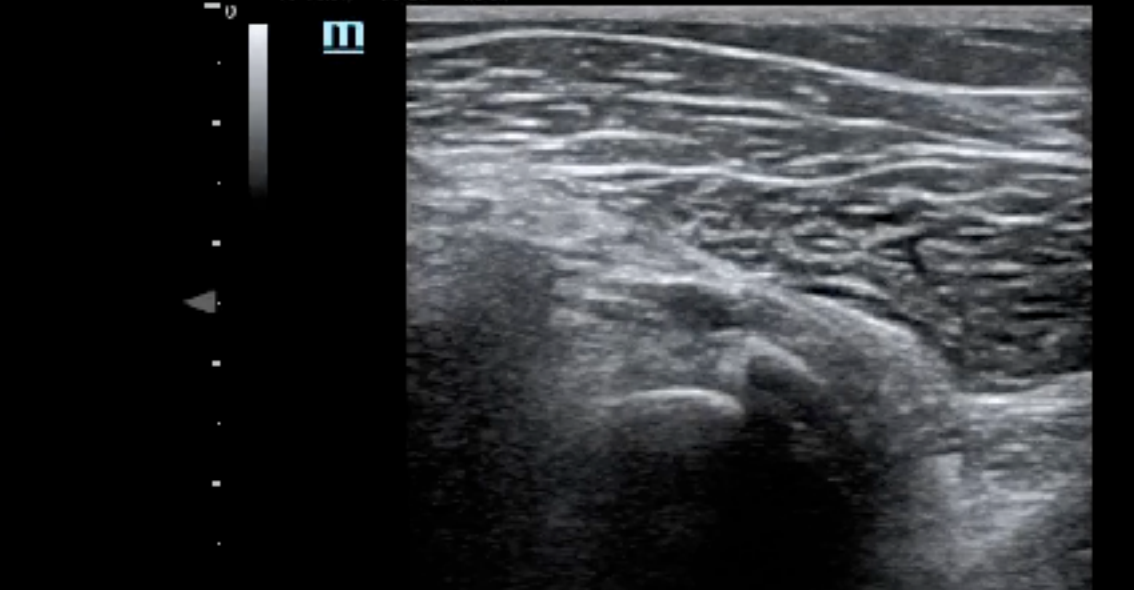
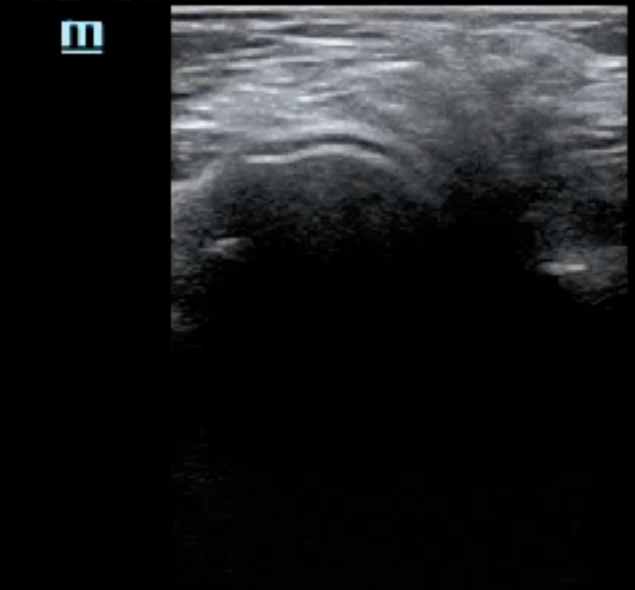
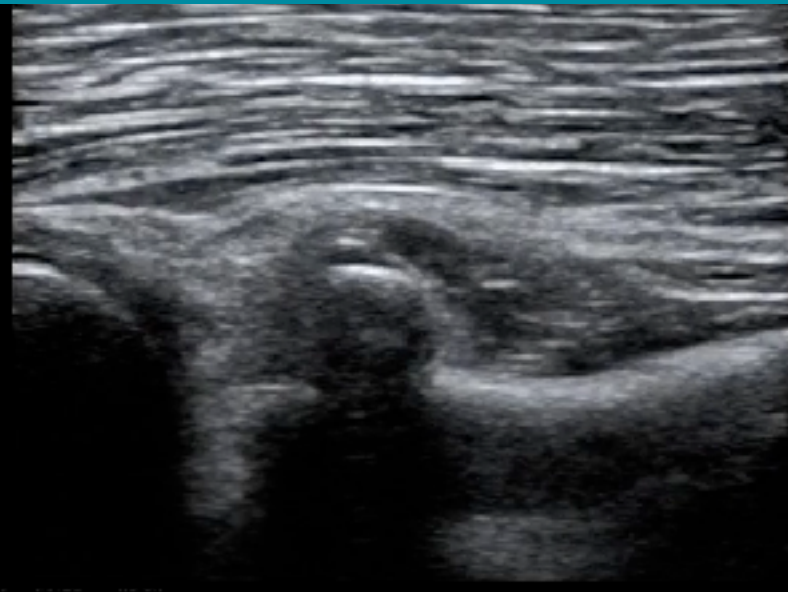
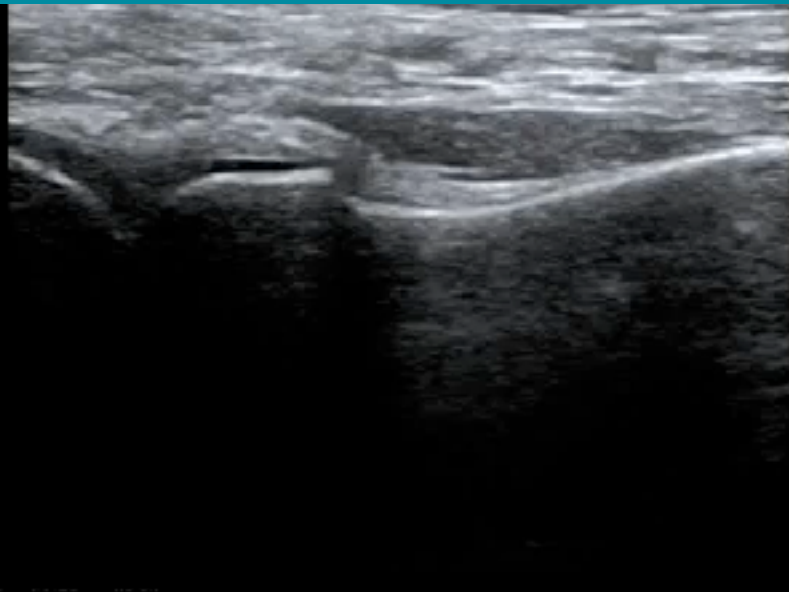
# Radial head fracture & Hemarthrosis



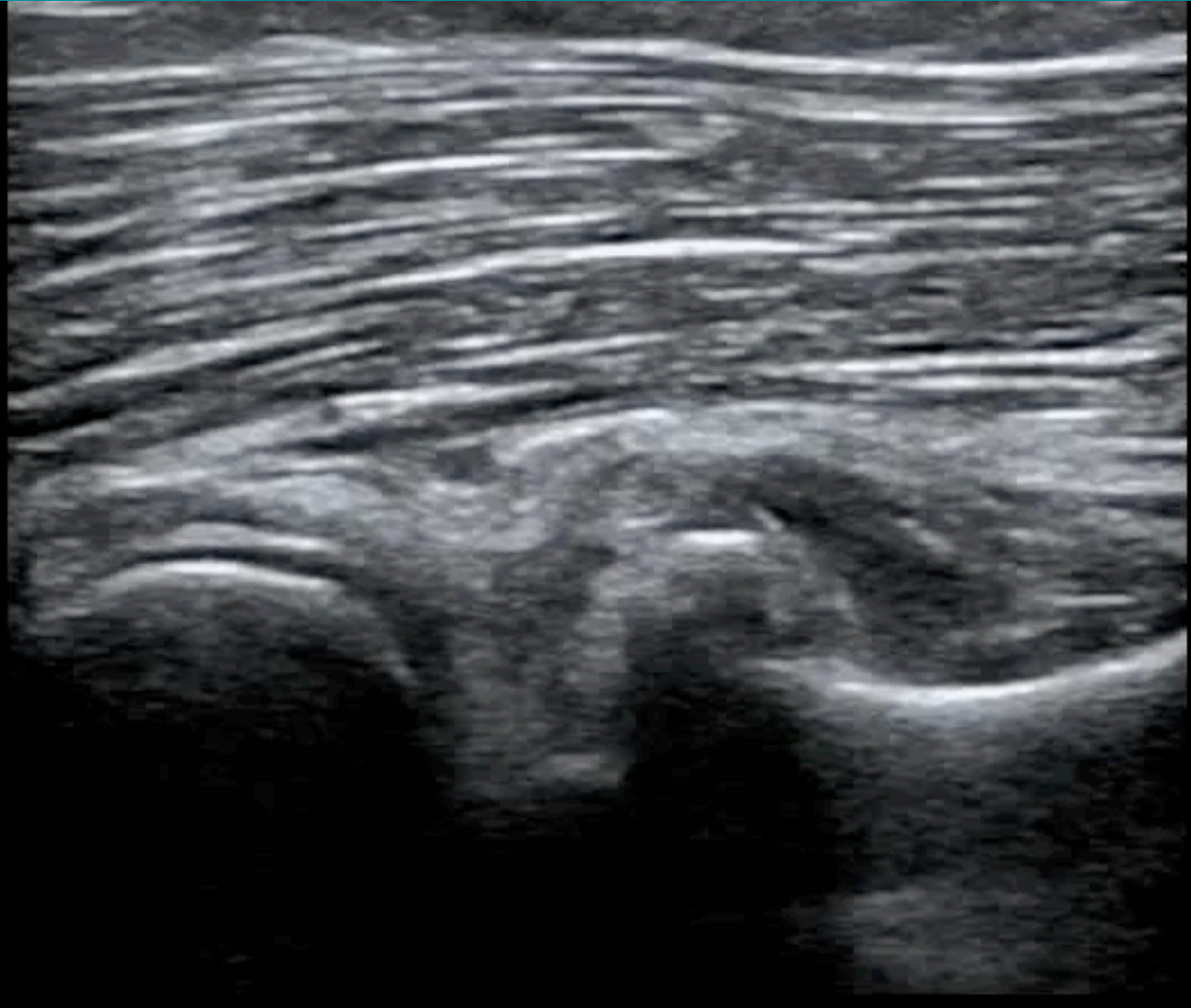
# 47M, 走路跌倒撞到右手肘



# 47M, 走路跌倒撞到右手肘



# Radial head fracture



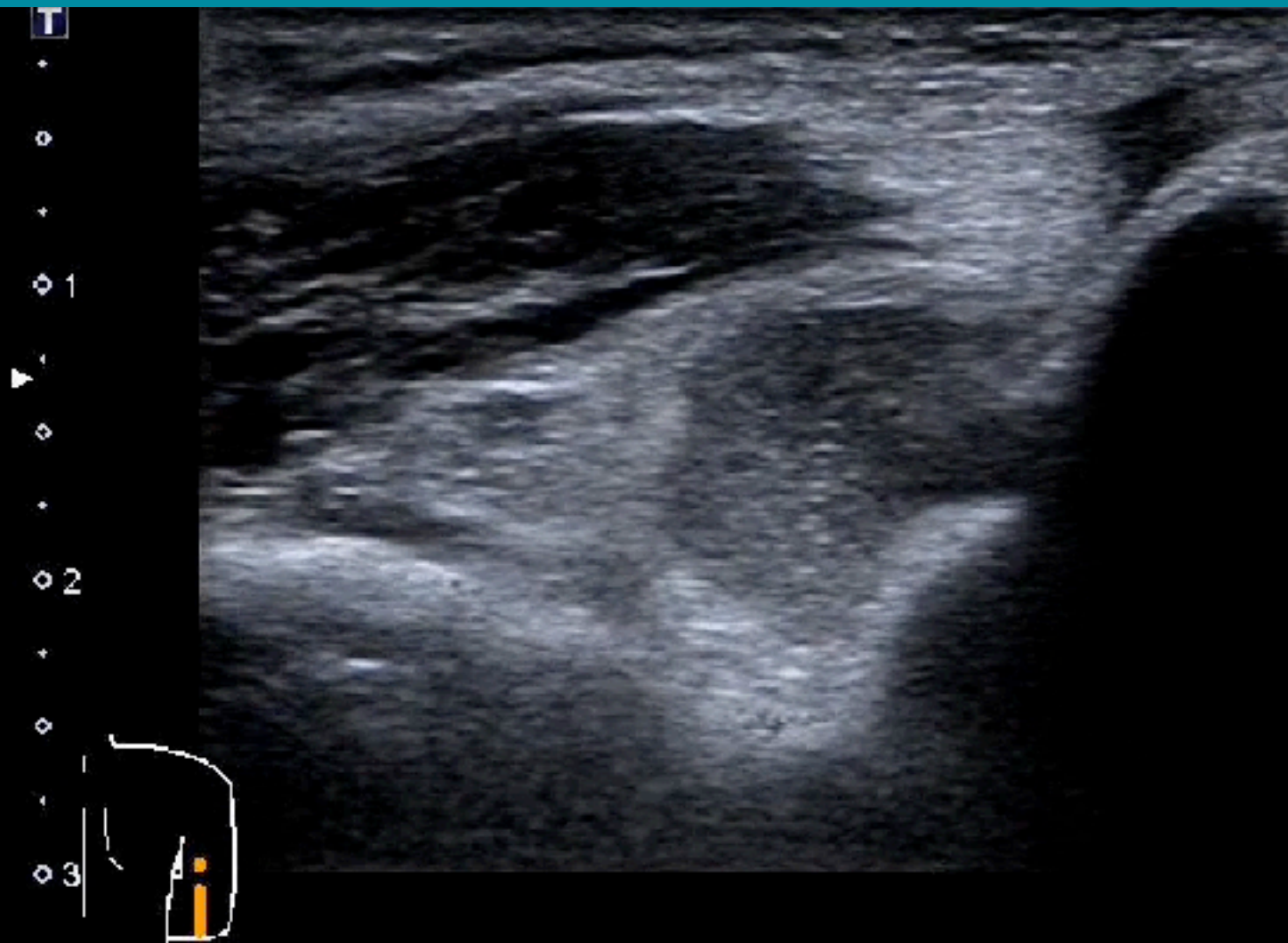


# 50F, 跌倒撞到右肘腫痛



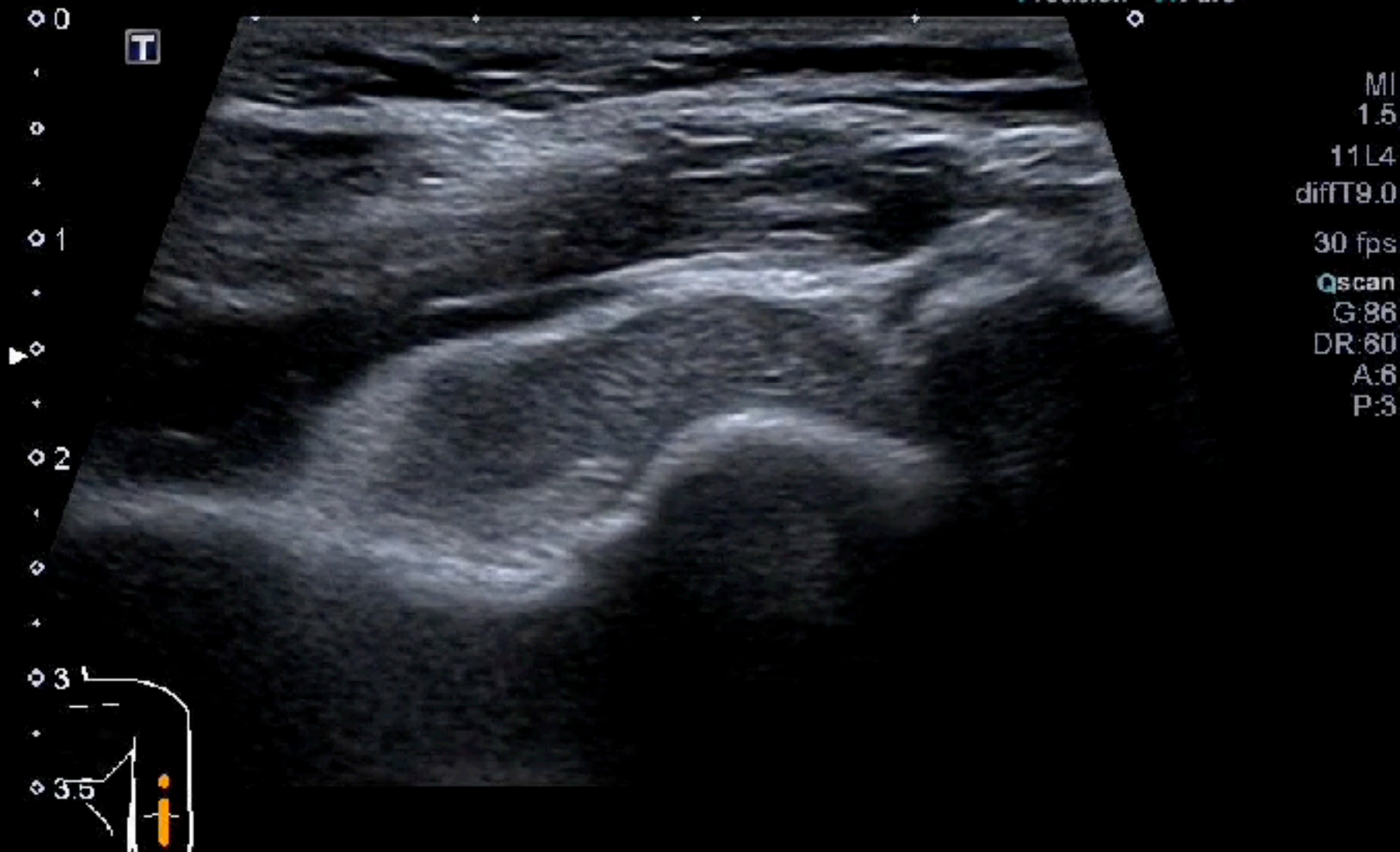


# 50F, 跌倒撞到右肘腫痛

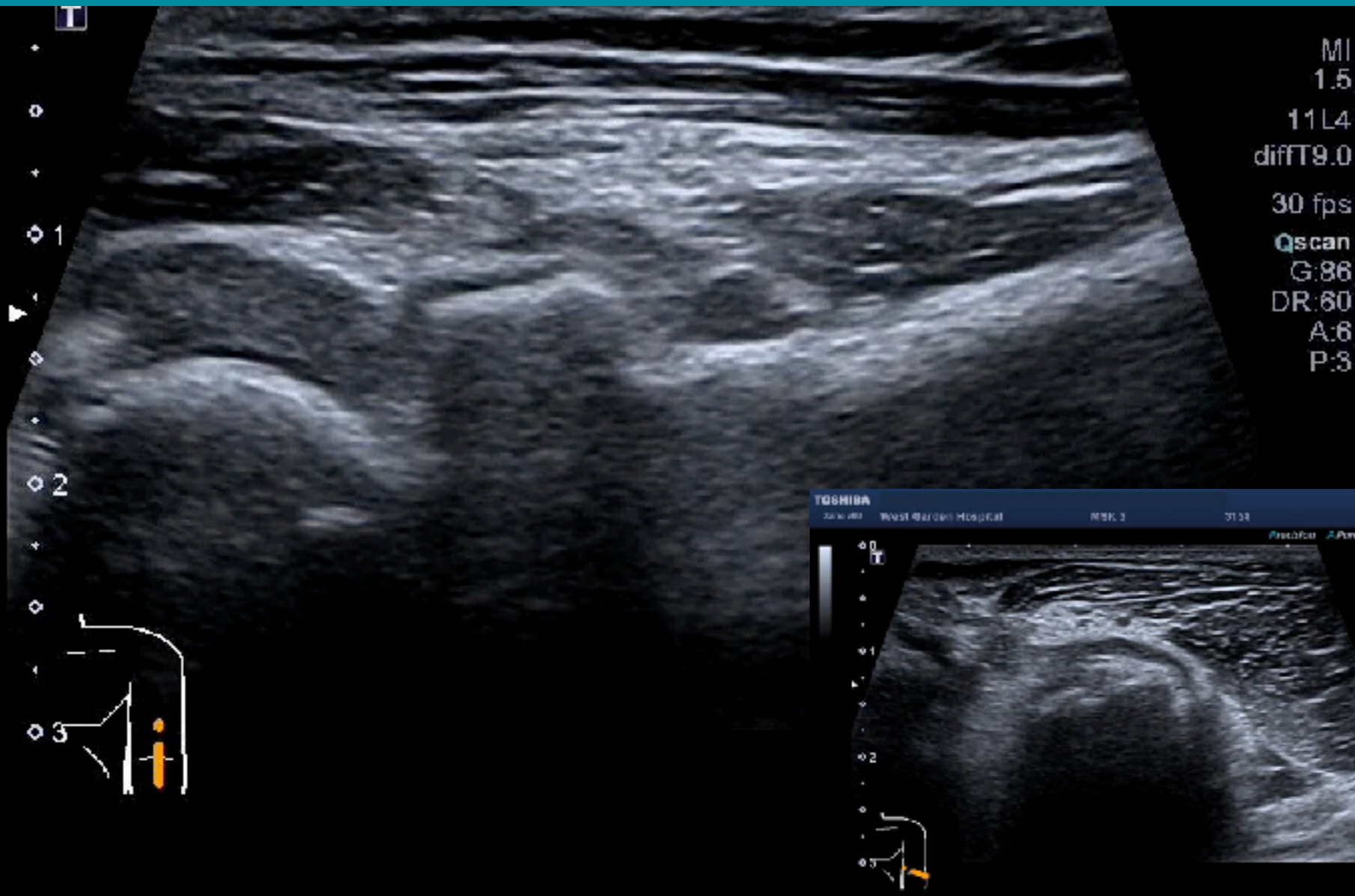


M  
1.5  
11L  
diffT9.  
30 fp  
Qsca  
G:8  
DR:6  
A:  
P:

# 50F, 跌倒撞到右肘腫痛



# 50F, 跌倒撞到右肘腫痛

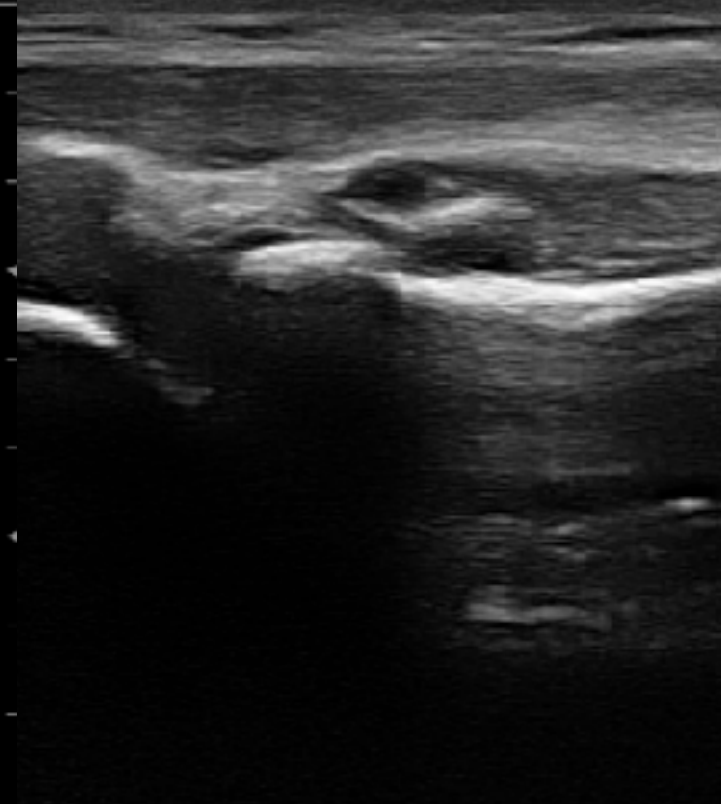
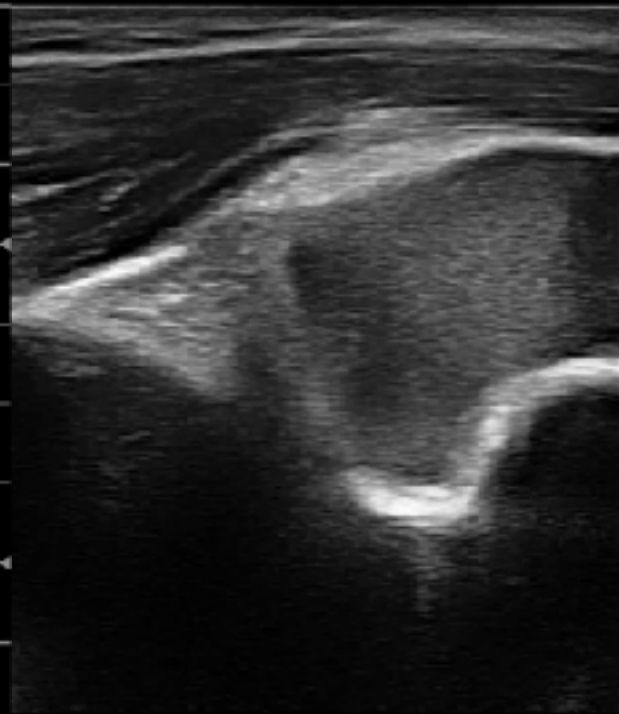
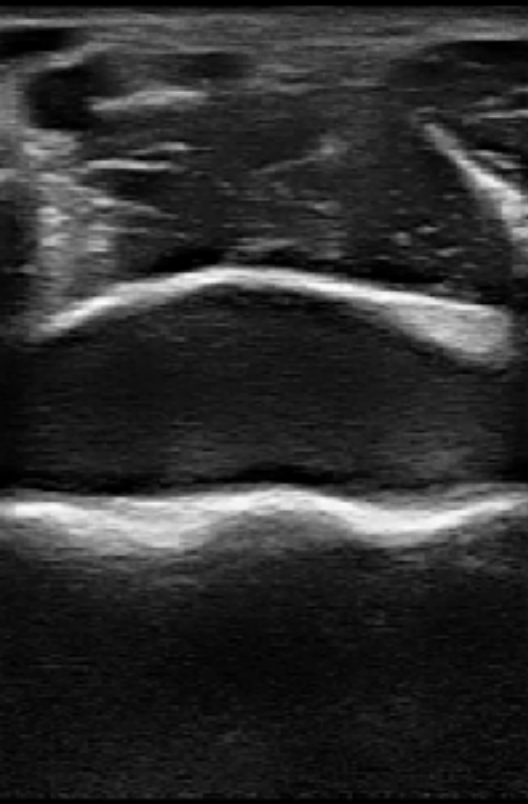




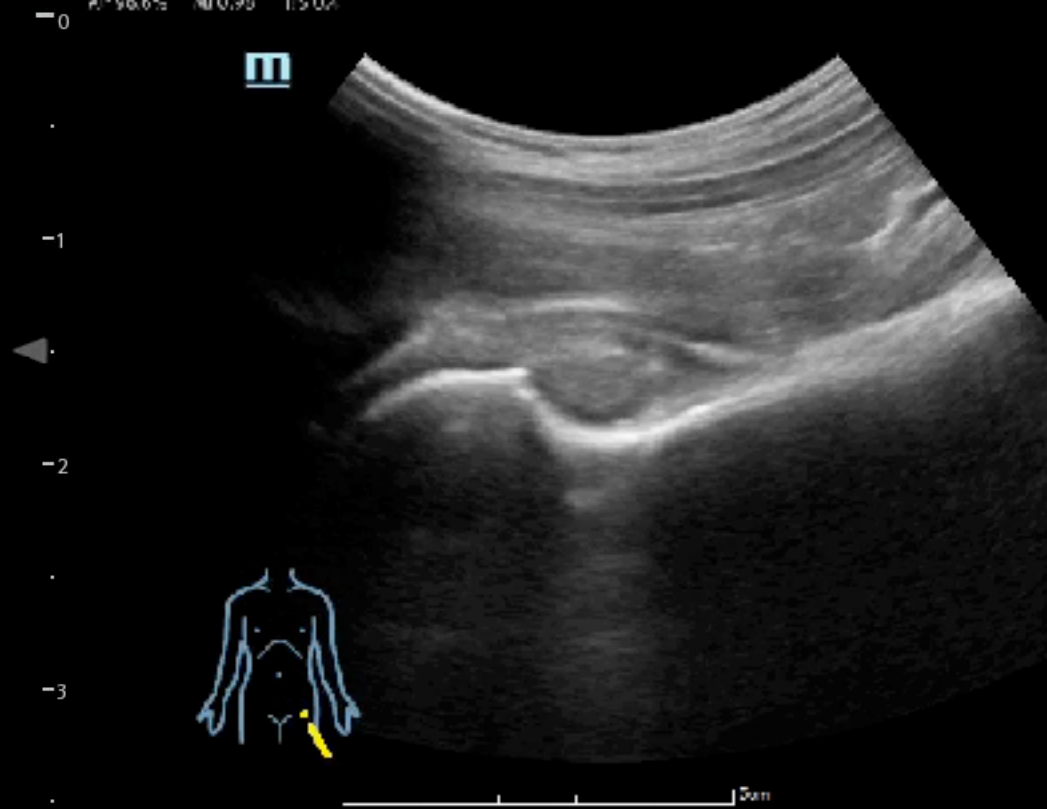
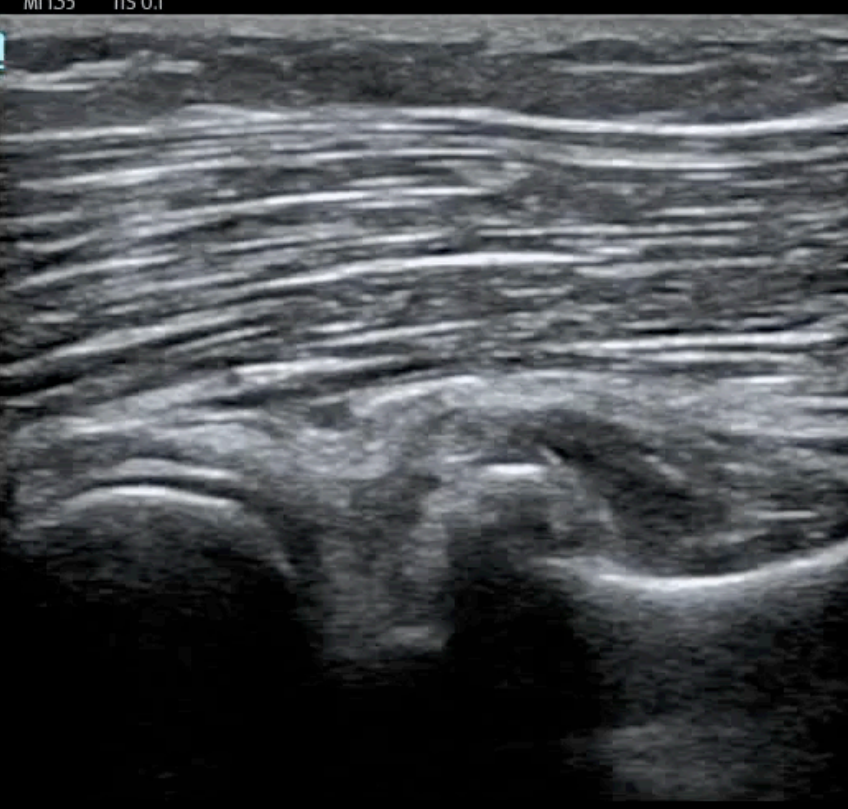
# 14M, 騎腳踏車自摔，左肘腫痛



# Radial head fracture





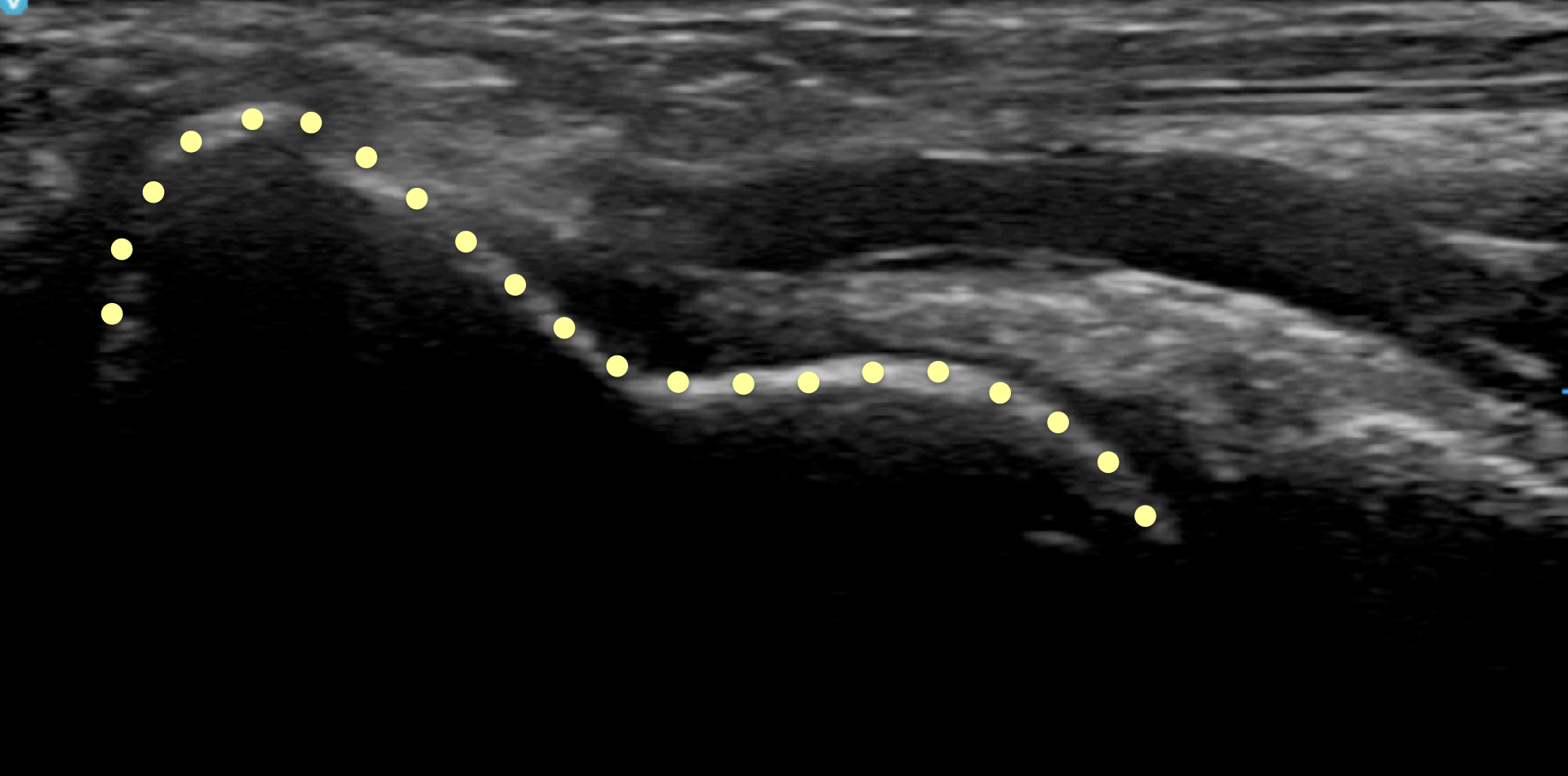


# FEMORAL NECK / RADIAL HEAD

先找Joint effusion

觀察骨頭的弧線





# SCAPHOID BONE

Superficial  
-3  
Hz  
cm

P

s  
100  
57  
2/1



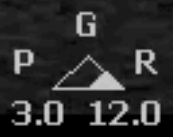
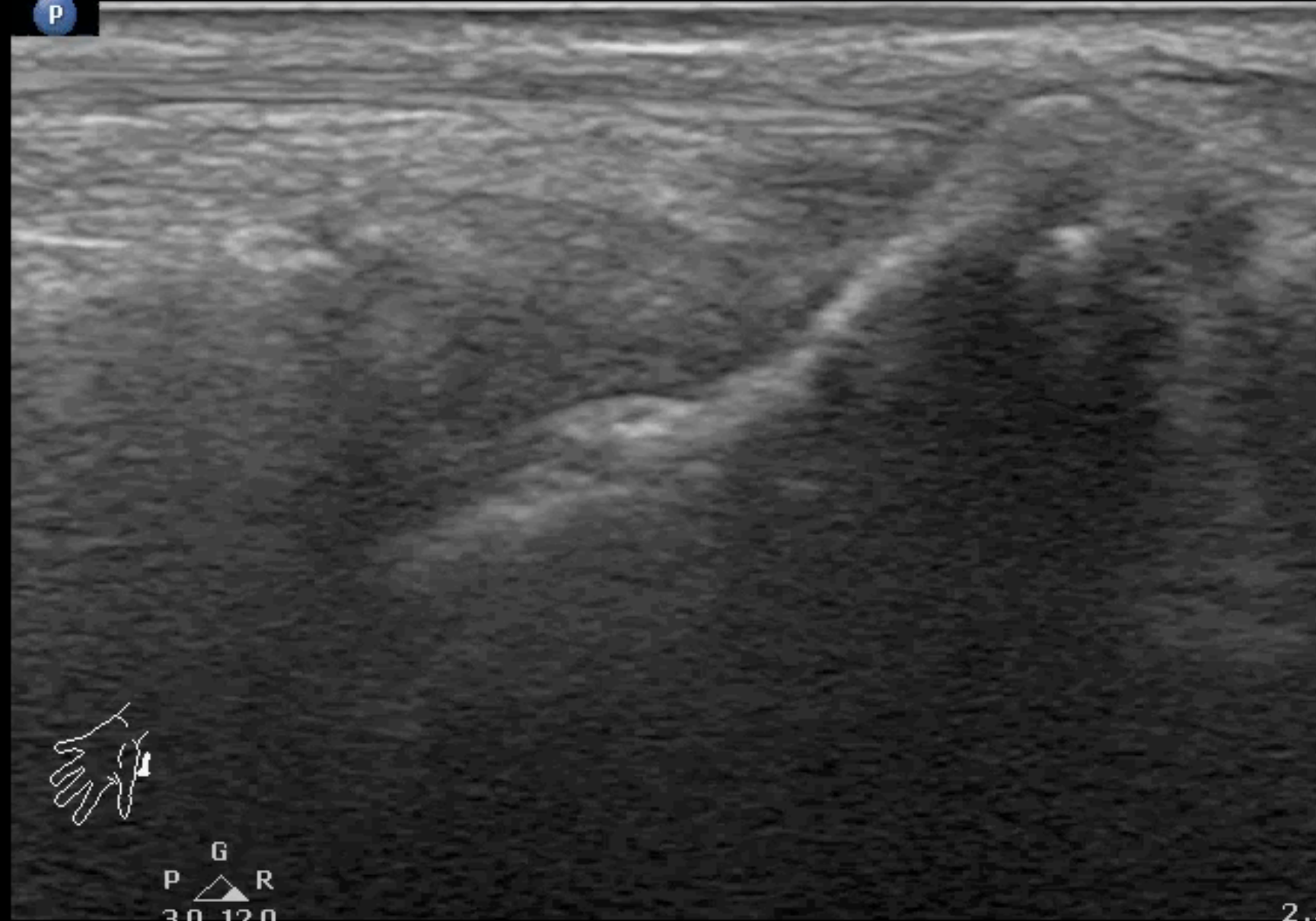
G  
P R  
3.0 12.0

3.0

erficial  
3  
lz  
cm

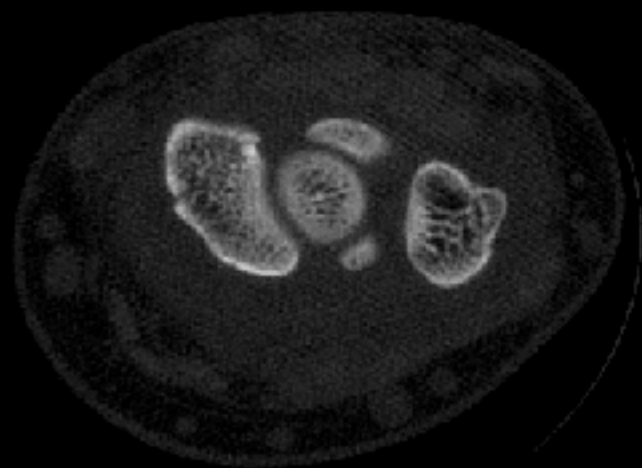
P

100  
6  
2/1



2.





4

7

Superficial

-3

Hz

5cm

S

100

56

2/1

P



G  
P R  
3.0 12.0

2.5



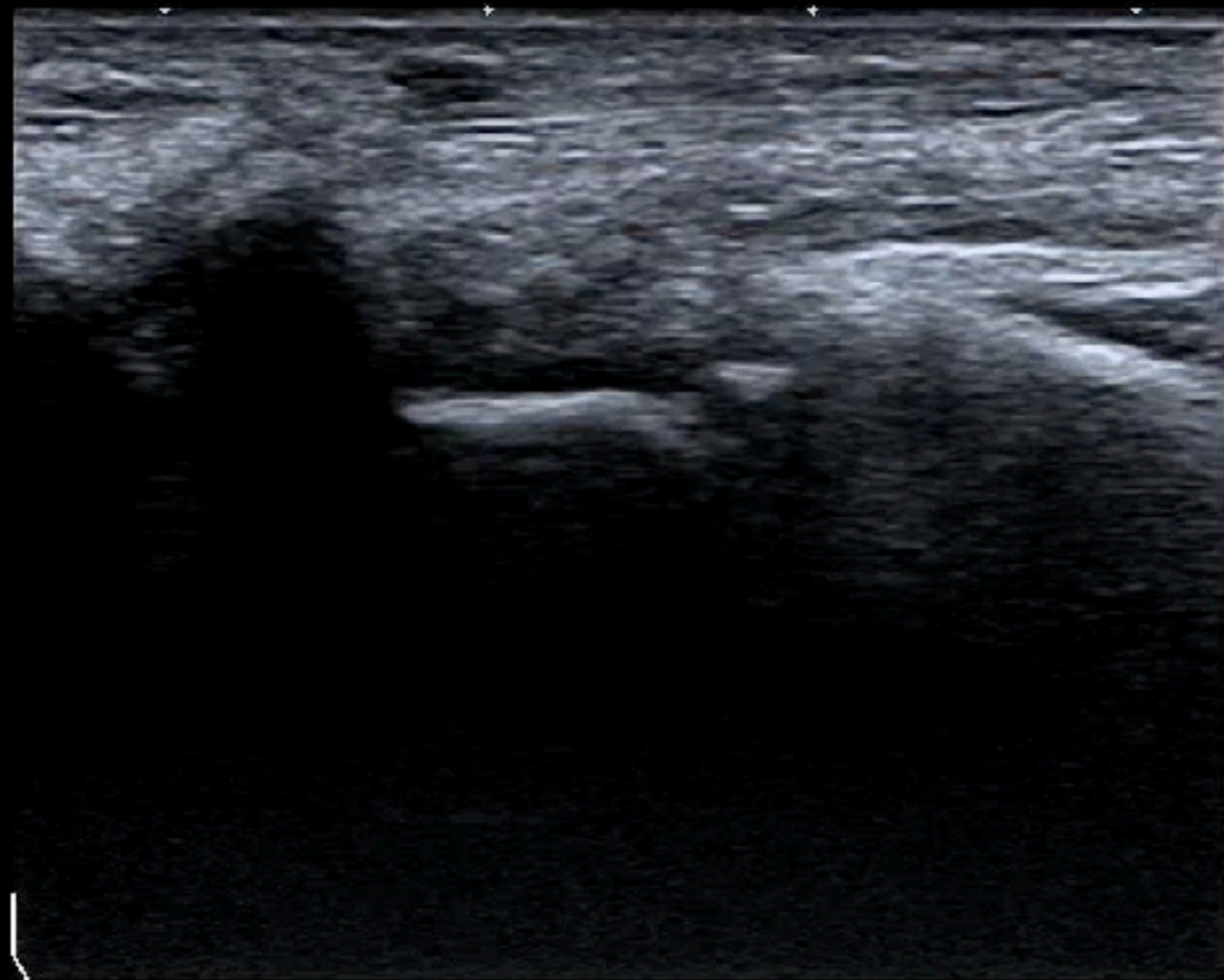
0

T

1

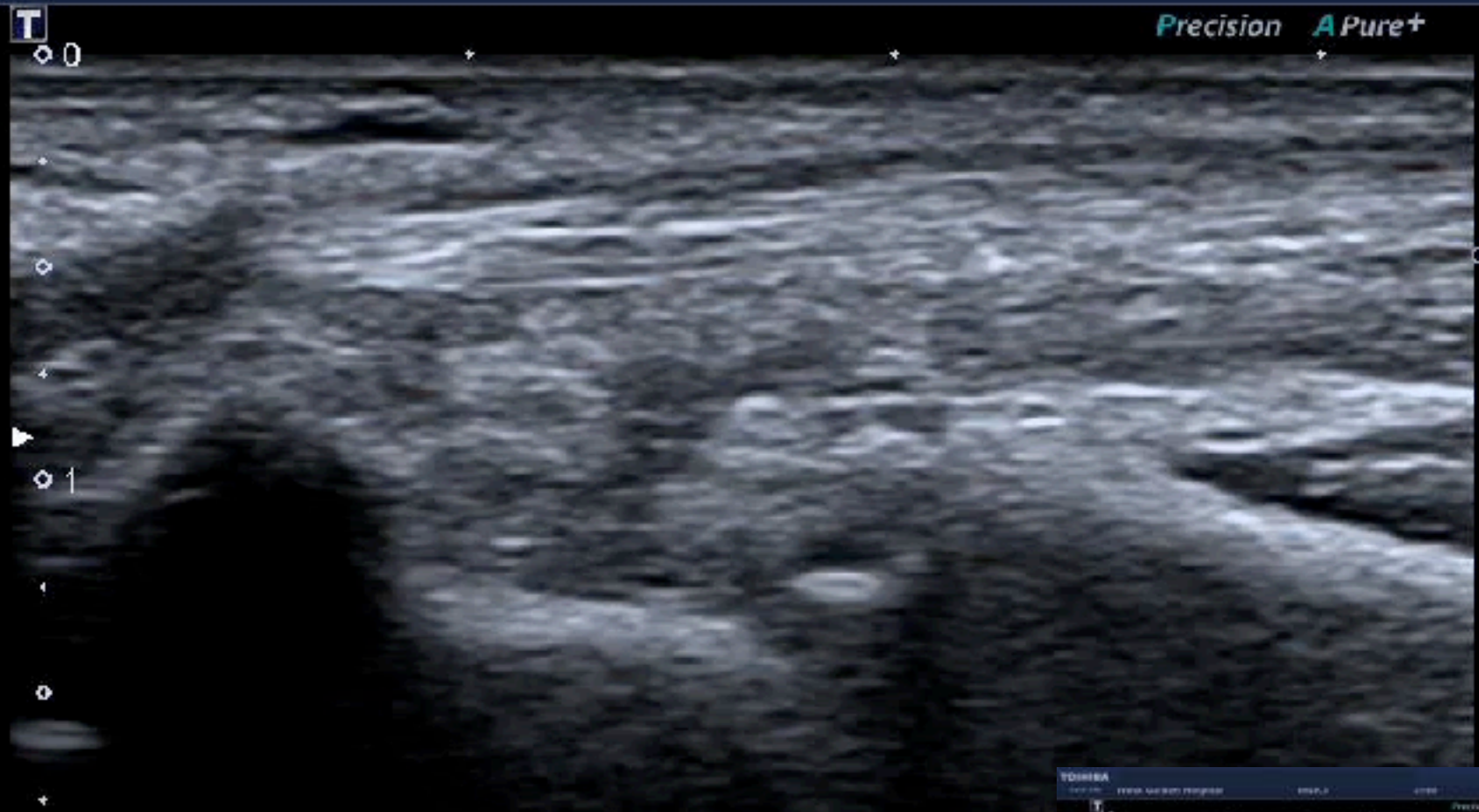
2

3



MI  
1.5  
11L4  
diffT9.0  
30 fps  
G:86  
DR:60  
A:6  
P:3





Precision A Pure+

MI  
1.5  
11L4  
diffT9.0  
30 fps  
G:86  
DR:60  
A:6  
P:3

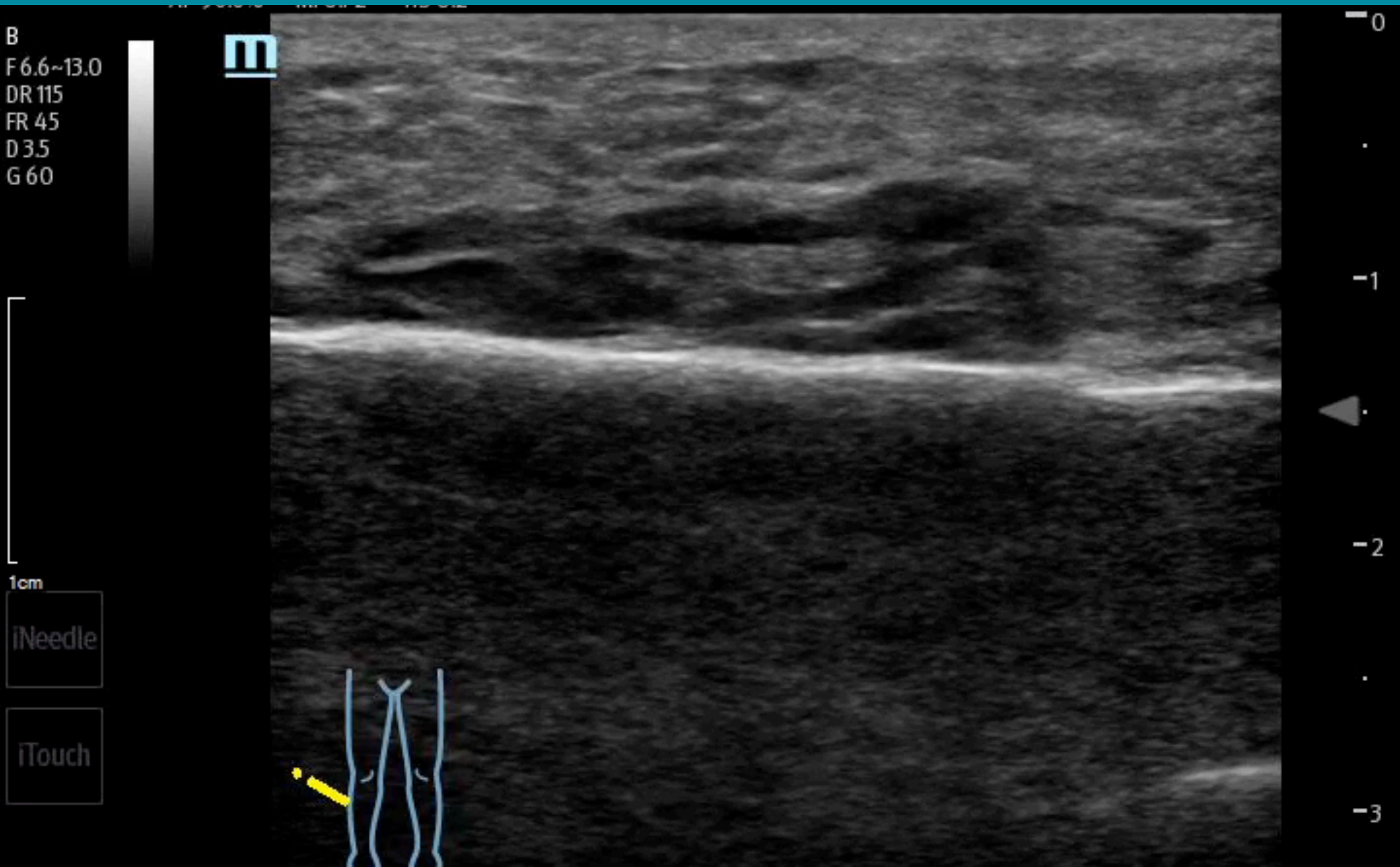




# 39M，3天前走路滑倒，小腿瘀青腫痛

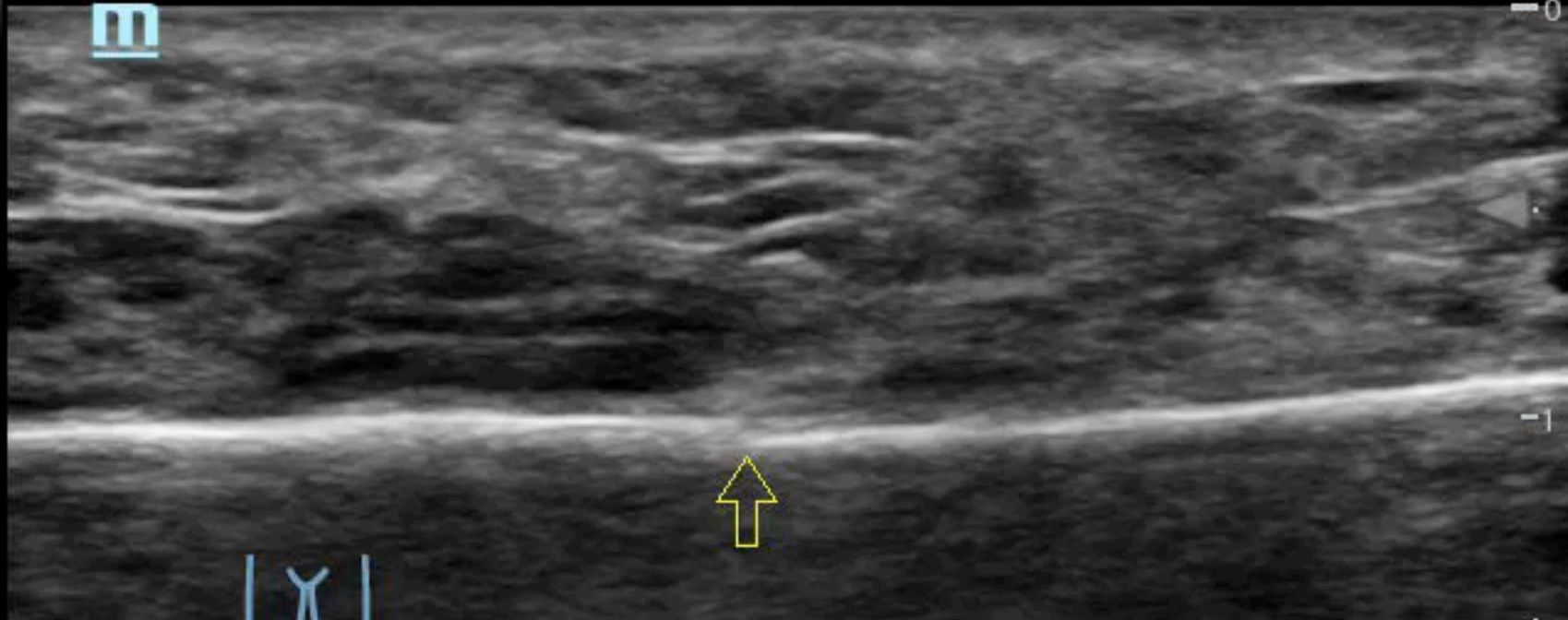


# Hematoma on anterior tibia



# Occult tibial fracture

DR 15  
FR 45  
D15  
G 60



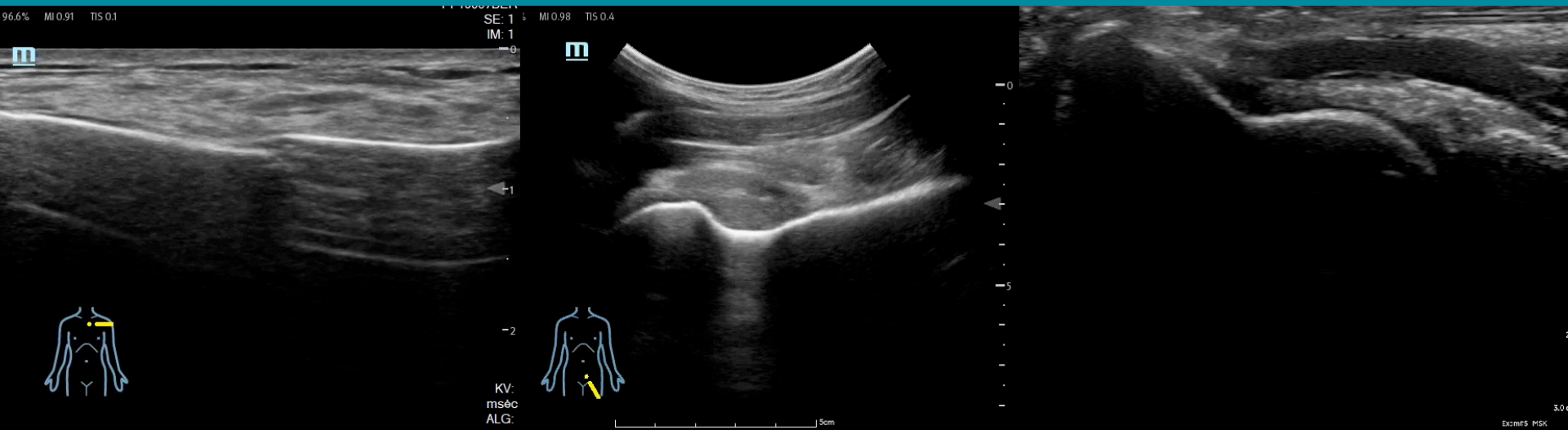
1cm  
iNeedle

iTouch



2cm

# Take Home Message



平長骨優先  
高低差  
不連續  
有血腫

弧形骨為主  
注意積血  
對側比對

特殊應用  
熟悉形態  
了解限制