



POCUS

急性腹痛的應用

陳國智西園急診醫學科



急救加護重症超音波工作坊

PAIN - Module (1) 工作坊

AEACUS Network President

(前)急診超音波委員會主委

(前)新光超音波訓練中心主任

Faculty

-WINFOCUS, PERCUSS, WFPICC

-台灣疼痛醫學會

POCUS Academy

FB: Emergency Ultrasound Training Center

POCUS

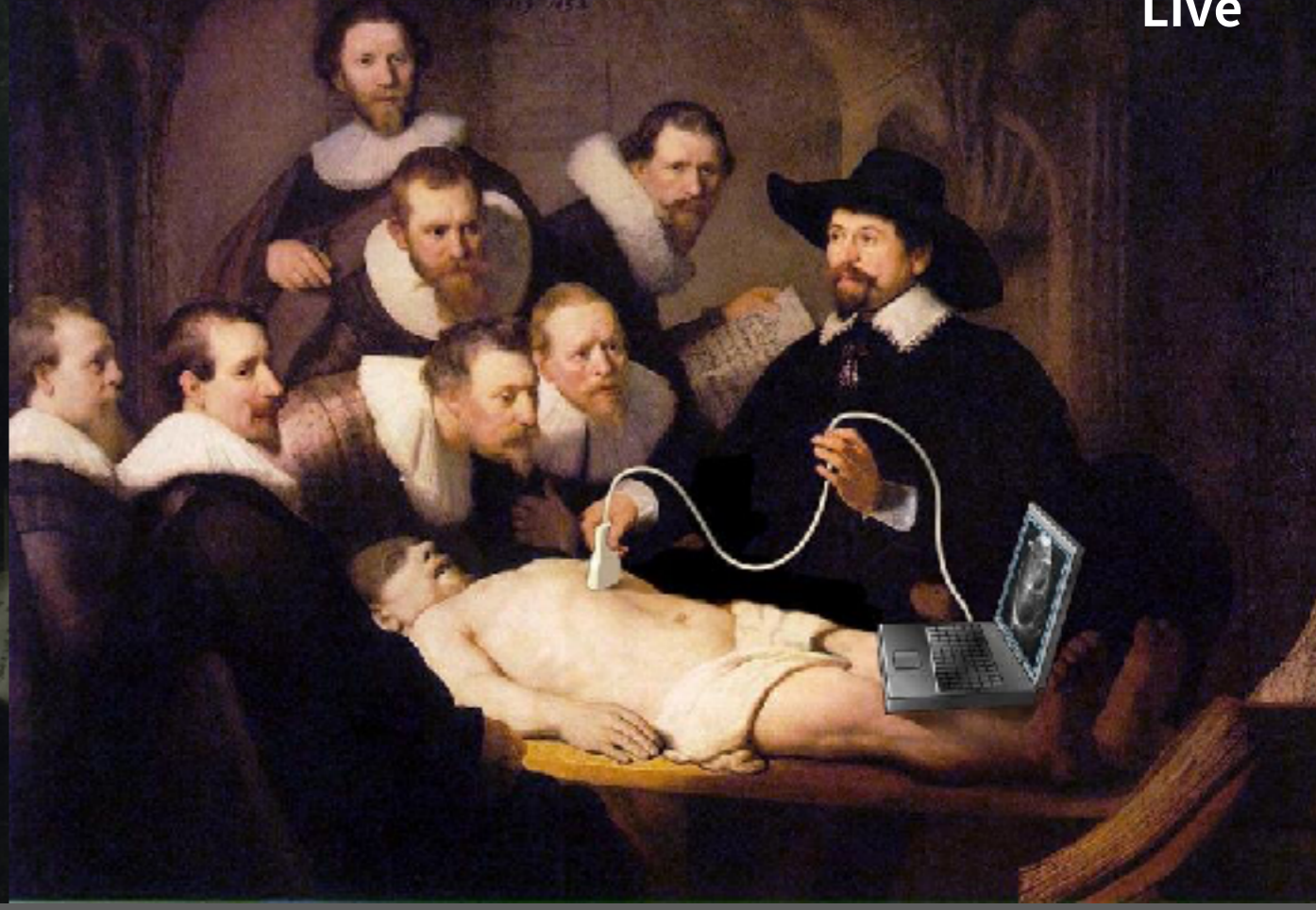
Point-of-Care Ultrasound

“ultrasonography brought to
the patient and performed by
the provider in real time”

Moore, C. L., & Copel, J. A. NEJM 2011

The Anatomy Lesson of Dr. Nicolaes Tulp
How Our Muscles Work
林布蘭 1632

今天我們要這麼做
Live



Anatomy



Probe

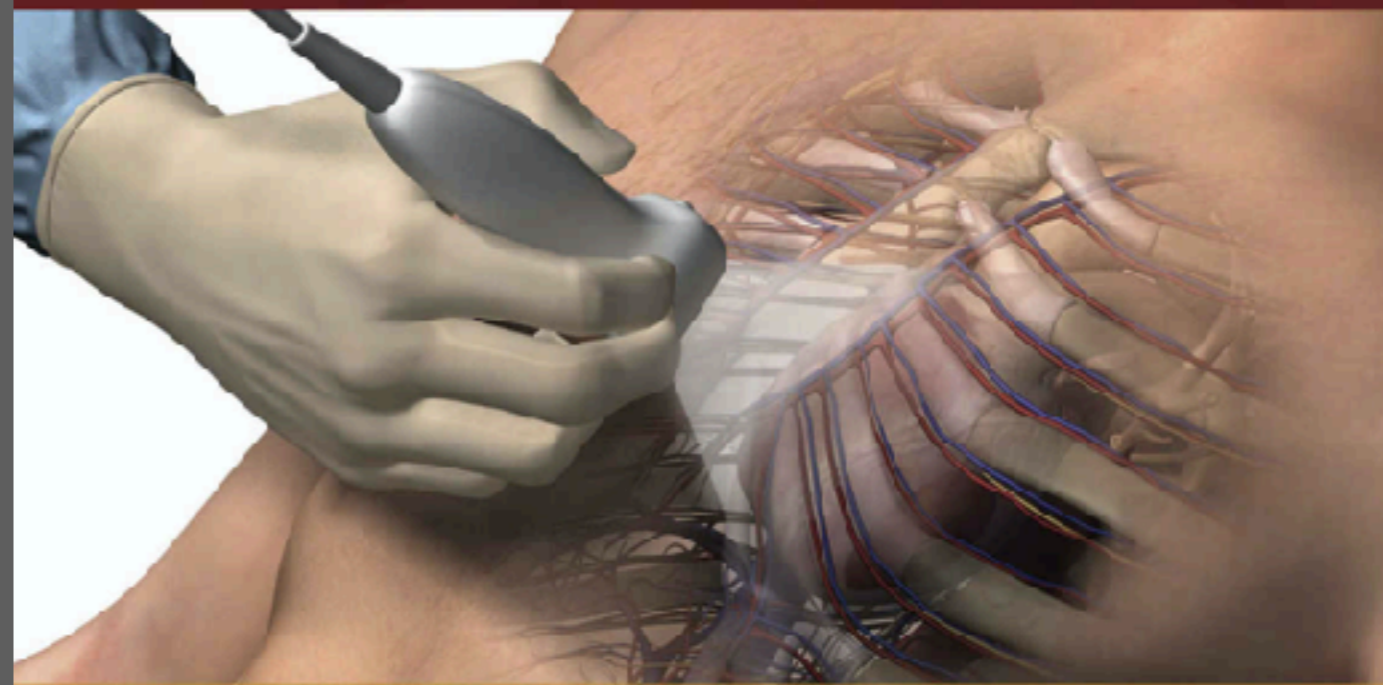


Echo

建議
書籍

Second Edition

Point-of-Care
ULTRASOUND



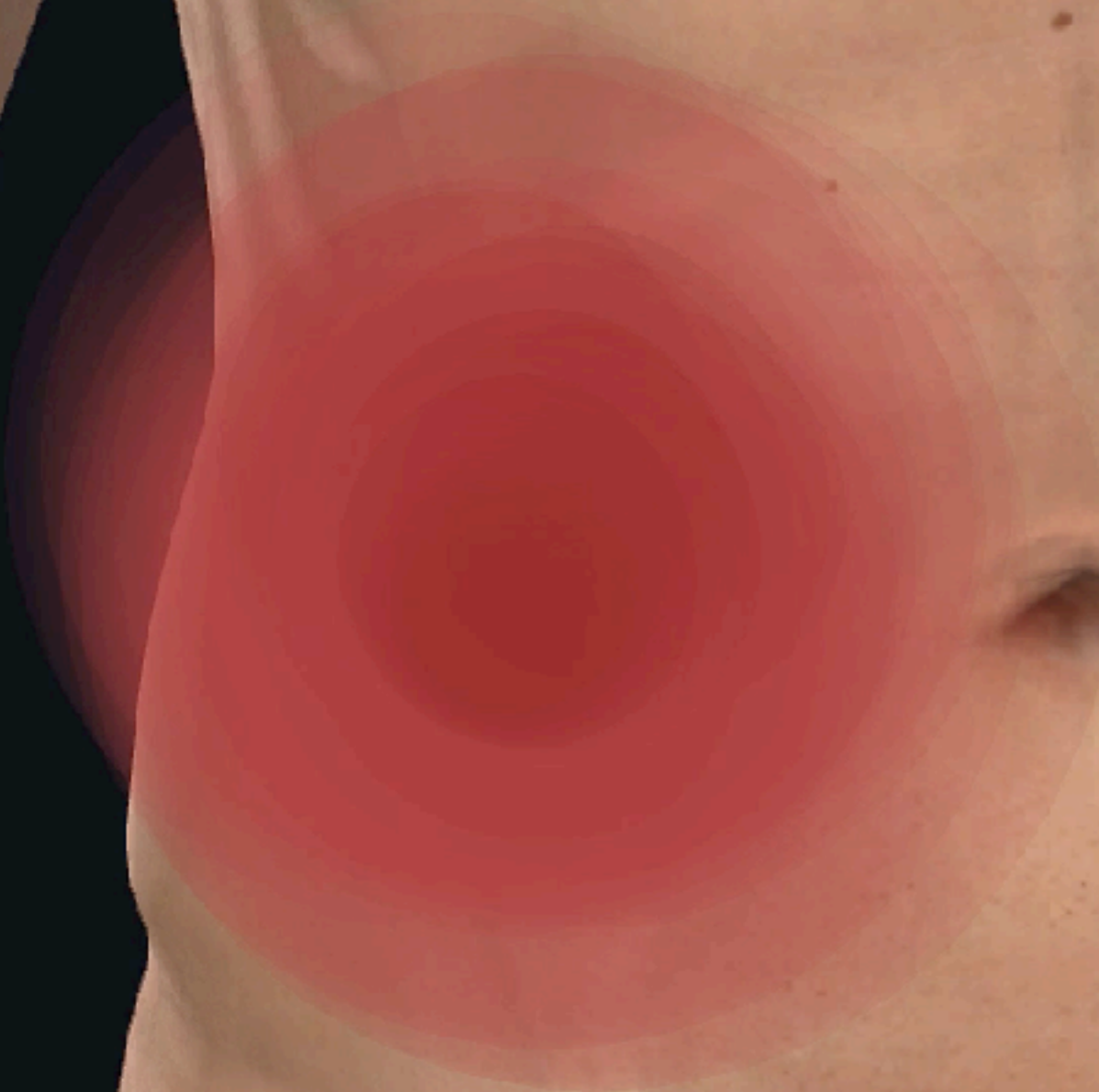
Nilam J. Soni
Robert Arntfield
Pierre Kory



病史
詢問

理學
檢查

ECHO
評估





可以
同步
病史詢問

理學檢查
不可
省略



Y

POCUS

N



1 + 1 > 2



該如何下手??



Approach to Abdominal Pain

Location

Onset

Type

Severity

Other locations (radiation)

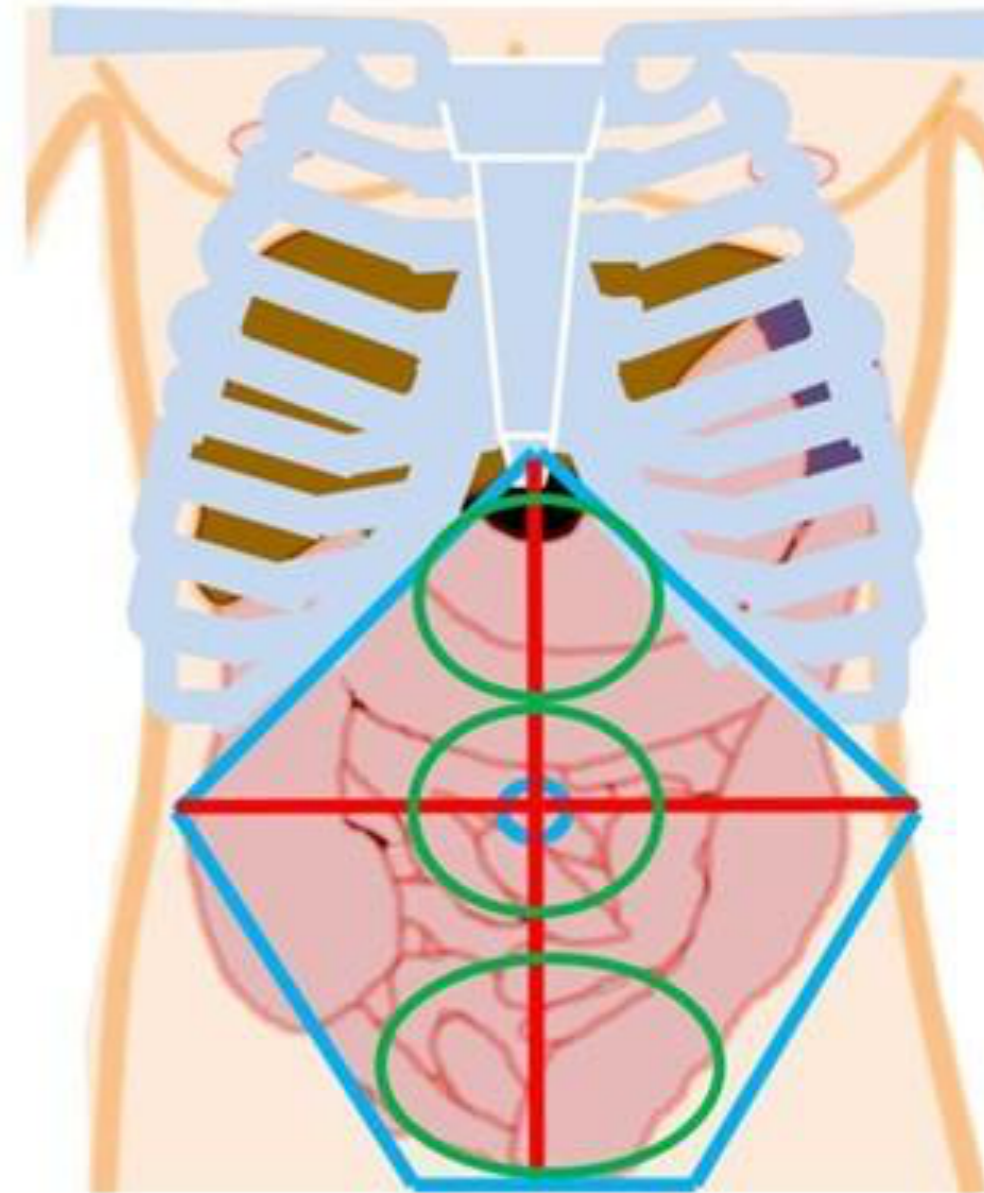
Factors (aggravating / alleviating)

Progression

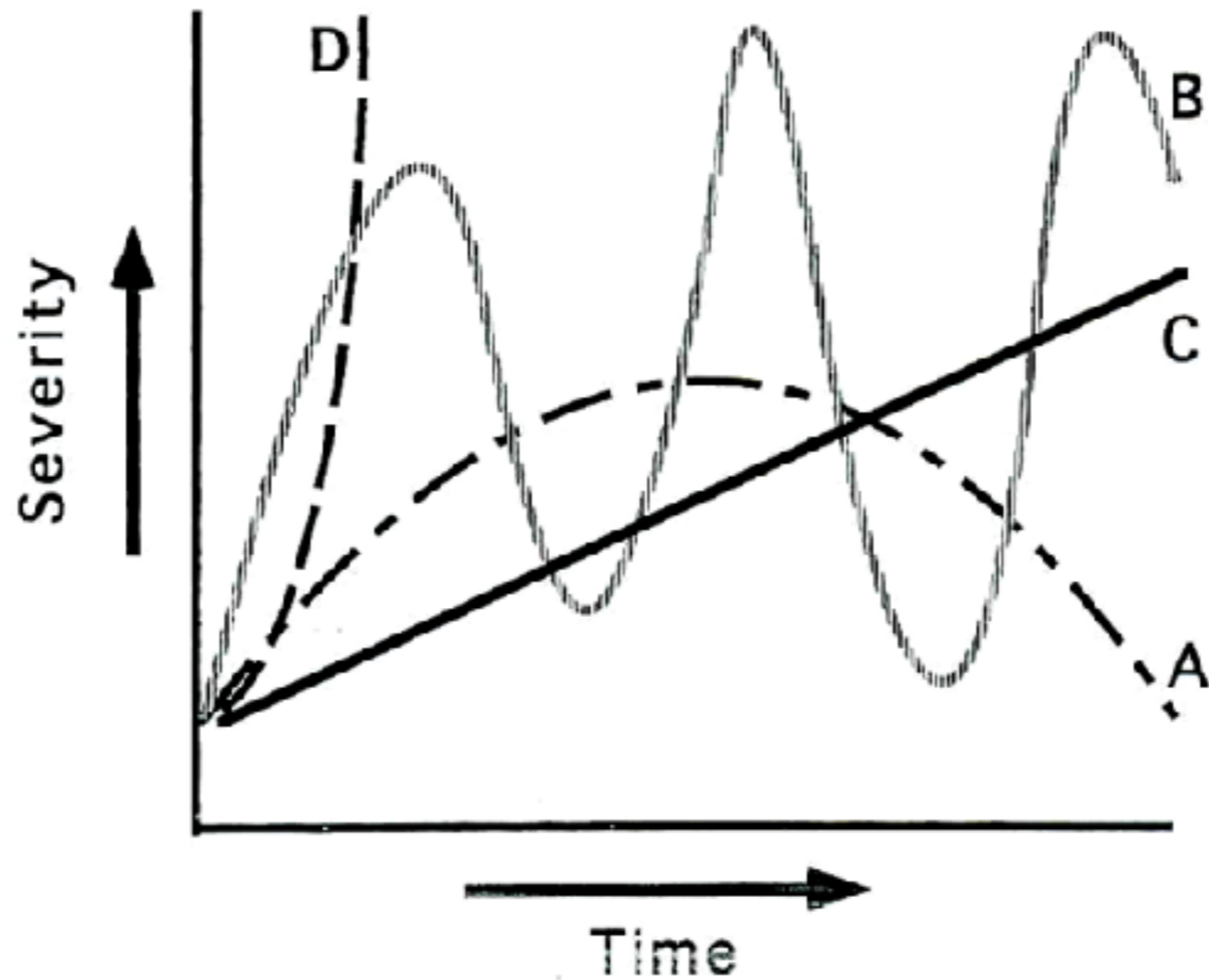
Associated symptoms

Insight (what do they think it is)

Need relief (what have they taken)



@kwburak



No Pain

Mild

Moderate

Severe

Very Severe

Worst Pain Possible



0

1-3

4-6

7-9

10



病史詢問



理學檢查



POCUS

VAS 9
Low BP



POCUS-急診緣由

症狀
問題

線索
時間

診斷
治療

雜

少

快

Resuscitative

Diagnostic

Procedural
Guidance

Symptom- or
Sign-Based

Therapeutic



Diagnostician



Interventionist

Core Applications

- Trauma
- Intrauterine Pregnancy
- AAA
- Cardiac/HD Assessment
- Biliary
- Urinary Tract
- DVT
- Soft-tissue/Musculoskeletal
- Thoracic/Airway
- Ocular
- Bowel
- Procedural Guidance

12 核心

5大應用

ACEP

2016

I-AIM

POINT



Acquire



Interpret



**Make
decision**

Acute Abdomen

Internal bleeding ?



FAST



Free Fluid



CT/TAE/OP

熟悉操控 6 大技巧

X

Sweep

**Fan/
Tilt**

Y

Slide

Rock

Z

Rotate

Compress

熟悉操控 6 大技巧

X

Sweep



Y

Slide



Z

Rotation



Fan



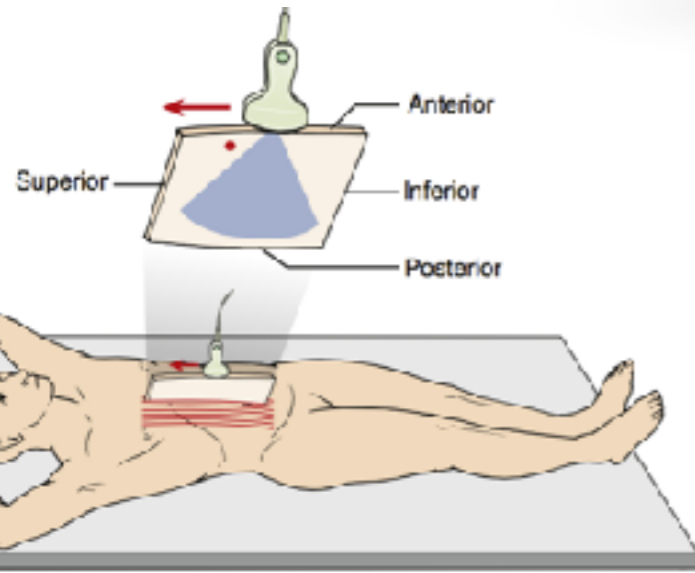
Rock



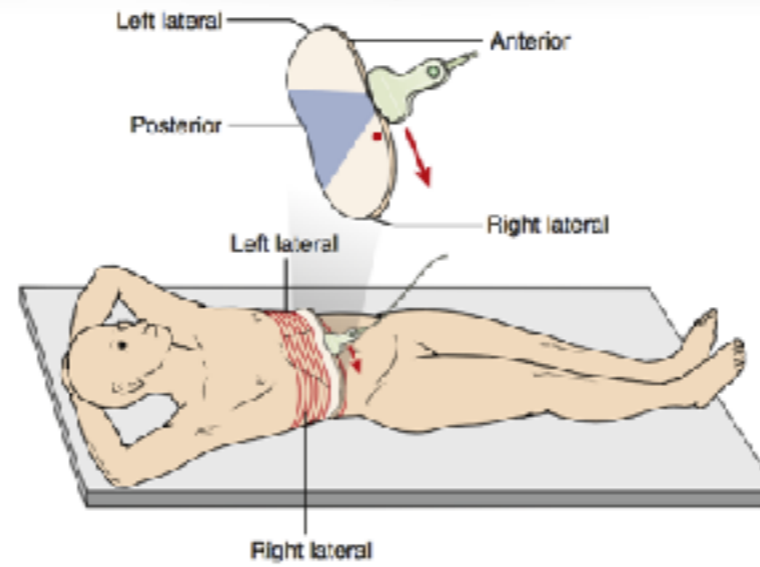
Compression



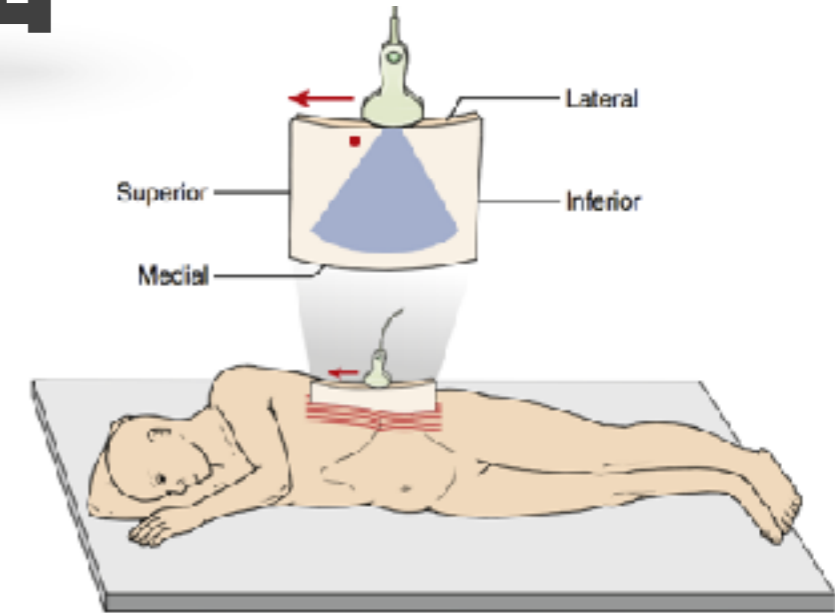
3D 立體掃描



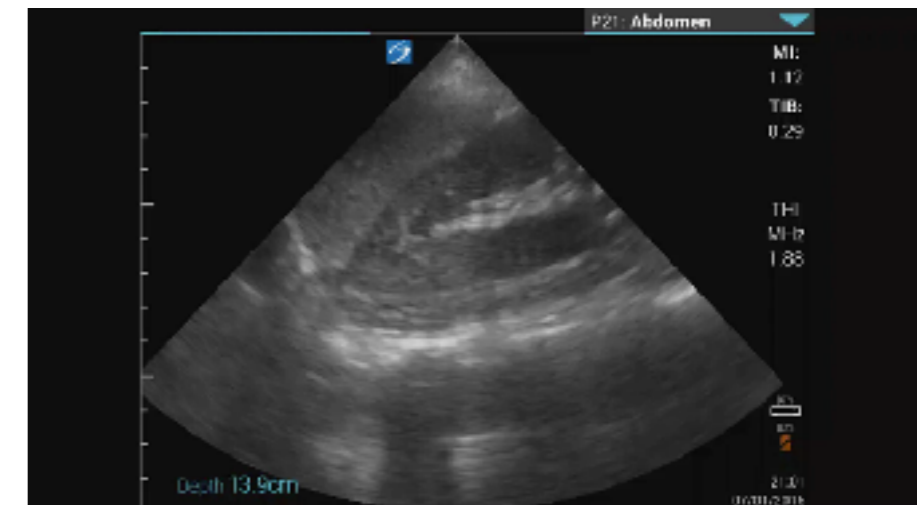
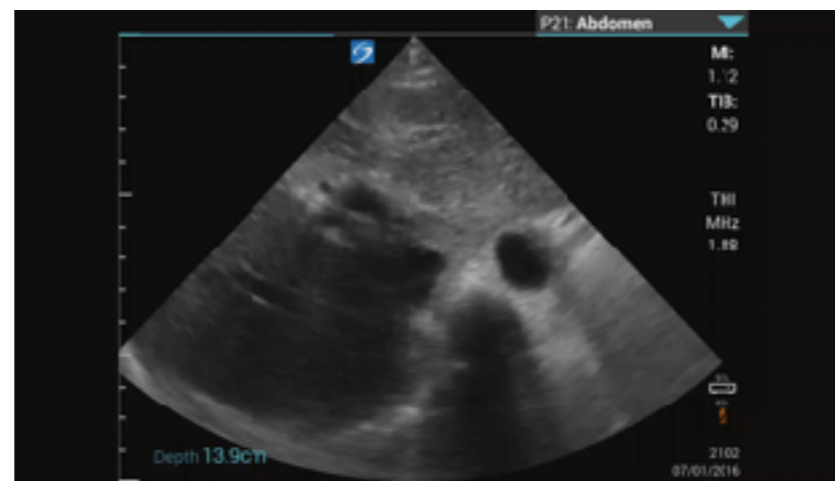
Sagittal 縱



Transverse 橫



Coronal 側



POCUS 常用探頭



弧



線



扇

POCUS 常用探頭



表面



頻率



深度

探頭選擇：腹為主／線為輔



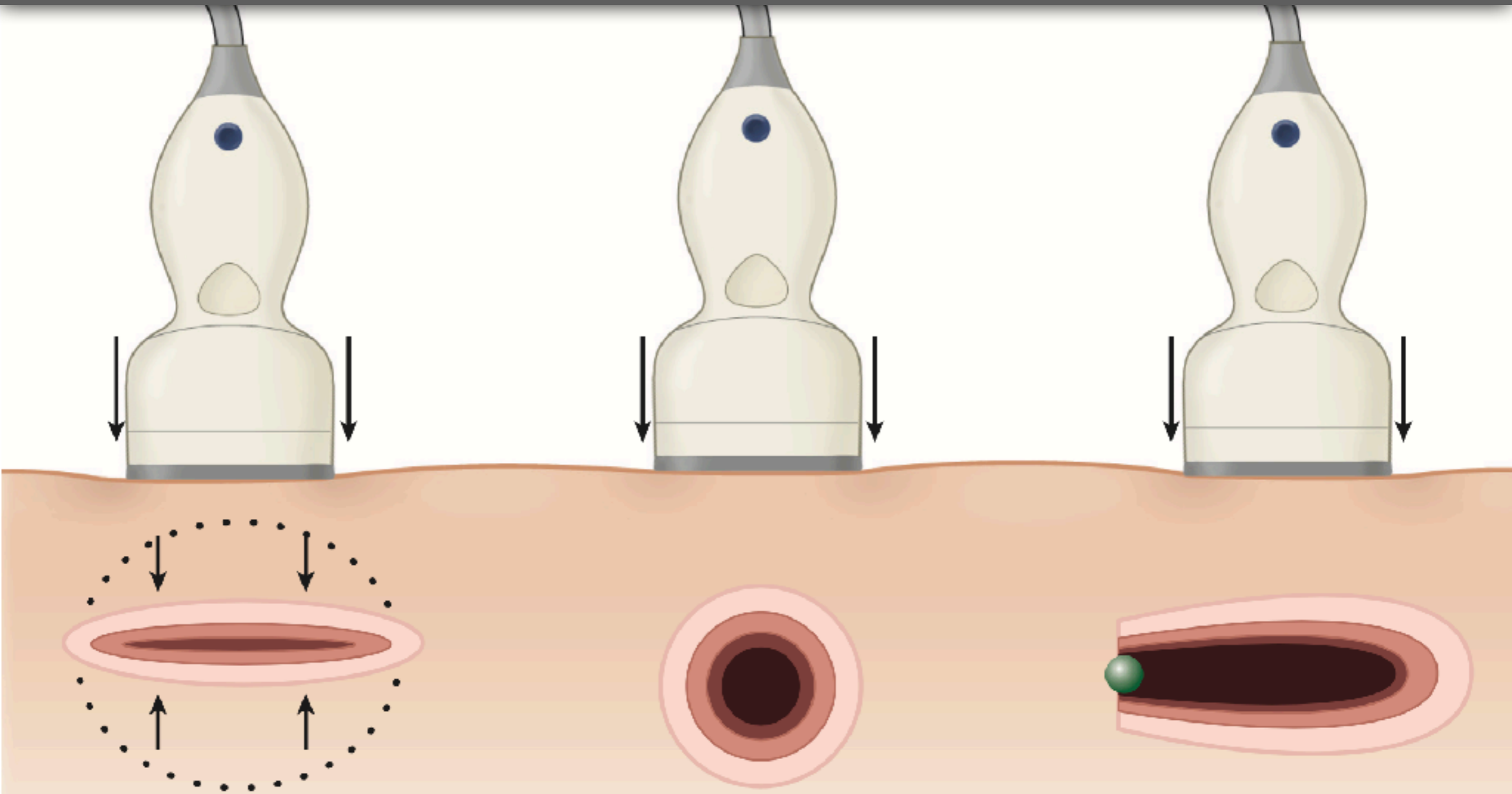
急診POCUS不用NP0
系統性掃描之後再聚焦

Graded compression

溫柔
穩定
施壓
停留
觀察



Compression很重要!!!



POCUS

for

Acute

ABDOMEN

A for aorta

B for biliary

D for diaphragm

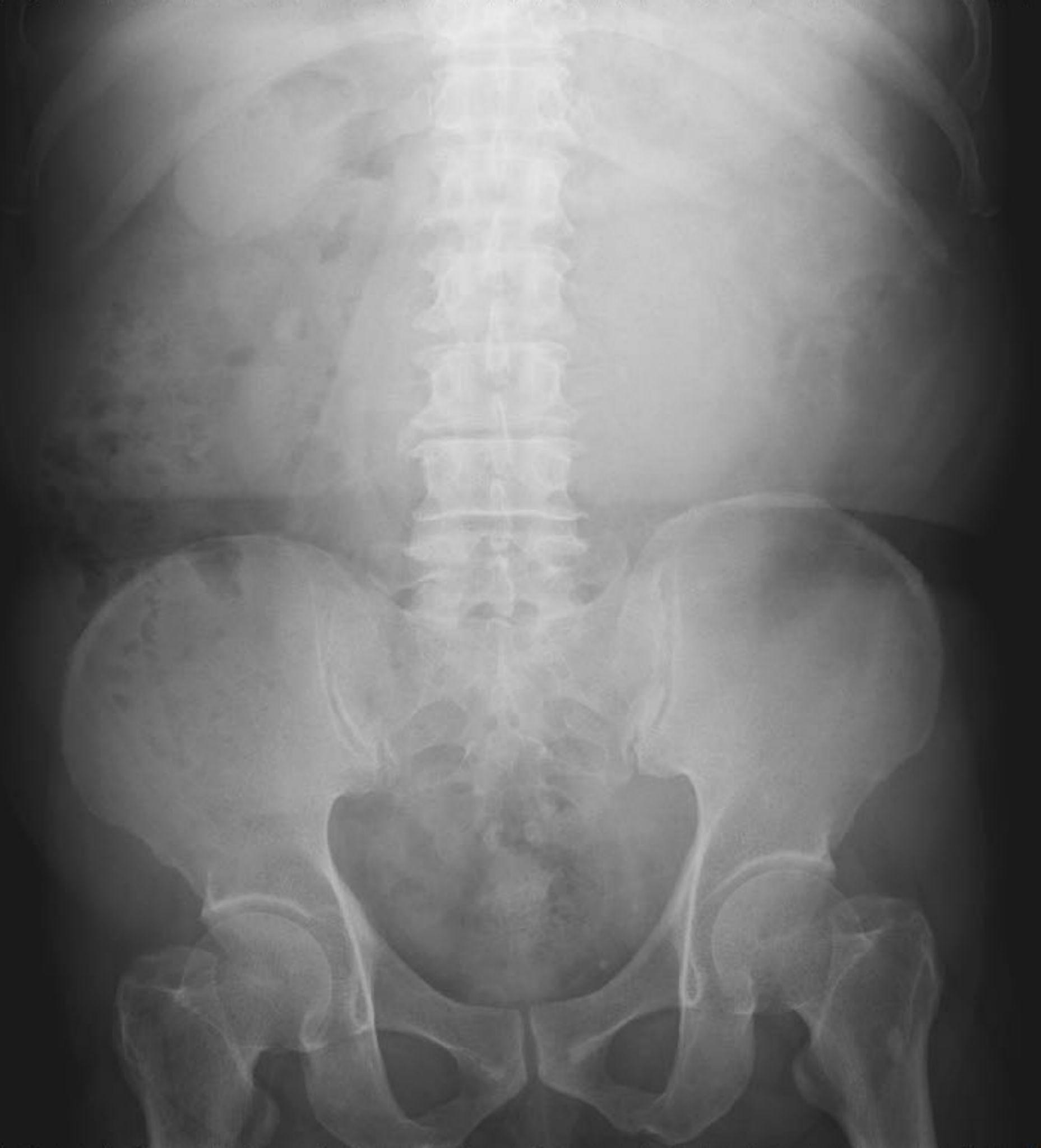
O for bowel obstruction

M for moving fluid & air

E for ectopic pregnancy

N for nephropathy



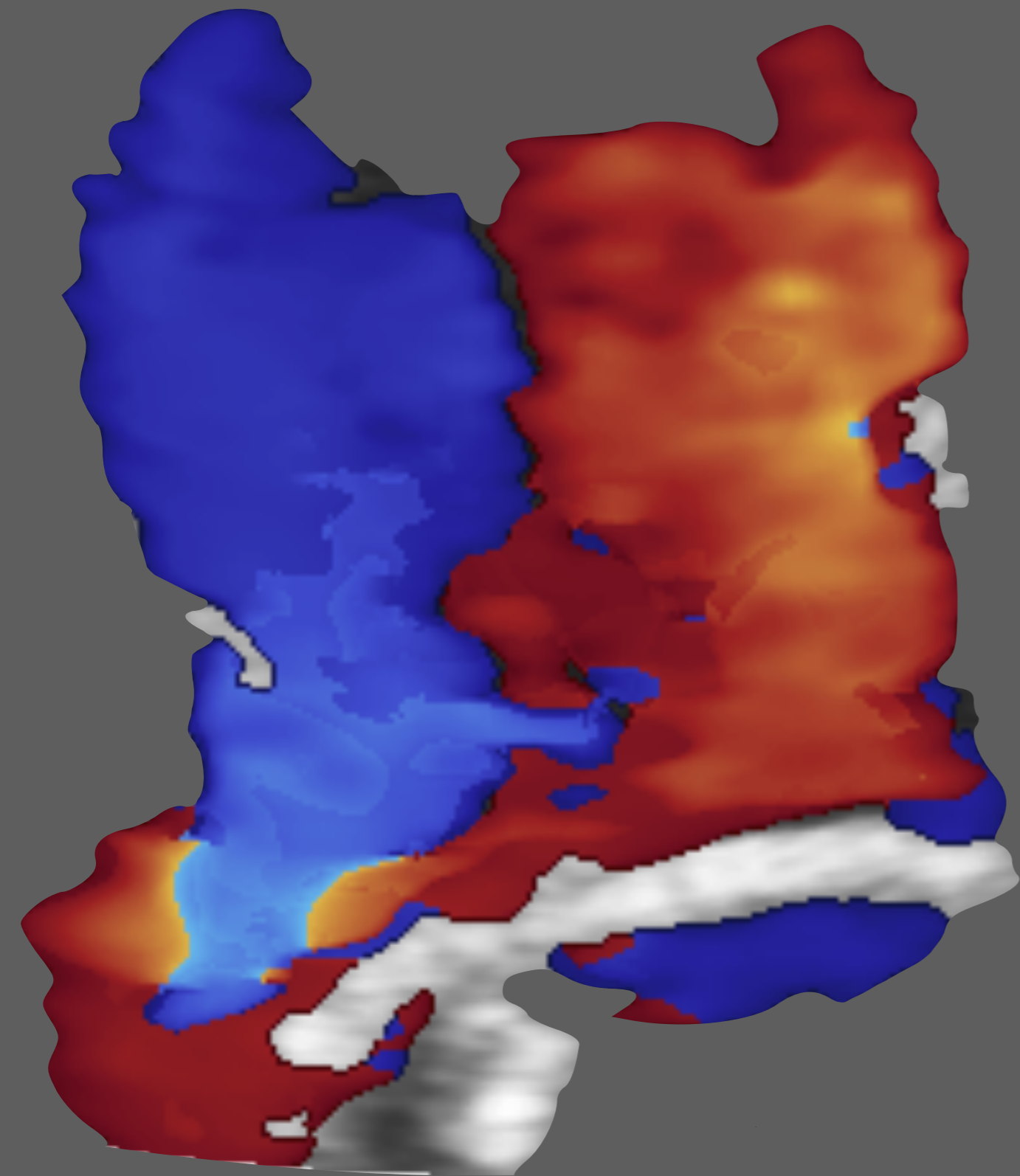


**64M,
左下腹痛
1小時
冒冷汗
結石病史**

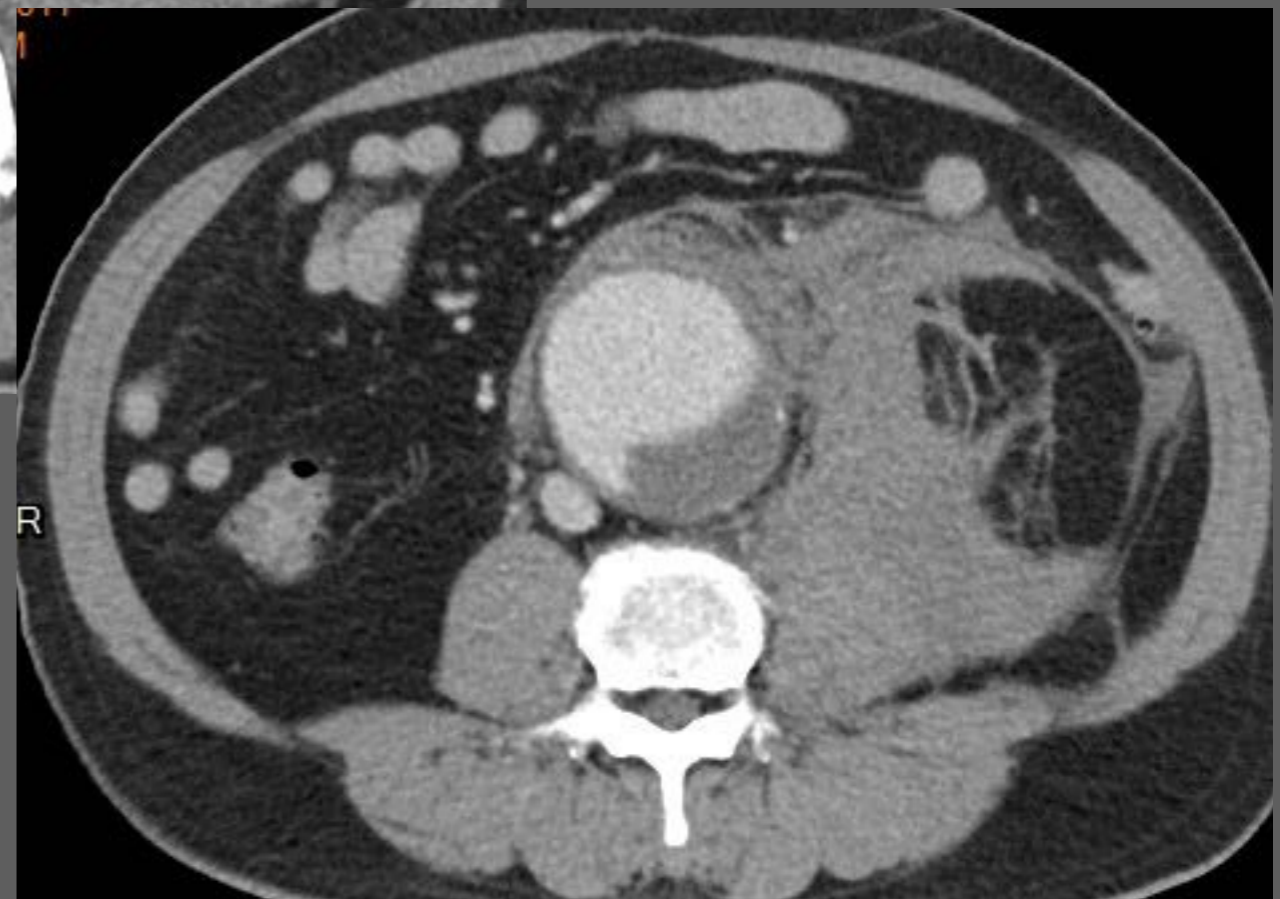
PR 117

BP

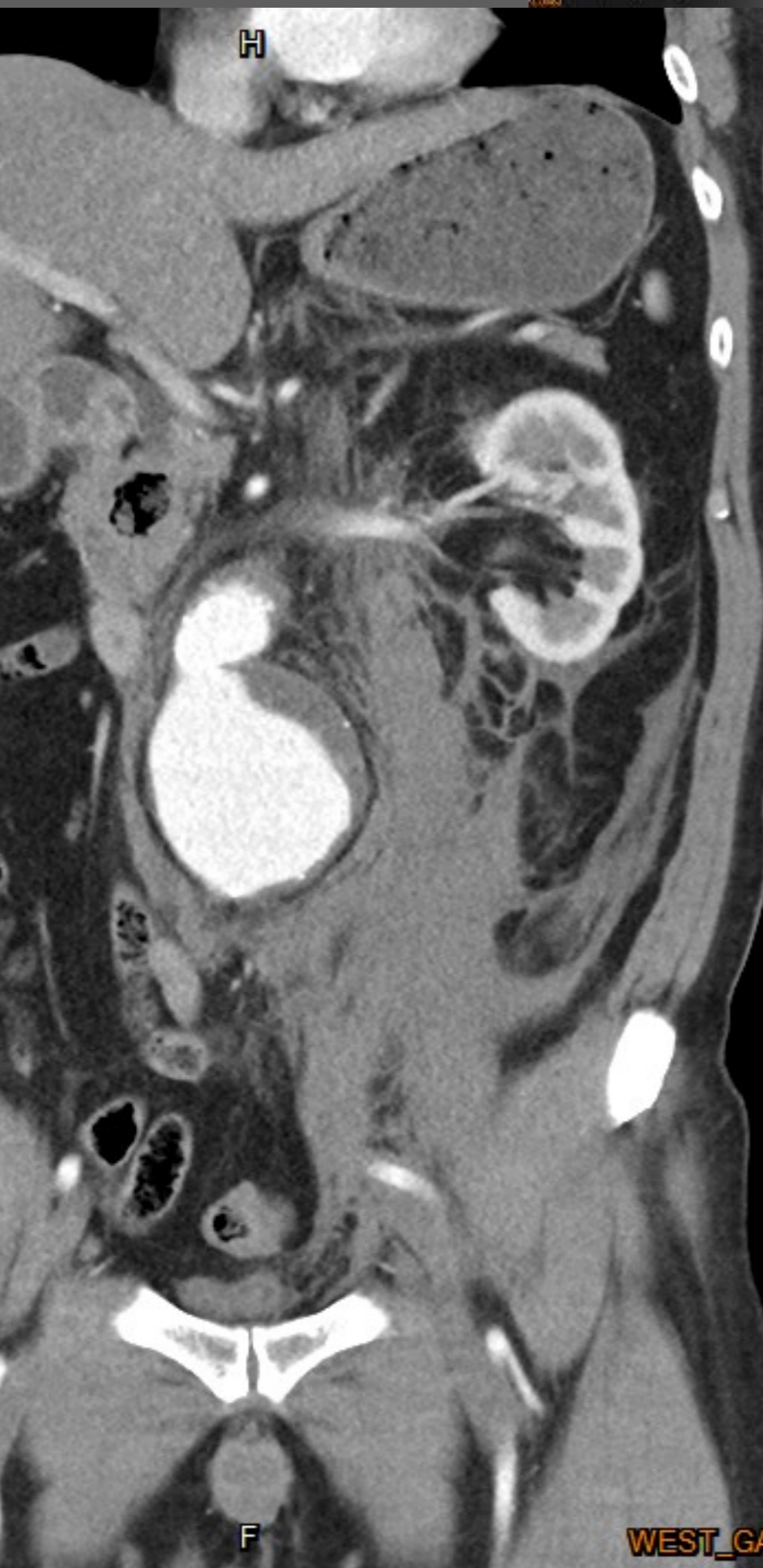
88/62



腰痛 + 冒冷汗，
我的病人可能是
主動脈瘤破裂？



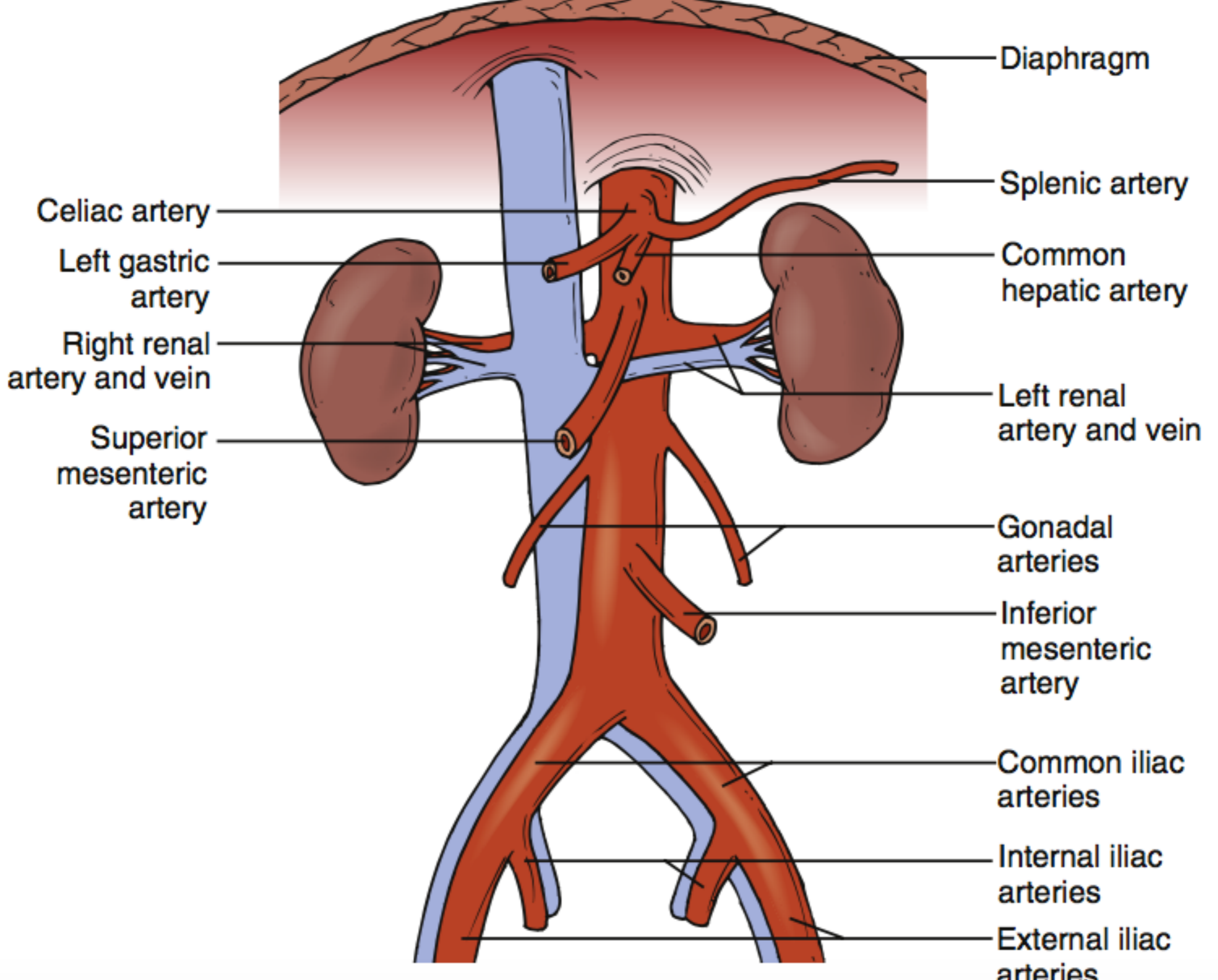


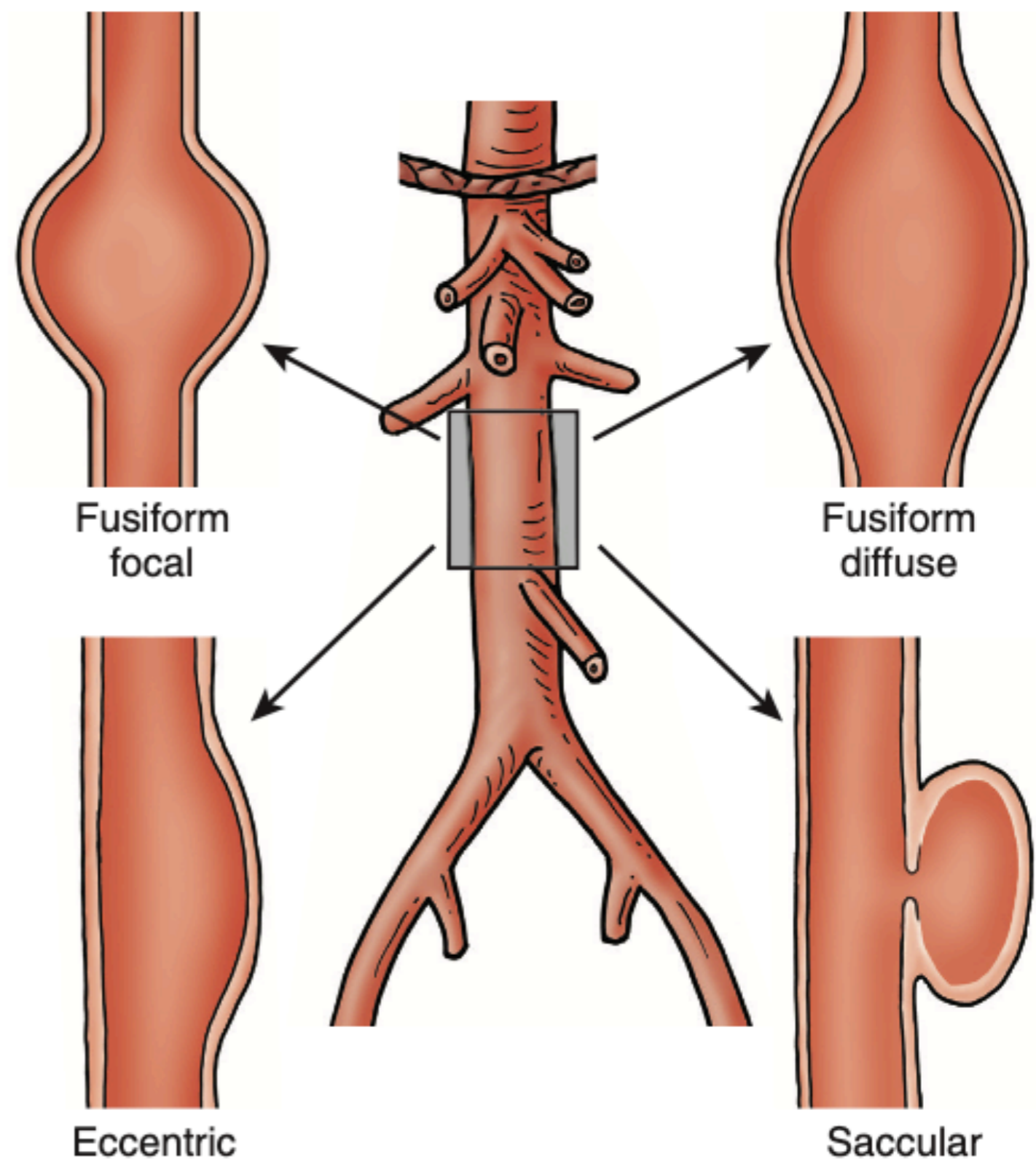
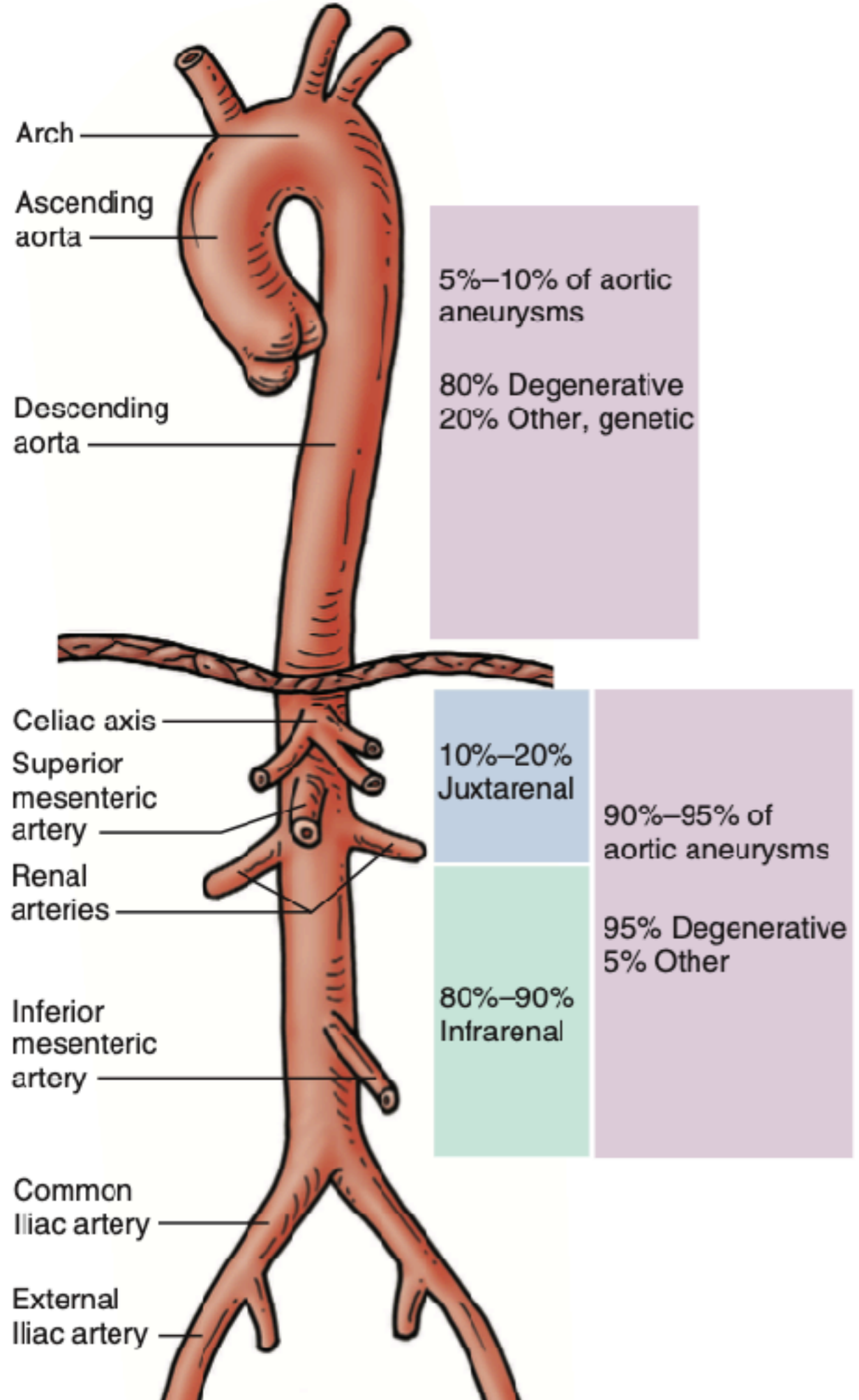


ABDOMEN

A for AAA

3cm

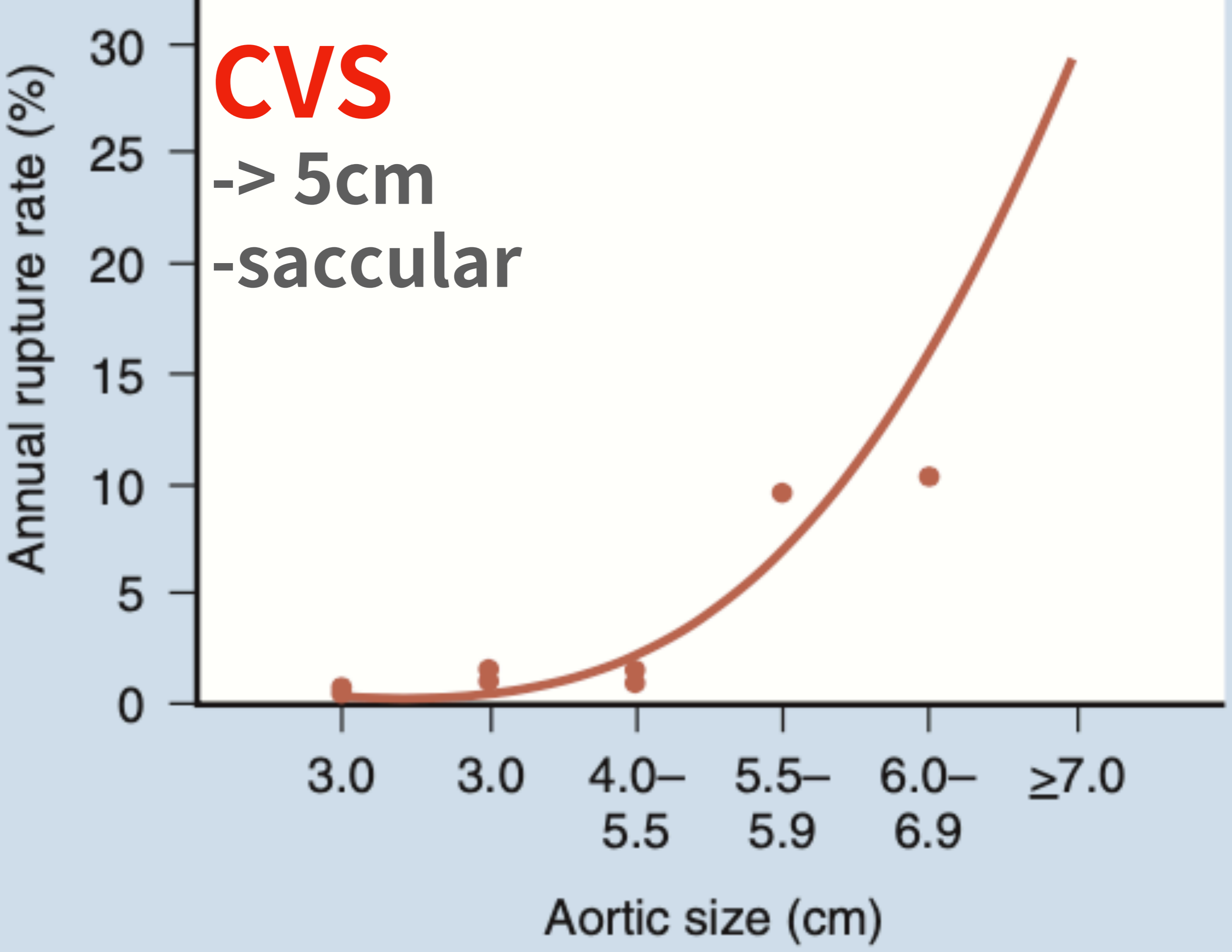




CVS

-> 5cm

-saccular



AAA



3 cm

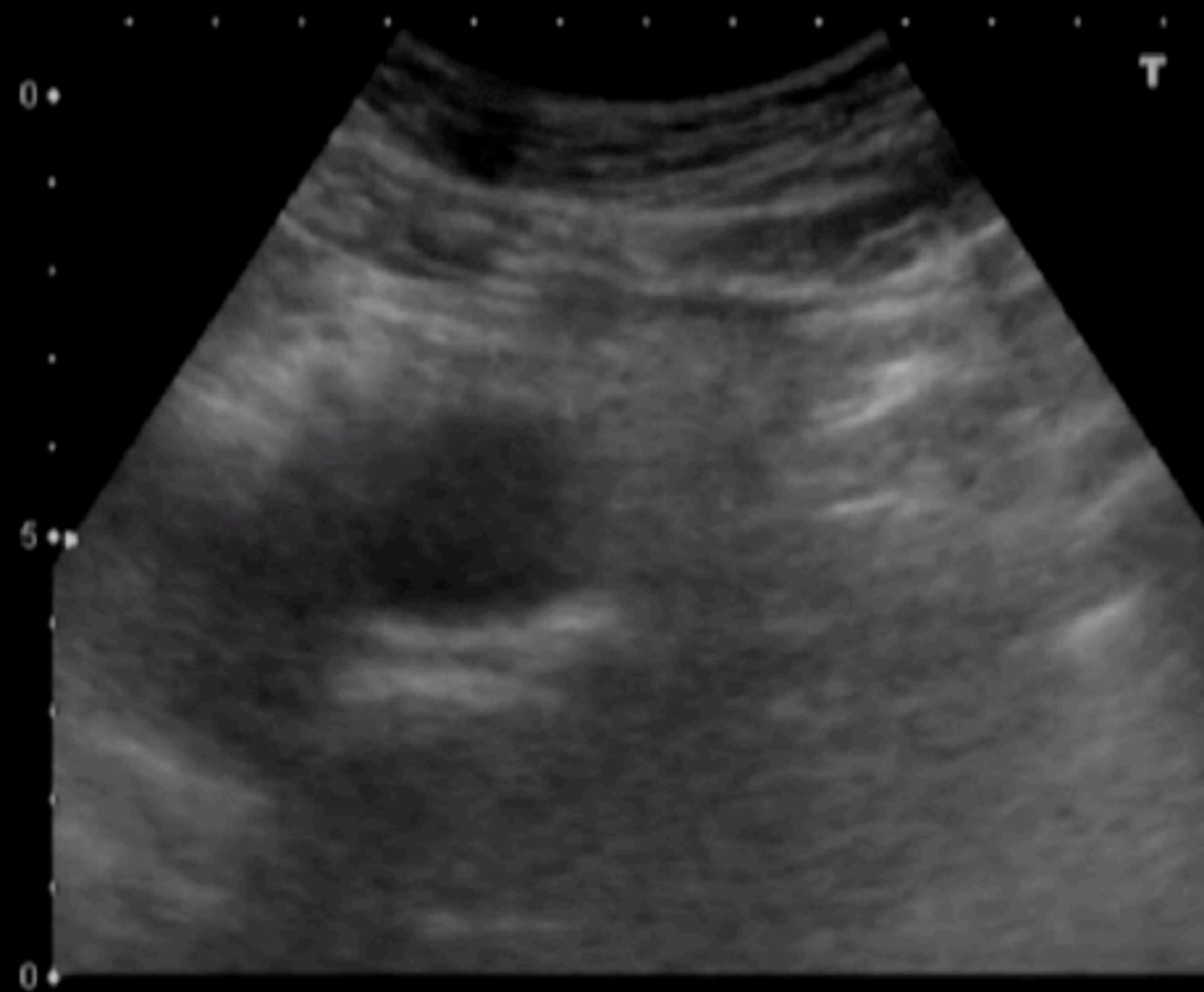
> 50 y/o
Syncope
Hypotension
ABD/Flank/Back/Groin

Sensitivity **97.5-100%**
Specificity **94.1-100%**

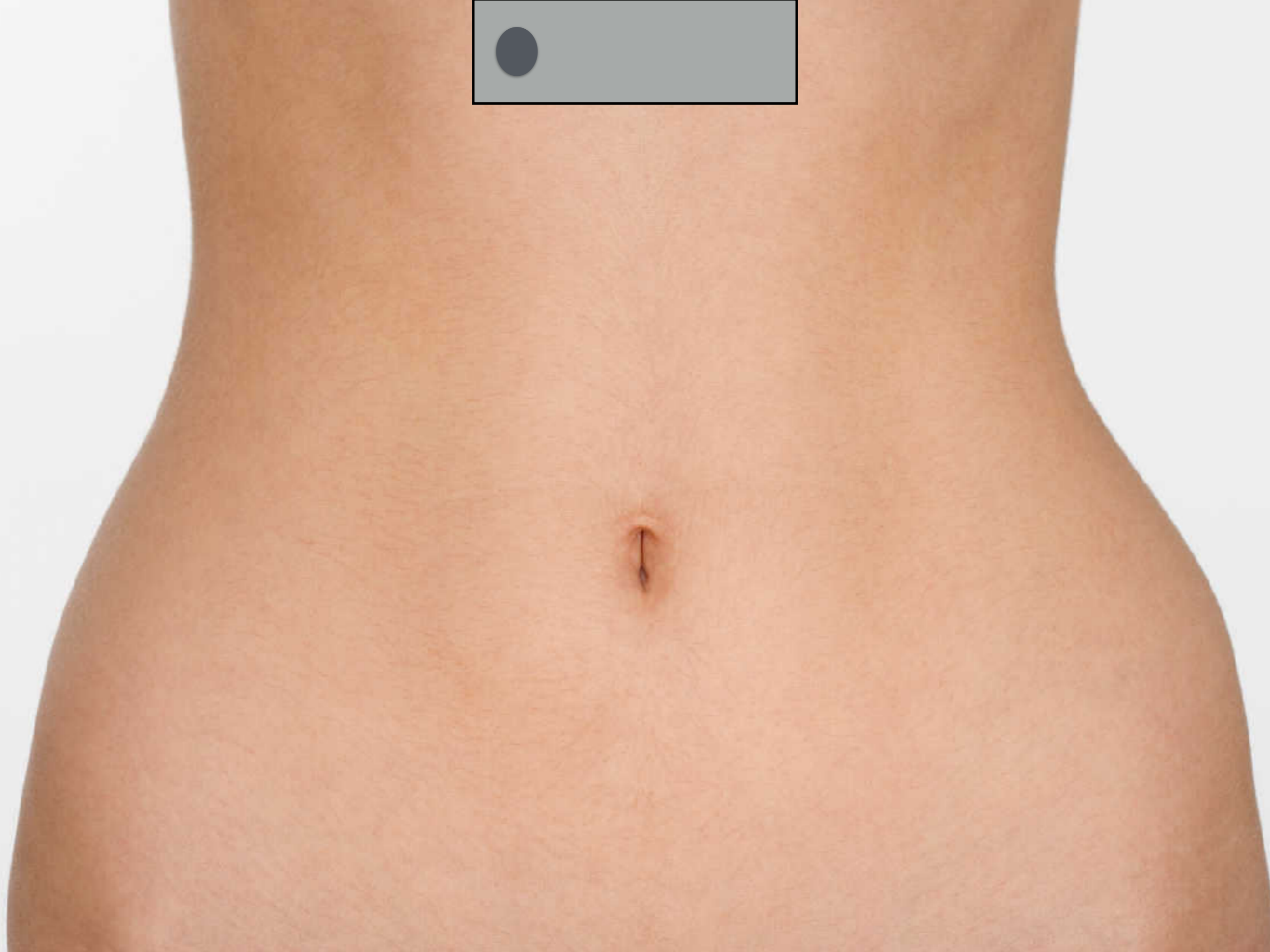
59M, Abd pain & hematuria

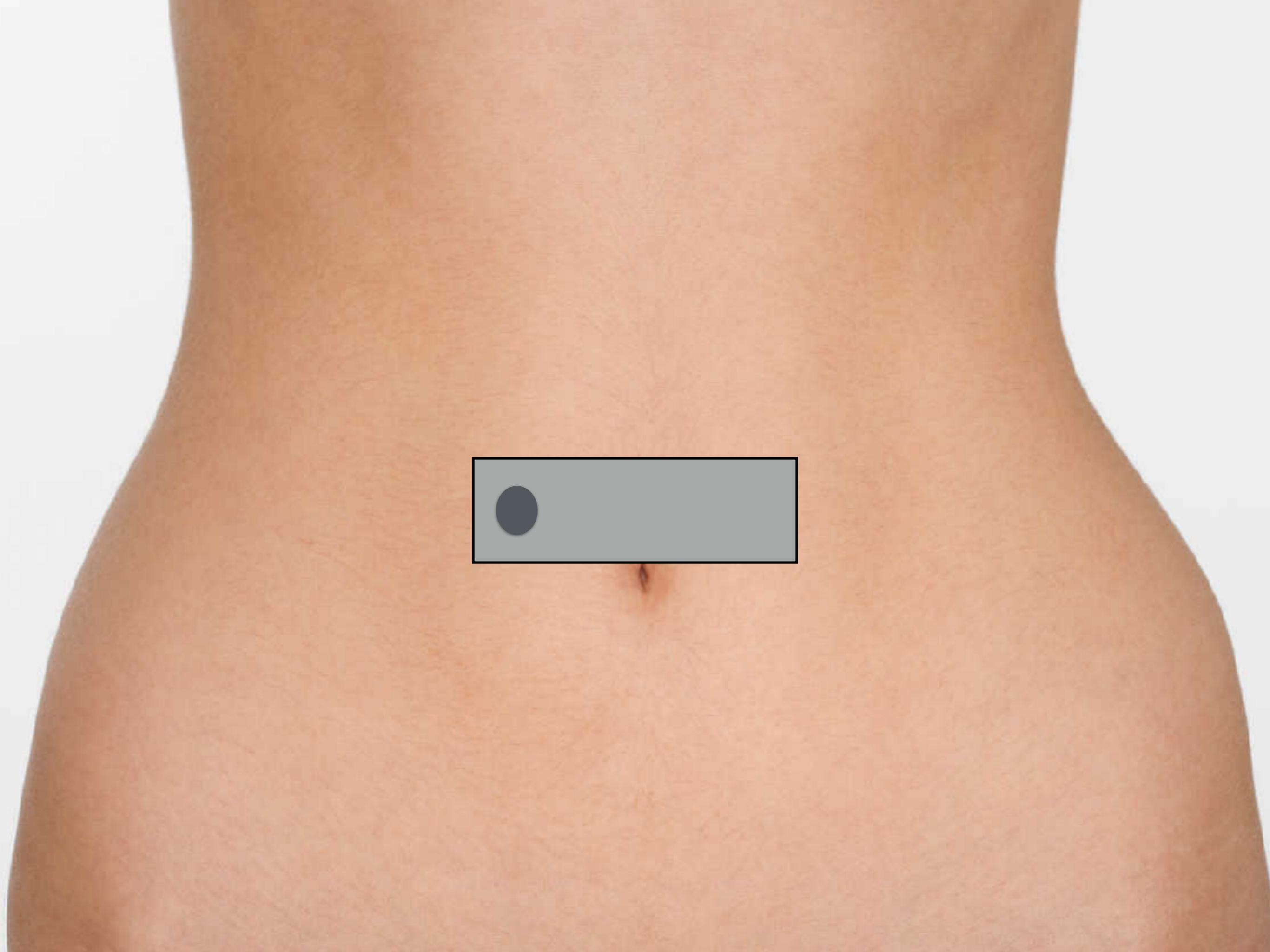


POCUS Academy©ChenK



Free 8





Abdominal aorta

Abd Gen
C5-1
42 Hz
11.0cm

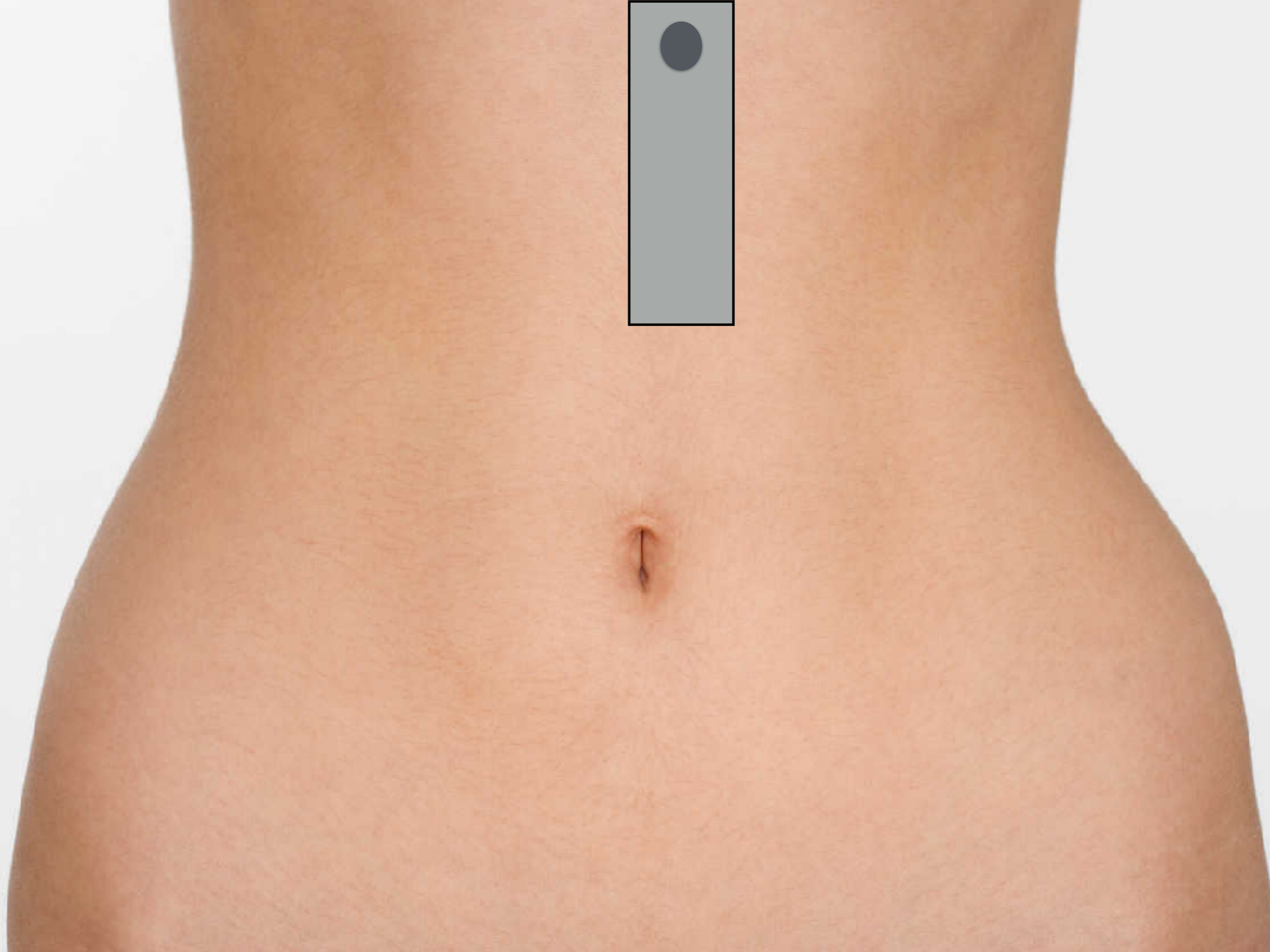
2D

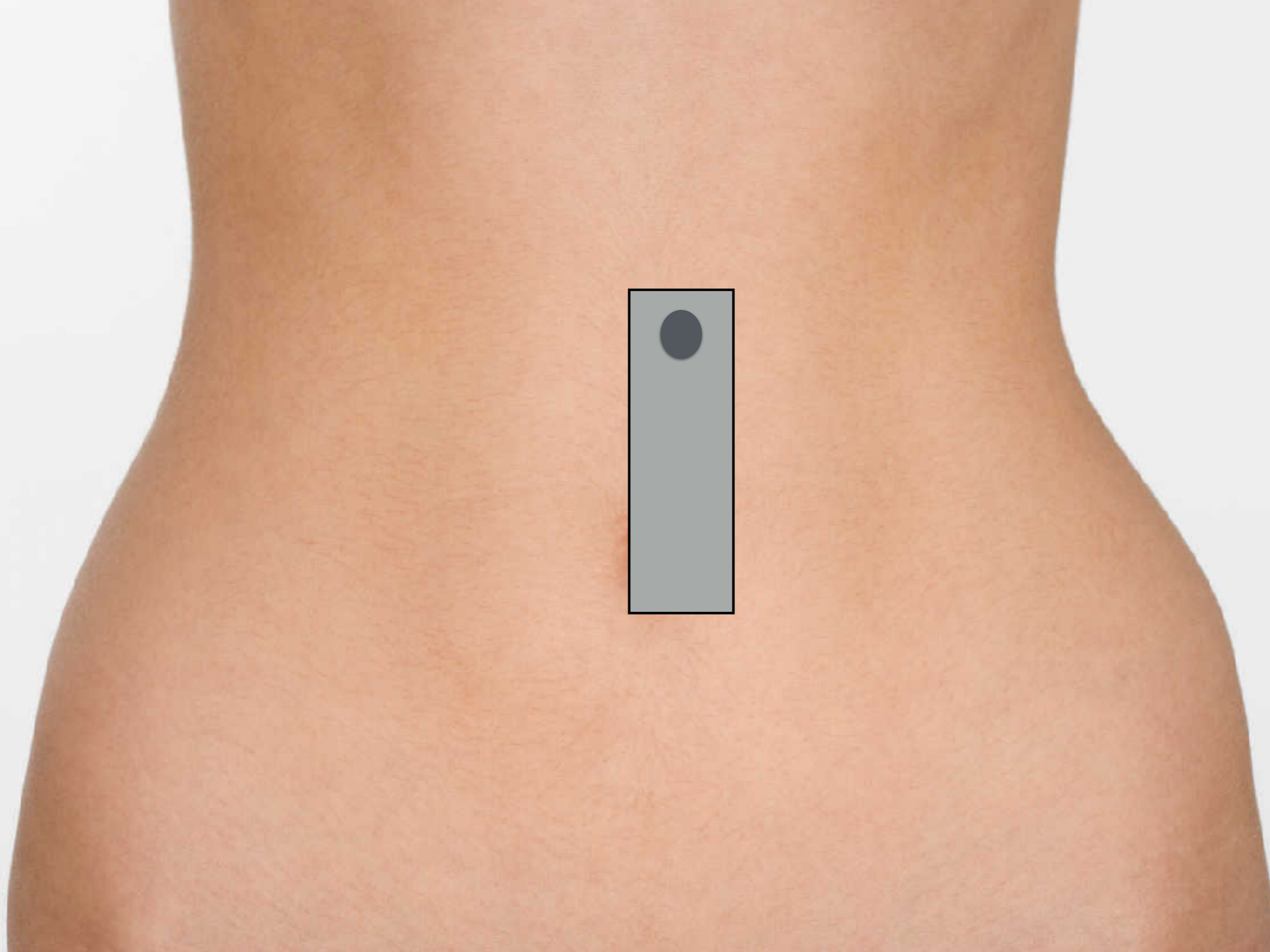
HGen
Gn 66
C 56
3 / 3 / 3



P (G) R
1.8 3.6

11.0cm





Abdominal aorta

Abd Gen
C5-1
45 Hz
10.0cm

2D

HGen
Gn 60
C 56
3/3/3



G
P R
1.8 3.6

10.0cm

A for AAA, not for rupture

POCUS Academy©ChenKC

POCUS Academy©ChenKC

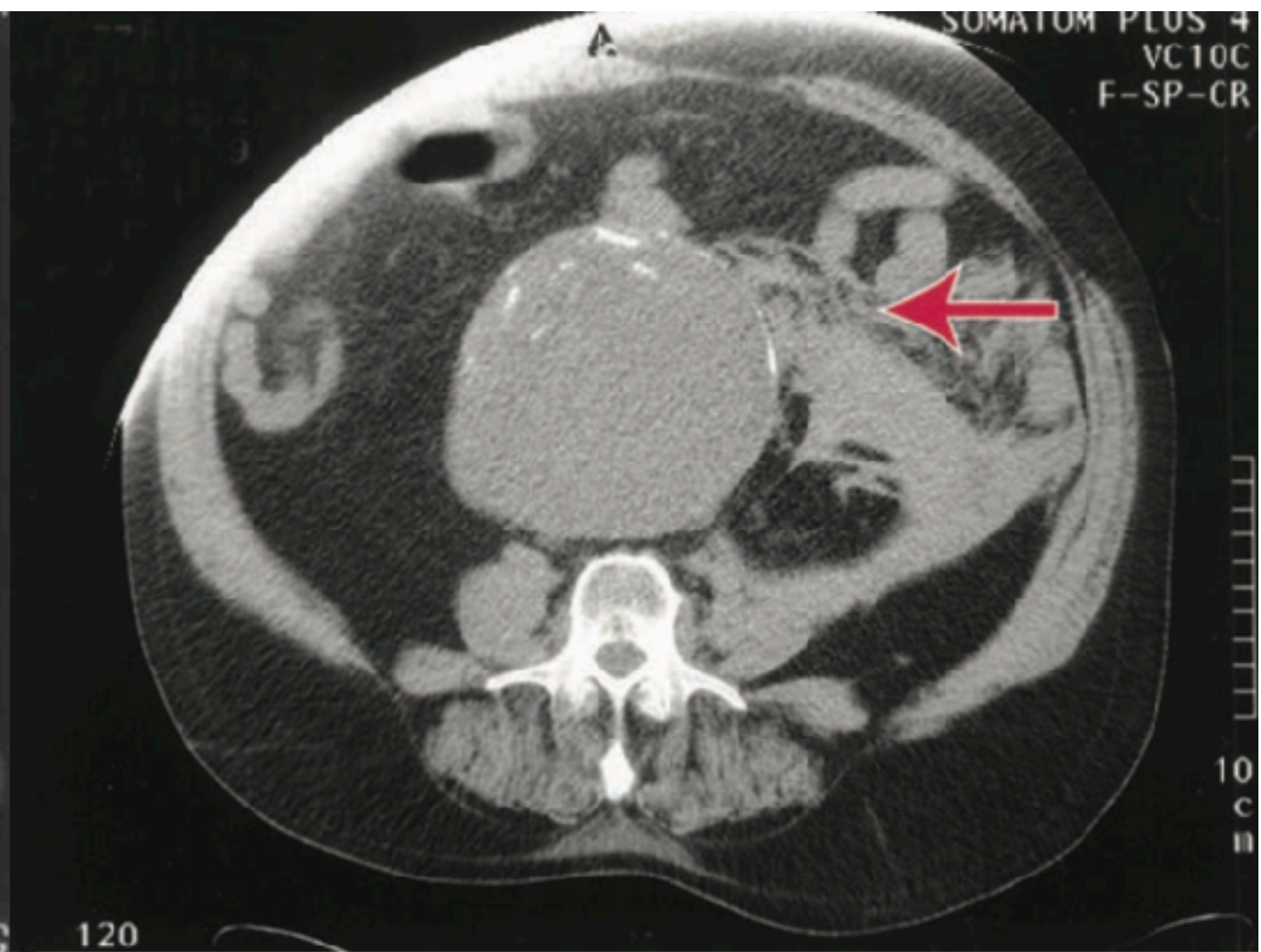
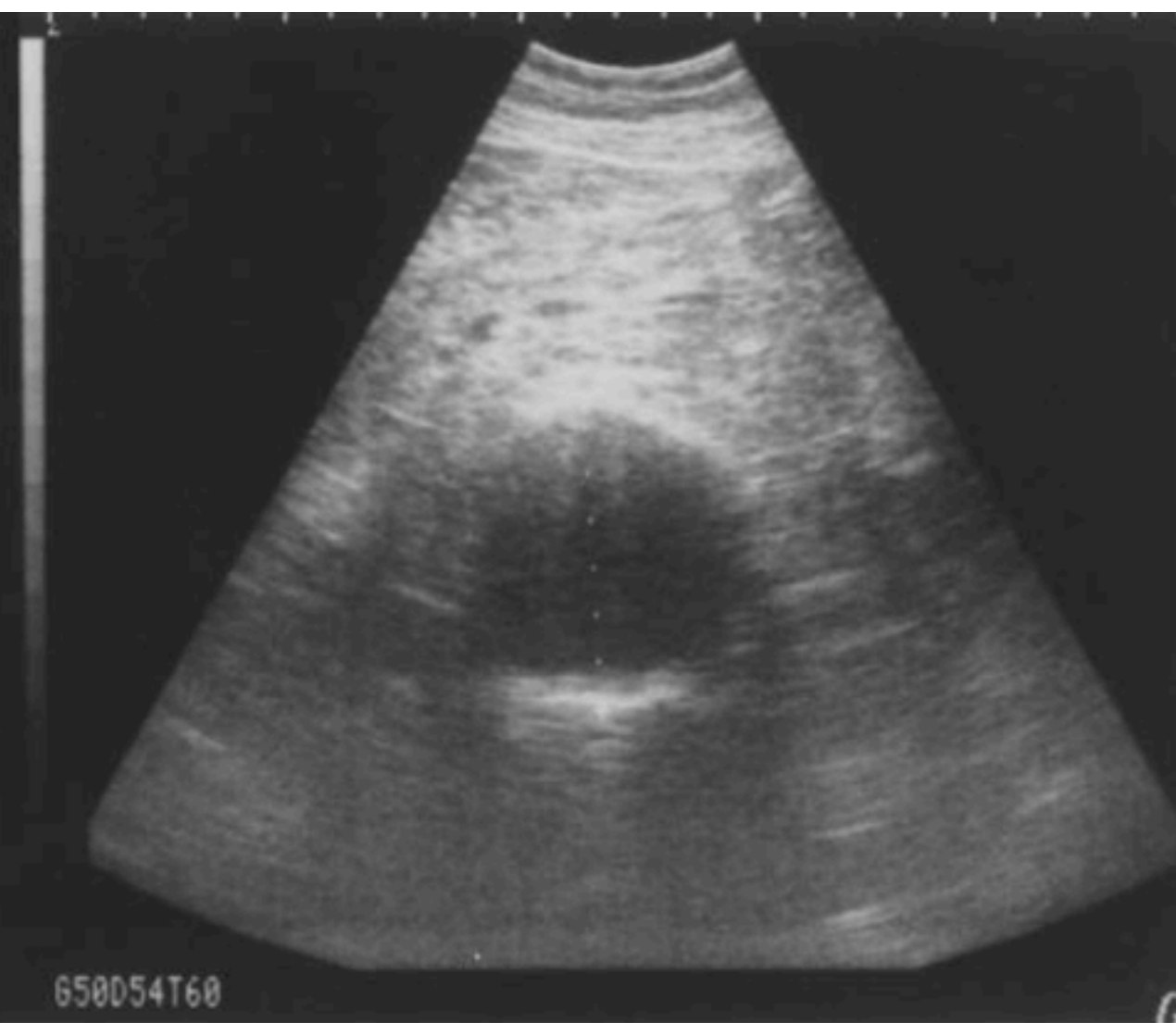


A

B

Echo for AAA (3~5cm)

Not for rupture



Eyeballing

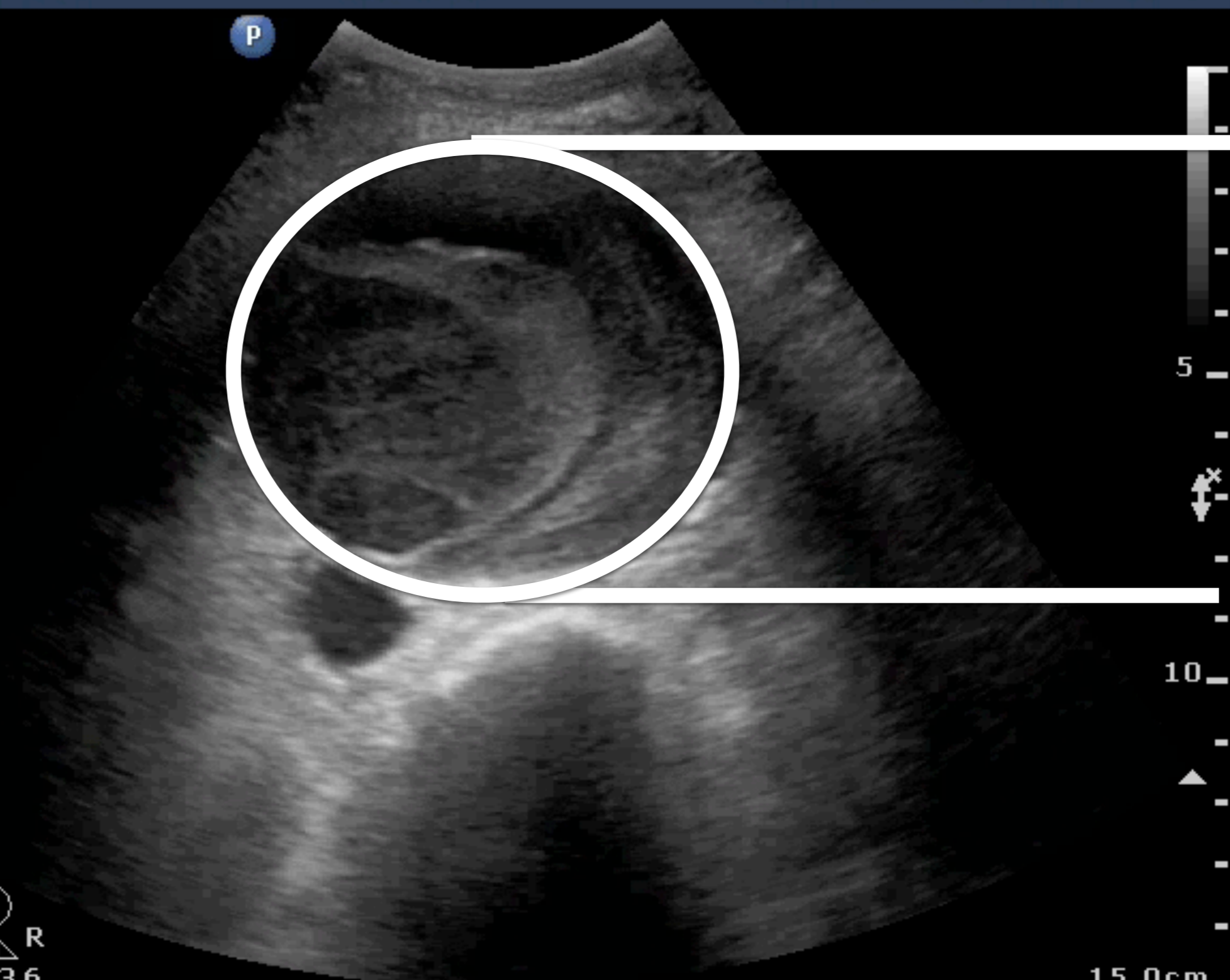
Abd Gen
C5-1
34 Hz
15.0cm

2D

HGen
Gn 57
C 56
3 / 3 / 3

P  R
1.8 3.6

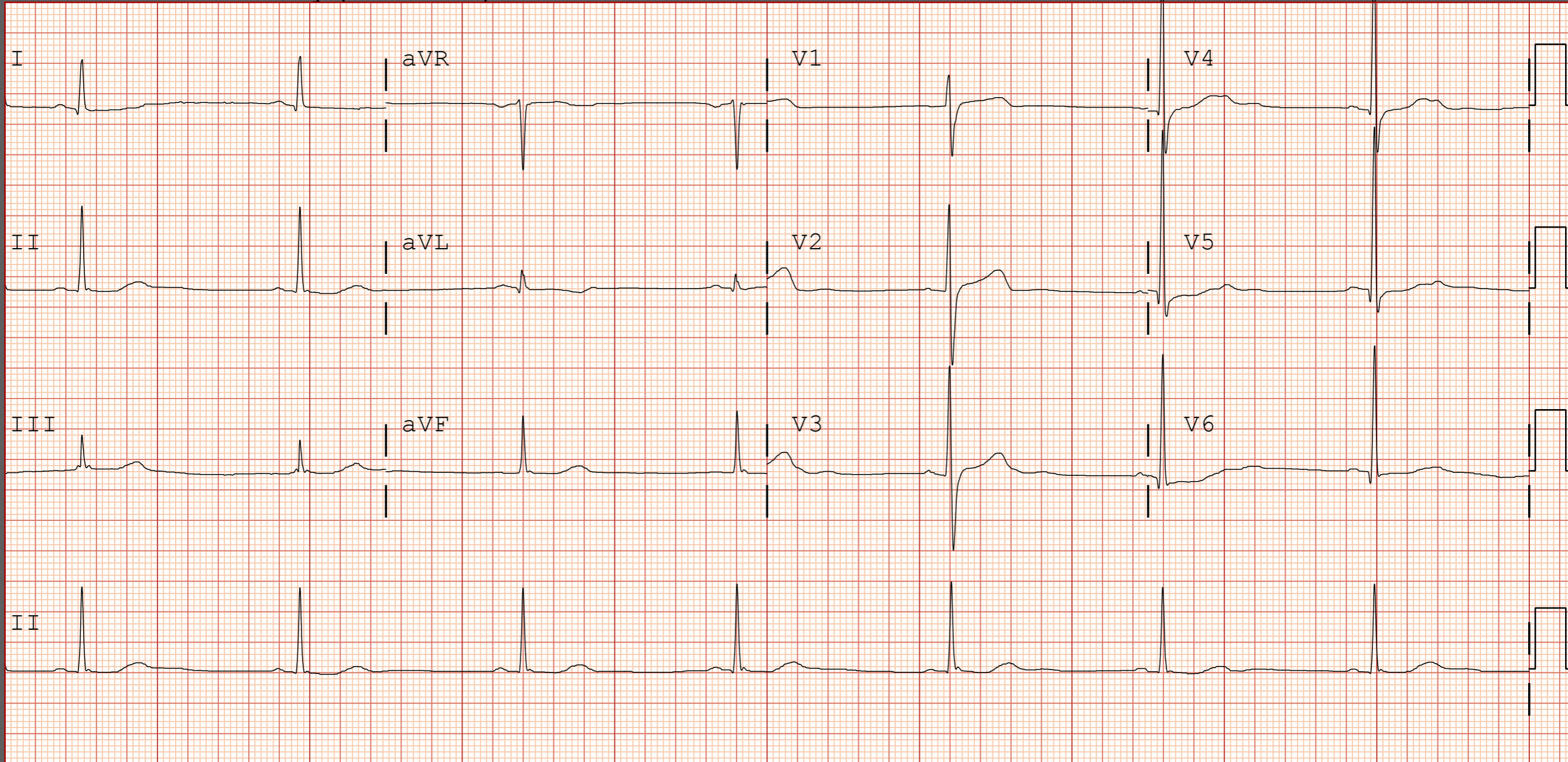
15.0cm



63M, chest/abd pain & low BP

SKH - Unidentified Facility (100-10000-06)

Not confirmed



Device:

Speed: 25 mm/sec

Limb: 10 mm/mV

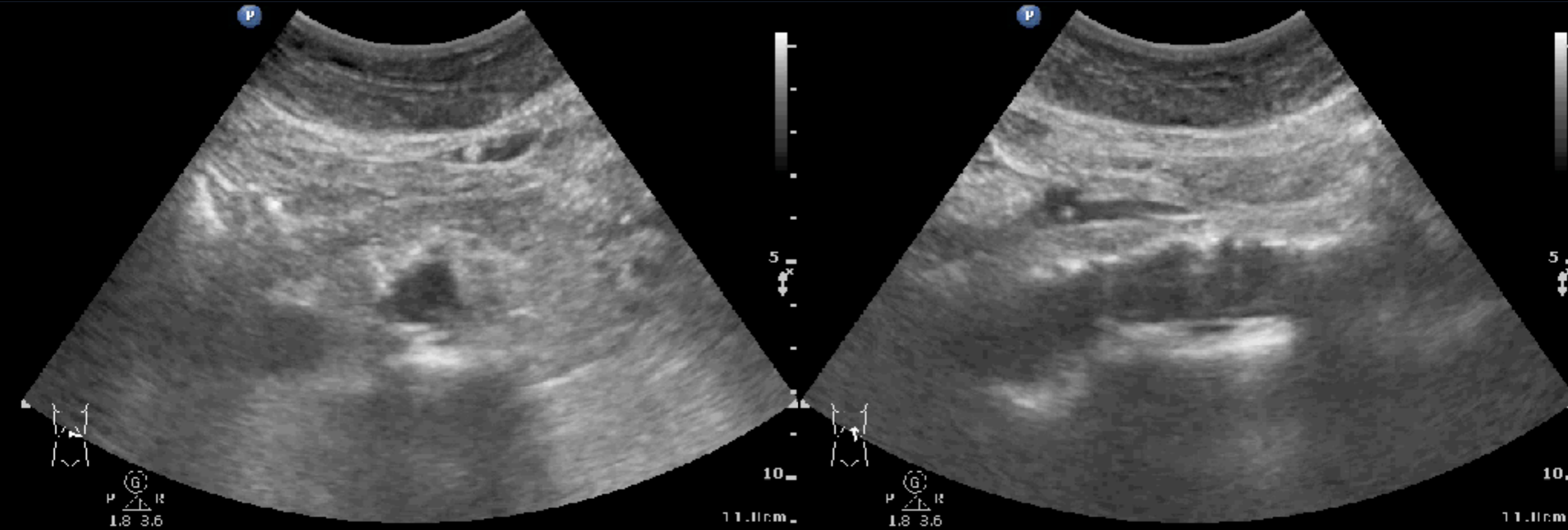
Chest: 10 mm/mV

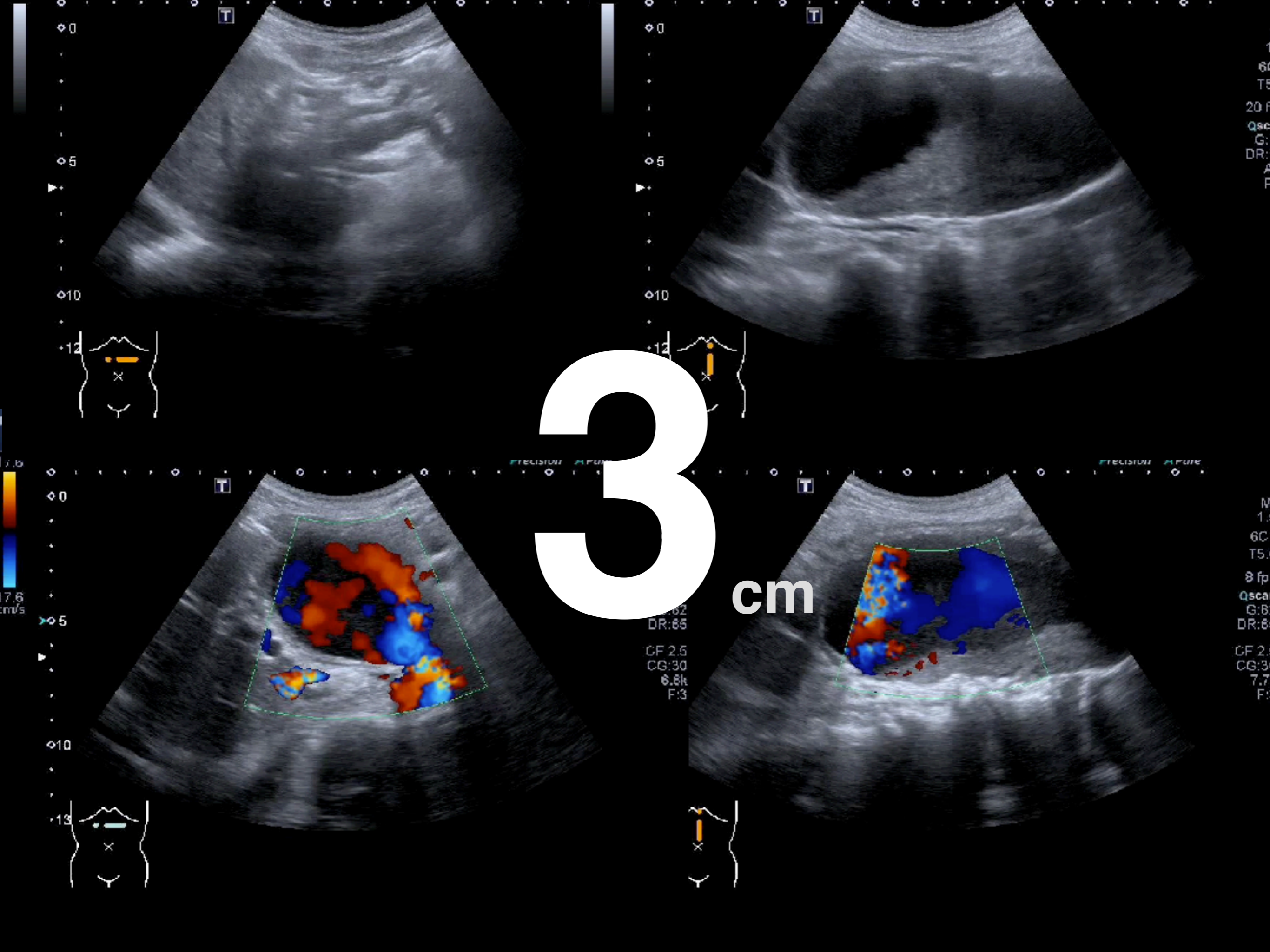
F 60~ 0.5-40 Hz W

PH100B CL P?

63M, chest/abd pain & low BP

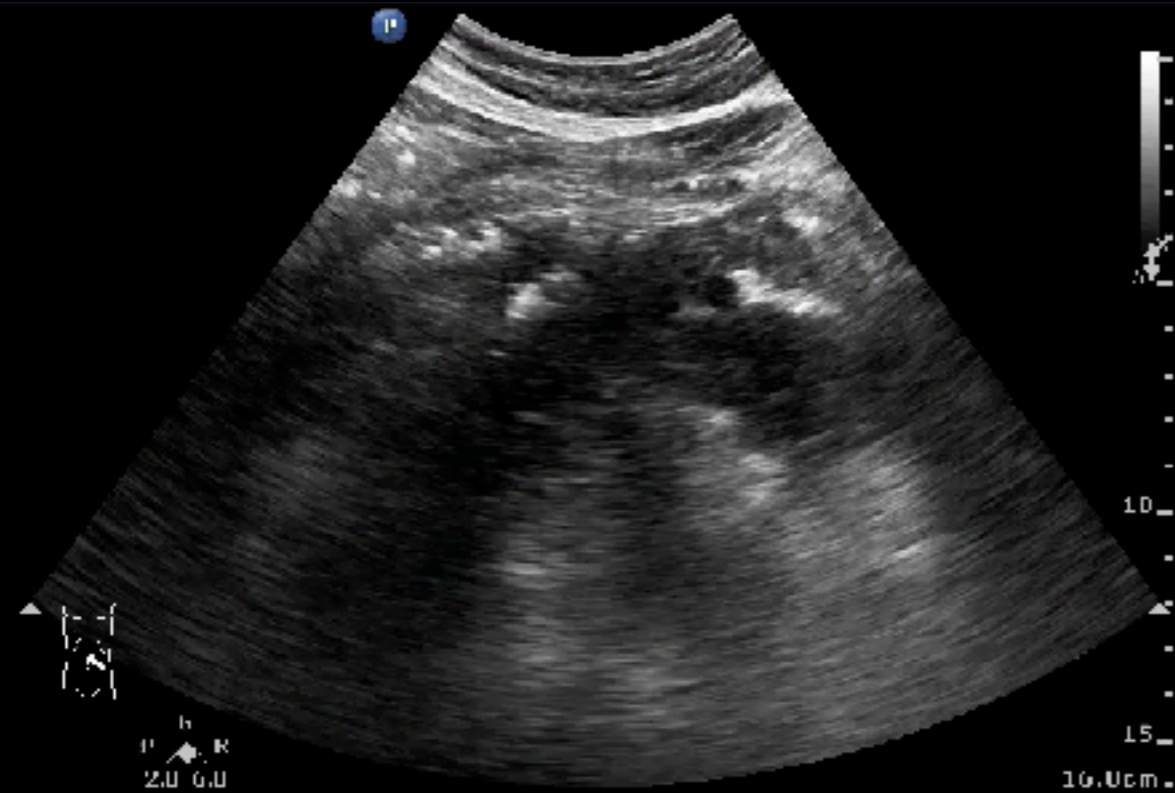
Aortic dissection





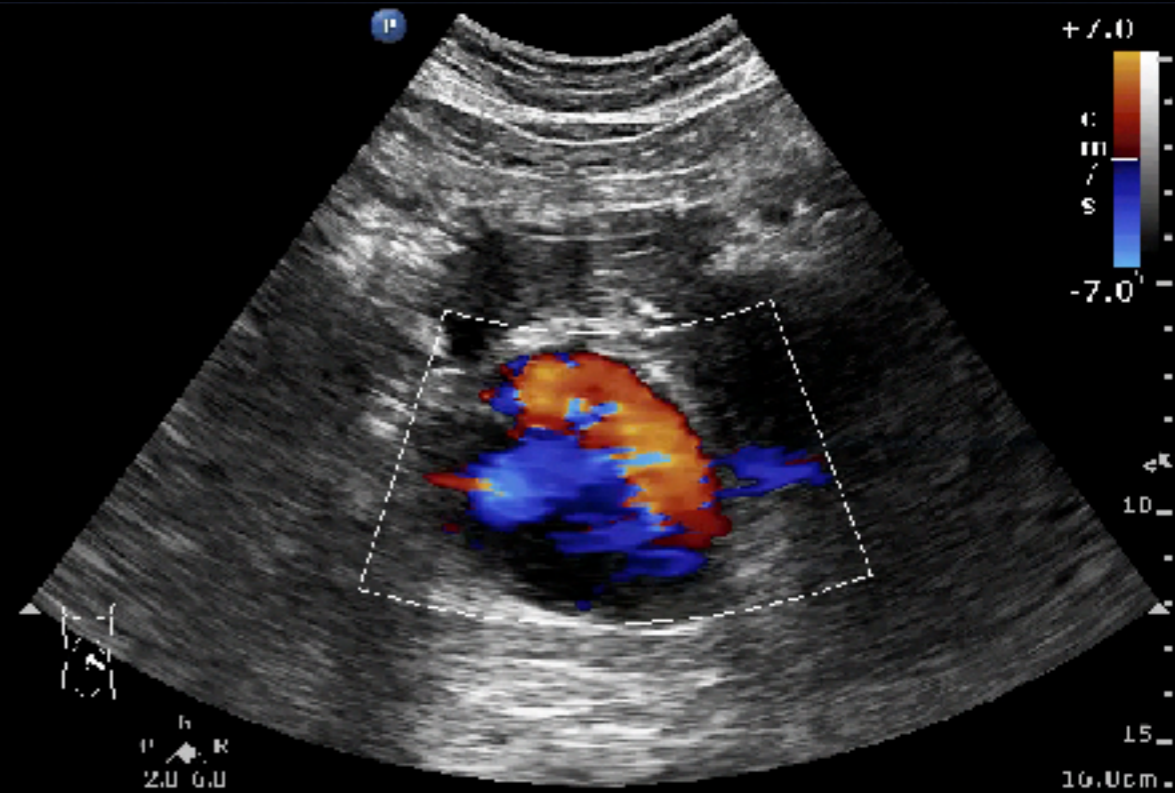
3 cm

0: Nerve
0.6 7
22 Hz
16.0cm
2D
Gen
0n 60
0: 58
2/3/4



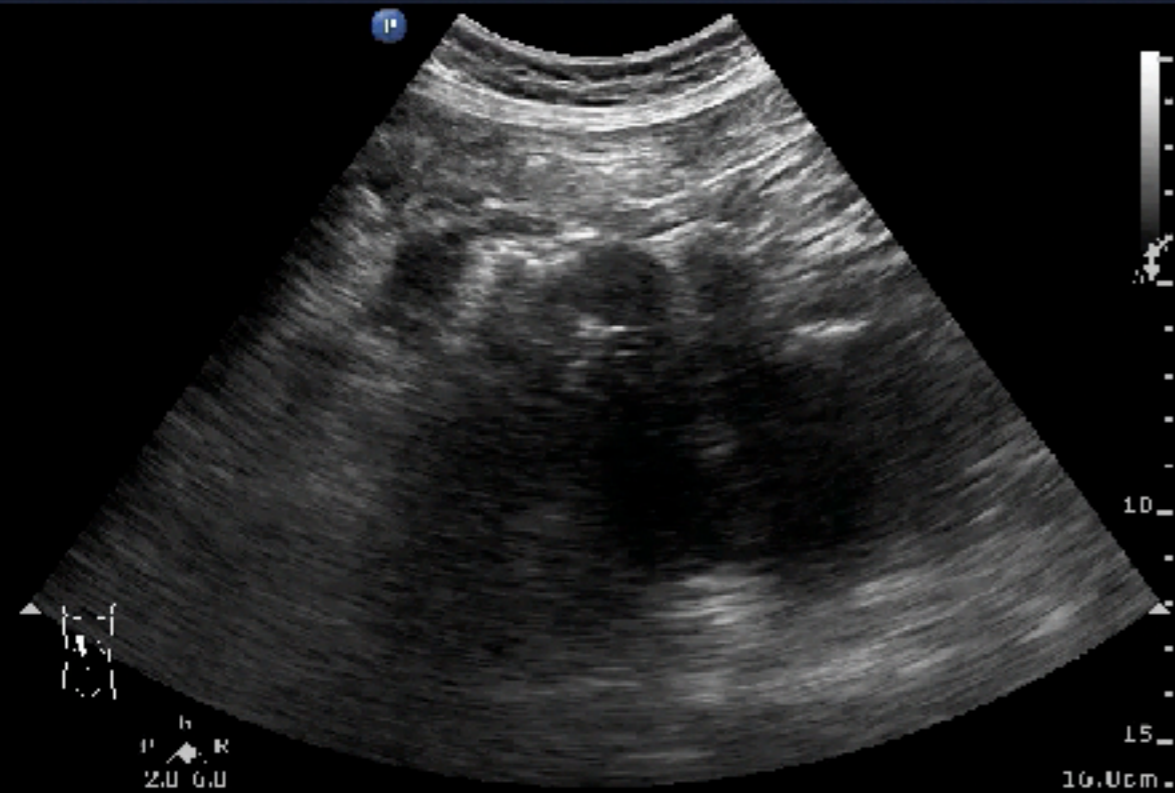
0: Nerve
0.6 7
22 Hz
16.0cm
2D
Gen
0n 60
0: 58
2/3/3

-Color
- 2.5 MHz
0n 66
3/5/4
- Filr Med



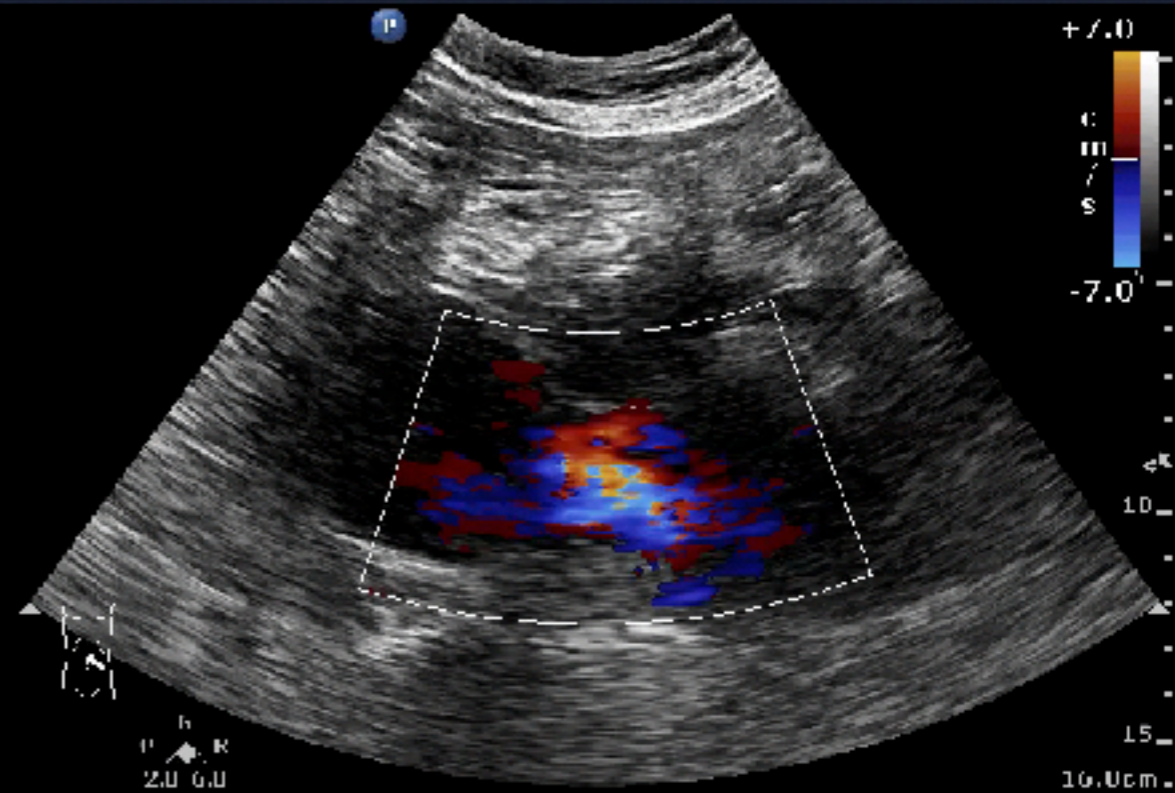
+7.0
cm/s
-7.0

0: Nerve
0.6 7
22 Hz
16.0cm
2D
Gen
0n 60
0: 58
2/3/4



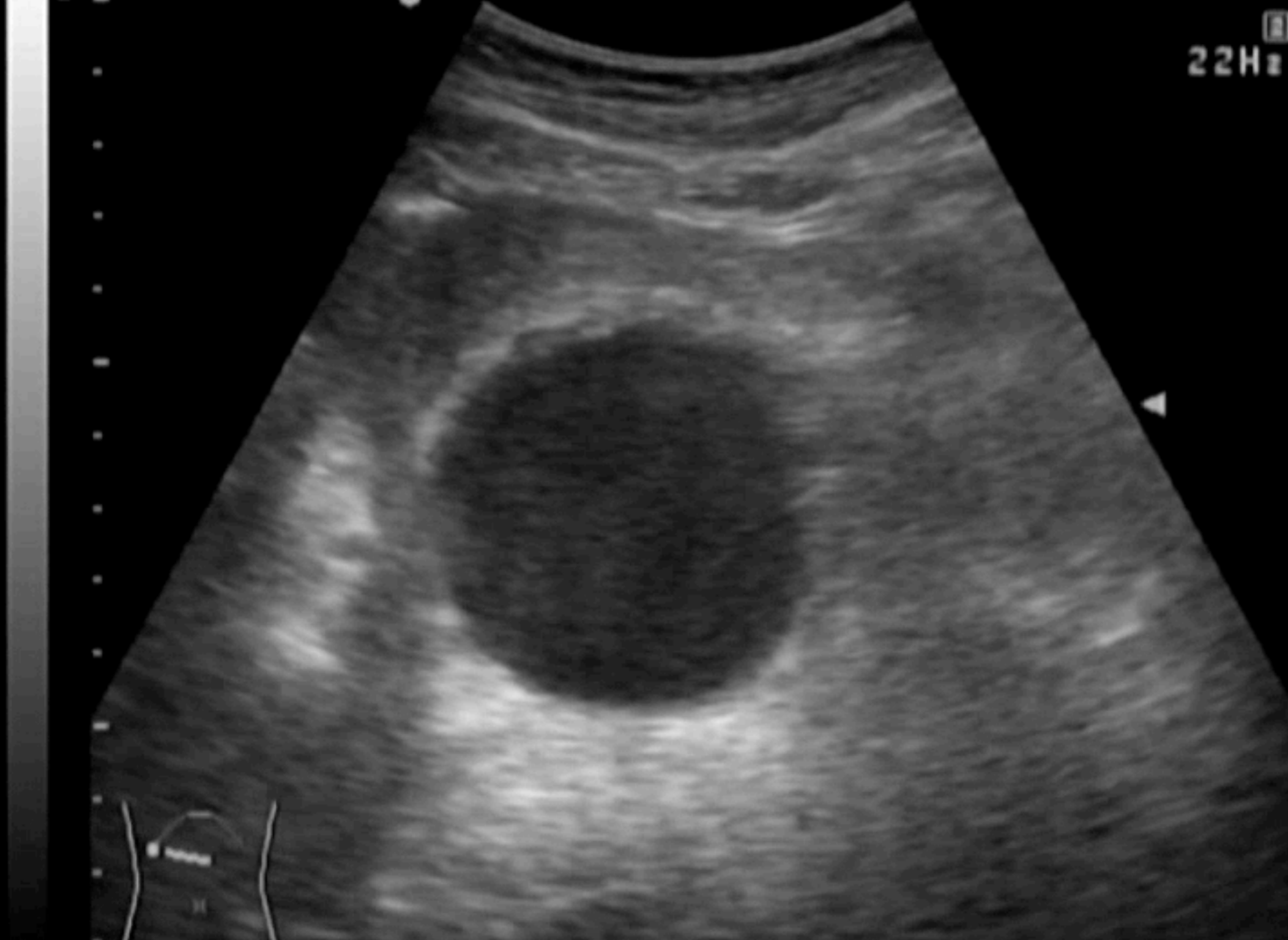
0: Nerve
0.6 7
22 Hz
16.0cm
2D
Gen
0n 60
0: 58
2/3/3

-Color
- 2.5 MHz
0n 66
3/5/4
- Filr Med



+7.0
cm/s
-7.0

22Hz 3.5M S-H
DUA: 100%
MI = 0.6



AAA protocol

3_{cm}

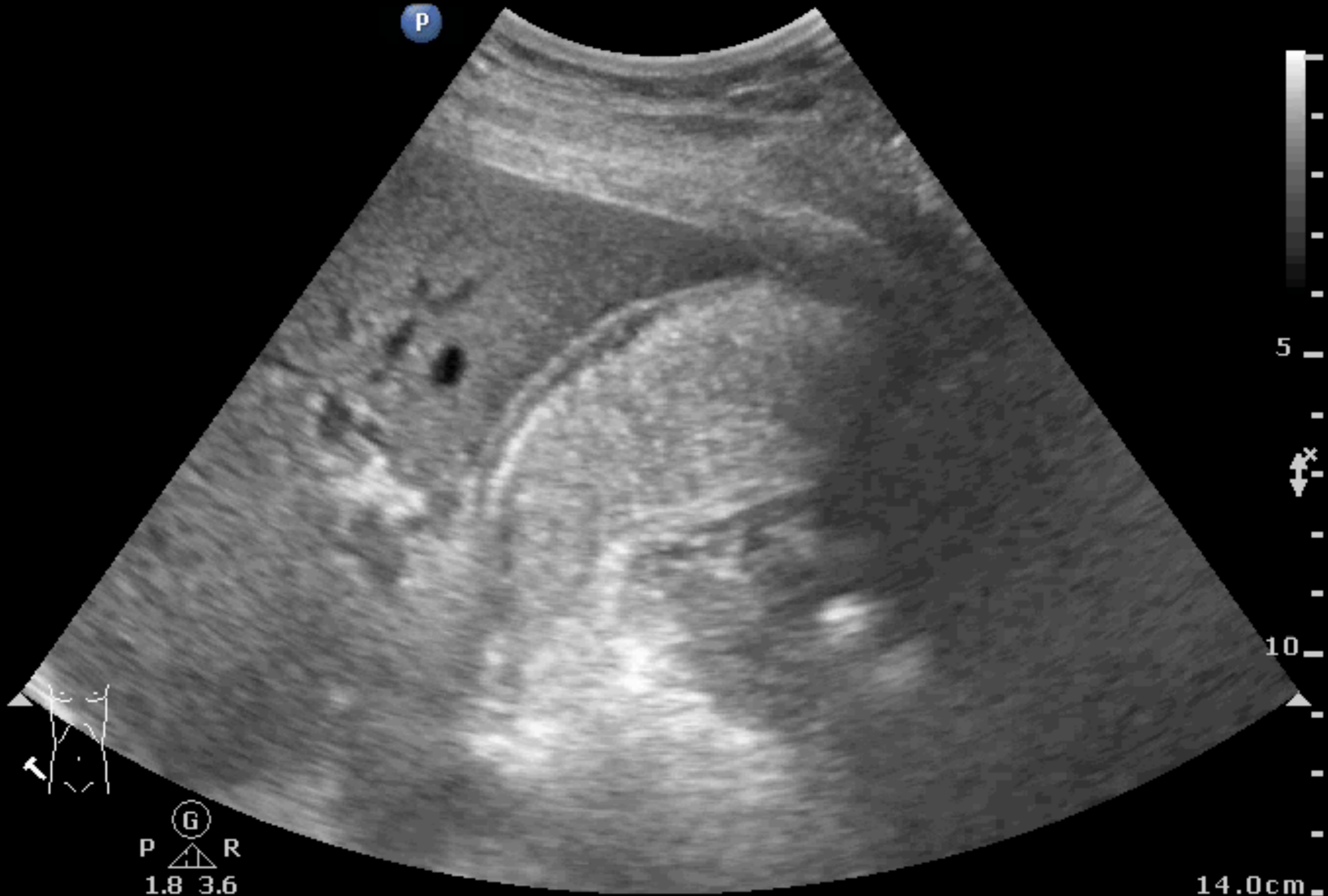
Not for rupture

59M, epigastric pain at midnight

Abd Gen2
C5-1
36 Hz
14.0cm

2D

HGen
Gn 100
C 56
3 / 3 / 3



ABDOMEN

B for GB stone & dilatation

3

mm

7

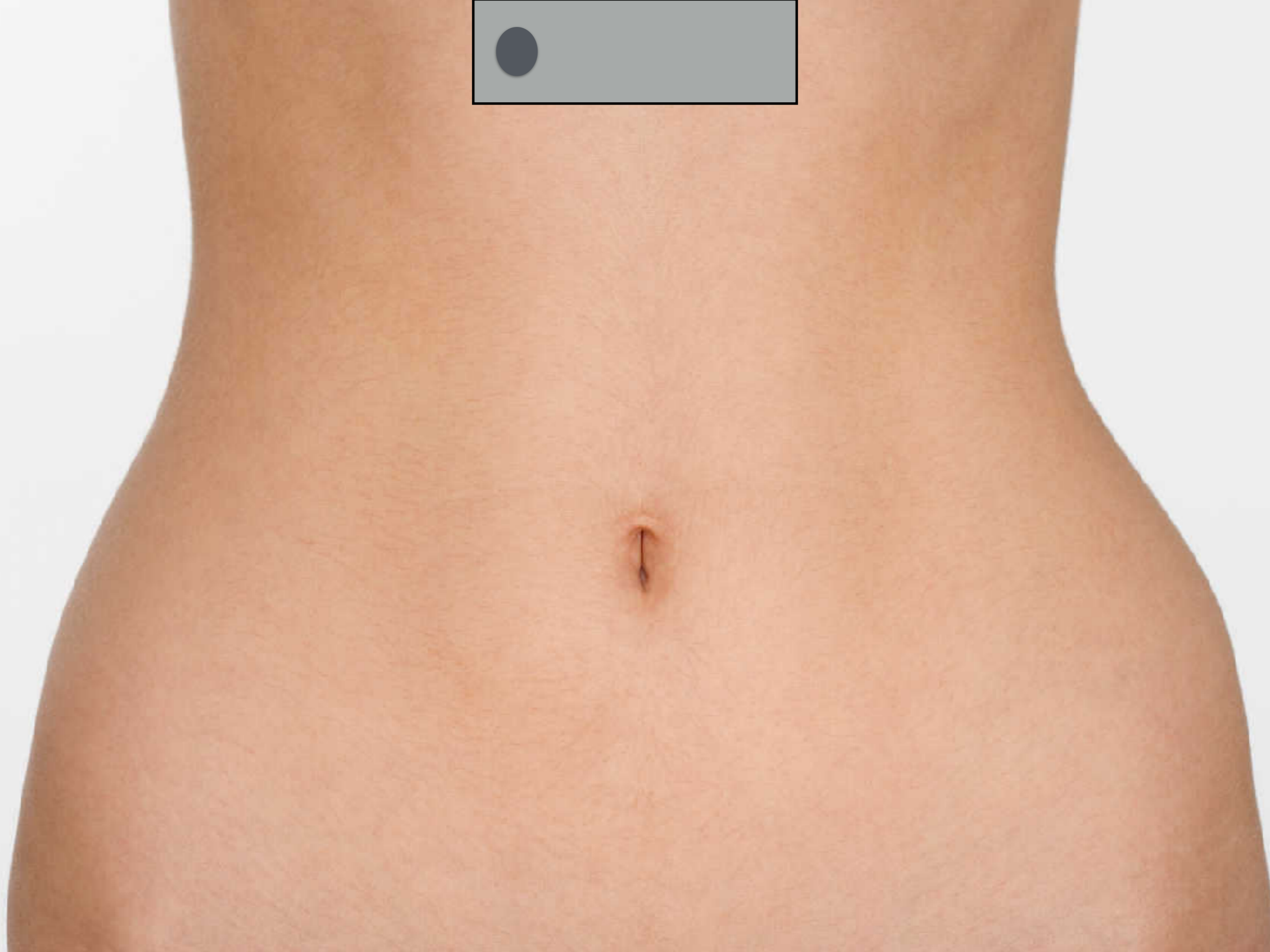
mm

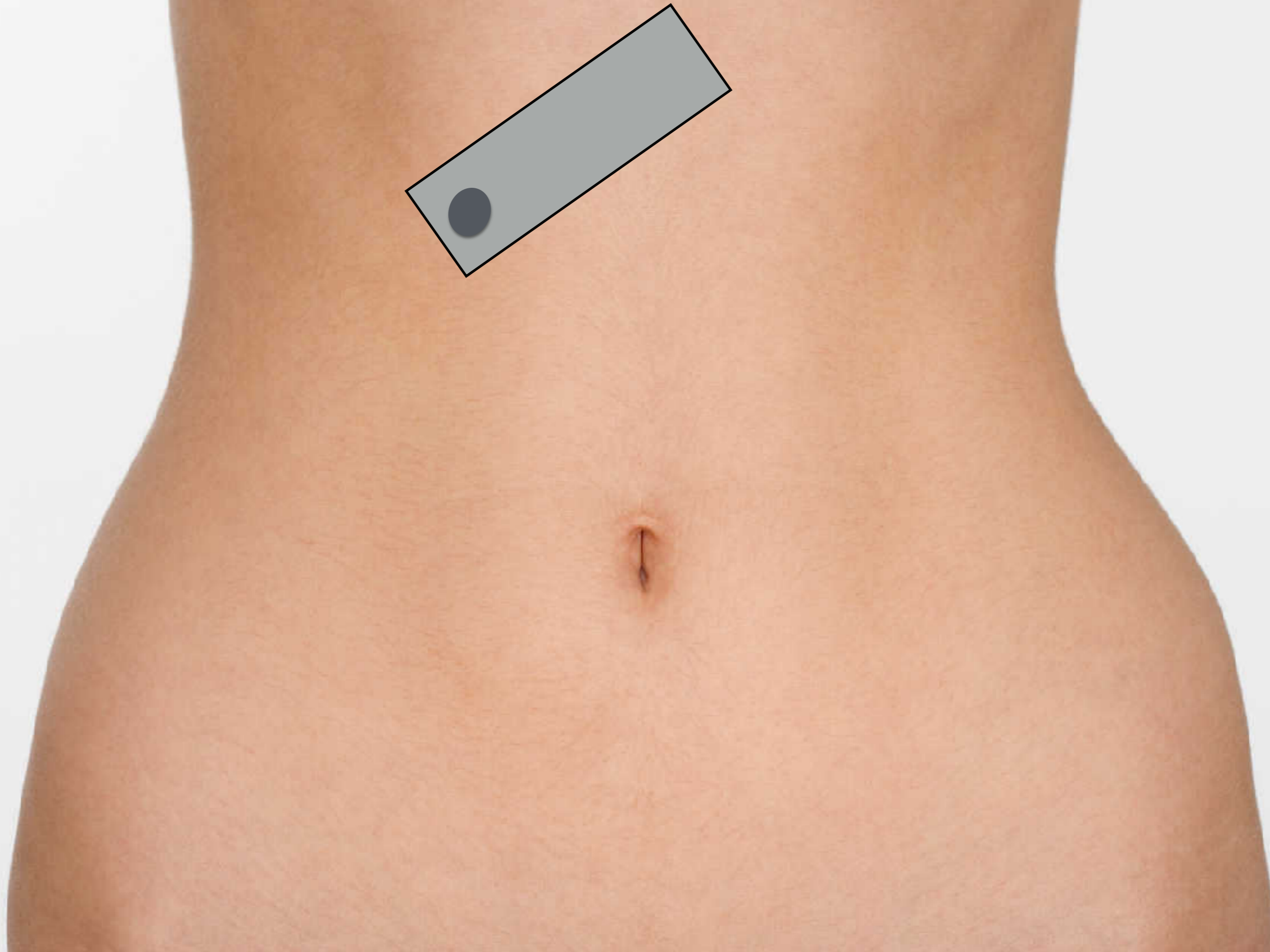
11

1

mm









讀讀看，你看到了什麼？

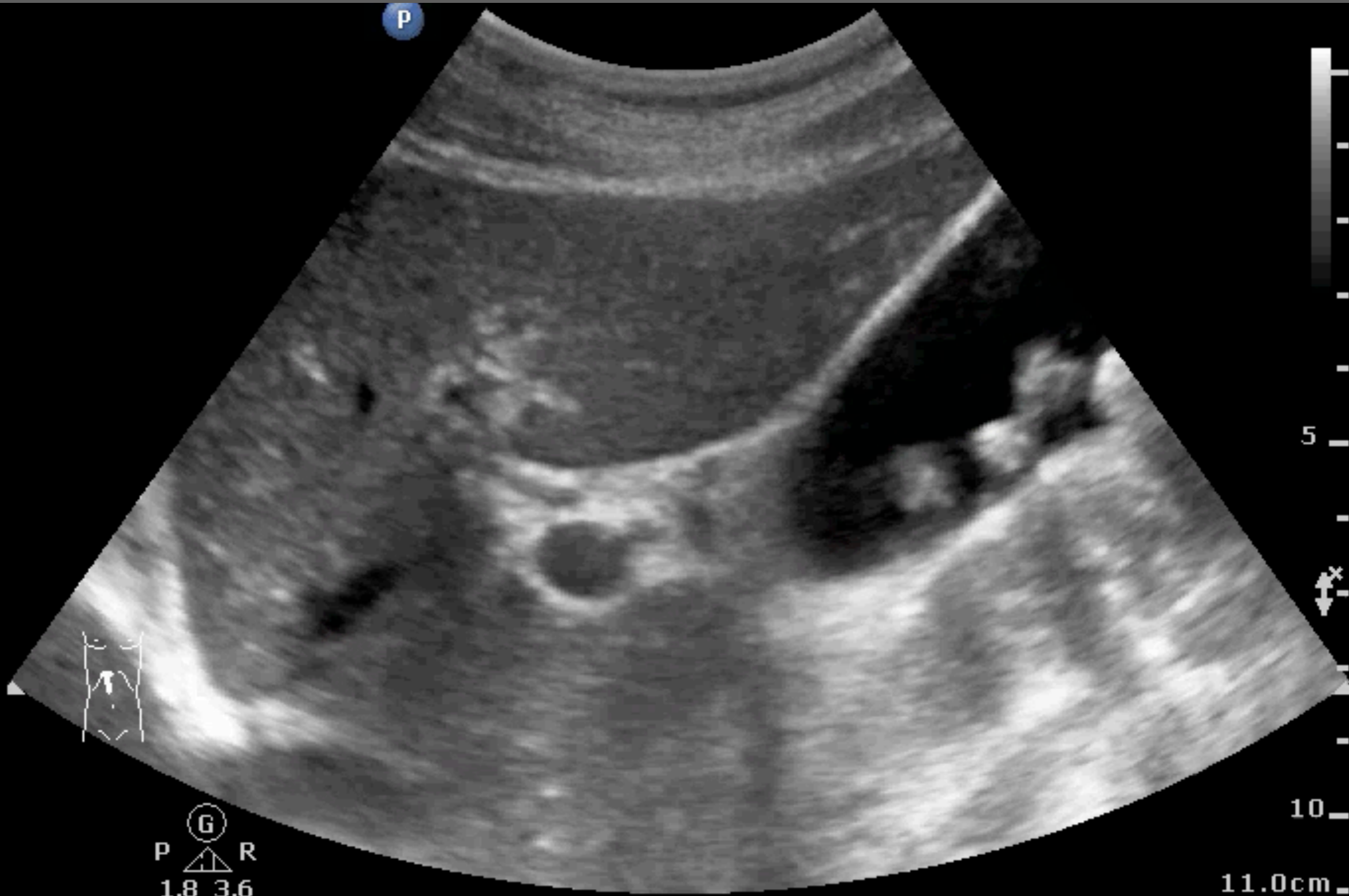


讀讀看，你看到了什麼？

Abd Gen
C5-1
42 Hz
11.0cm

2D

HGen
Gn 80
C 56
3 / 3 / 3



G
P R
1.8 3.6

11.0cm

讀讀看，你看到了什麼？

Abd Gen
C5-1
38 Hz
13.0cm

2D

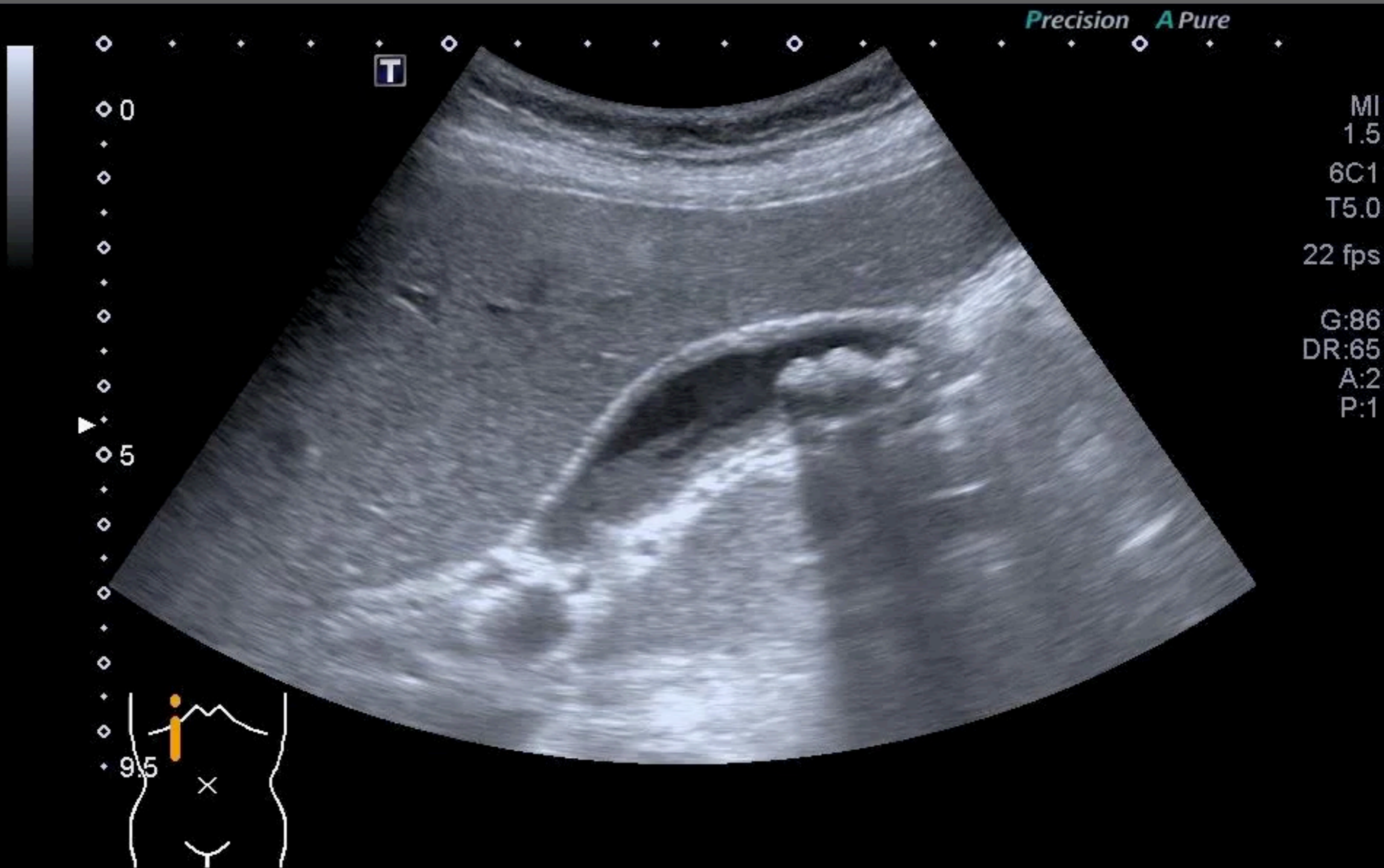
HGen
Gn 82
C 56
3 / 3 / 3



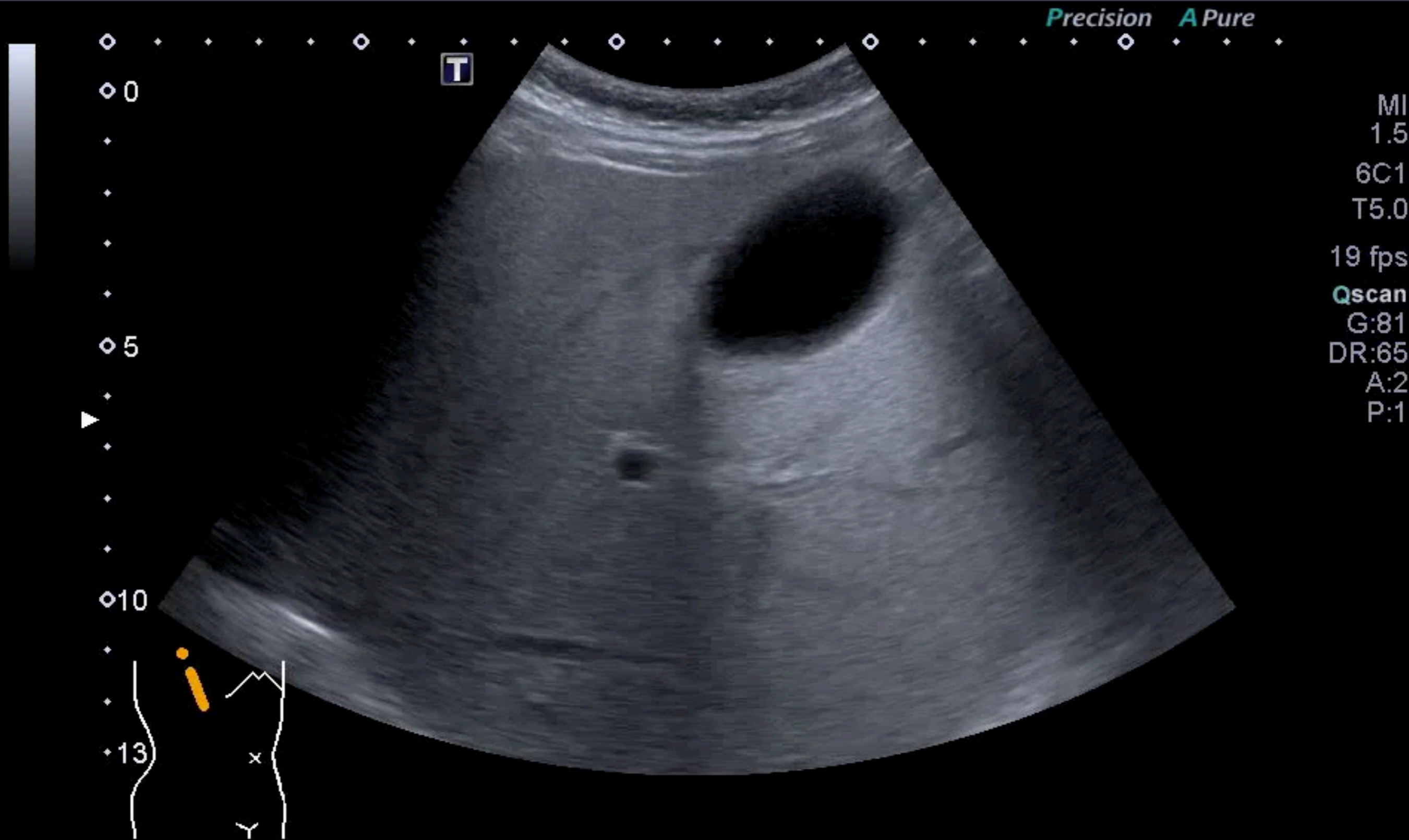
⊙ G
P △ R
1.8 3.6

13.0cm

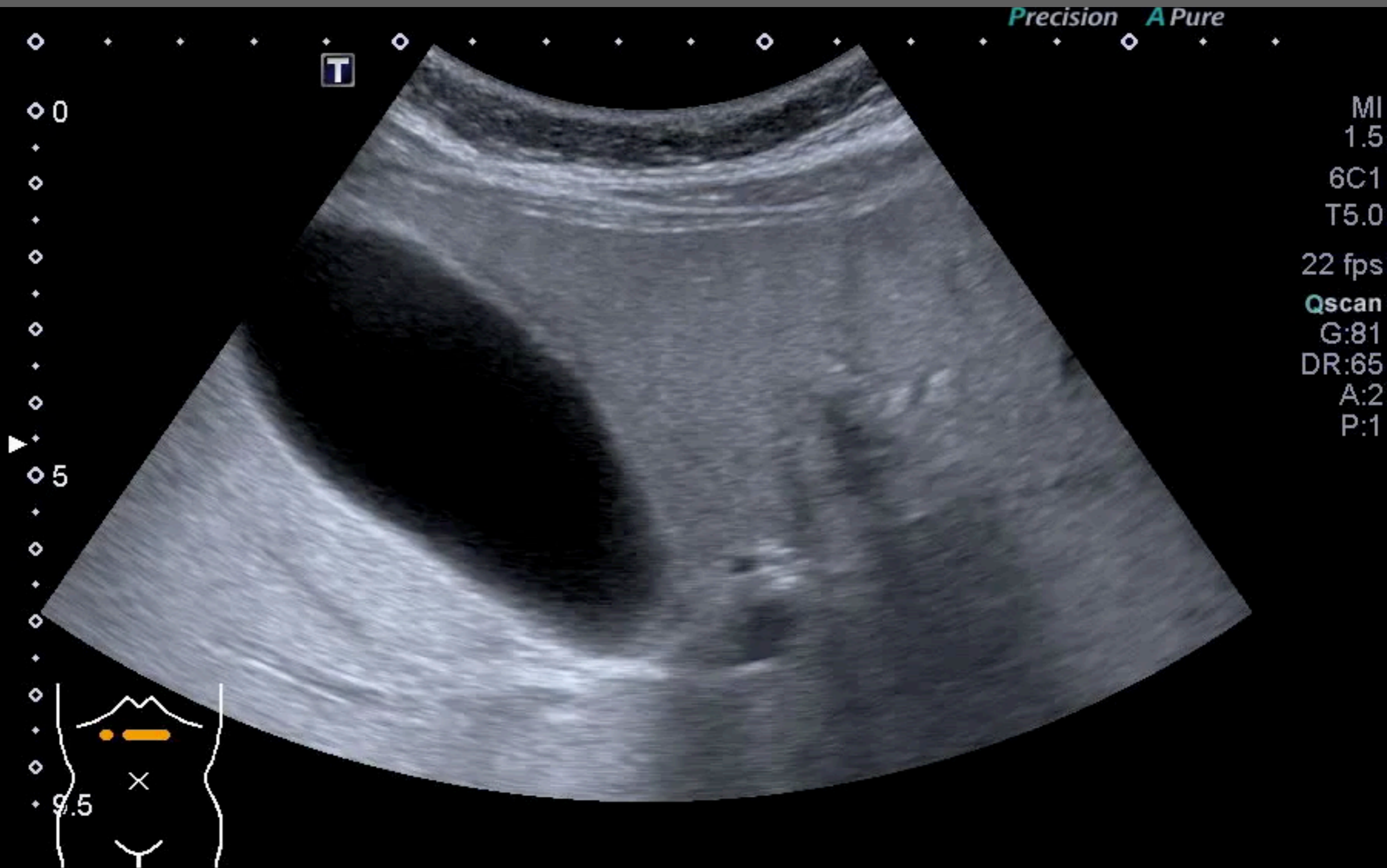
讀讀看，你看到了什麼？



61F , ABD pain for 3-4 days



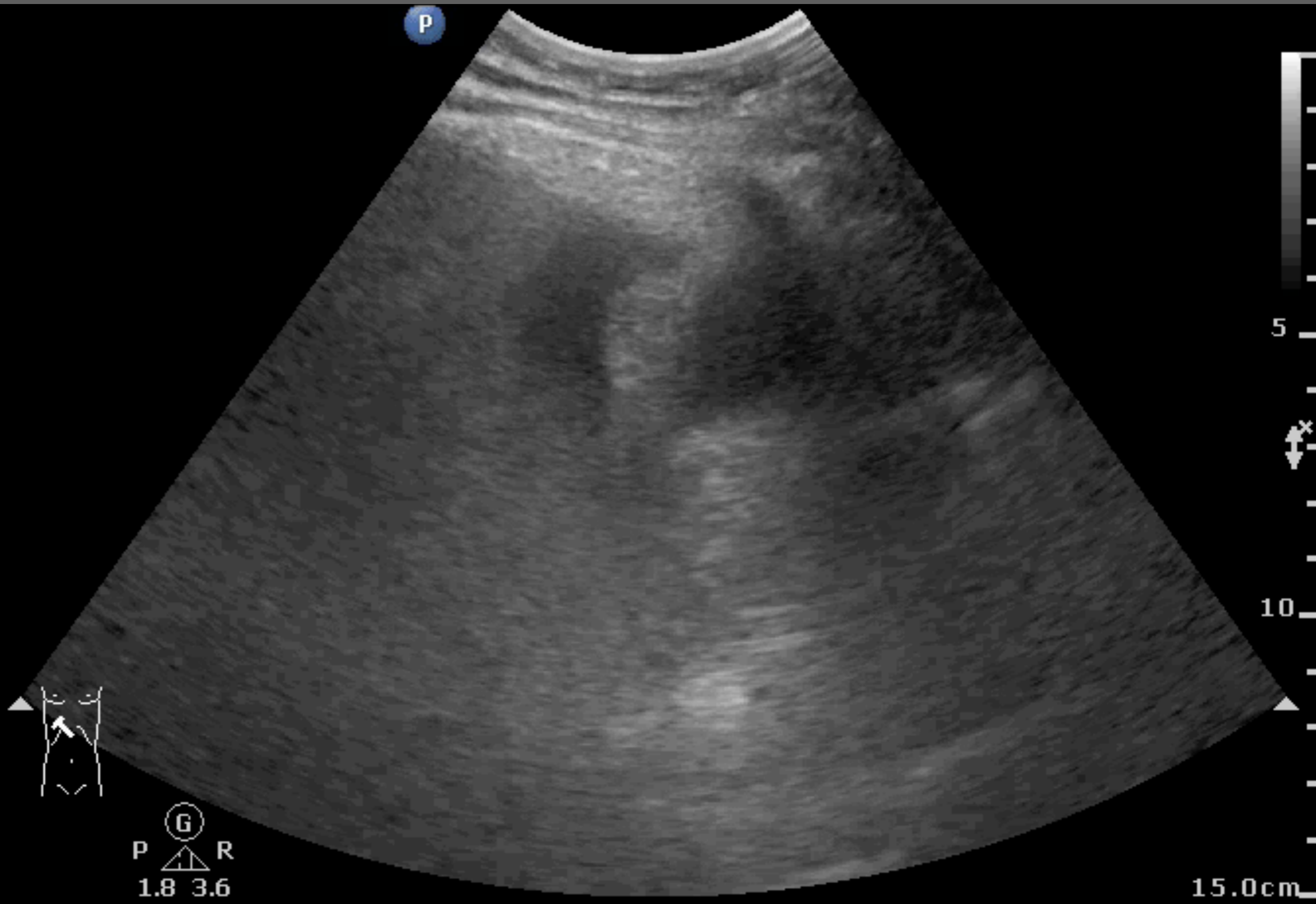
GB stones & Cholecystitis



45M, RUQ pain & fever

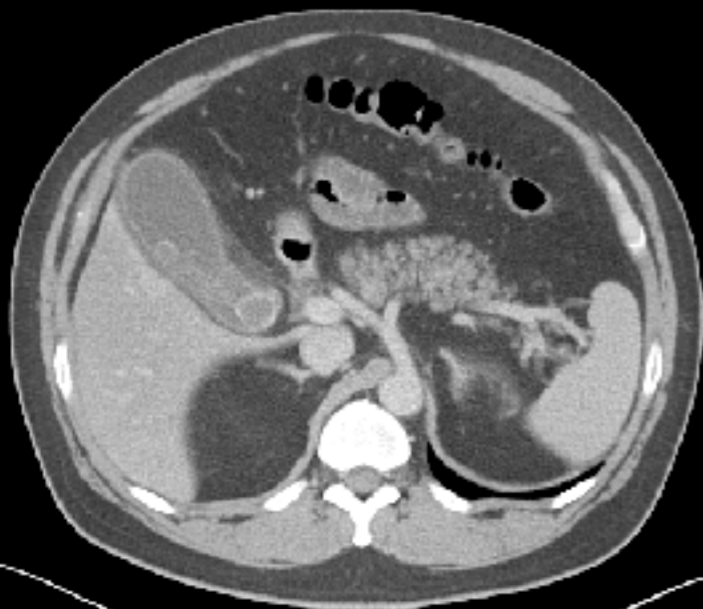
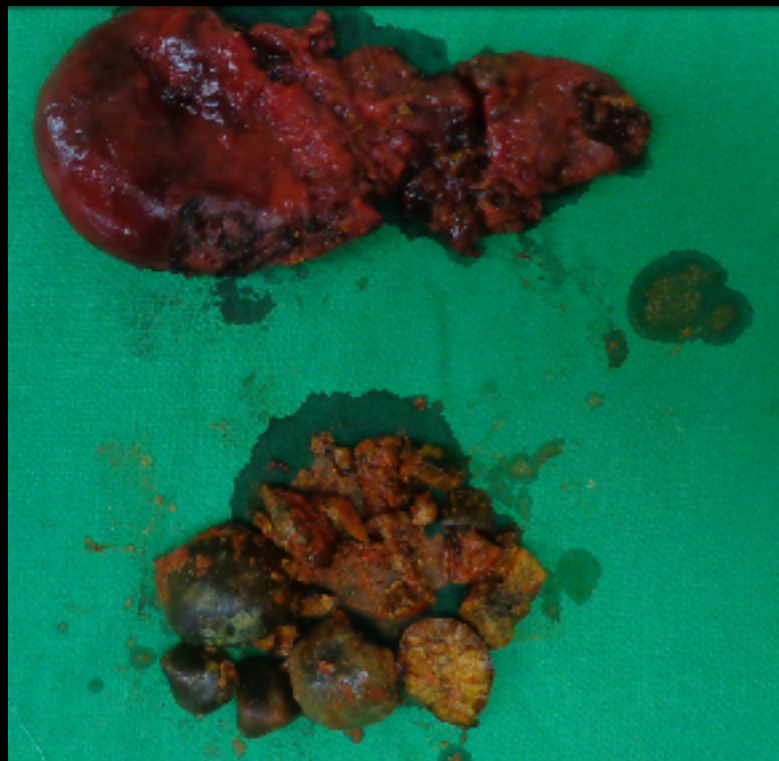
Abd Gen2
C5-1
34 Hz
15.0cm

2D
HGen
Gn 100
C 56
3 / 3 / 3



15.0cm

Acute calculous cholecystitis



76F, Fever & Chills

Abd Gen2
C5-1
34 Hz
15.0cm

2D

HGen
Gn 78
C 56
3/3/3



76F, Fever & Chills

Abd Gen2
C5-1
32 Hz
16.0cm

2D

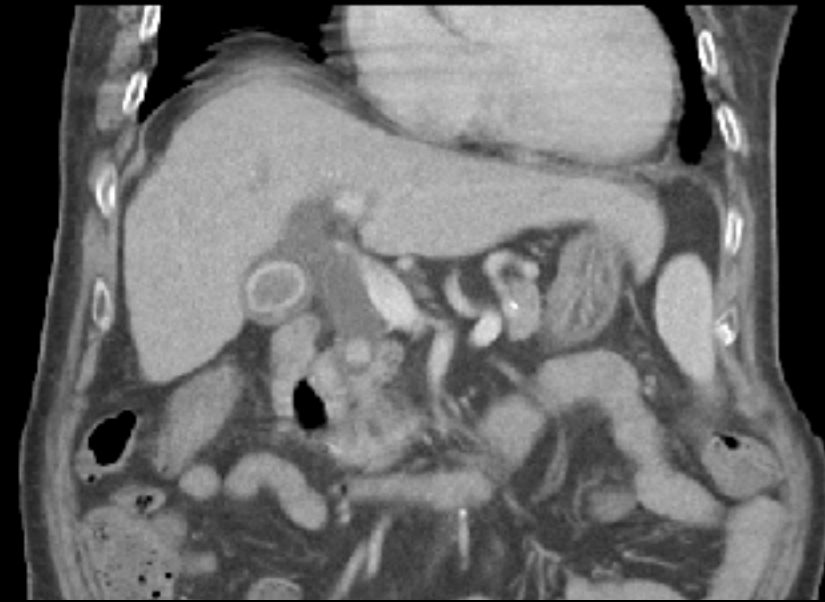
HGen
Gn 100
C 56
3 / 3 / 3



CBD dilatation & stone

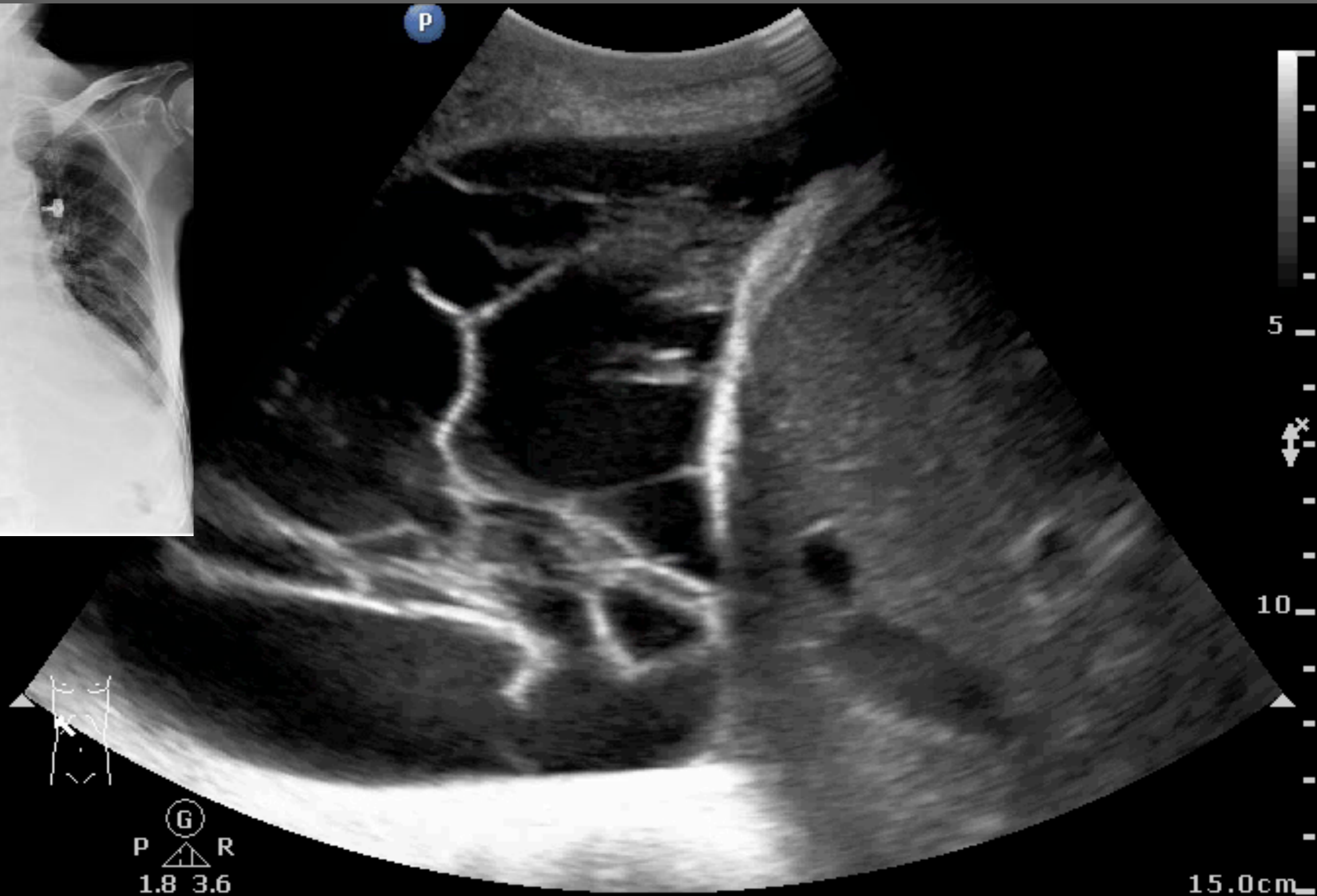
Abd Gen2
C5-1

P



G
P R
1.8 3.6

73M, chest/abd pain & SOB



ABDOMEN

D for diaphragm

Outsider





45M, LUQ pain

Abd Gen
C5-1
31 Hz
17.0cm

2D
HGen
Gn 100
C 56
3/3/3

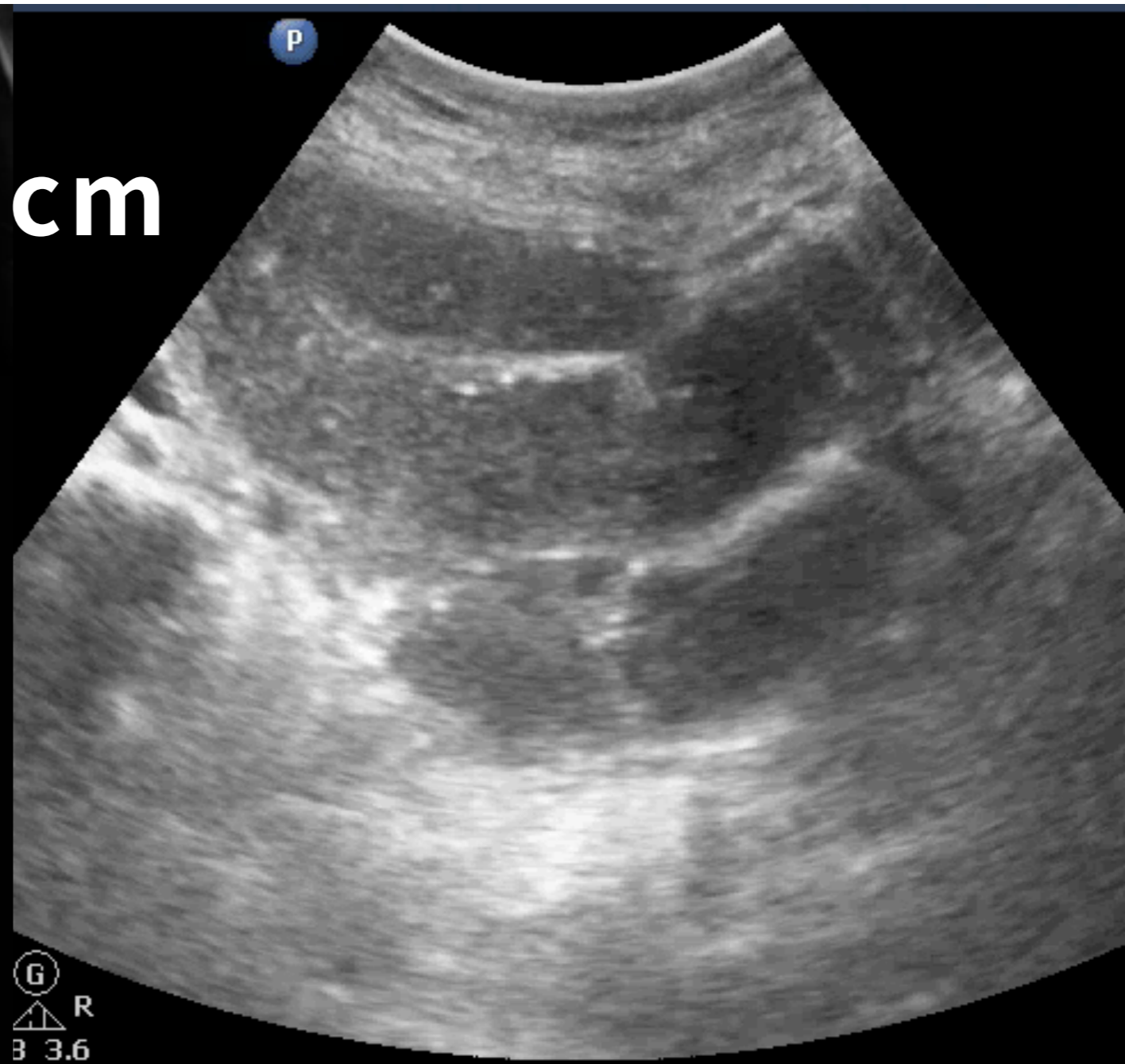
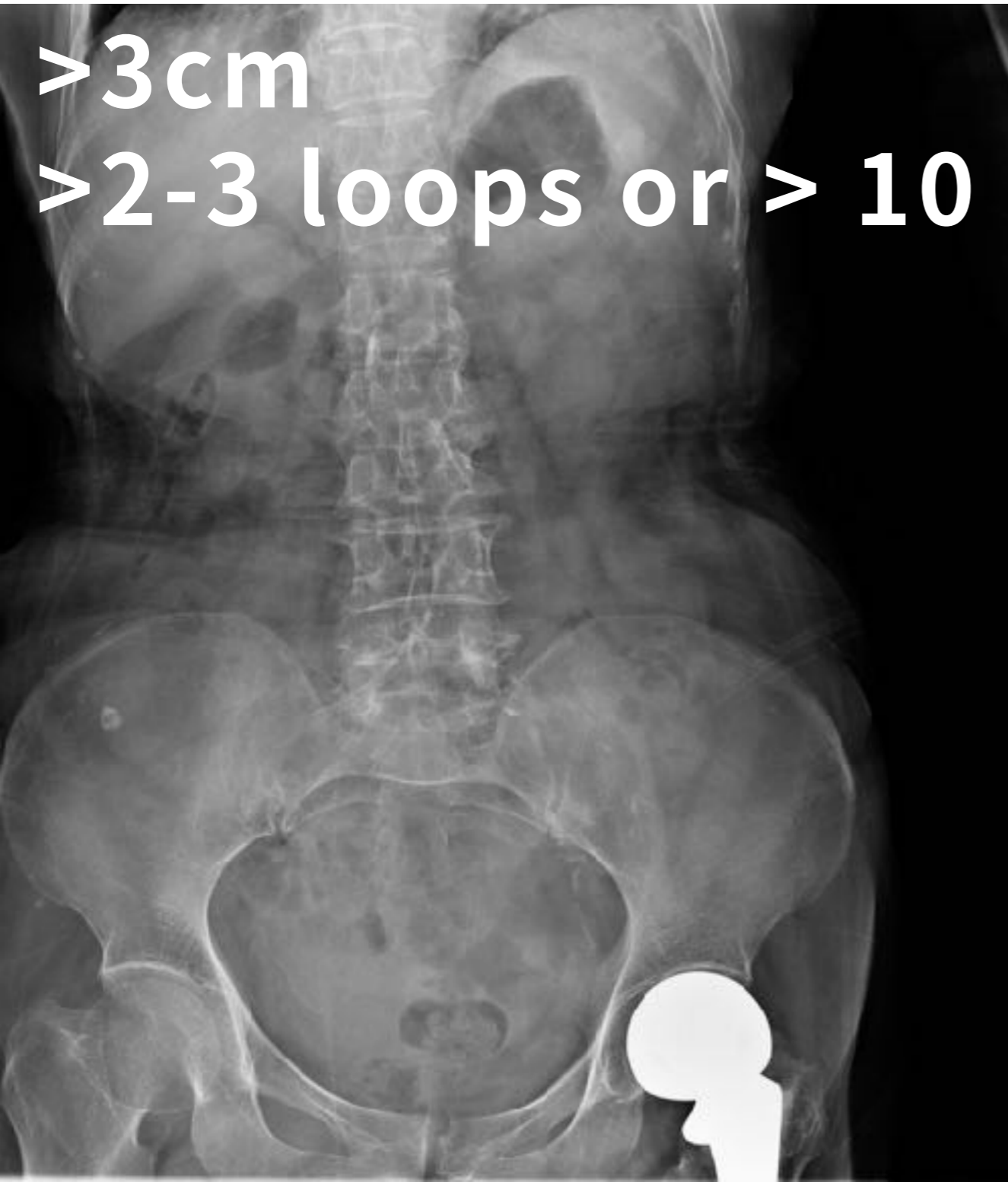


PN & parapneumonic effusion

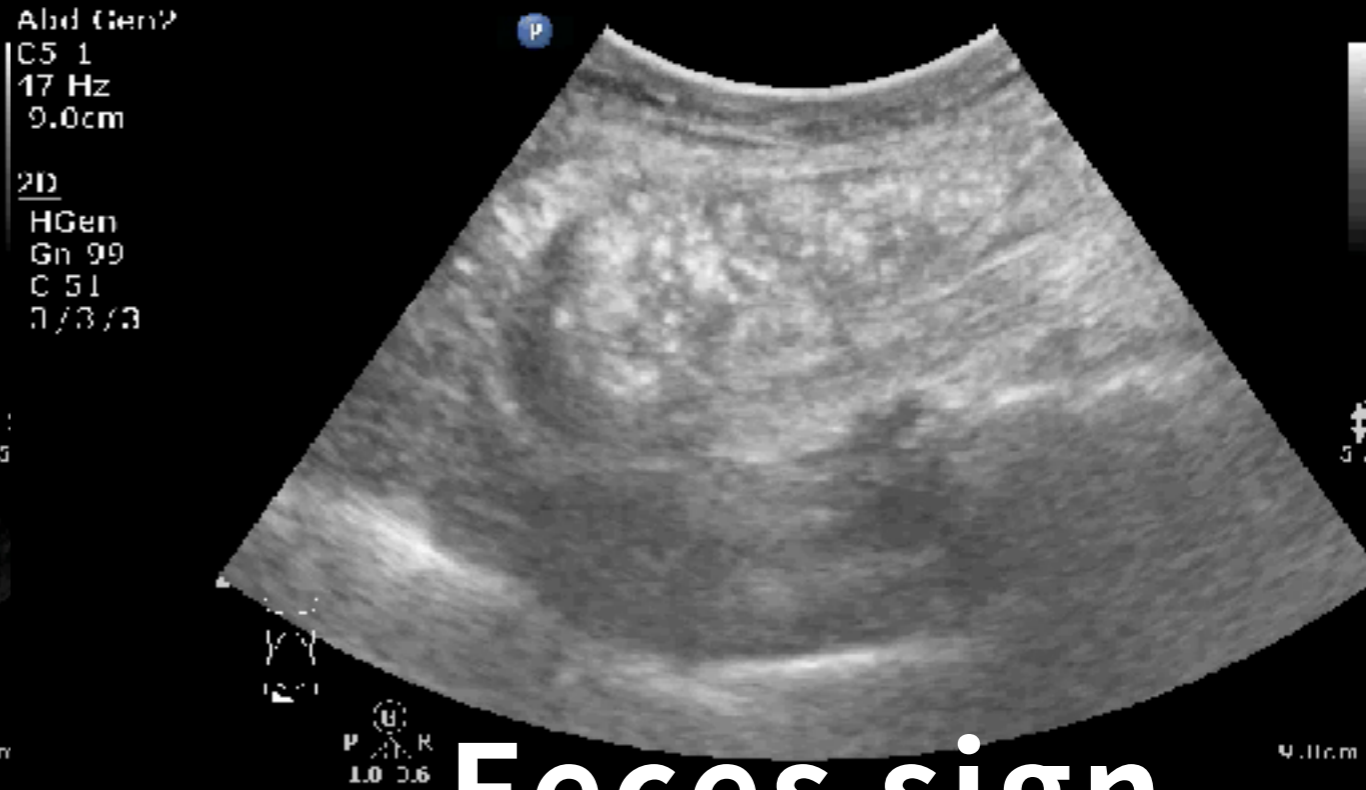


88F, diffuse abdominal pain

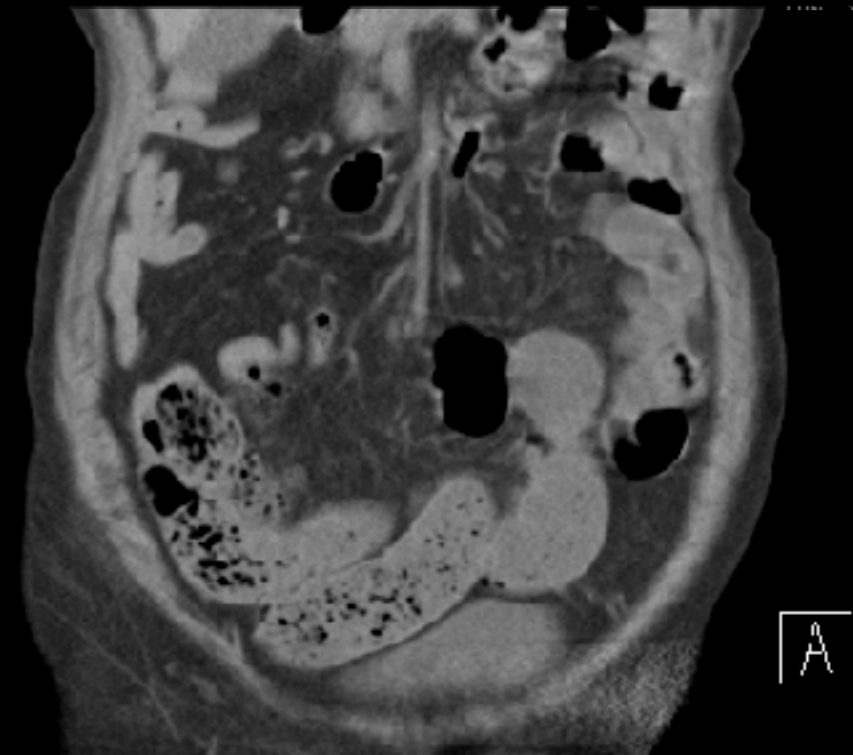
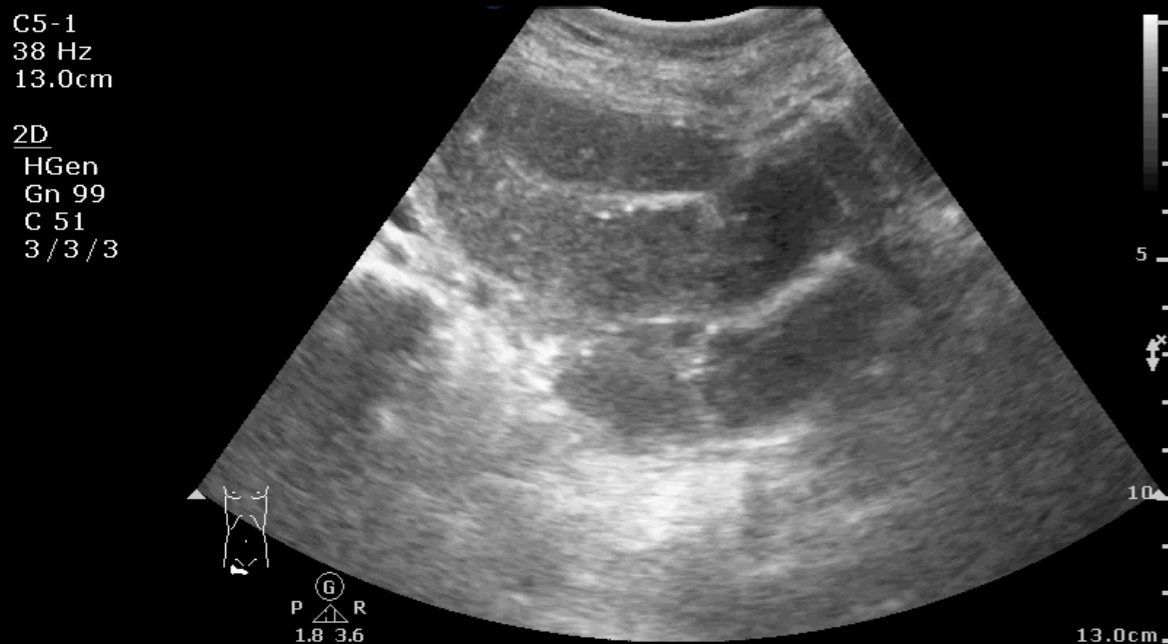
> 3 cm
> 2-3 loops or > 10 cm



88F, diffuse abdominal pain



Feces sign



ABDOMEN

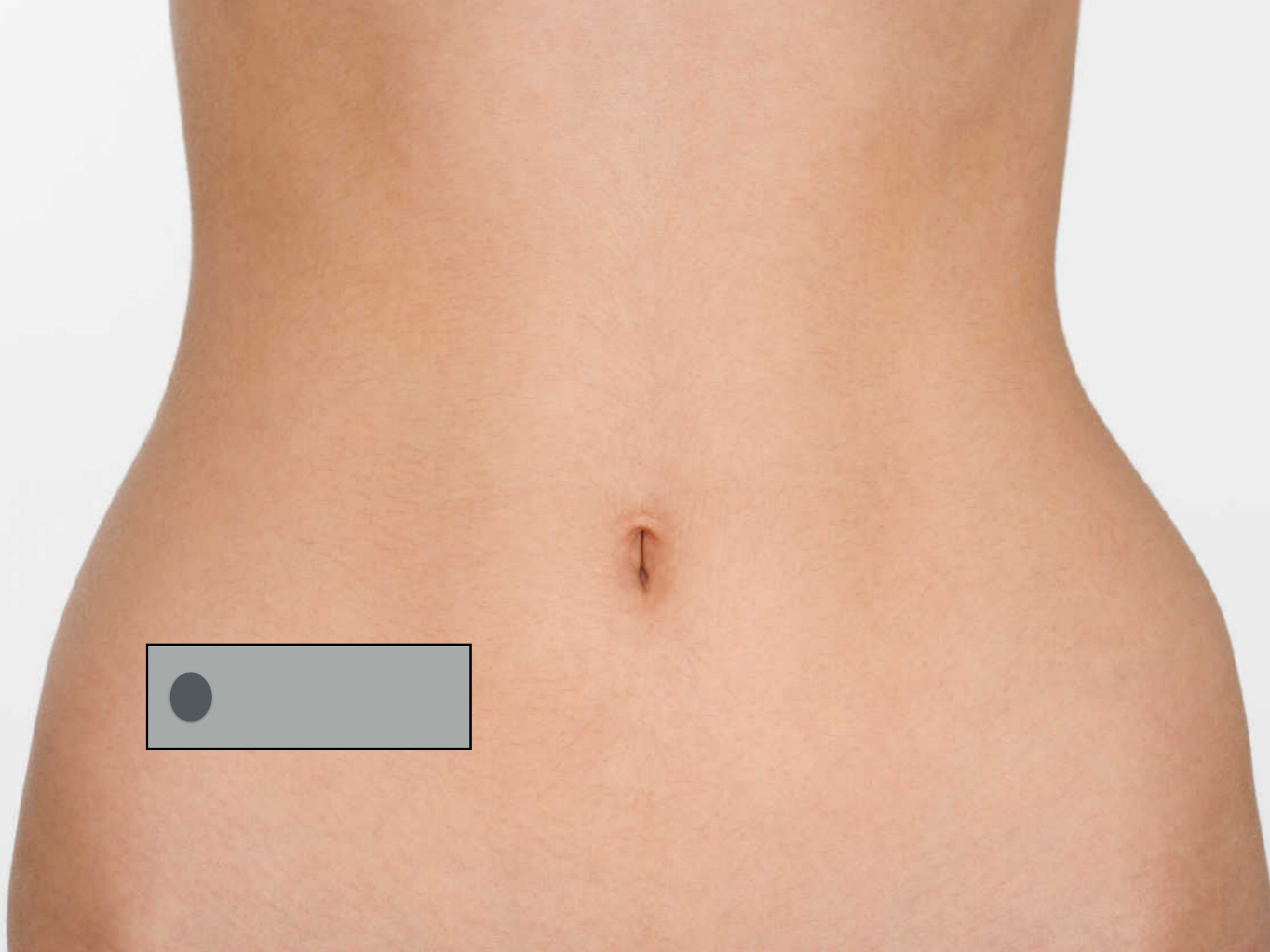
O for obstruction
(SBO & Intussusception)

3 cm

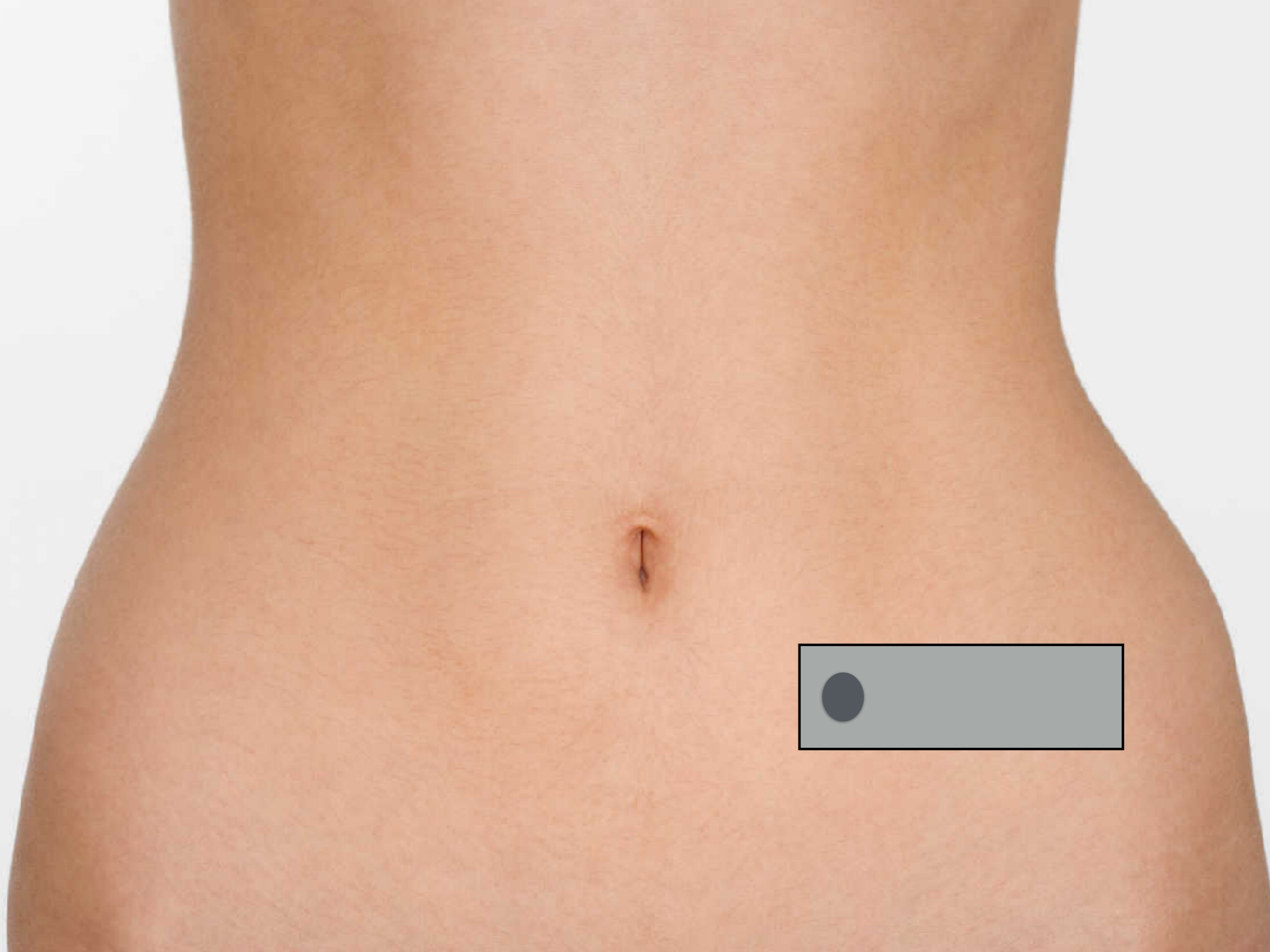
5 cm

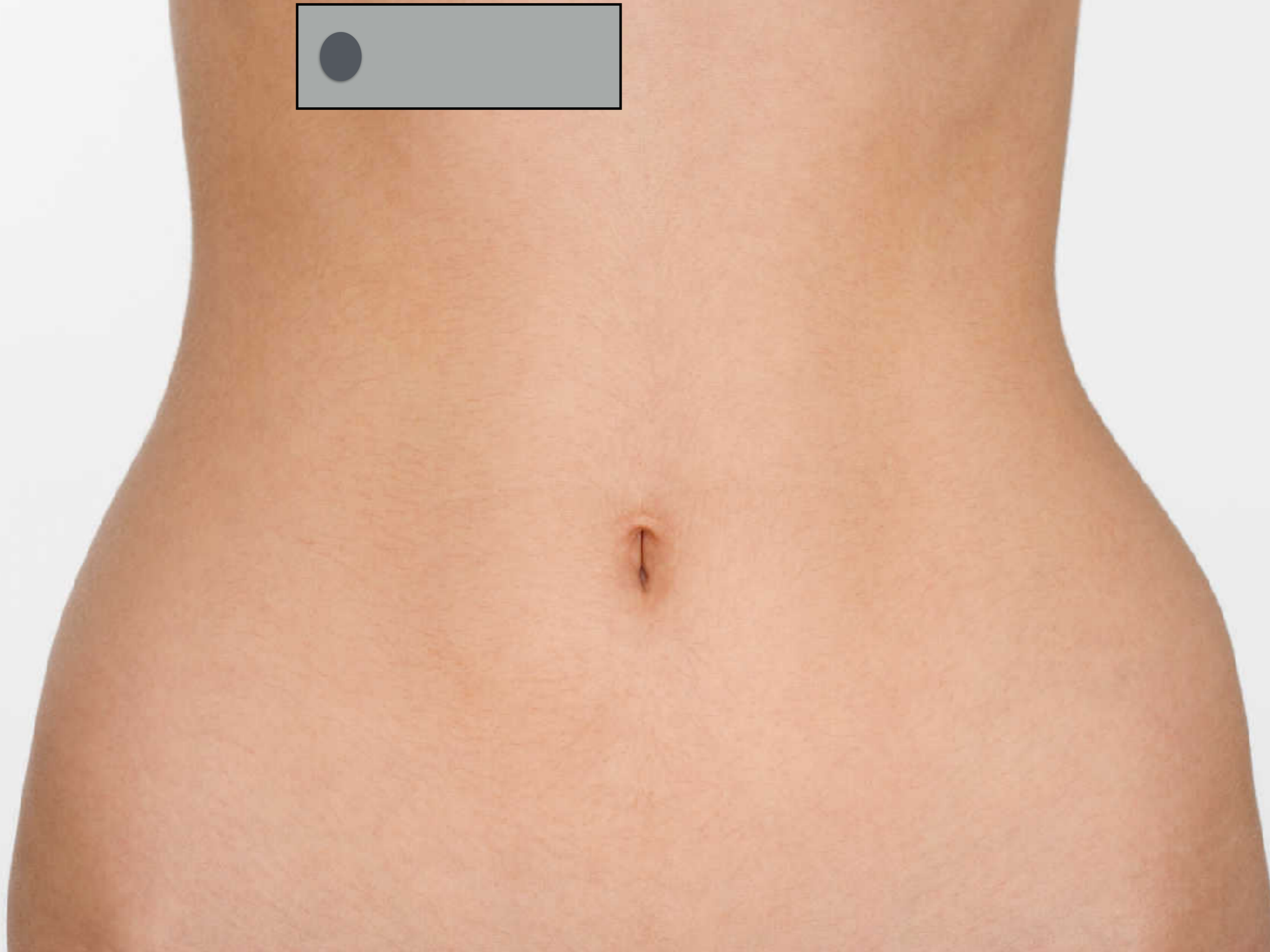


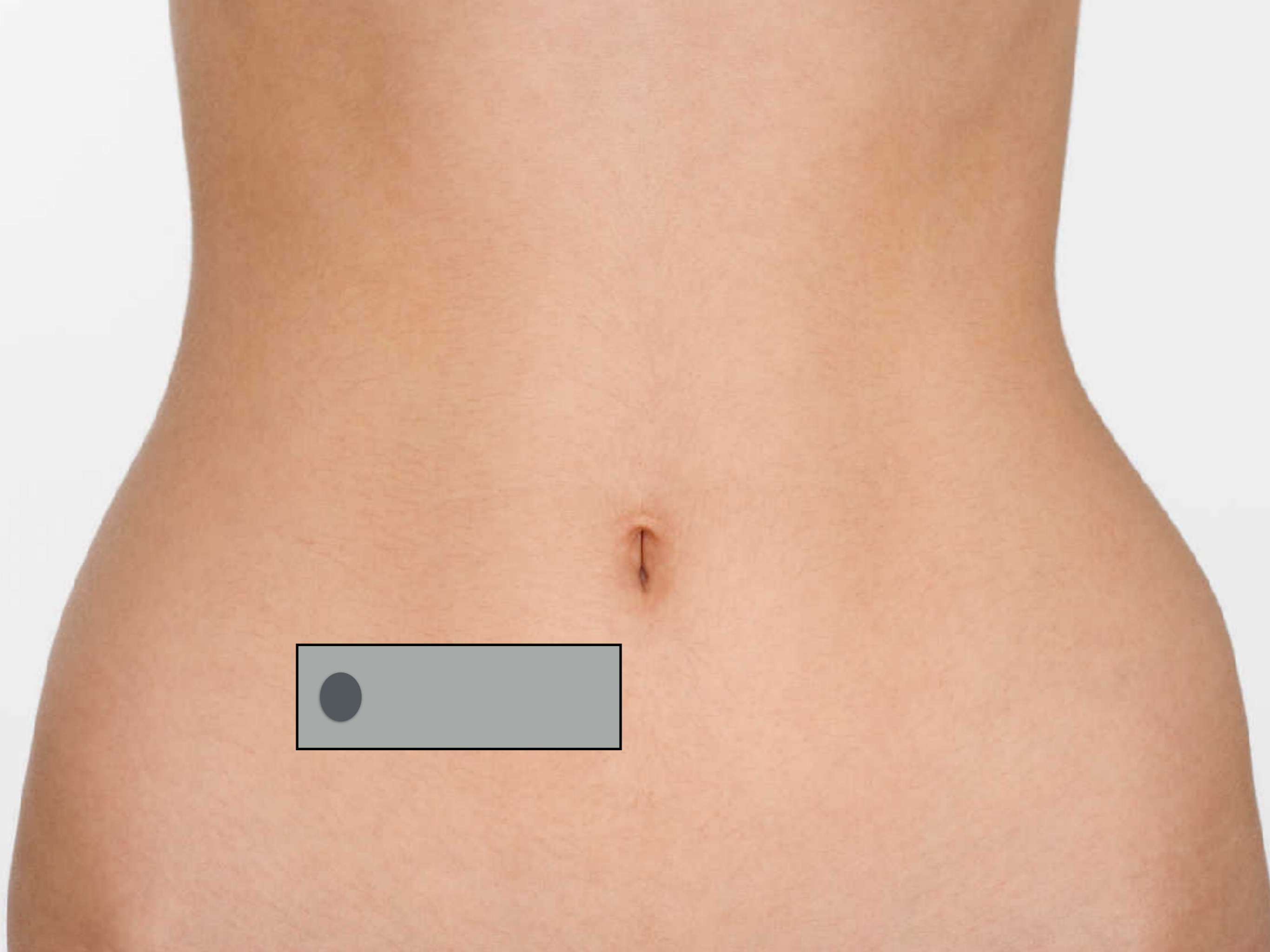


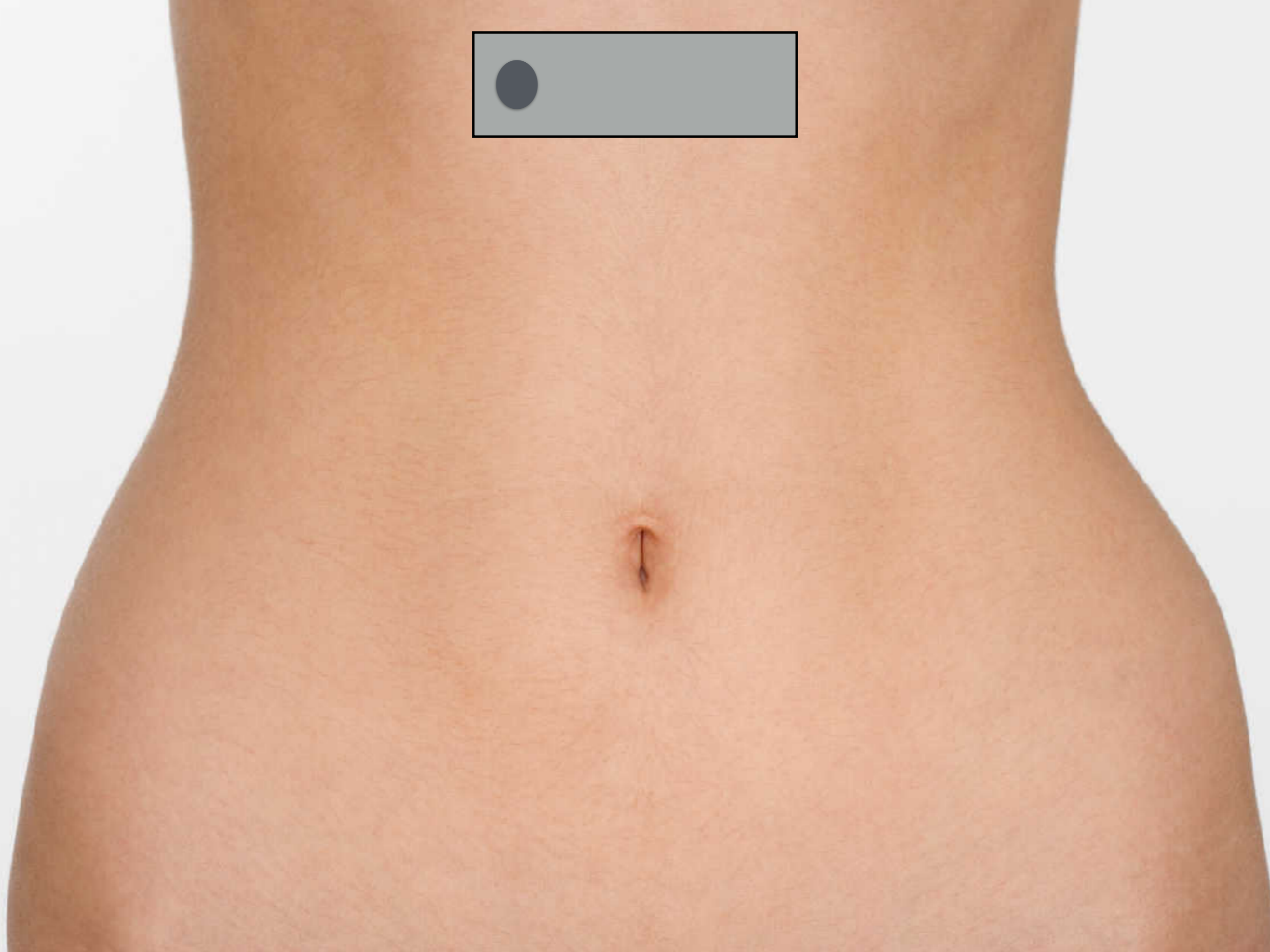


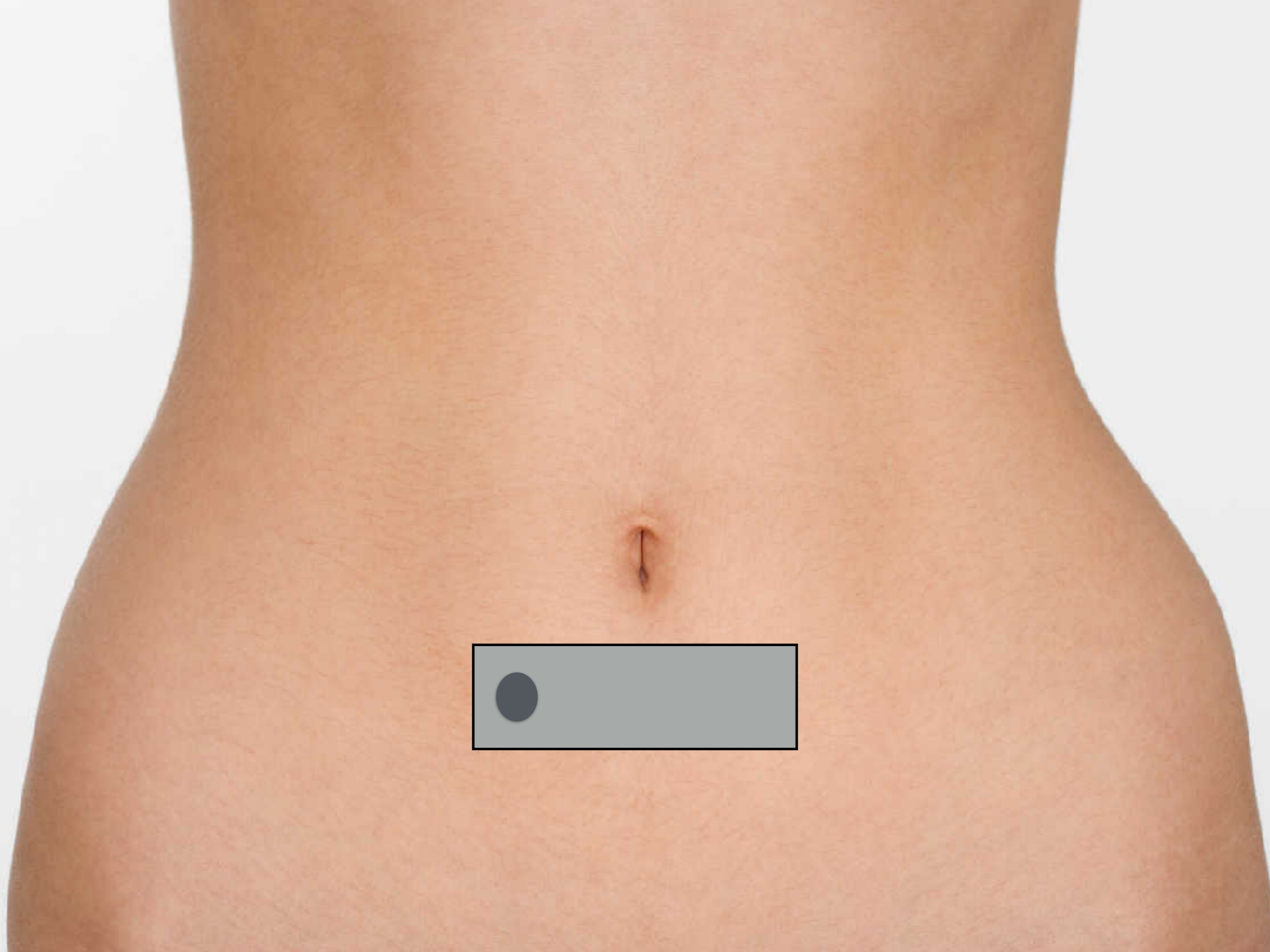


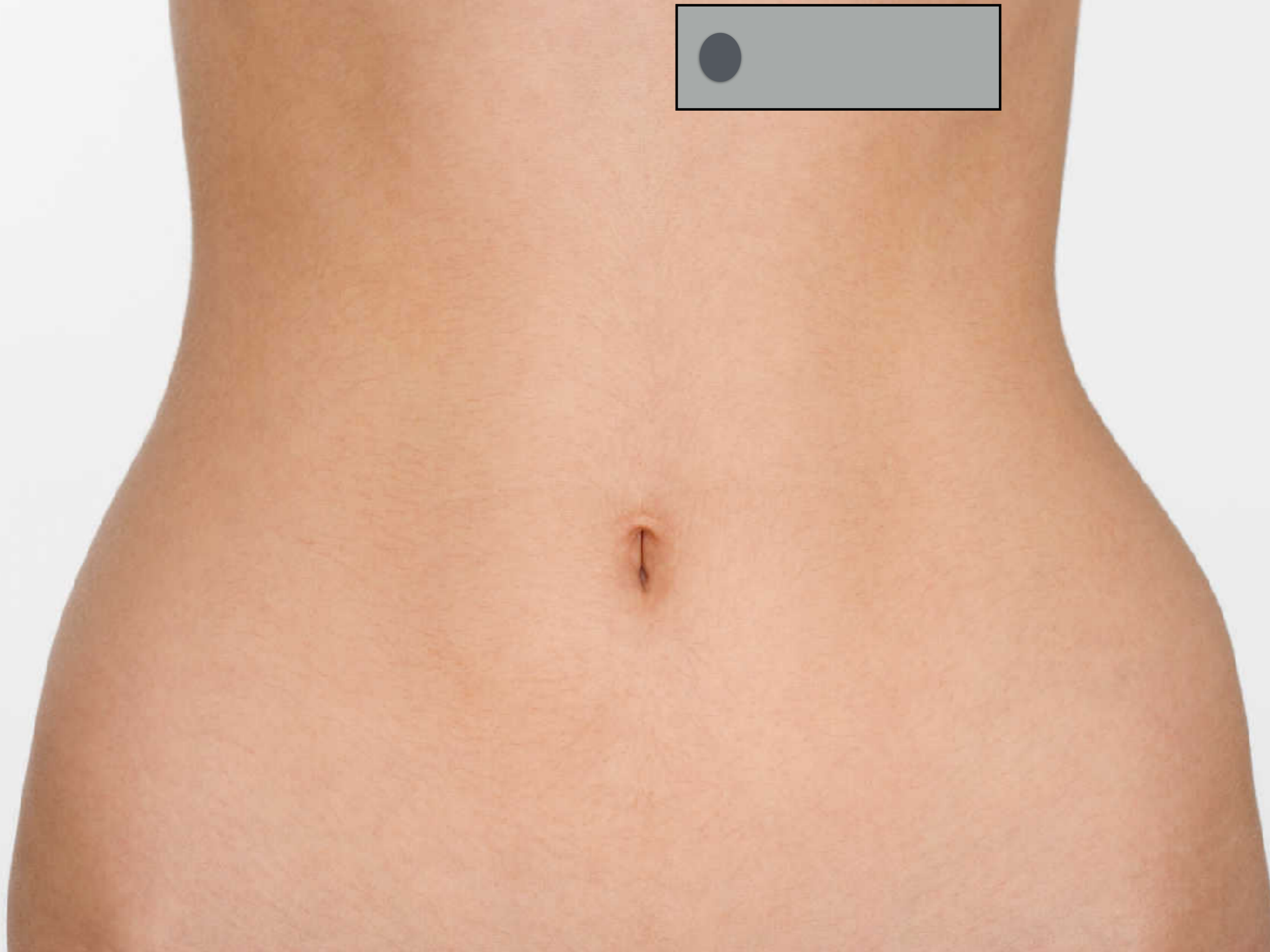


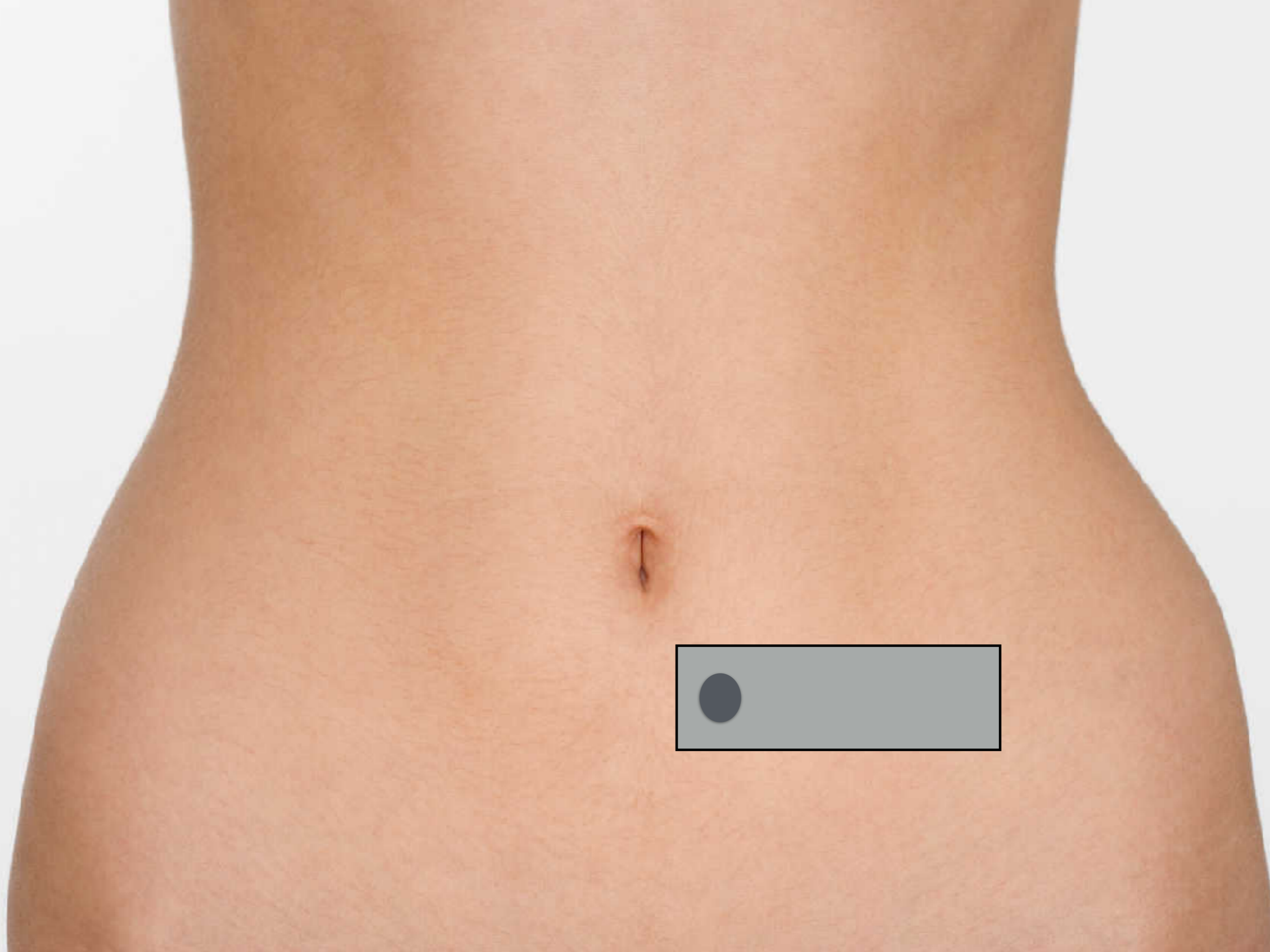








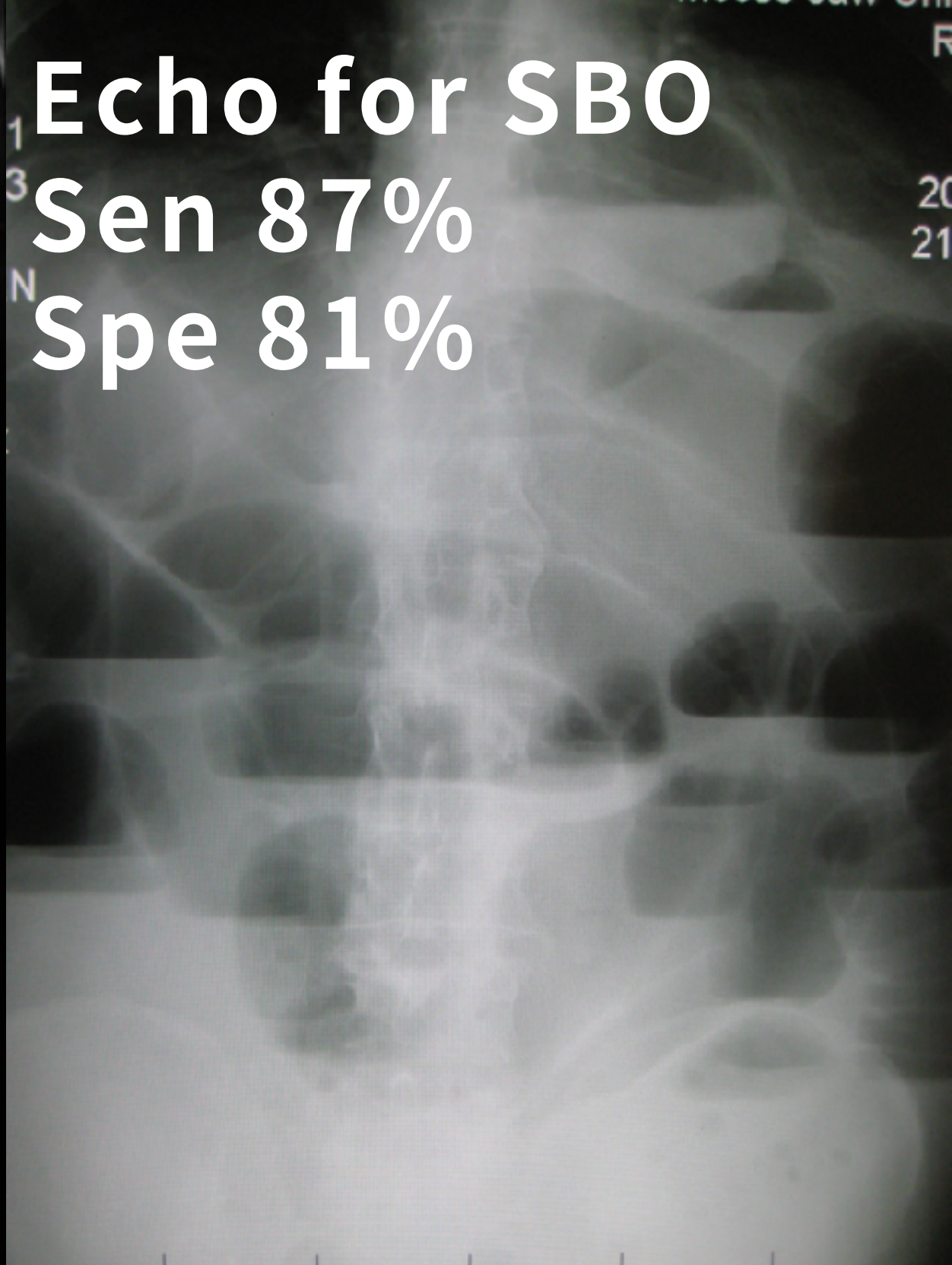




X光要開【對】的條件才有用啊



X-ray for SBO
Sen 75%
Spe 66%

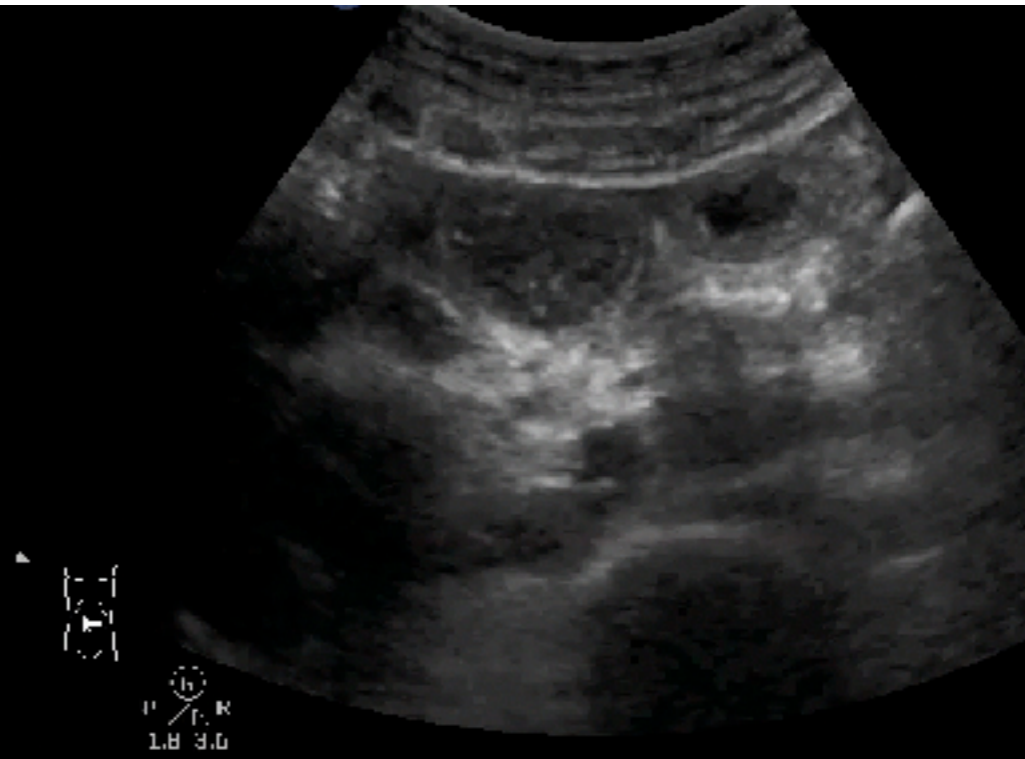


Echo for SBO
Sen 87%
Spe 81%

F/31, ABD pain & vomiting for 2Ds

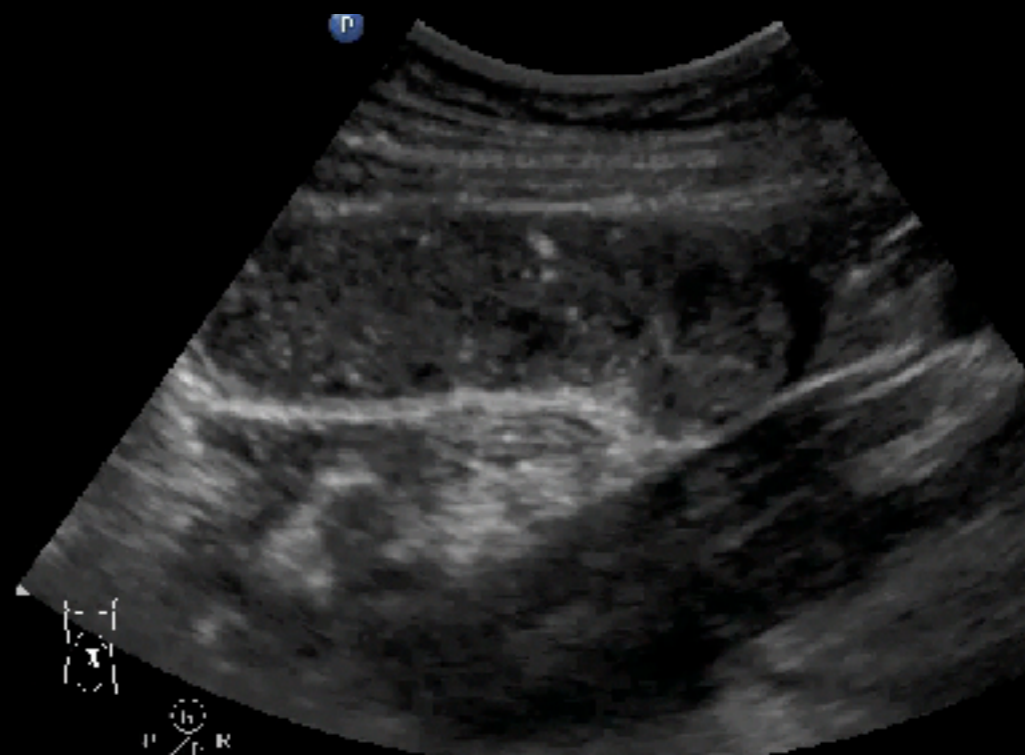


5 1
15 Hz
10.0cm
ID
II Gen
Gn 51
I: 56
3/3/3



15
P
1.8 3.0

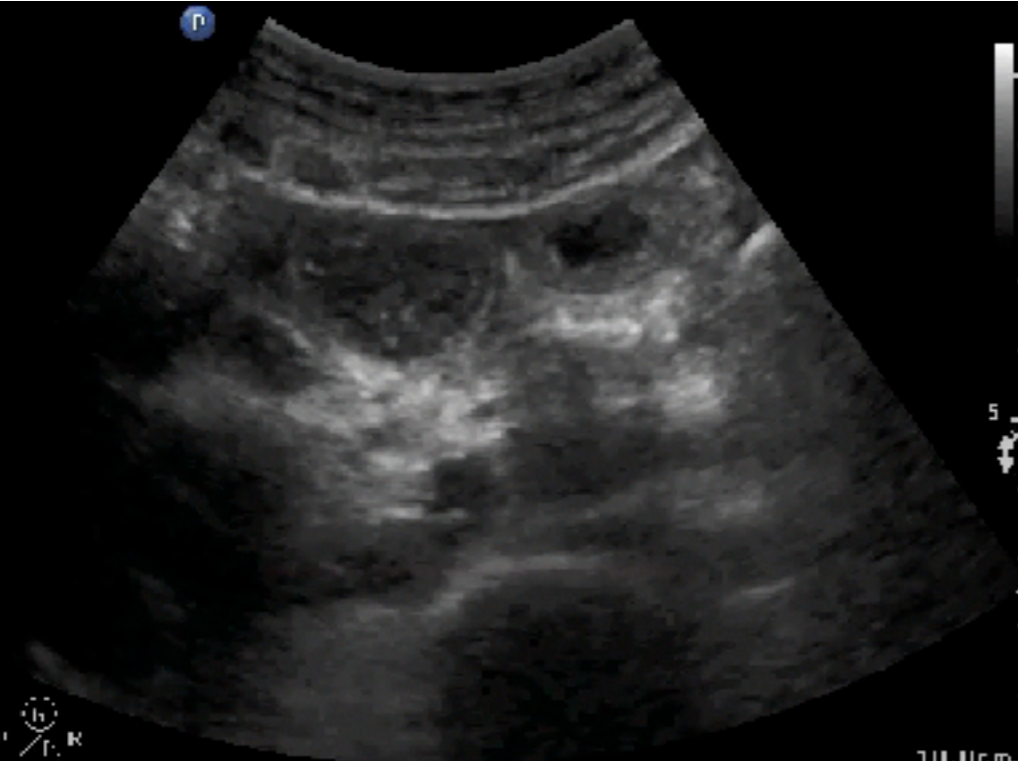
Abd Gen
5 1
15 Hz
10.0cm
ID
II Gen
Gn 45
I: 56
3/3/3



15
P
1.8 3.0

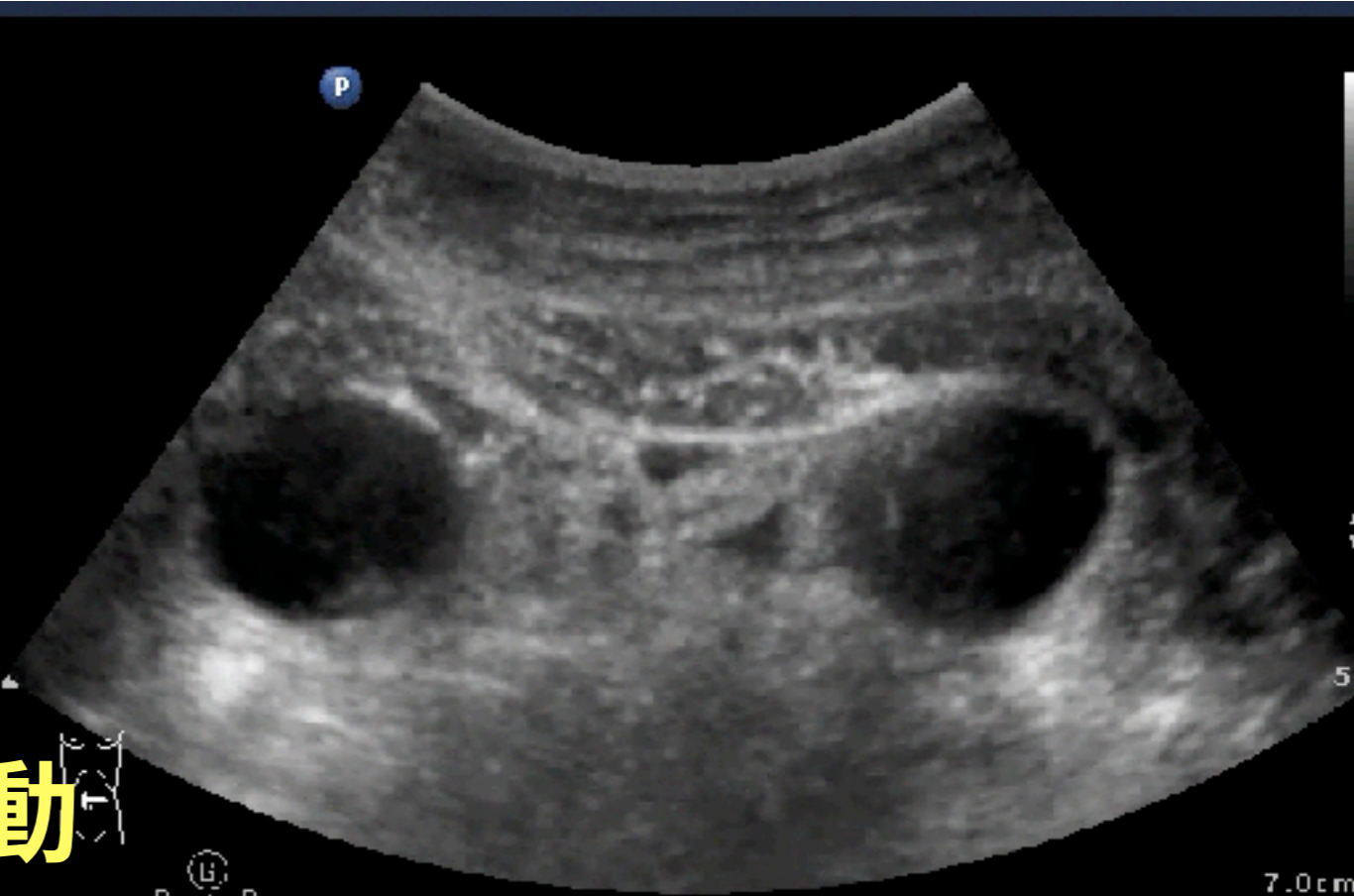
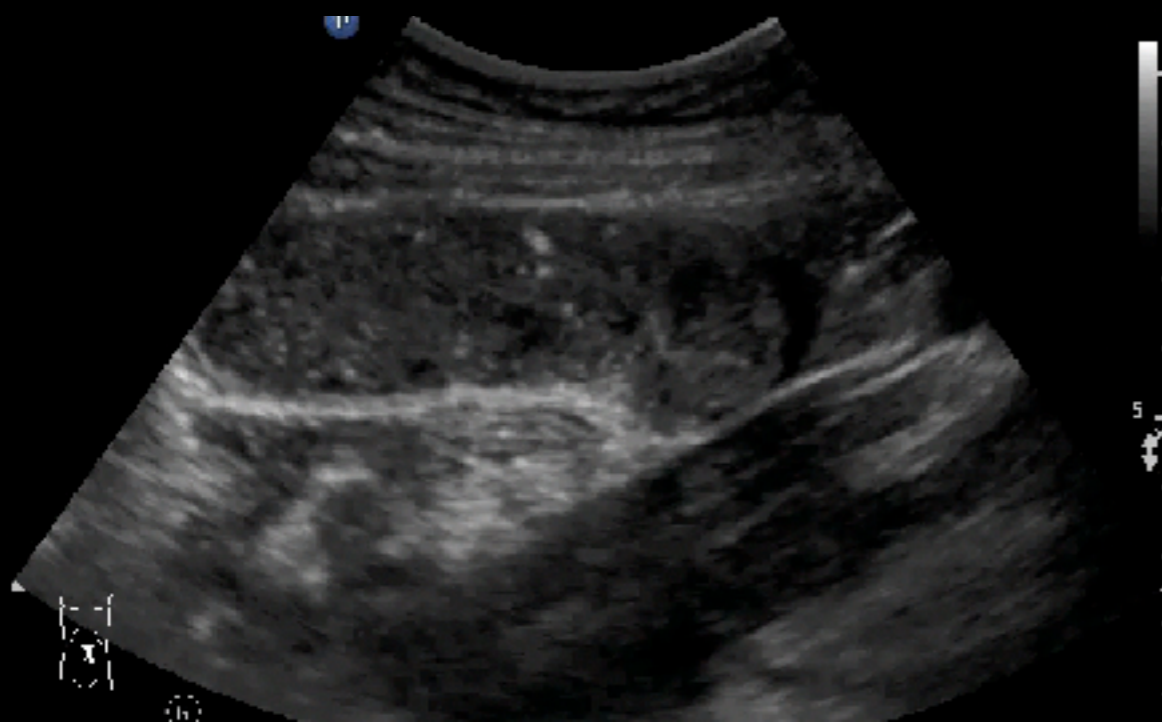
Adhesion ileus

Abd Gen
S 1
35 Hz
10.0cm
2D
TI Gen
Gn 51
T: 56
3/3/3



沾黏的腸子不會隨呼吸滑動

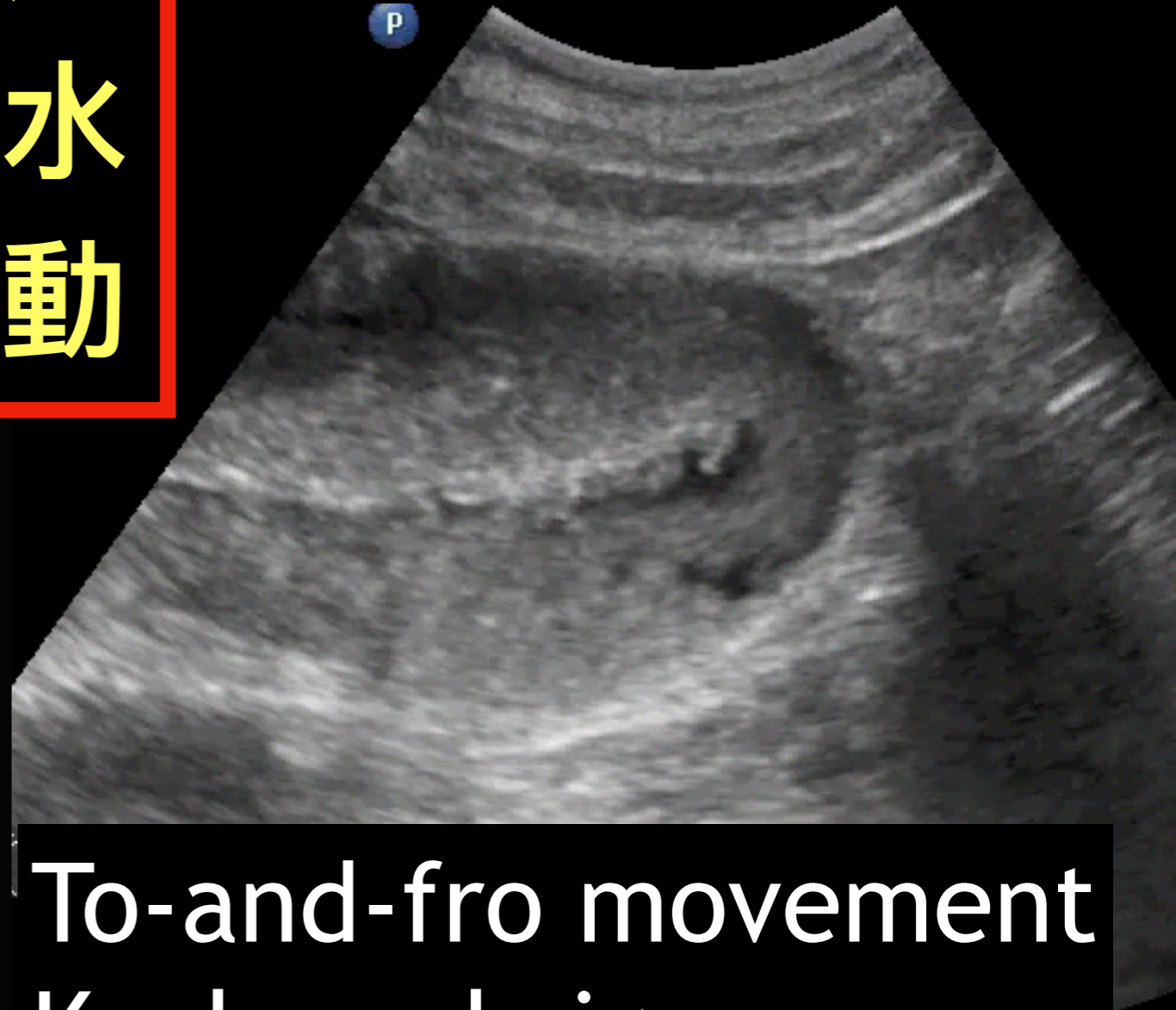
Abd Gen
S 1
35 Hz
10.0cm
2D
TI Gen
Gn 45
T: 56
3/3/3



Keyboard sign
Tanga sign 腸間液體
Adhesion band

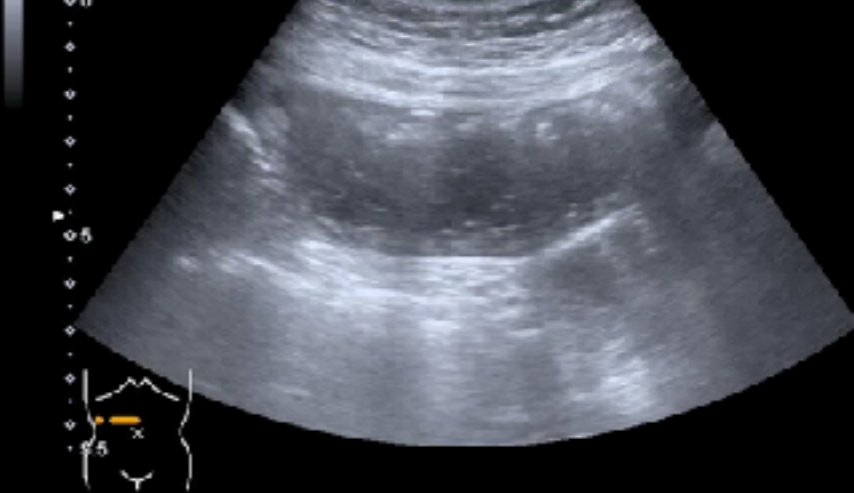
POCUS is useful for gasless ileus

壁厚
腹水
蠕動



To-and-fro movement
Keyboard sign
Tanga sign

Small Bowel Obstruction



TAKE-HOME MESSAGE

For trained operators, ultrasonography possesses sensitivity and specificity comparable to that of abdominal computed tomography (CT) for the diagnosis of small bowel obstruction.

US for SBO diagnosis LR + >20起跳

| Ultrasonographic Diagnosis of SBO | Specificity (95% CI) | Sensitivity (95% CI) | +LR (95% CI) | -LR (95% CI) | SROC AUC (95% CI) |
|--|-----------------------------|-----------------------------|----------------------|---------------------|--------------------------|
| Overall | 0.97 (0.88–0.99) | 0.92 (0.89–0.95) | 27.5 (7.7–98.4) | 0.08 (0.06–0.11) | 0.96 (0.94–0.97) |
| ED | 0.96 (0.86–0.99) | 0.93 (0.89–0.95) | 21.1 (6.5–68.9) | 0.08 (0.05–0.12) | 0.96 (0.94–0.97) |
| Non-ED | 0.99 (0.60–1.00) | 0.92 (0.85–0.96) | 70.8 (1.5–3279.7) | 0.08 (0.05–0.15) | 0.96 (0.94–0.98) |

CI, Confidence interval; *+LR*, positive likelihood ratio; *-LR*, negative likelihood ratio; *SBO*, small bowel obstruction; *SROC*, summary receiver operating characteristic; *AUC*, area under the curve.

超音波在SBO時的好處

管徑
壁厚
腹水
蠕動

診斷
型態
減壓
手術



Precision A Pure

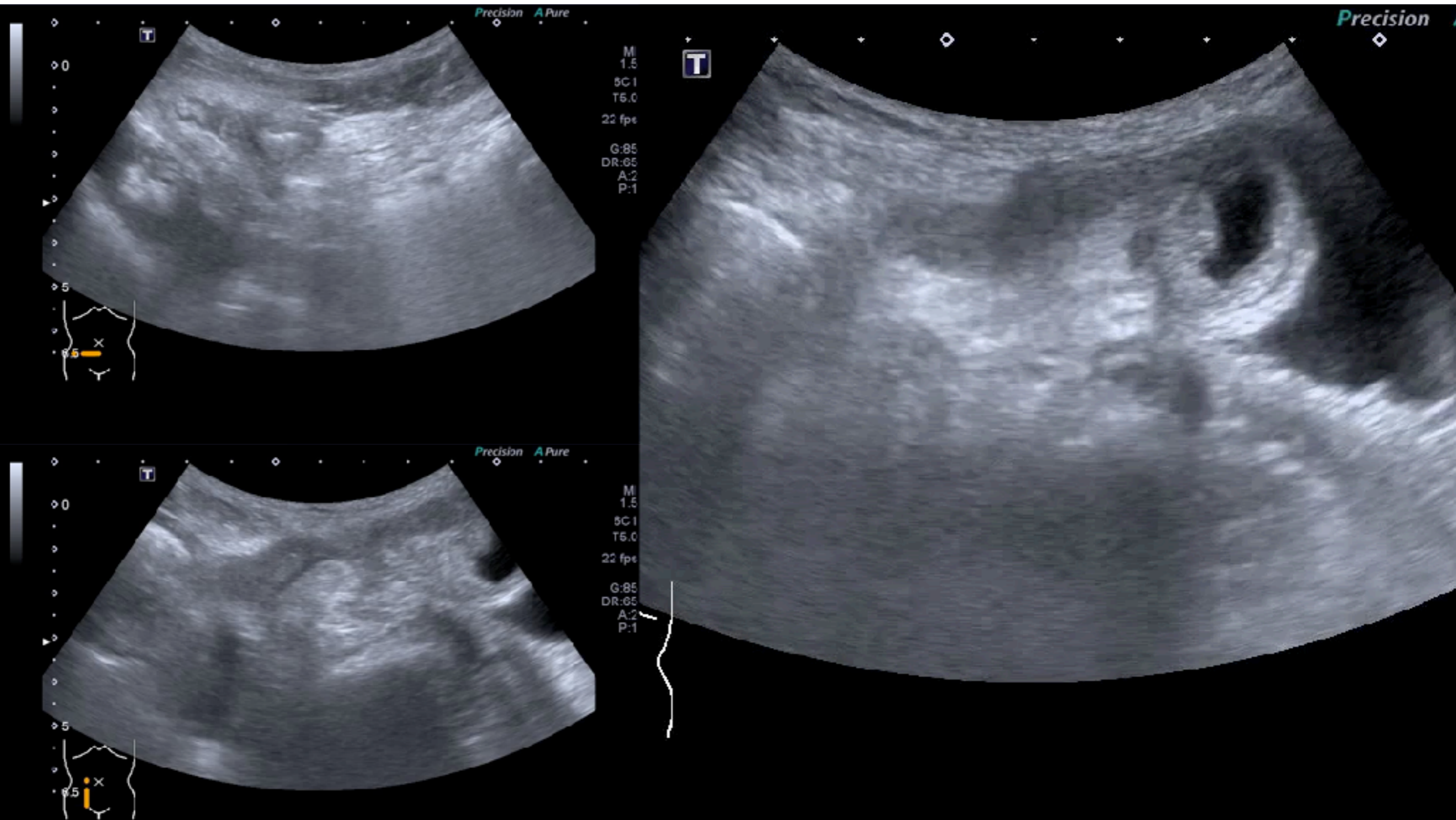
MI
1.5
6C1
T5.0
19 fps
G:85
DR:65
A:2
P:1

0
10



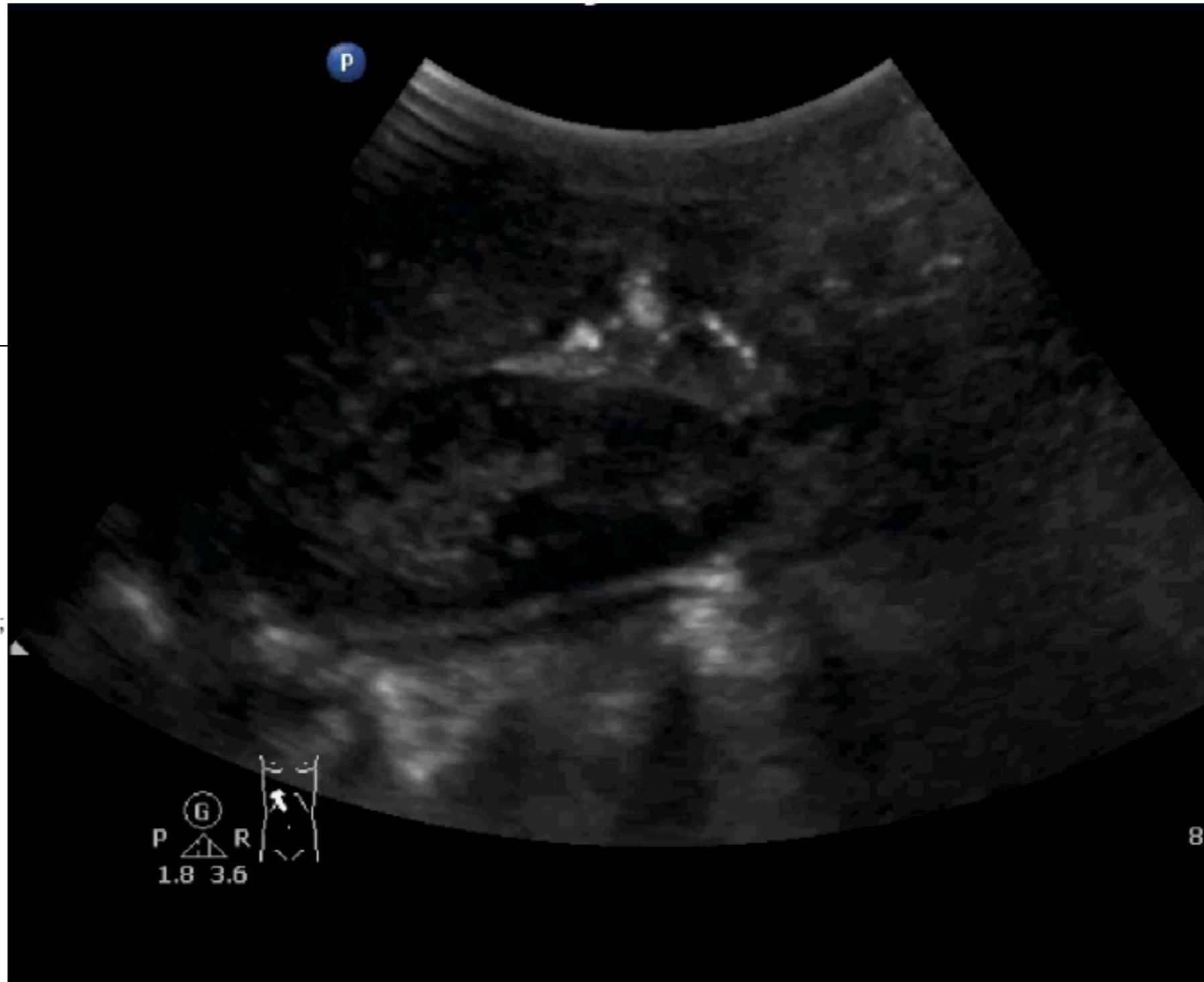
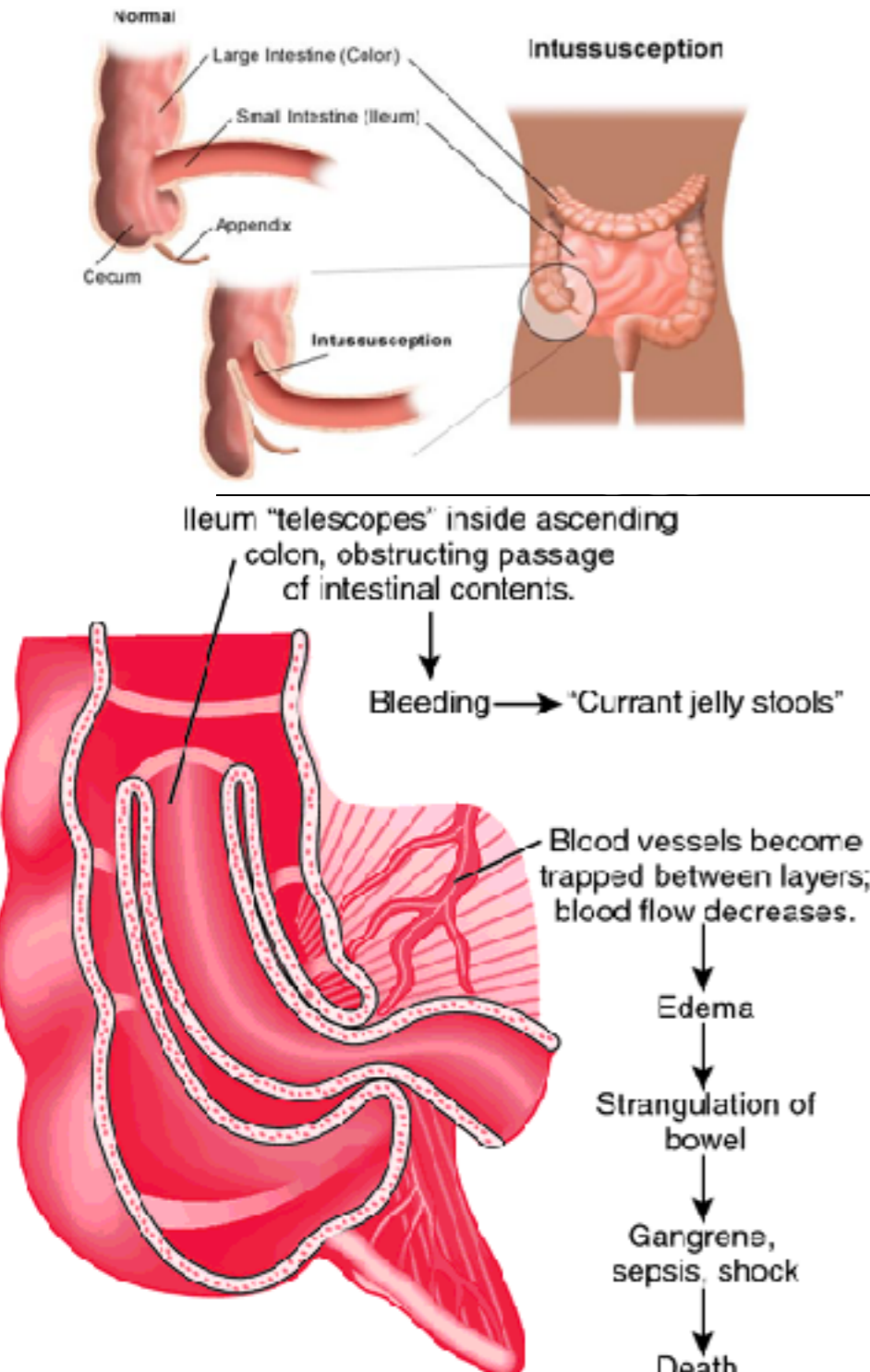
66M, right inguinal painful swelling

診斷 & 協助擬定復位路徑



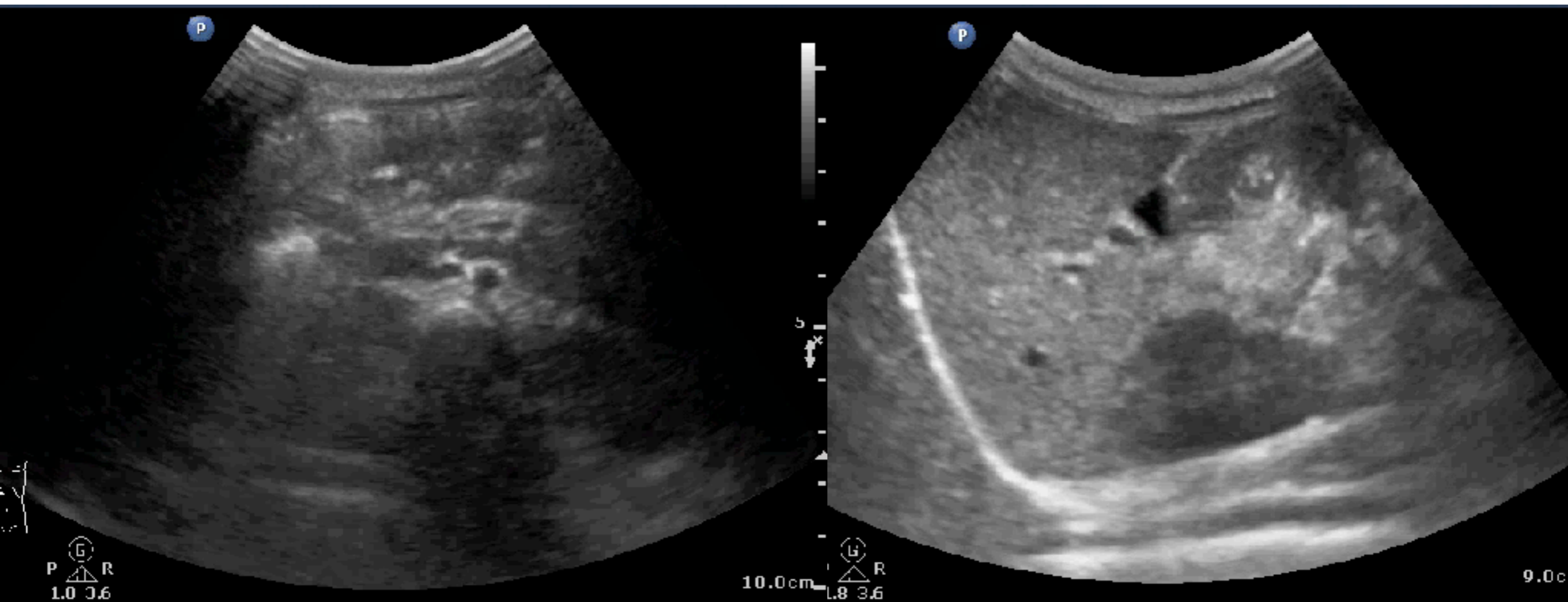
Intussusception

小孩優先找右上腹

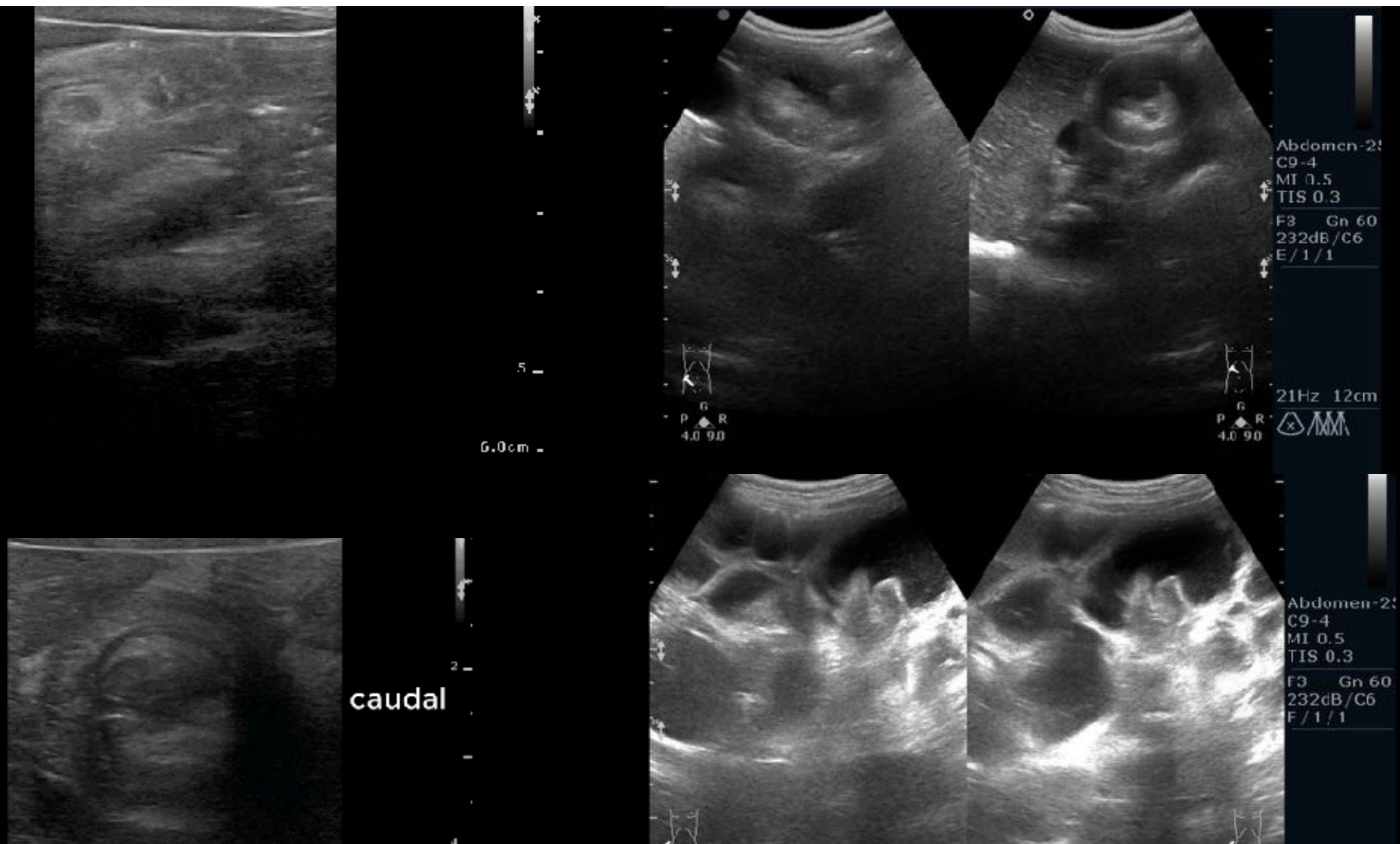


7個月大男童，間歇性溢奶

間歇性或周期性都要小心



Leading point Guide reduction



80F, diffuse abdominal pain



80F, diffuse abdominal pain

Abd Gen2
C5-1
32 Hz
16.0cm

2D

HGen
Gn 90
C 56
3/3/3



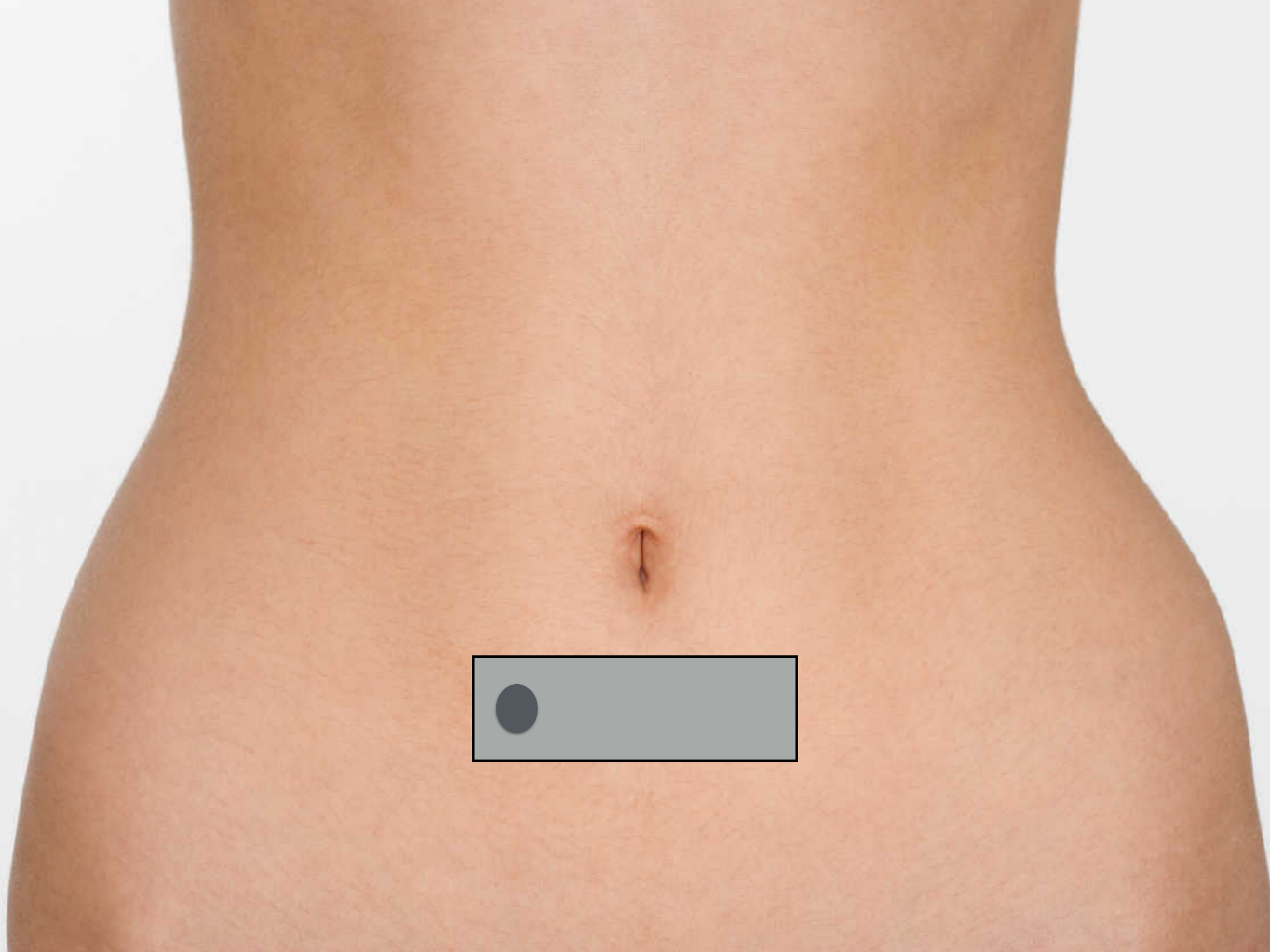
ABDOMEN

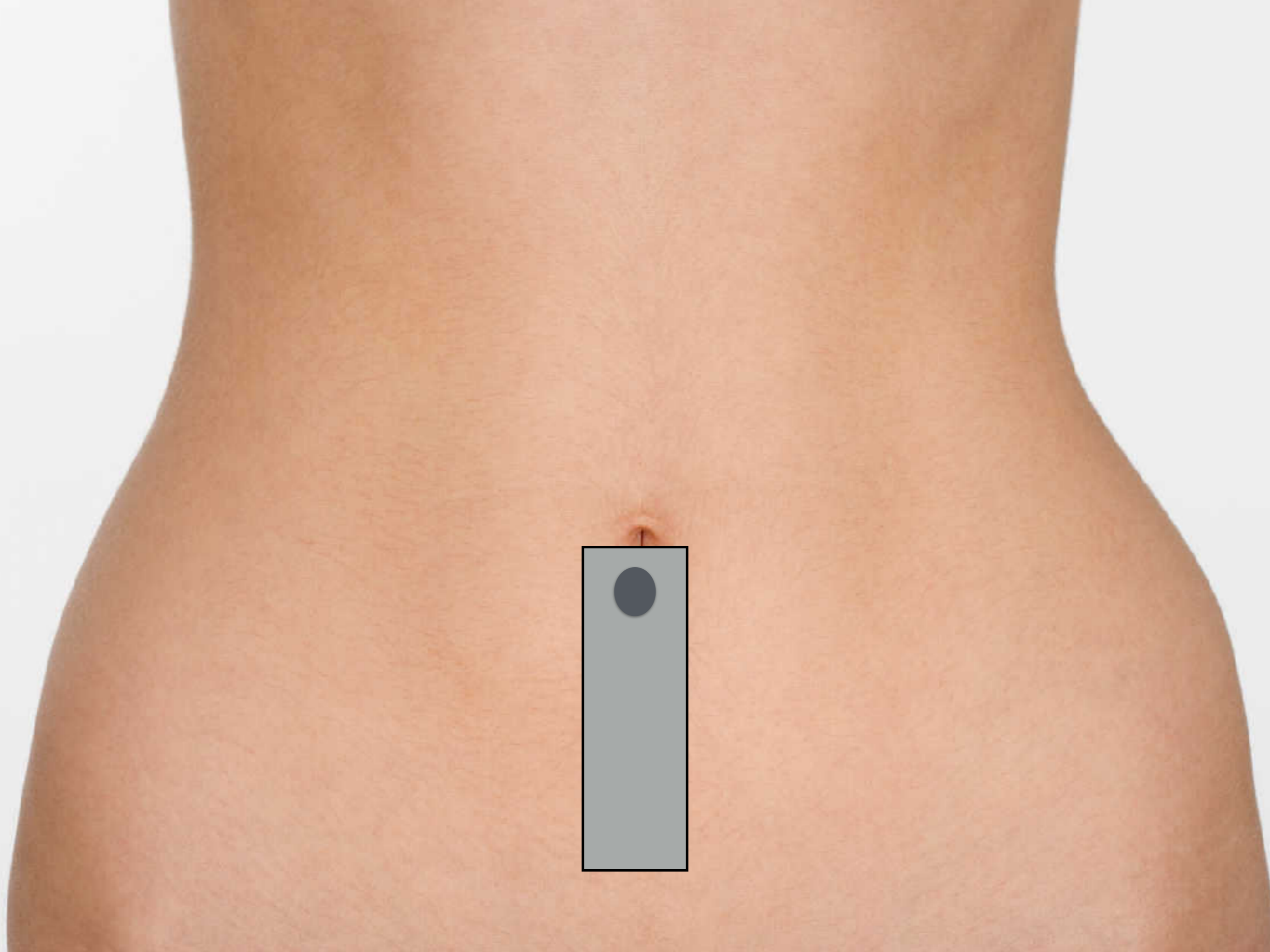
M for moving fluid or air

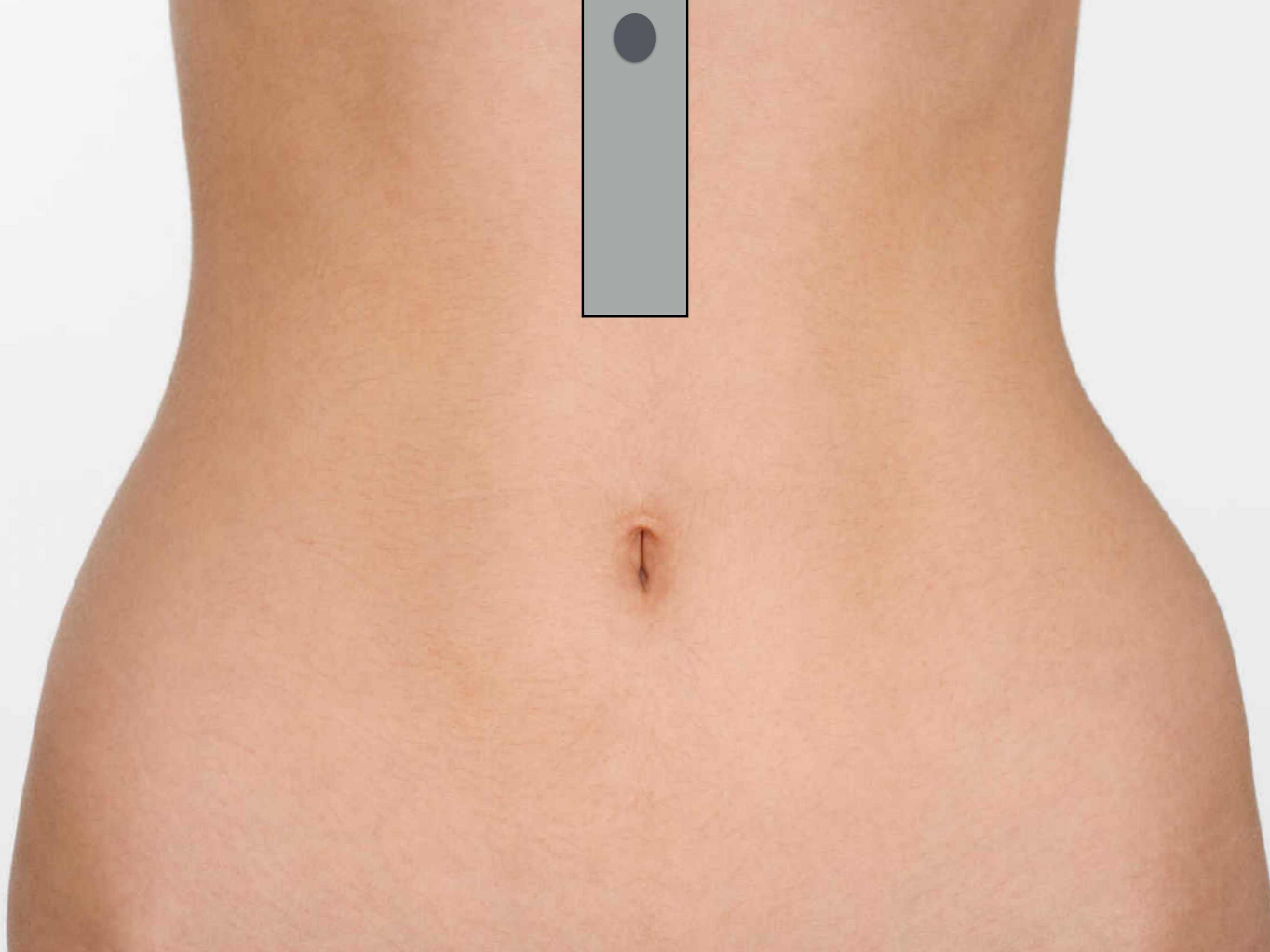
FAST / Liver surface







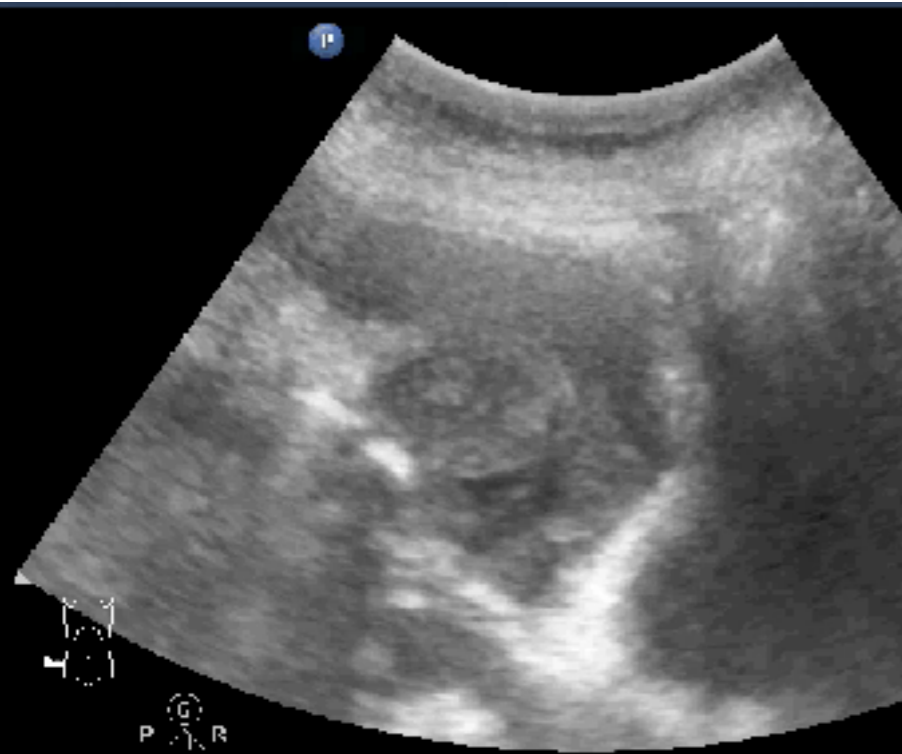






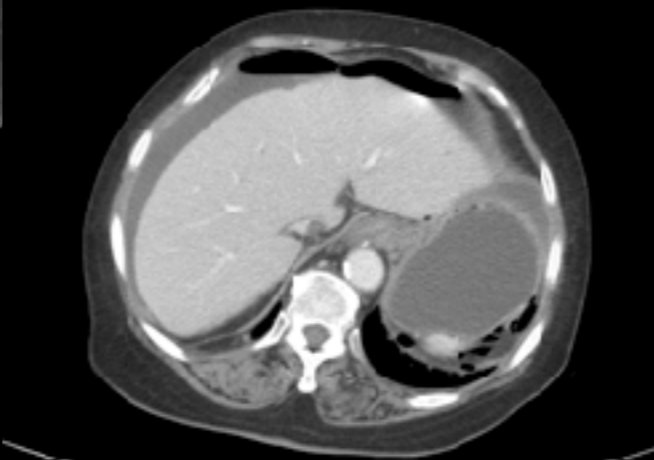
80F, diffuse abdominal pain

Abd Gen2
C5-1
17 Hz
9.0cm
2D
HGen
Gn 100
C 56
3/3/3

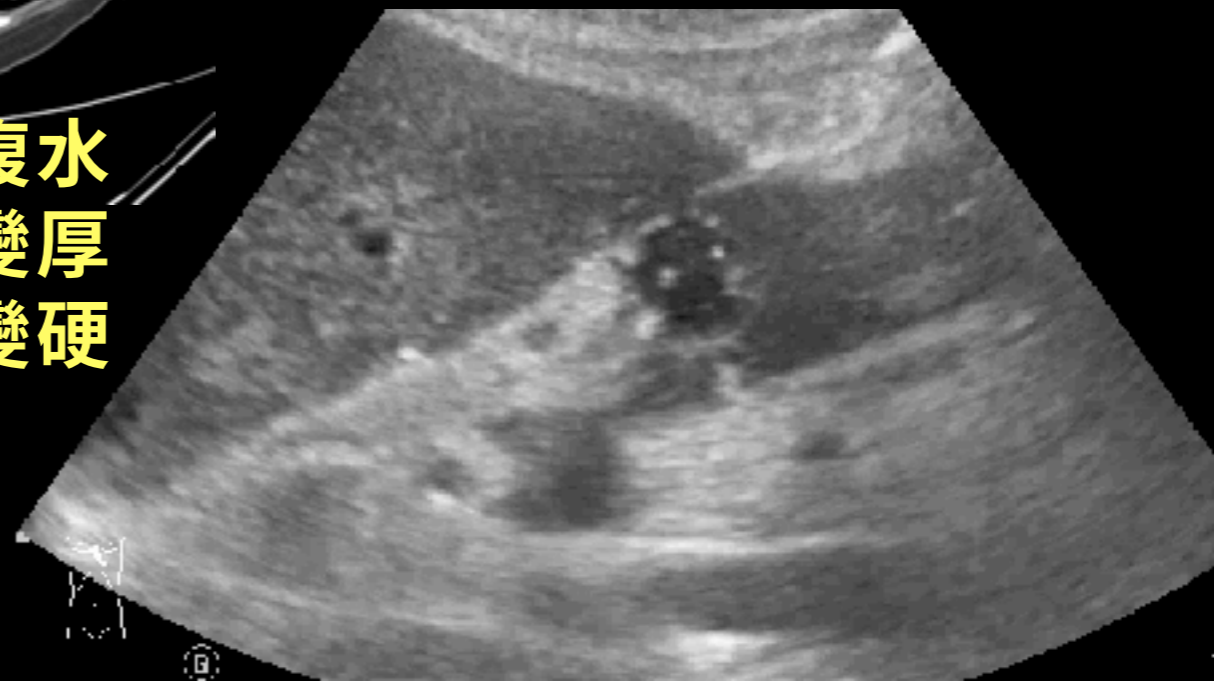


Scissors maneuver

Abd Gen2
C5-1
17 Hz
9.0cm
2D
HGen
Gn 100
C 56
3/3/3



有亮度的腹水
腸壁異常變厚
脂肪變亮變硬

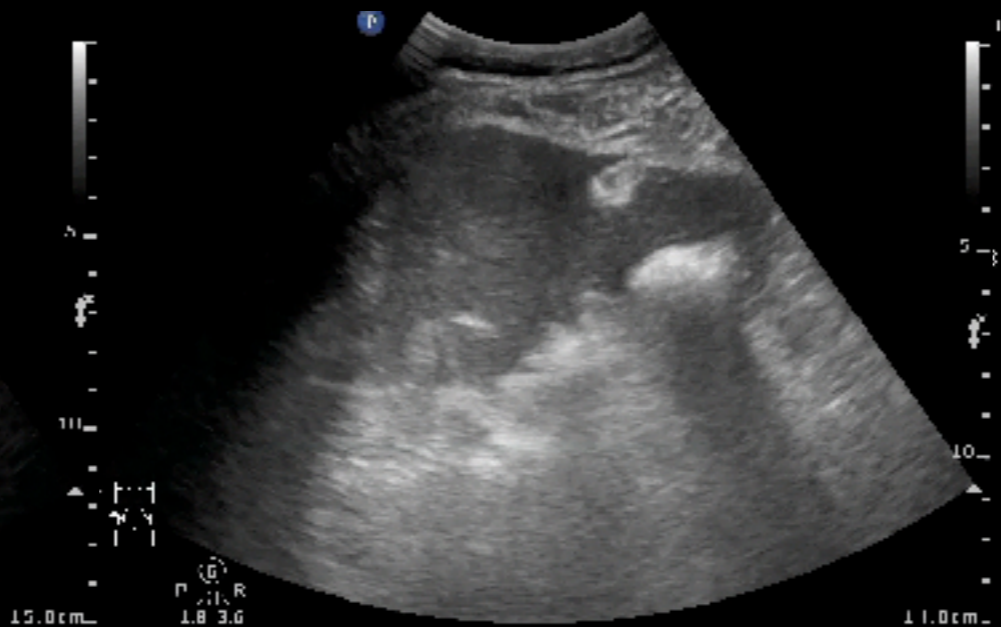


Dirty ascites: 水往下流

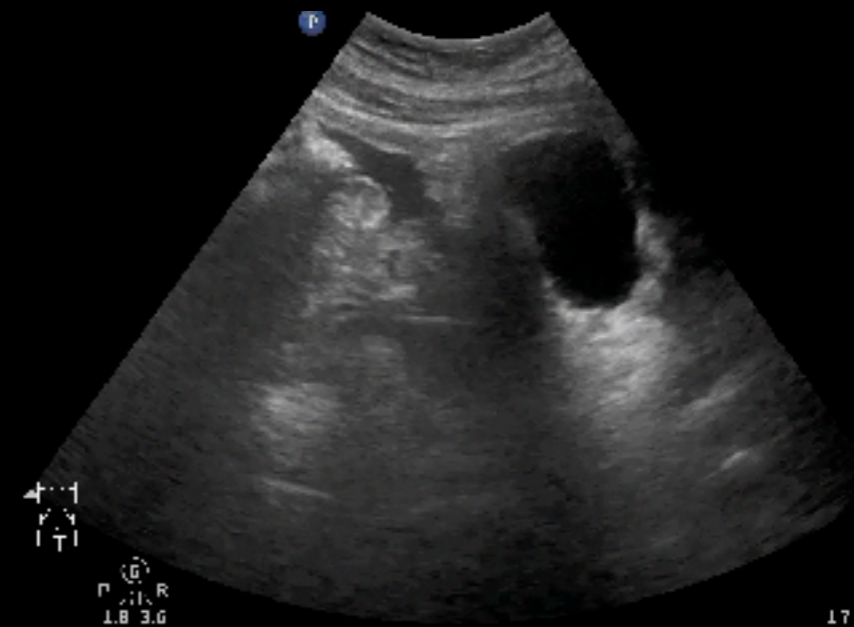
Around liver



Paracolic gutter



Pelvis



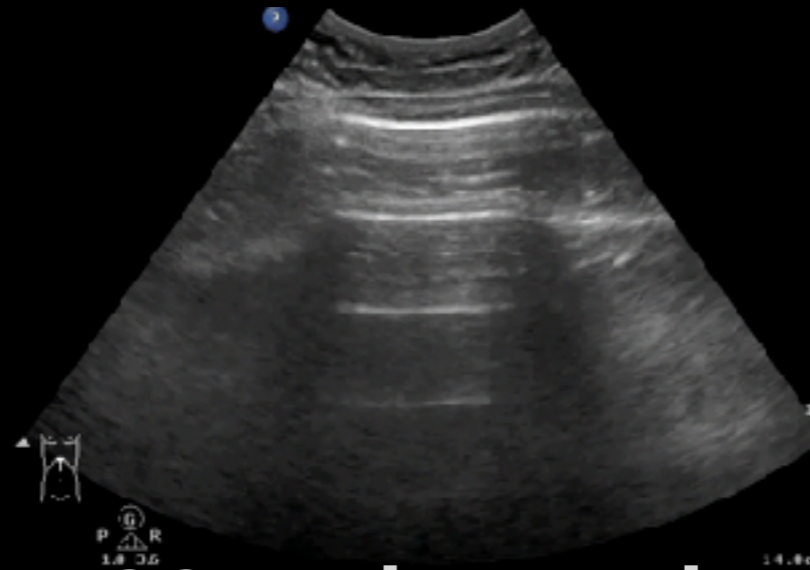
FAST倒三角是最基本的

Free air: 往上找

Liver surface



Curtain sign



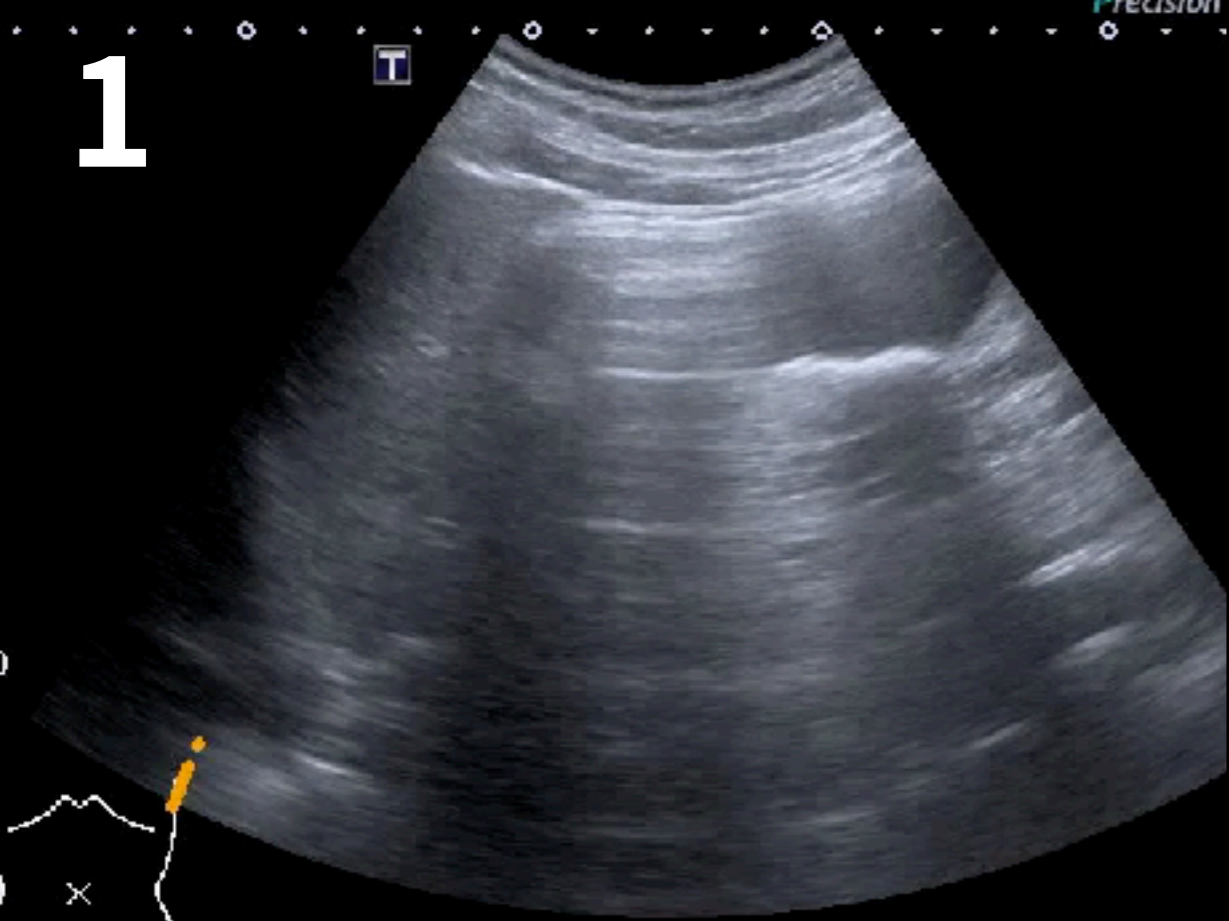
EPSS



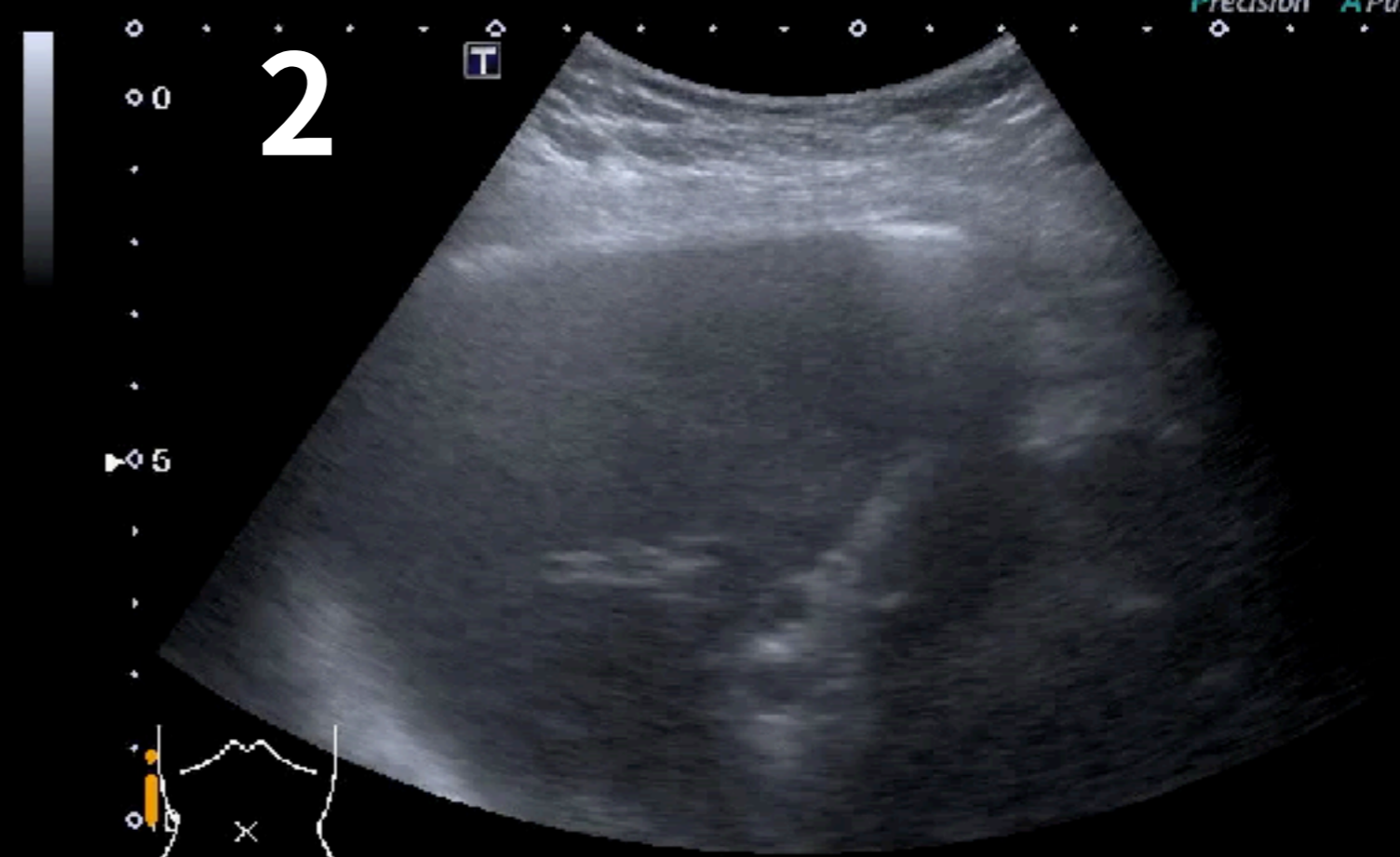
EPSS: Enhanced peritoneal strip sign

游離氣存在界面變亮
跟肺部的氣胸一個樣
不要忘了可以壓一壓

1

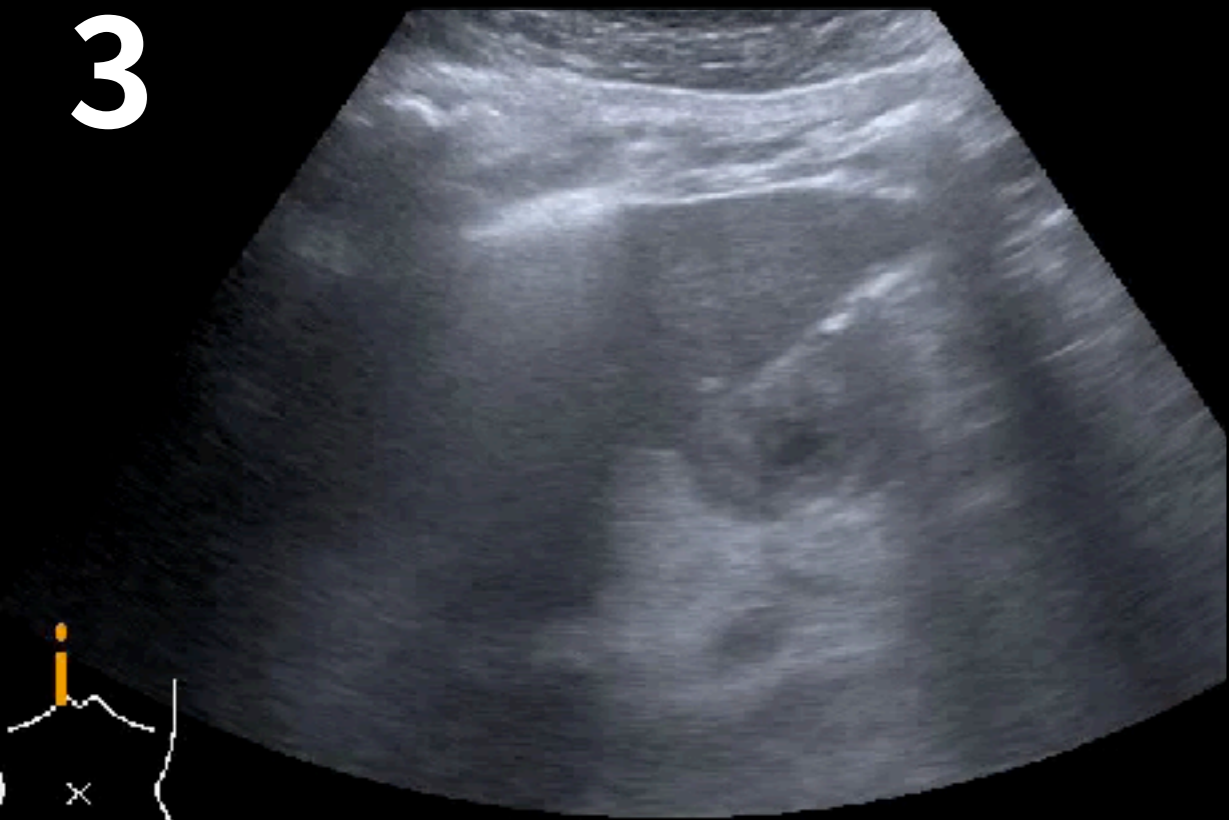


2

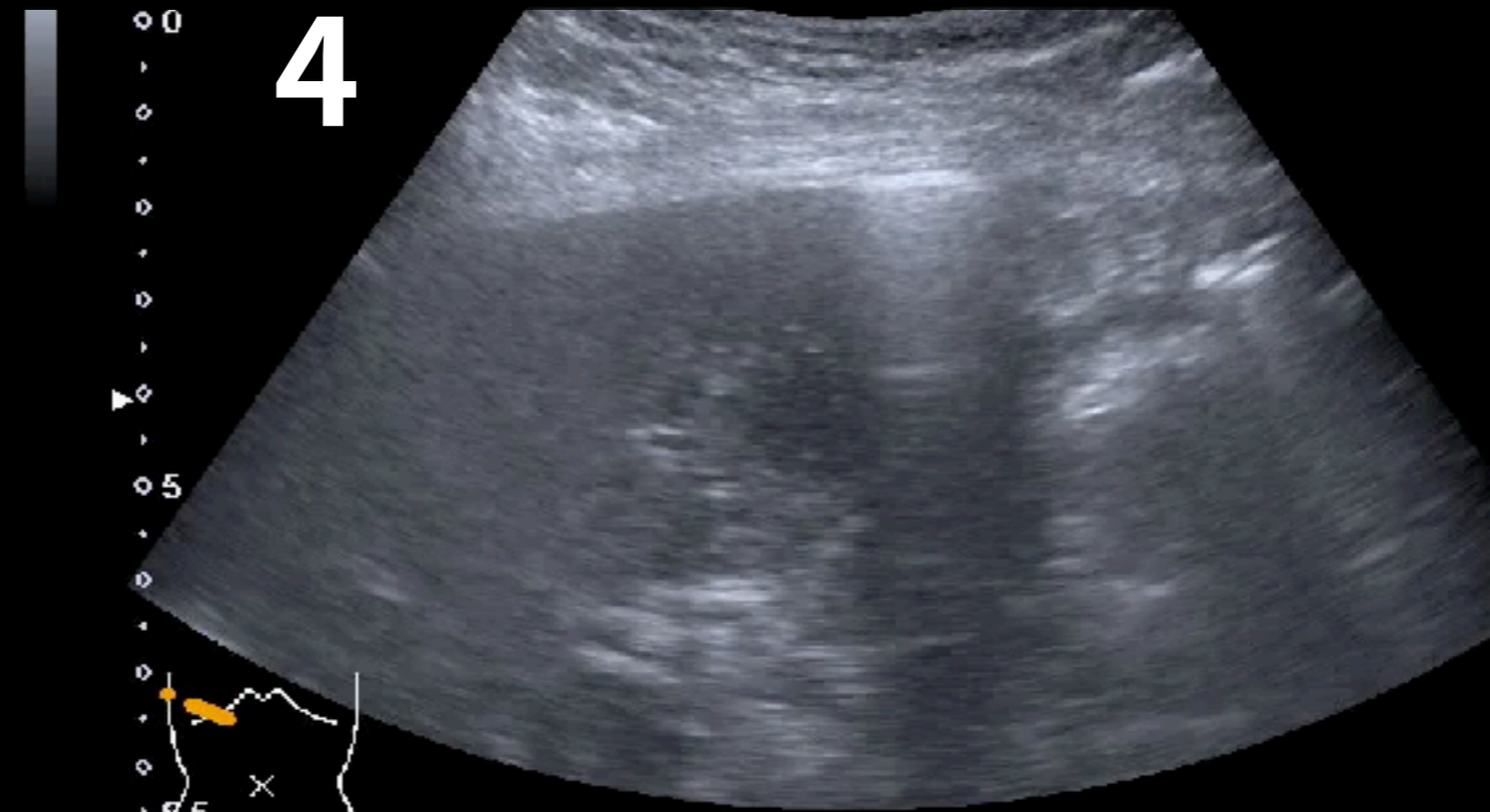


請問那一段影片不是Pneumoperitoneum？

3

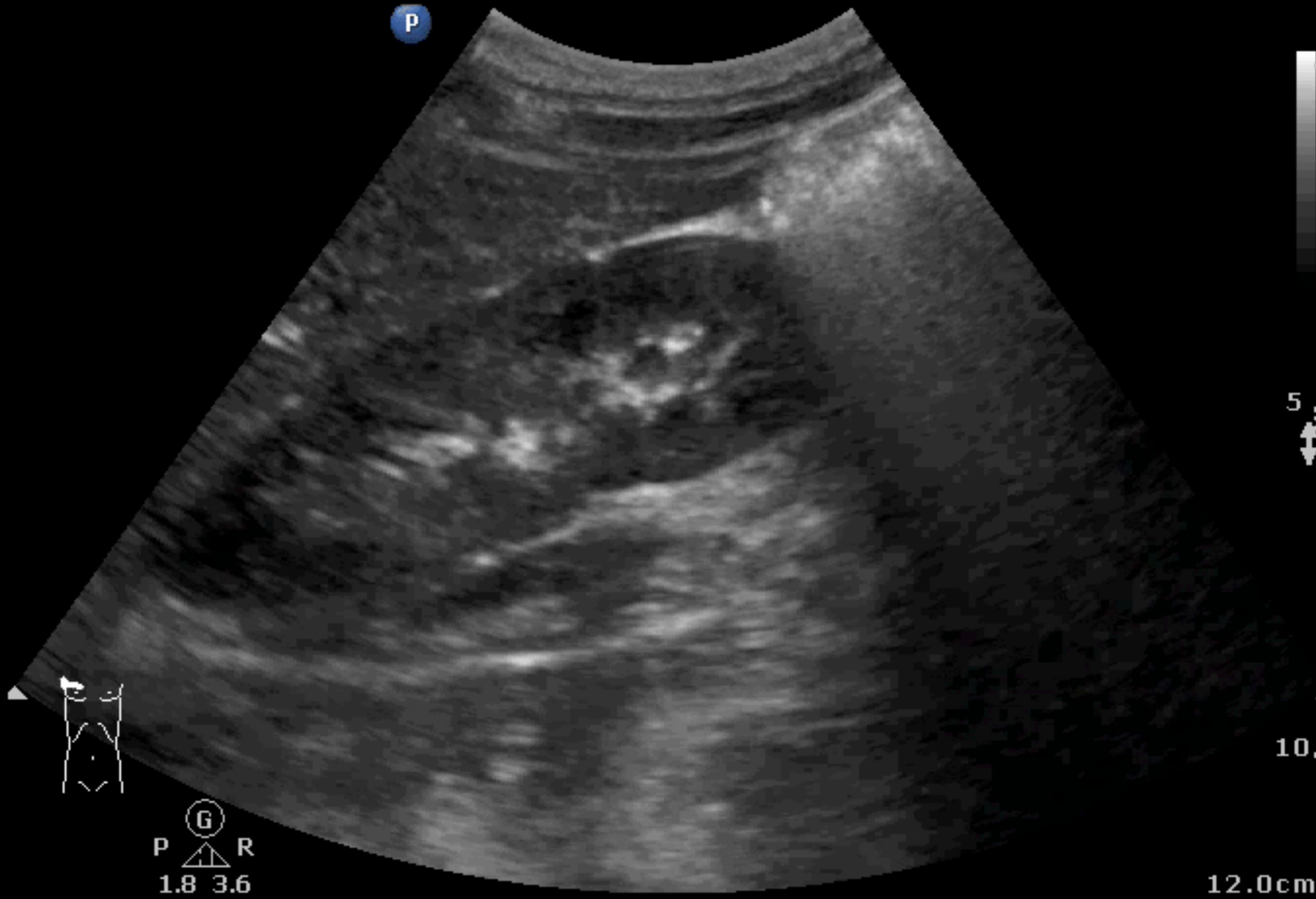


4



33F, low abdominal pain & shock

Abd Gen
C5-1
39 Hz
12.0cm
2D
HGen
Gn 71
C 56
3/3/3

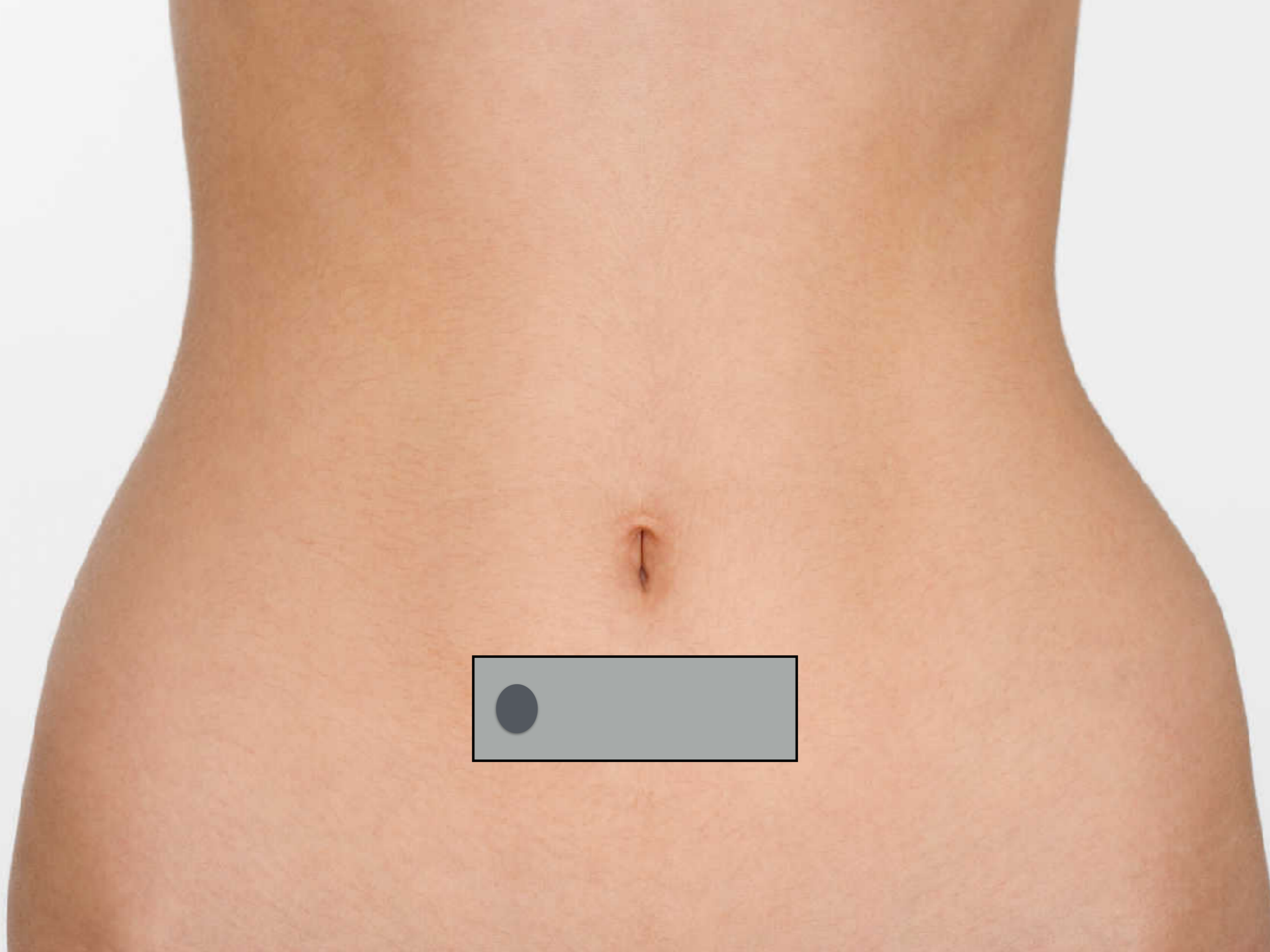


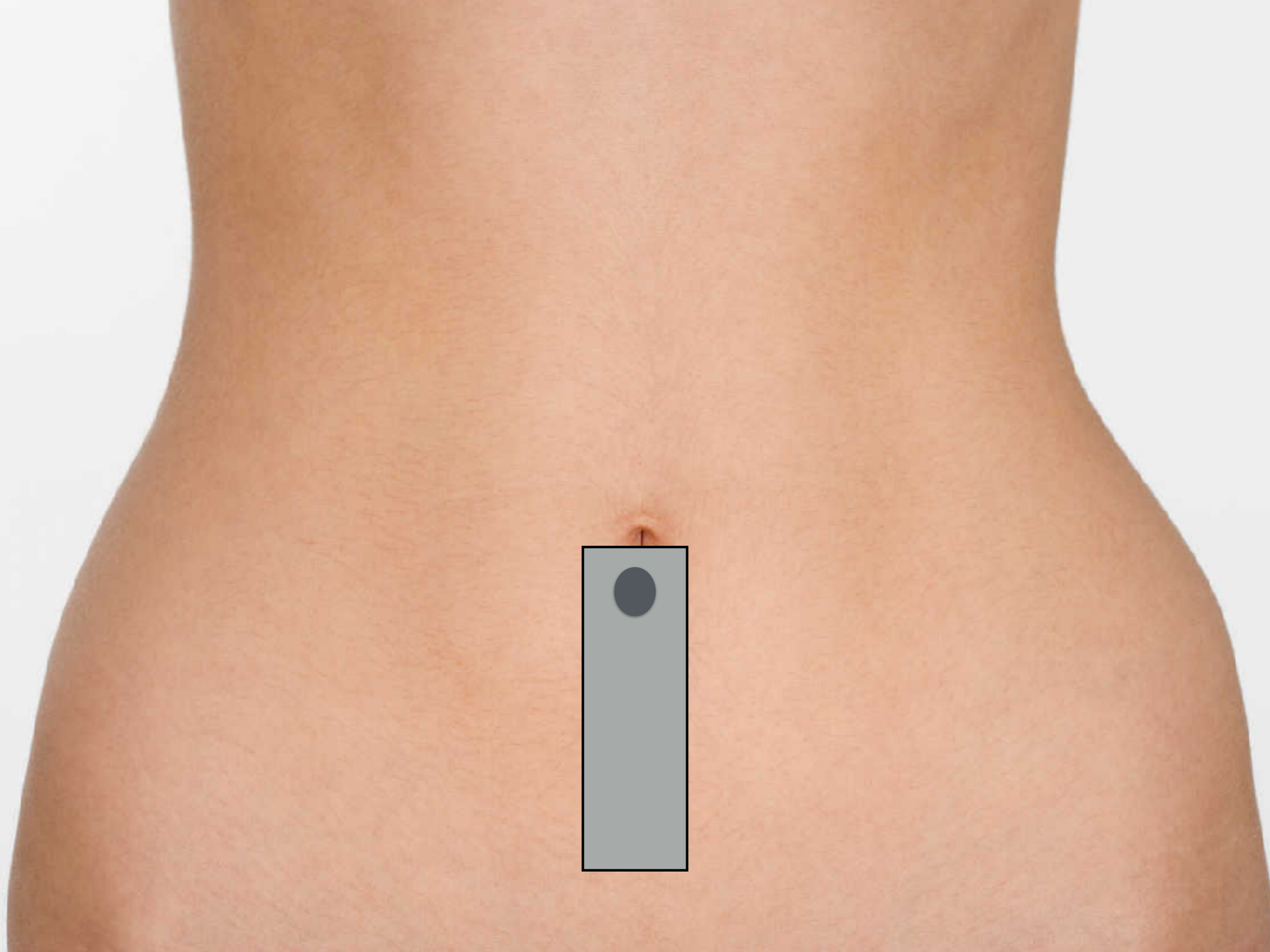
ABDOMEN

E for ectopic pregnancy

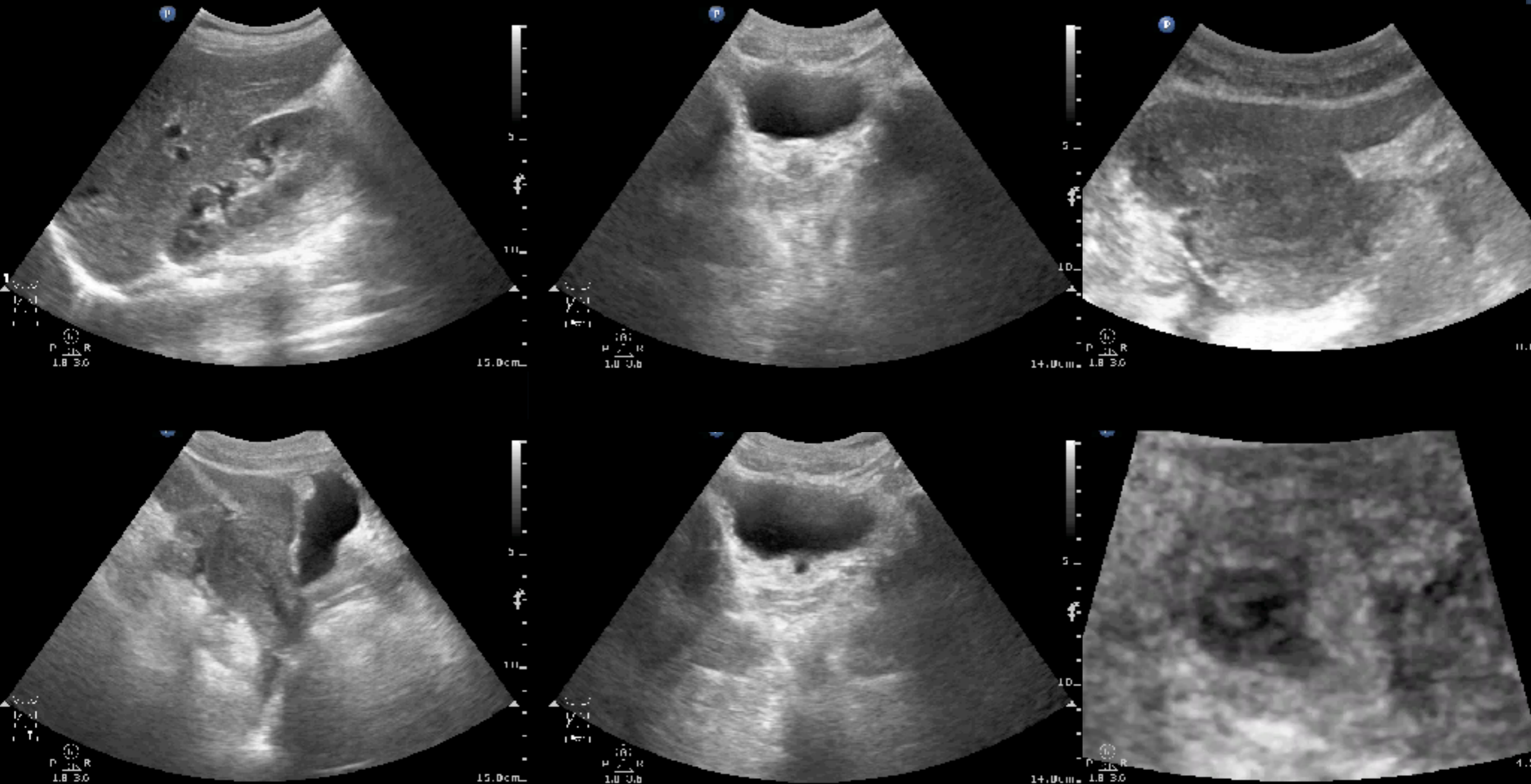
Ascites & IUP







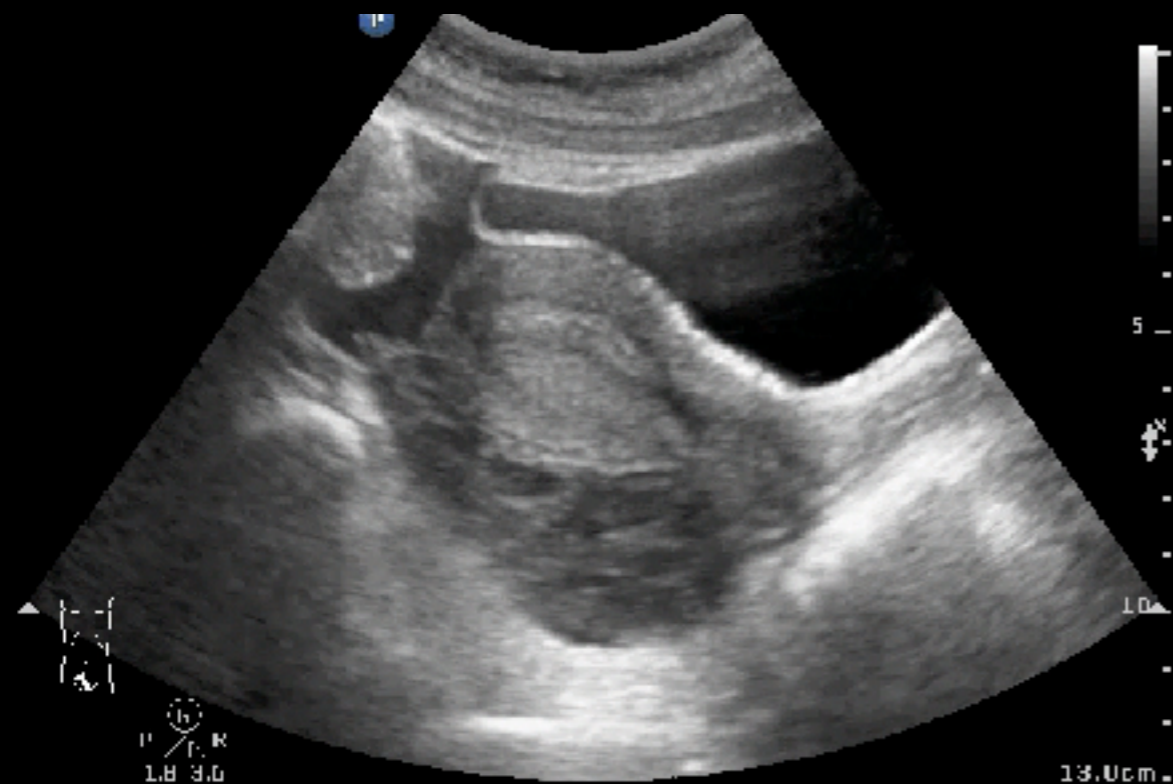
25F, abdominal pain



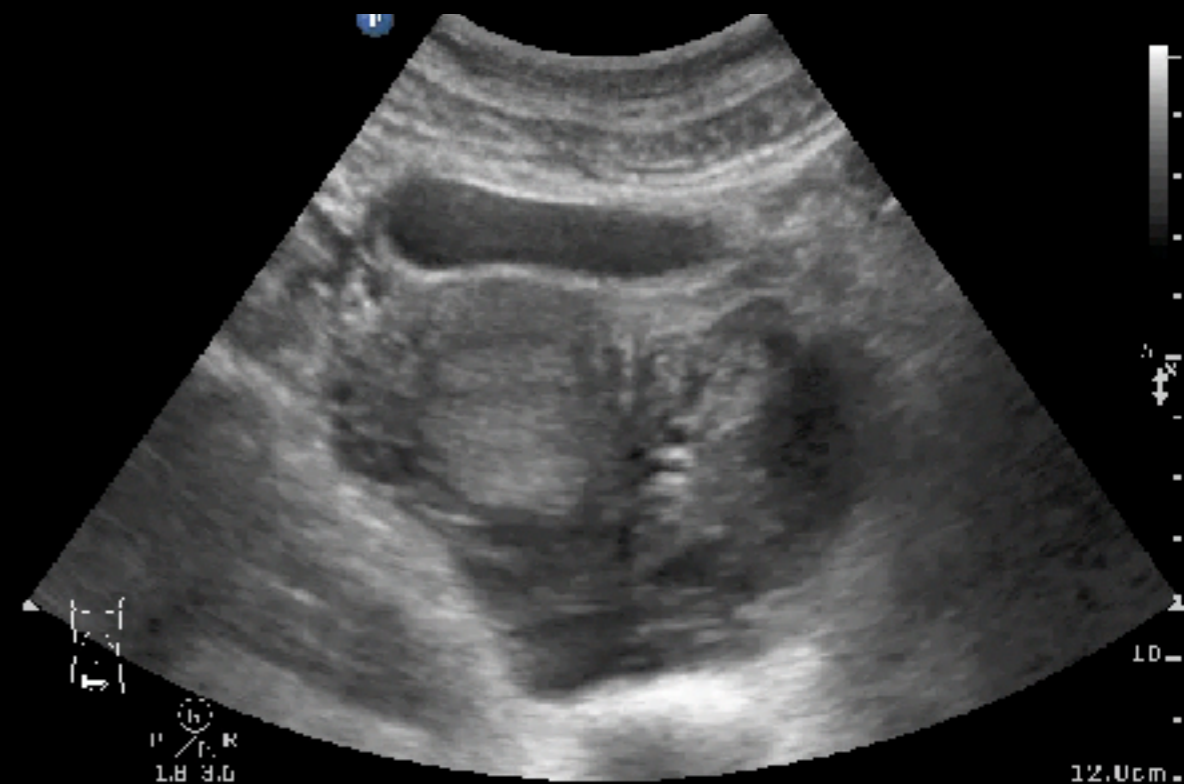
14F, acute lower abdominal pain with cold sweating

Female acute abdomen or shock consider **ovarian cyst rupture**

Abd Gen
[15 1
38 Hz
13.0cm
2D
11Gen
[1n 7/8
[1 56
3/3/3



Abd Gen
[15 1
39 Hz
12.0cm
2D
11Gen
[1n 7/8
[1 56
3/3/3



Echo first then Urine pregnancy test

25M, left flank pain

Abd Gen2
C5-1
32 Hz
16.0cm

2D

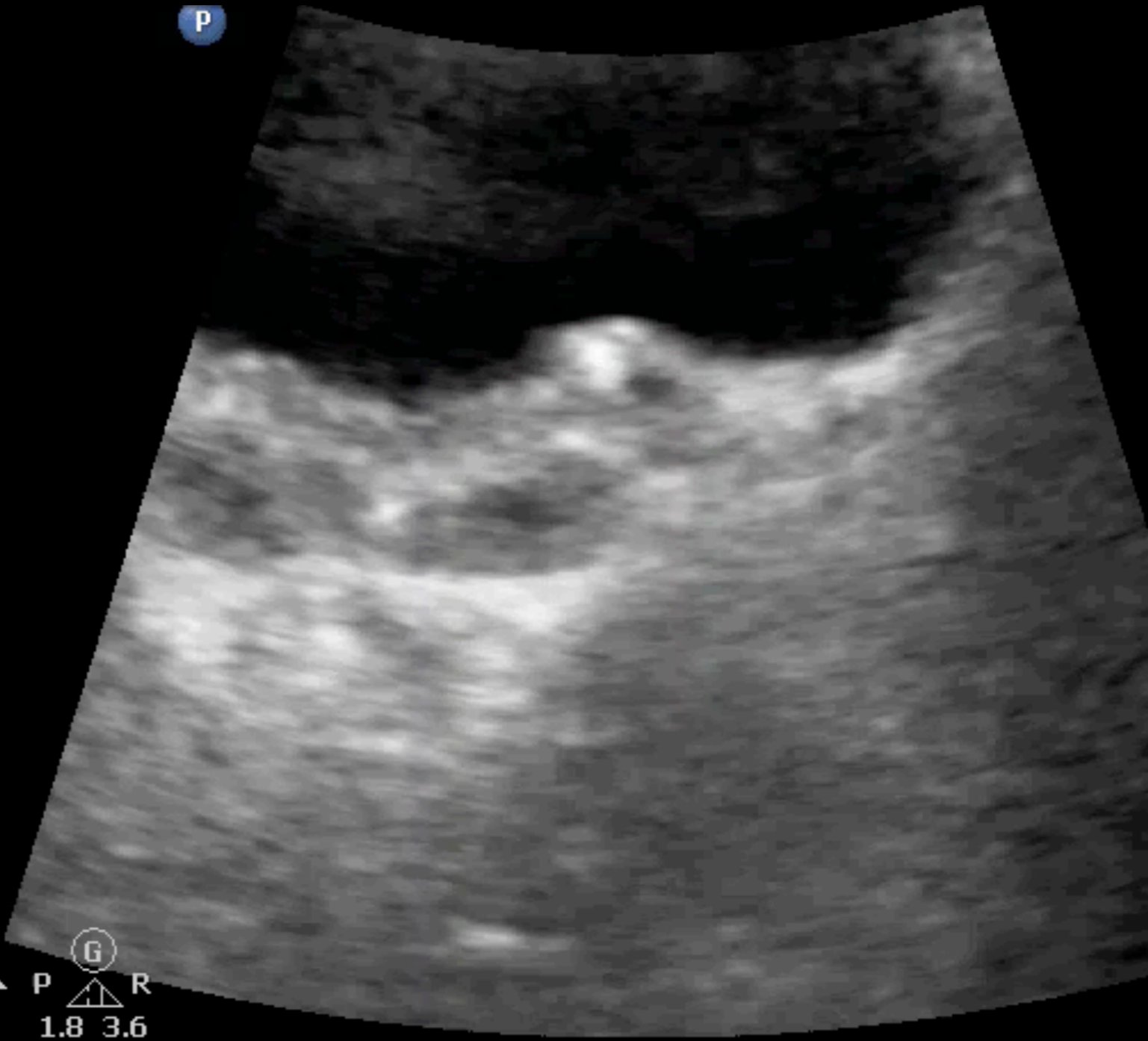
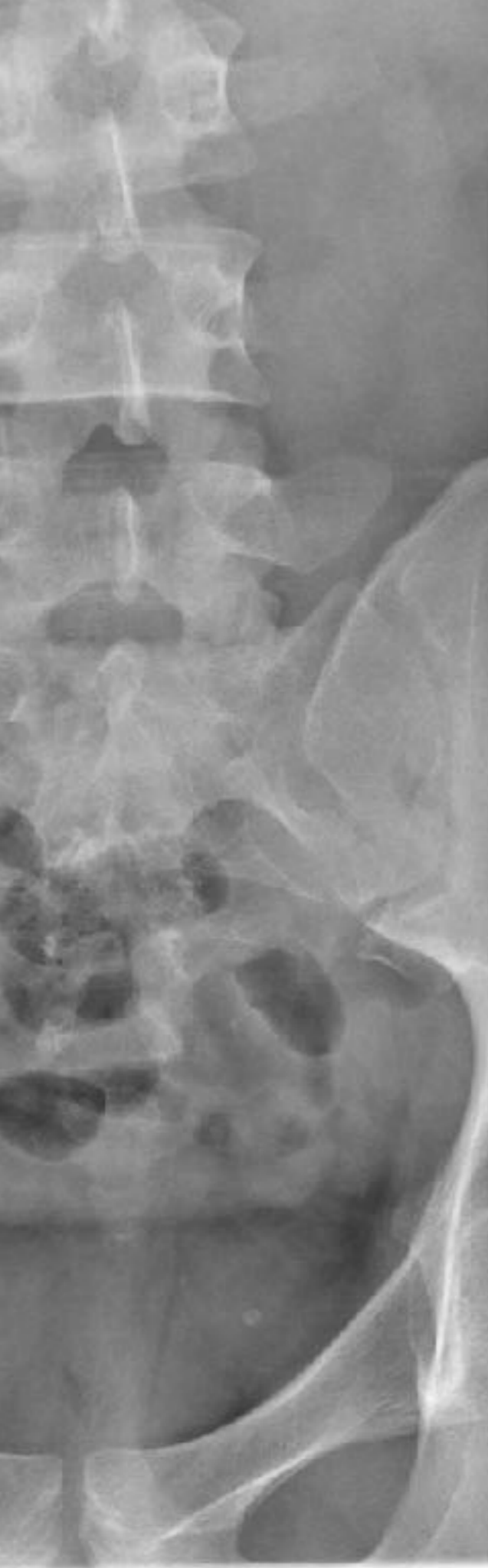
HGen
Gn 93
C 56
3/3/3



L UJV stone

Abd Gen2
C5-1
73 Hz
HD Zoom

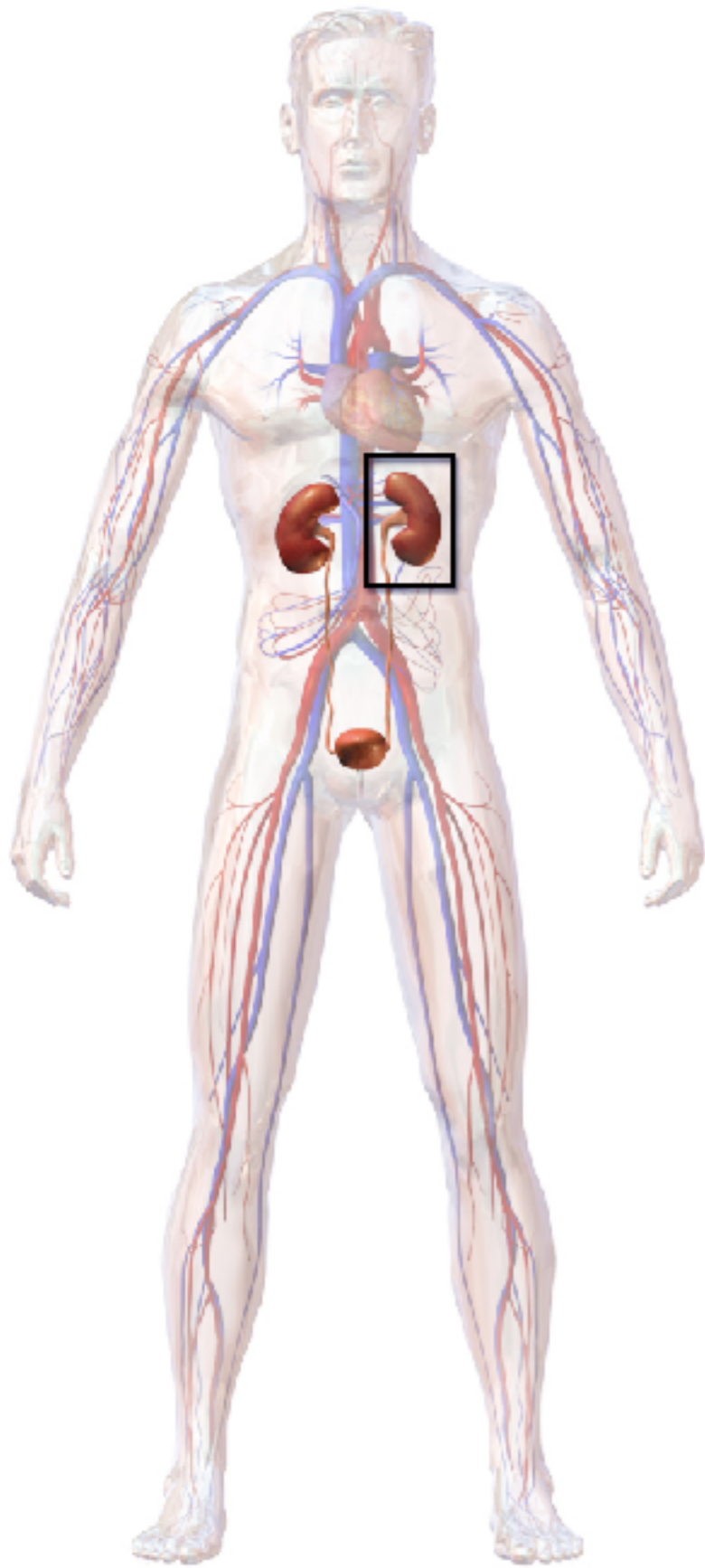
2D
HGen
Gn 58
C 56
3 / 3 / 3



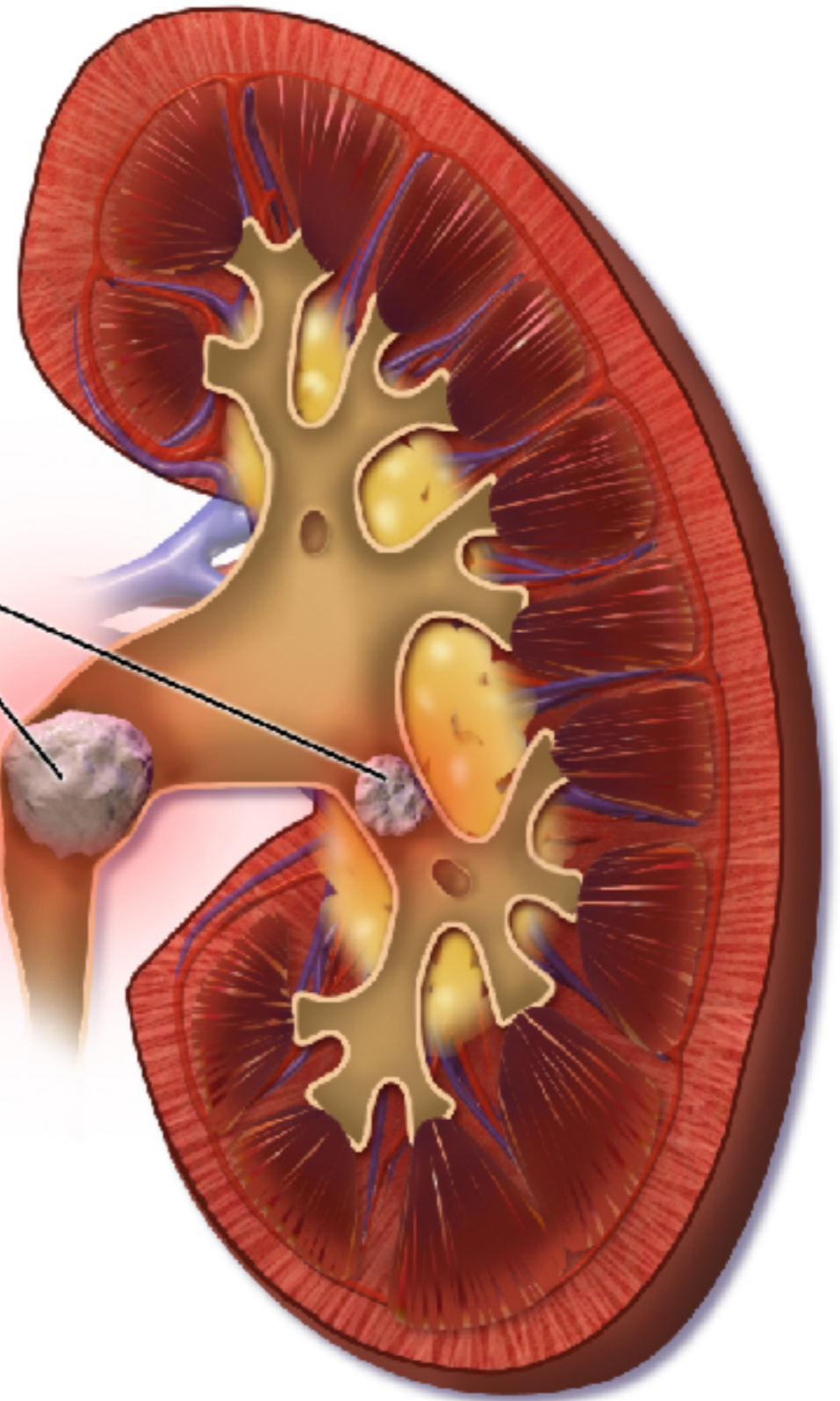
ABDOMEN

N for nephropathy

Hydronephrosis & KuB

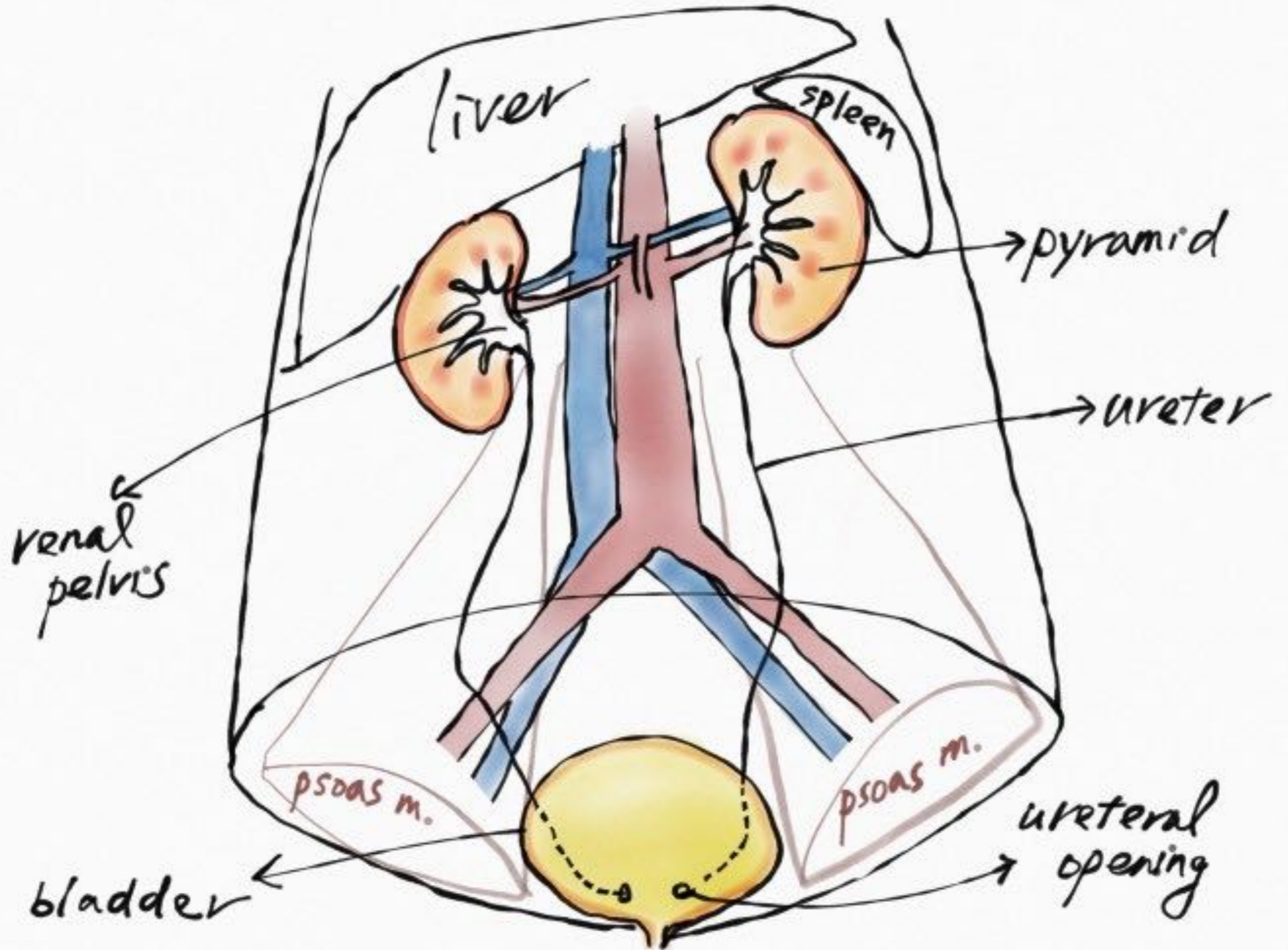


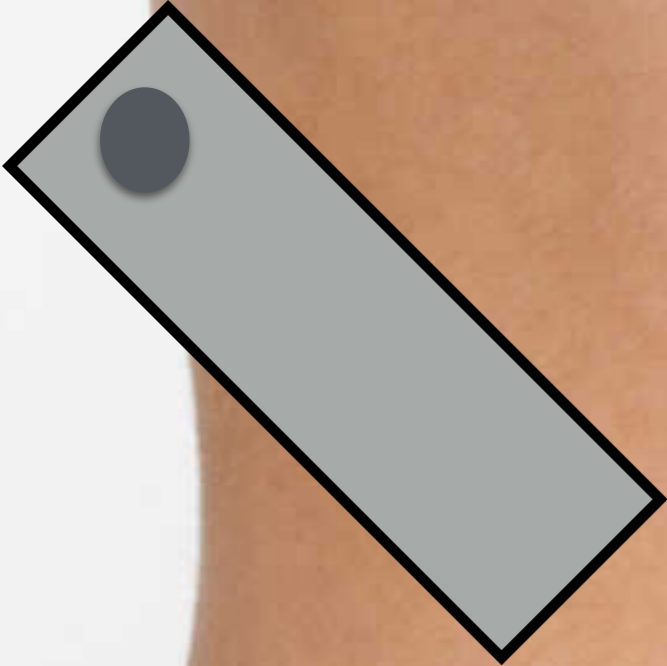
Kidney stones



Kidney Stones

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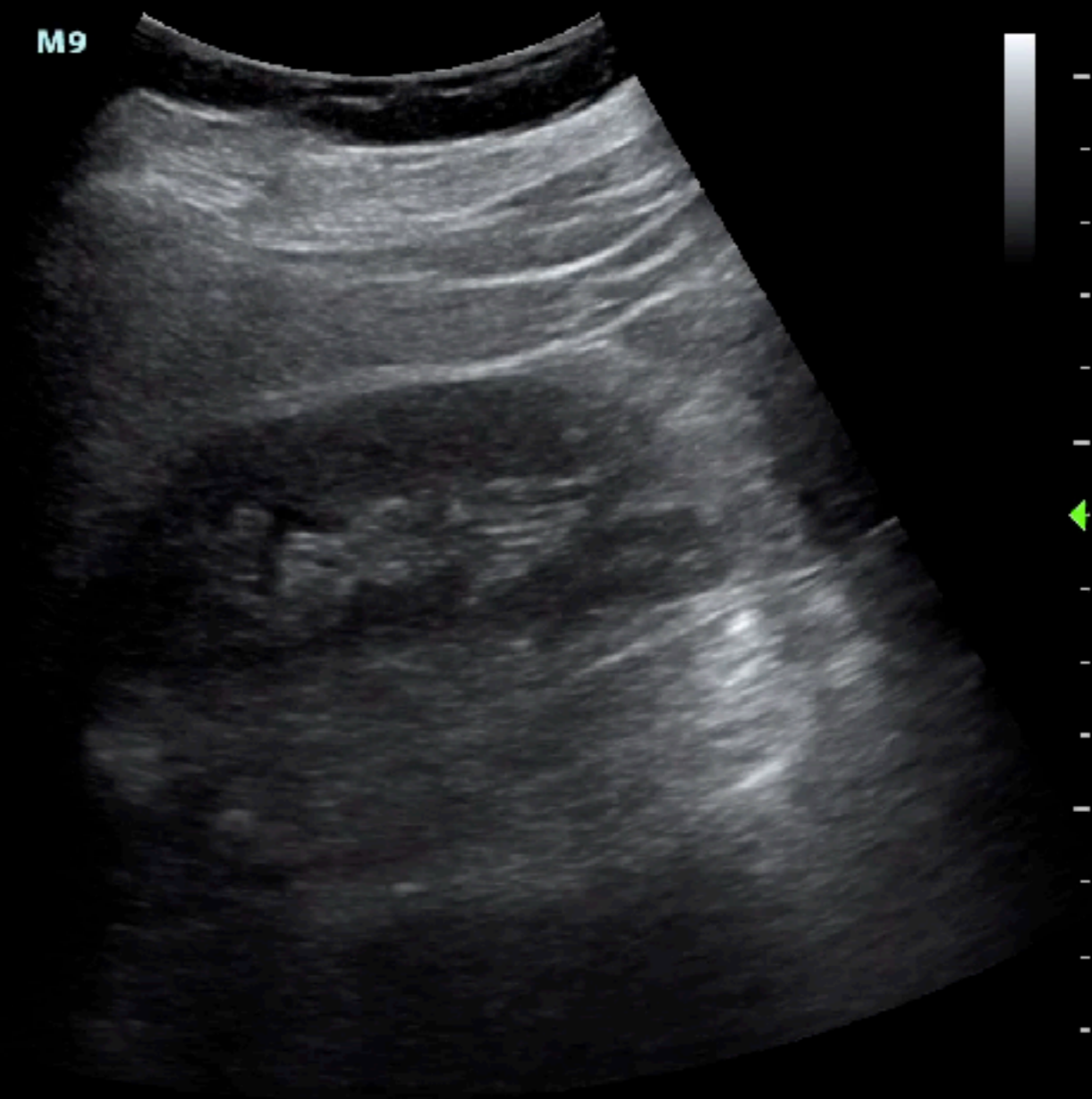
13-03-2016 16:07:02

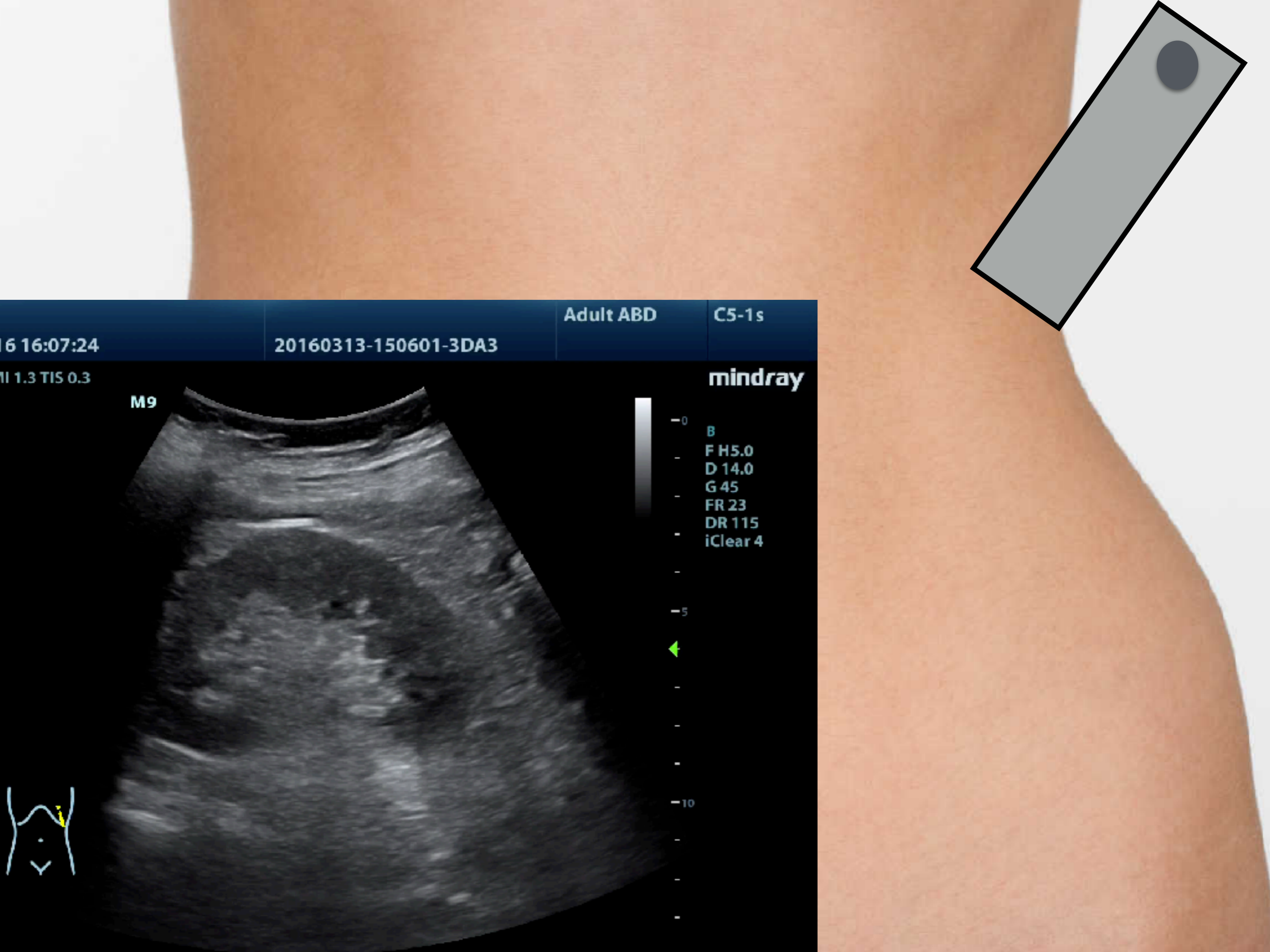
20160313-150601-3DA3

Adult ABD

AP 96.6% MI 1.3 TIS 0.3

M9





16 16:07:24 20160313-150601-3DA3 Adult ABD C5-1s

MI 1.3 TIS 0.3 **mindray**

M9

-0
B
F H5.0
D 14.0
G 45
FR 23
DR 115
iClear 4

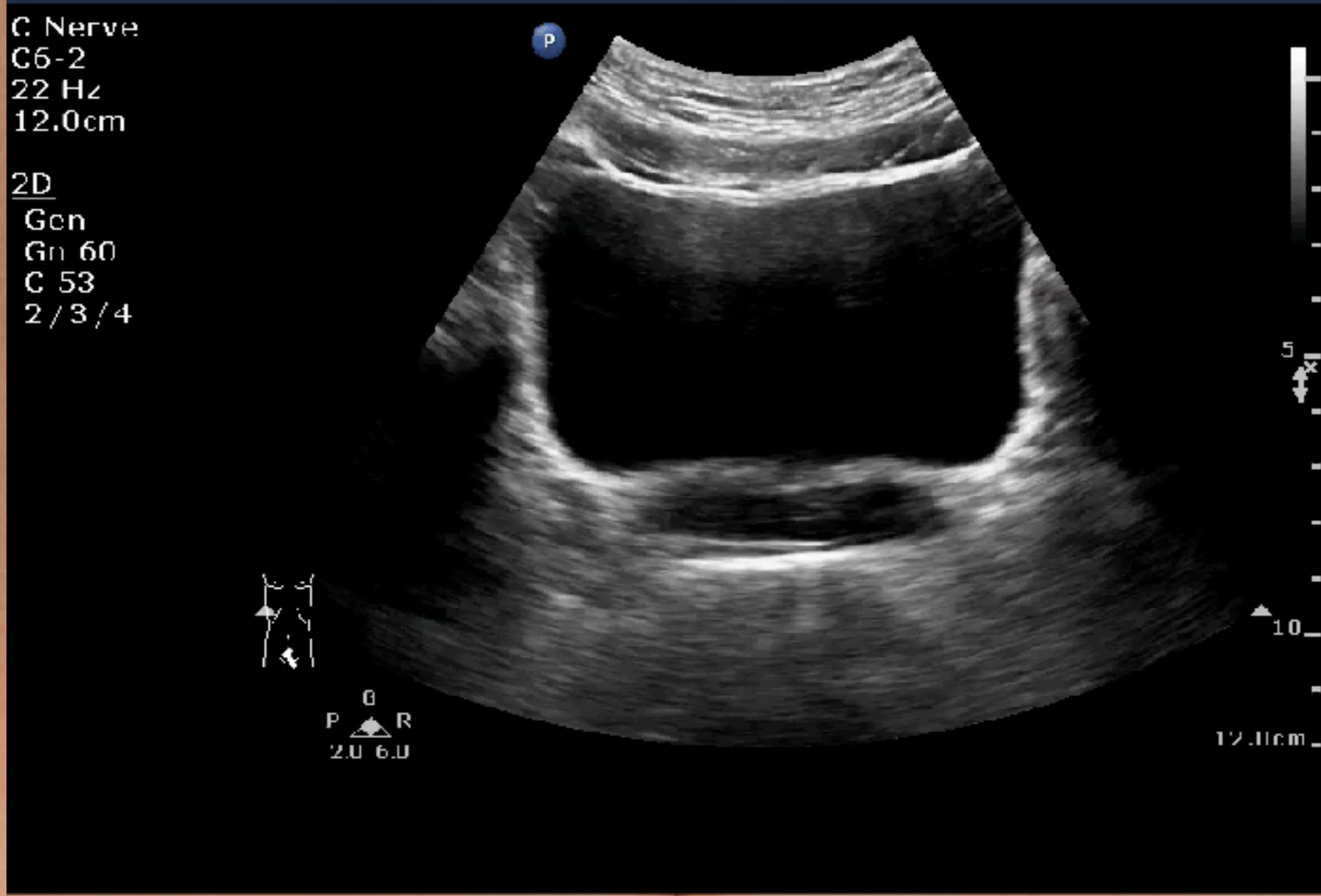
-5

-10



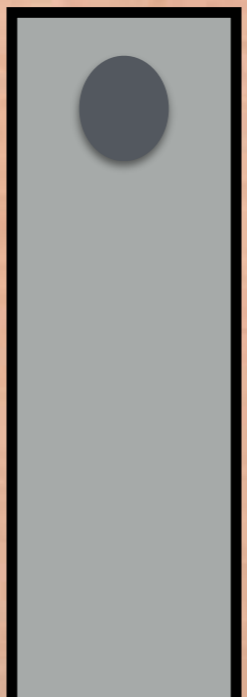
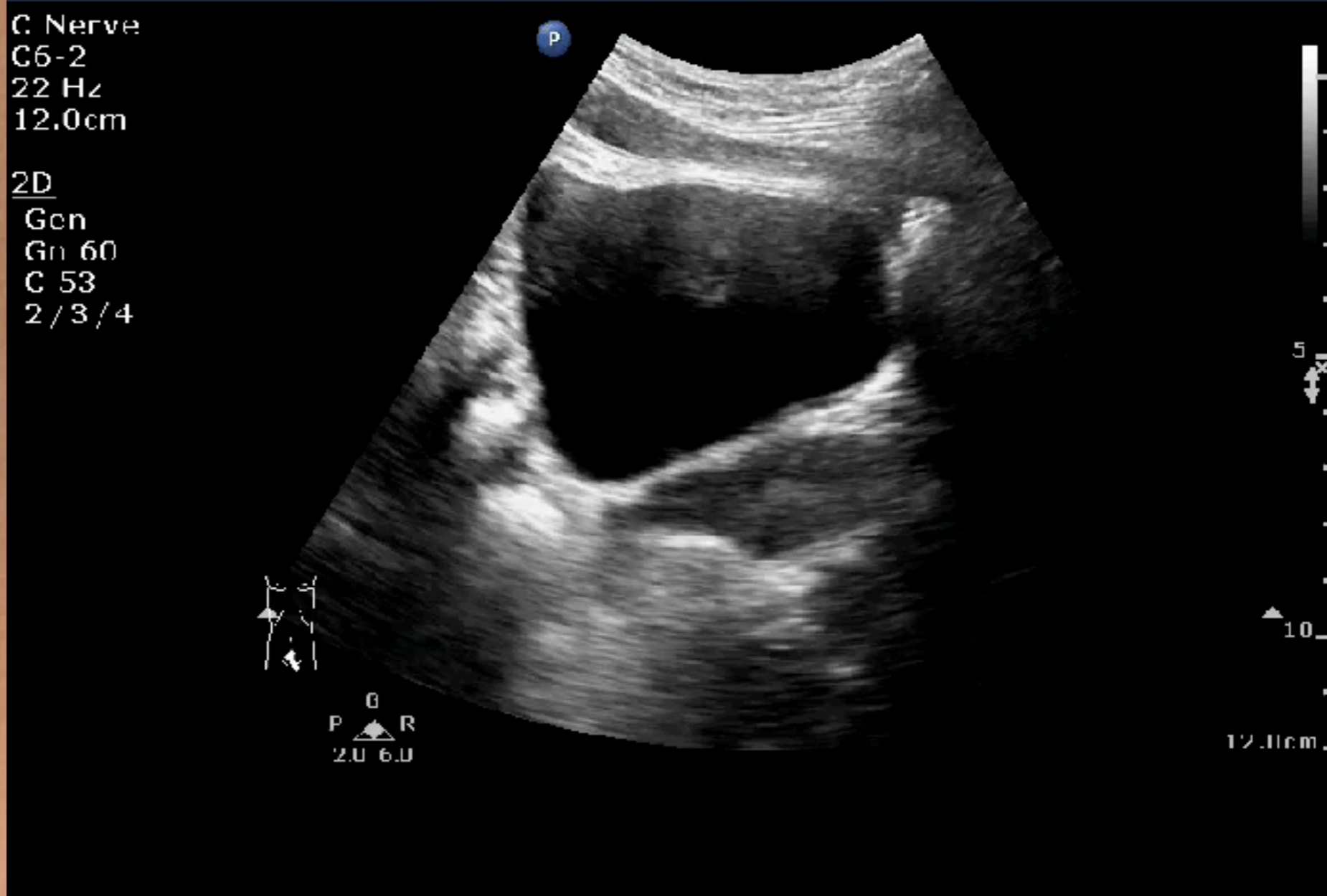
C. Nerve
C6-2
22 Hz
12.0cm

2D
Gen
Gn 60
C 53
2/3/4

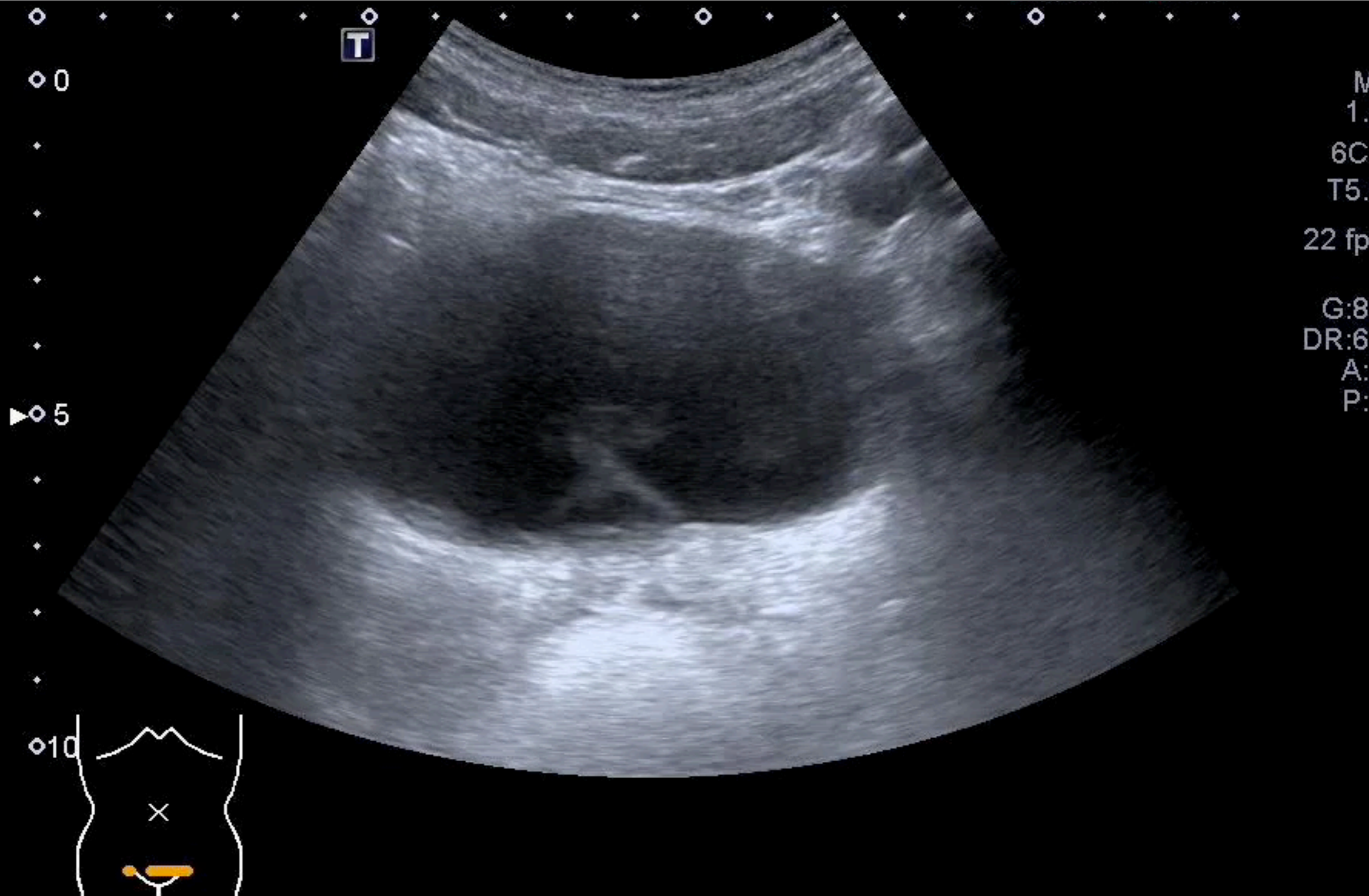


C. Nerve
C6-2
22 Hz
12.0cm

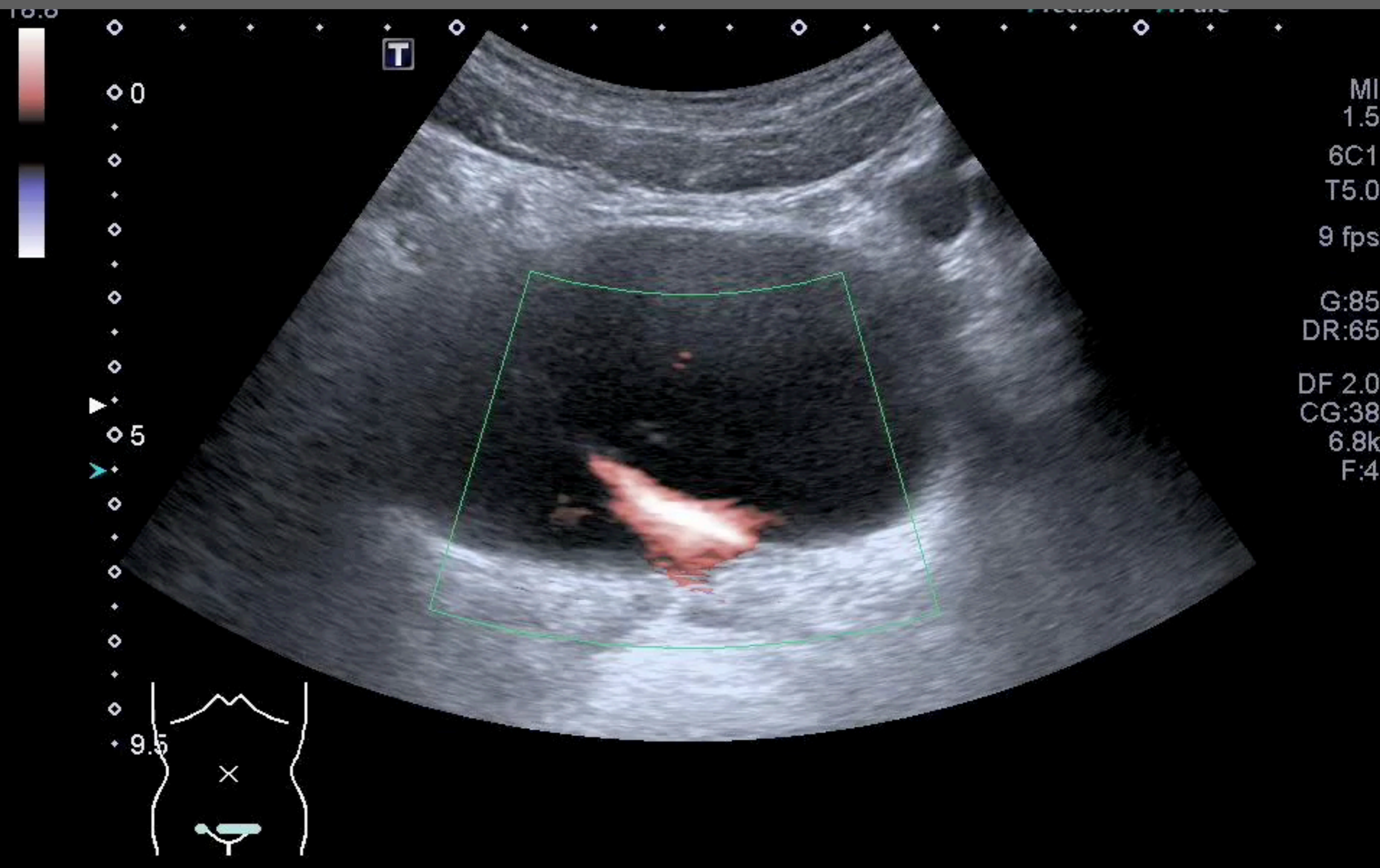
2D
Gen
Gn 60
C 53
2/3/4



Urinary jet



Urinary jet



When will you use US for GU emergency?

Pain

Infection

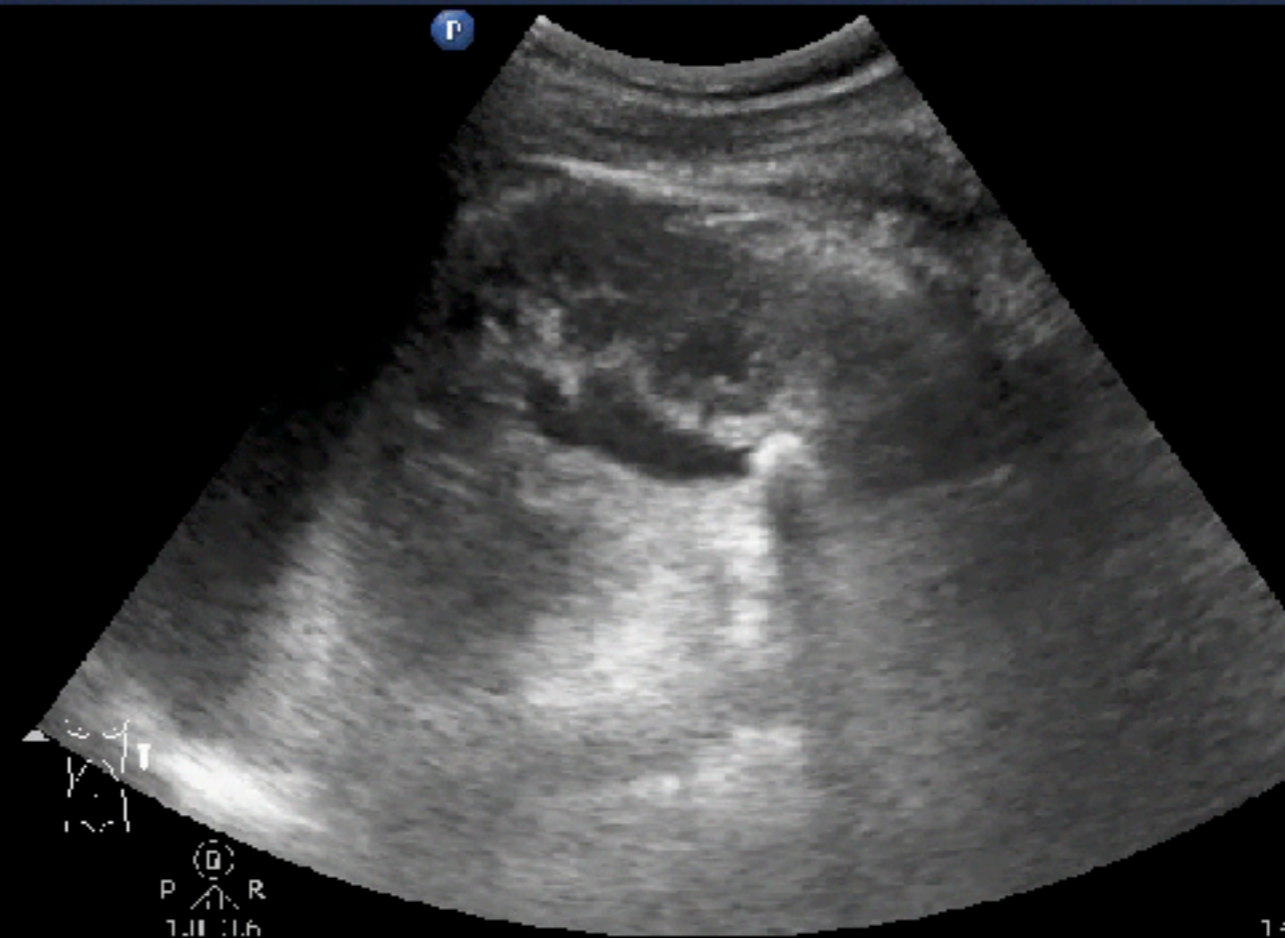
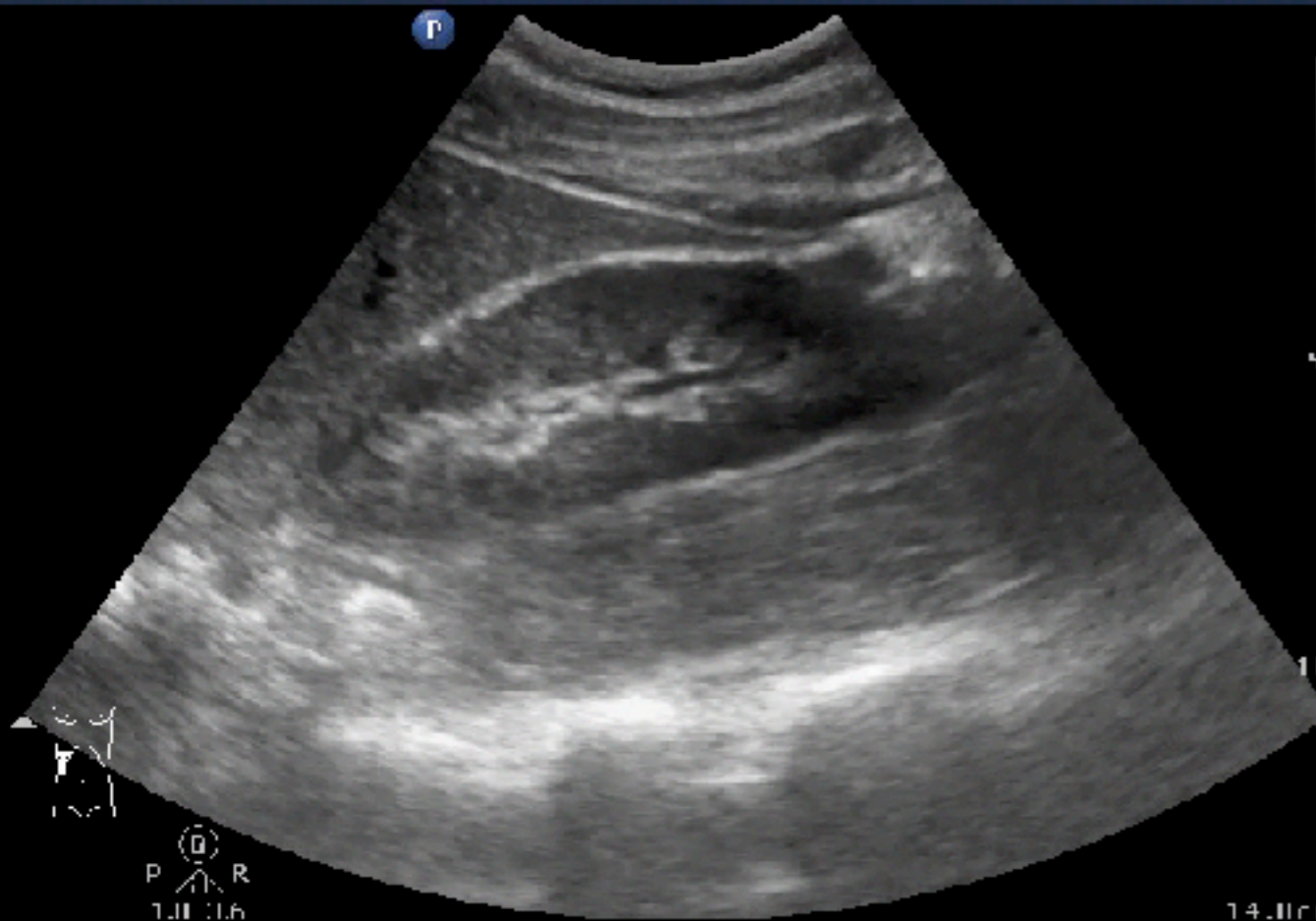
Failure

GU emergency

POCUS first

or

Urine first



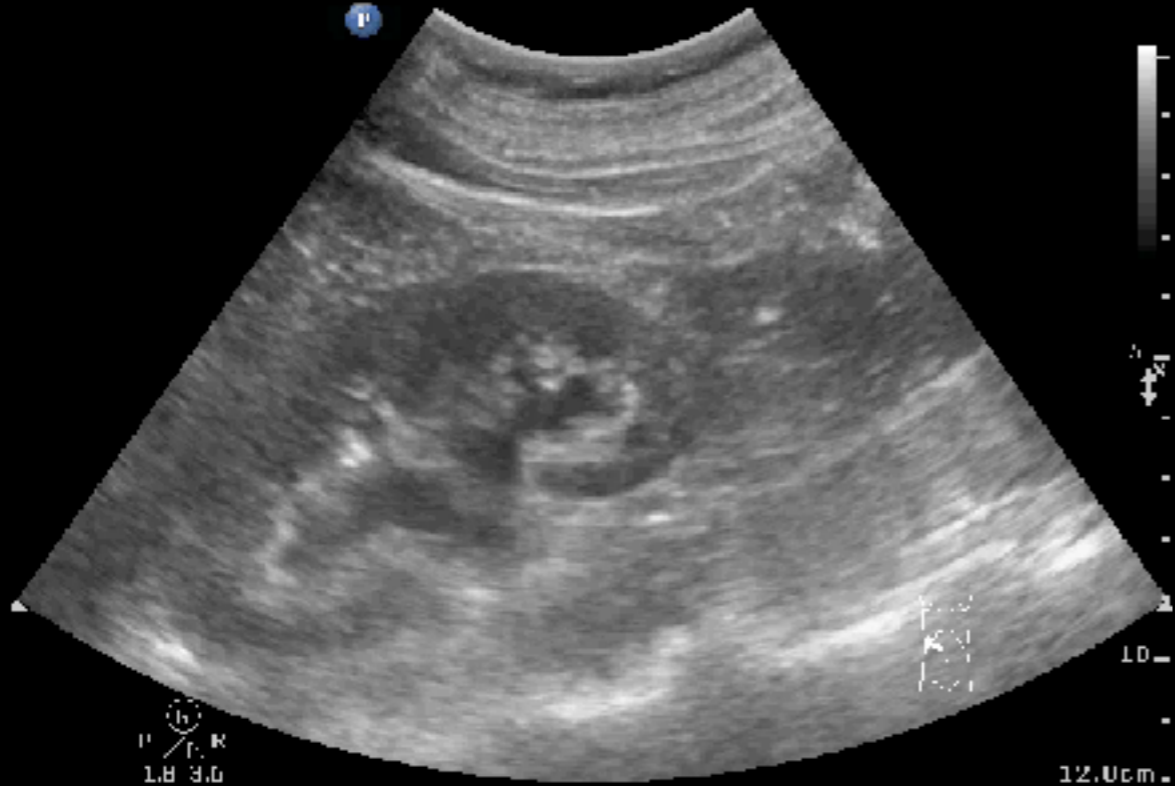
54M, right flank/abd pain



54M, right flank/abd pain

Abd Gen2
11.5 1
39 Hz
12.0cm

2D
11Gen
11.5 1
11.55
3/3/3

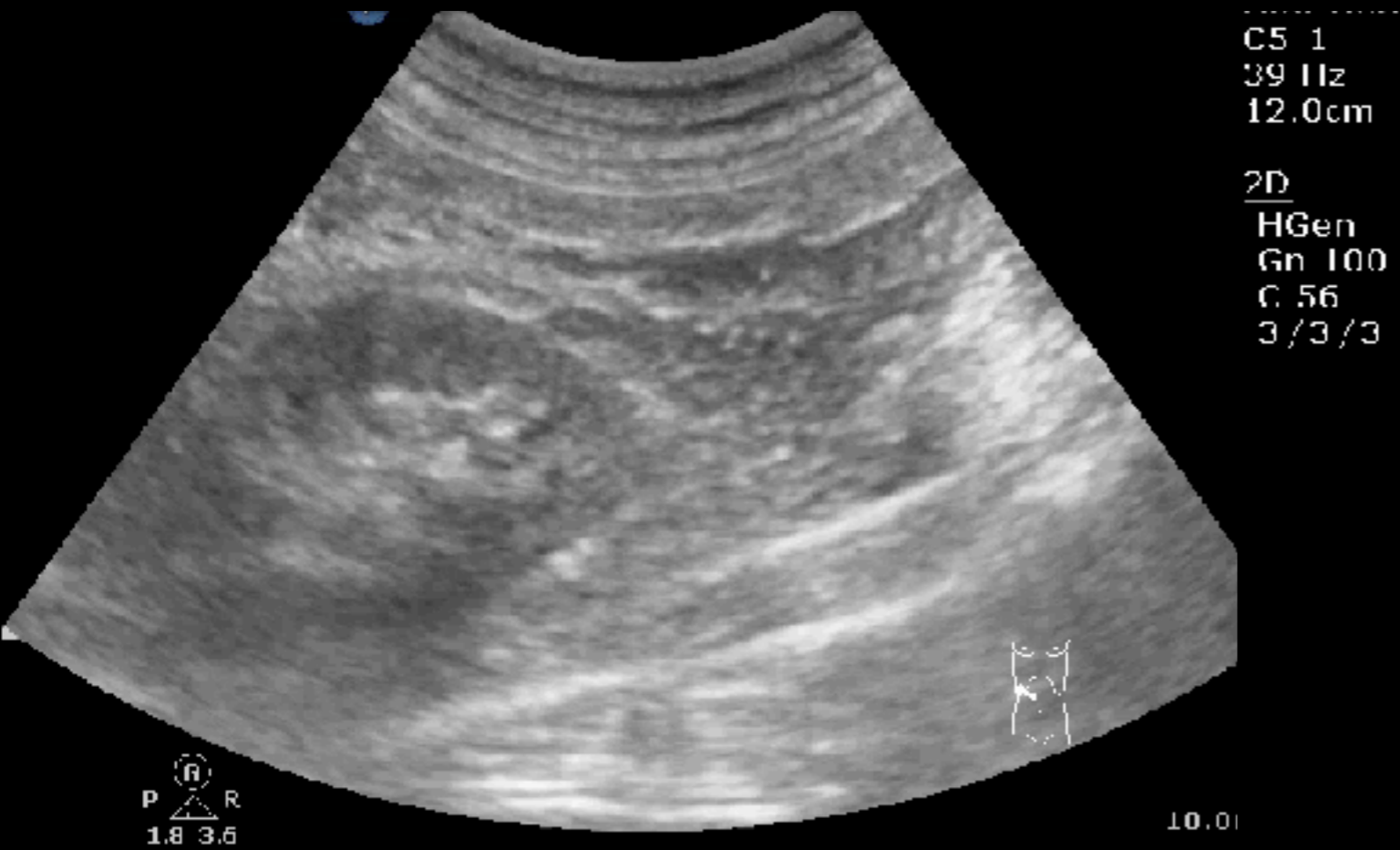


Abd Gen2
11.5 1
39 Hz
12.0cm

2D
11Gen
11.5 1
11.55
3/3/3



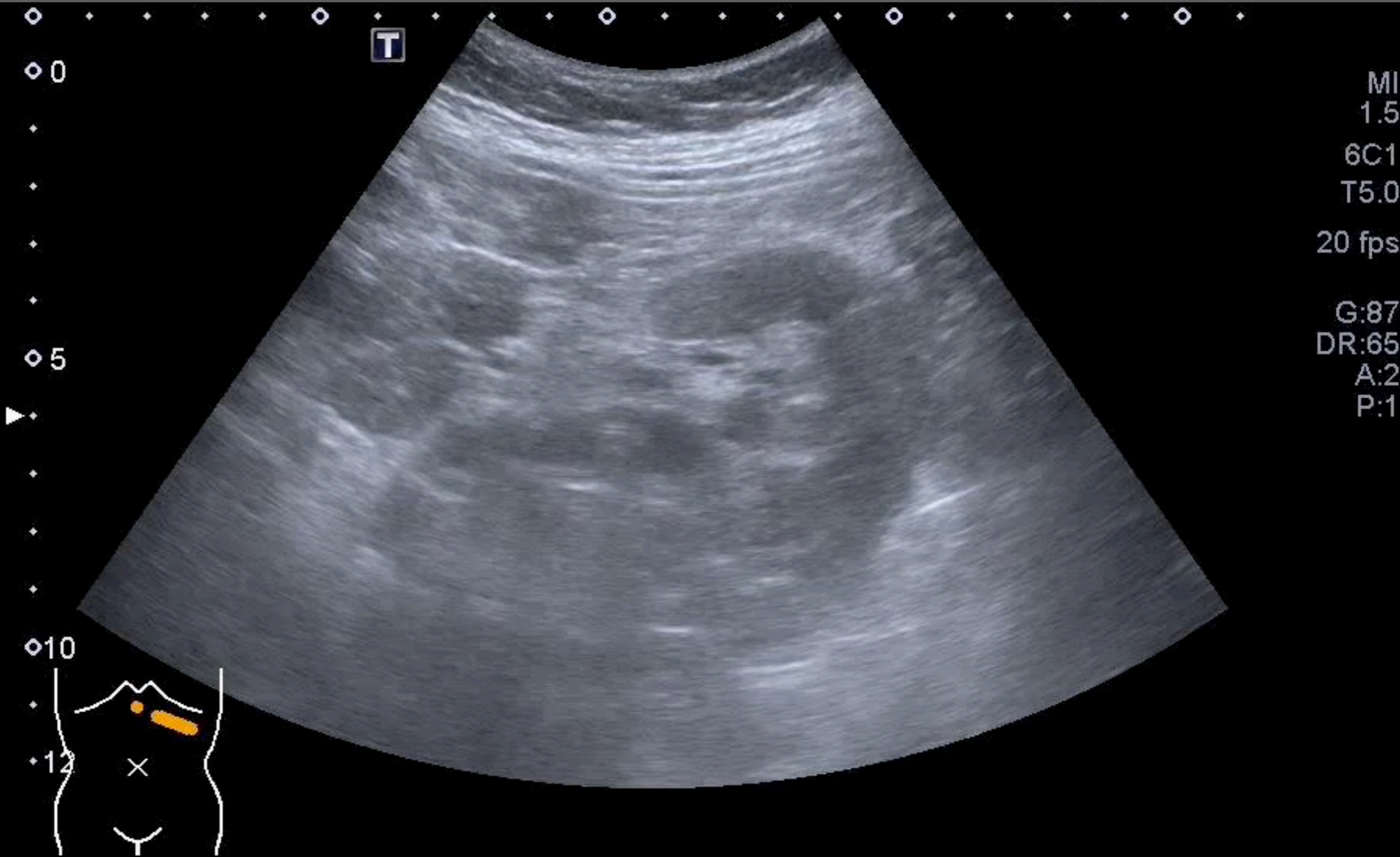
Ureteral stone



Hydronephrosis (Coronal)



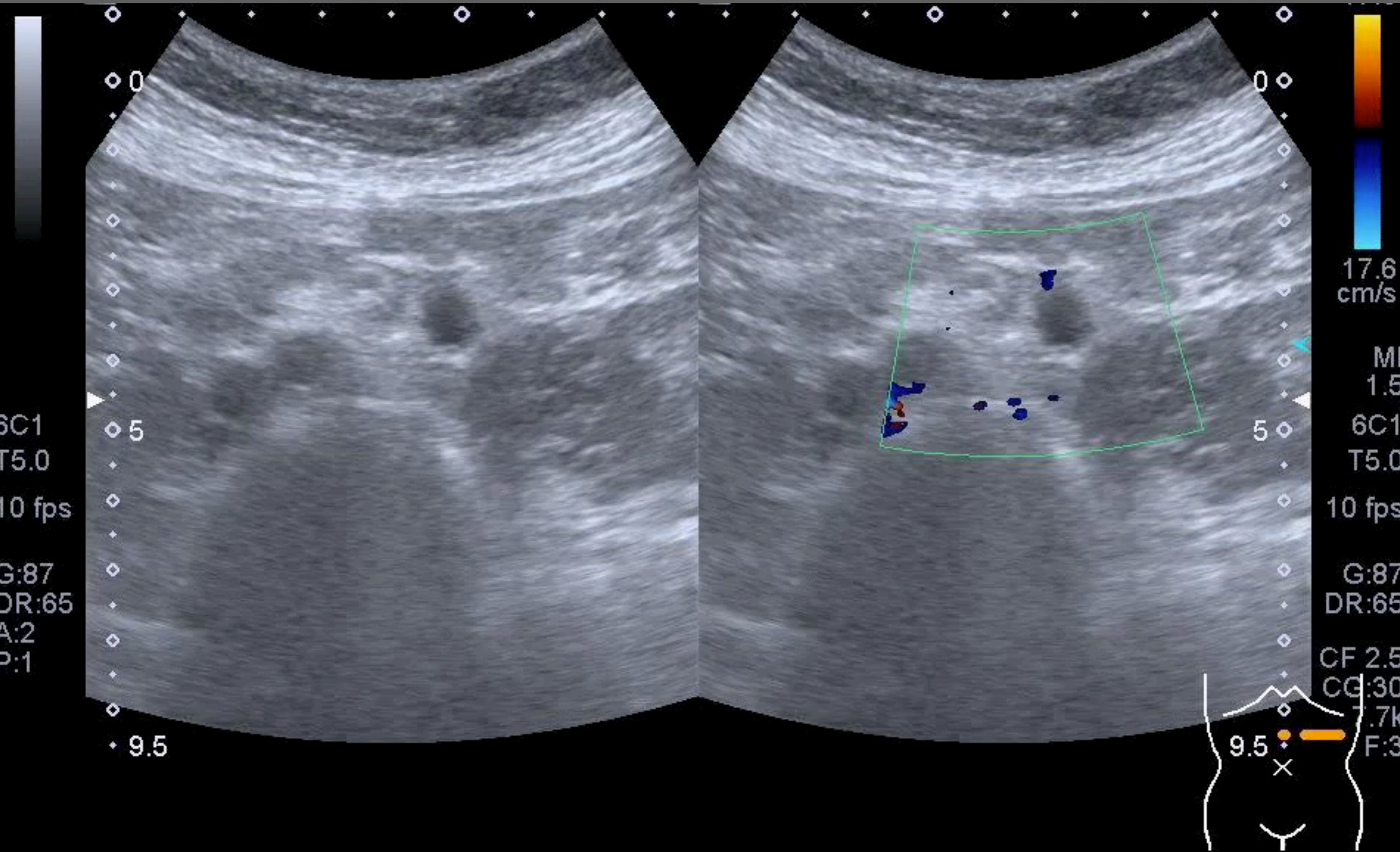
Transverse (medial to colon)



Rotation



Twinkling artifact



51M,
RUQ pain

WBC 13000;

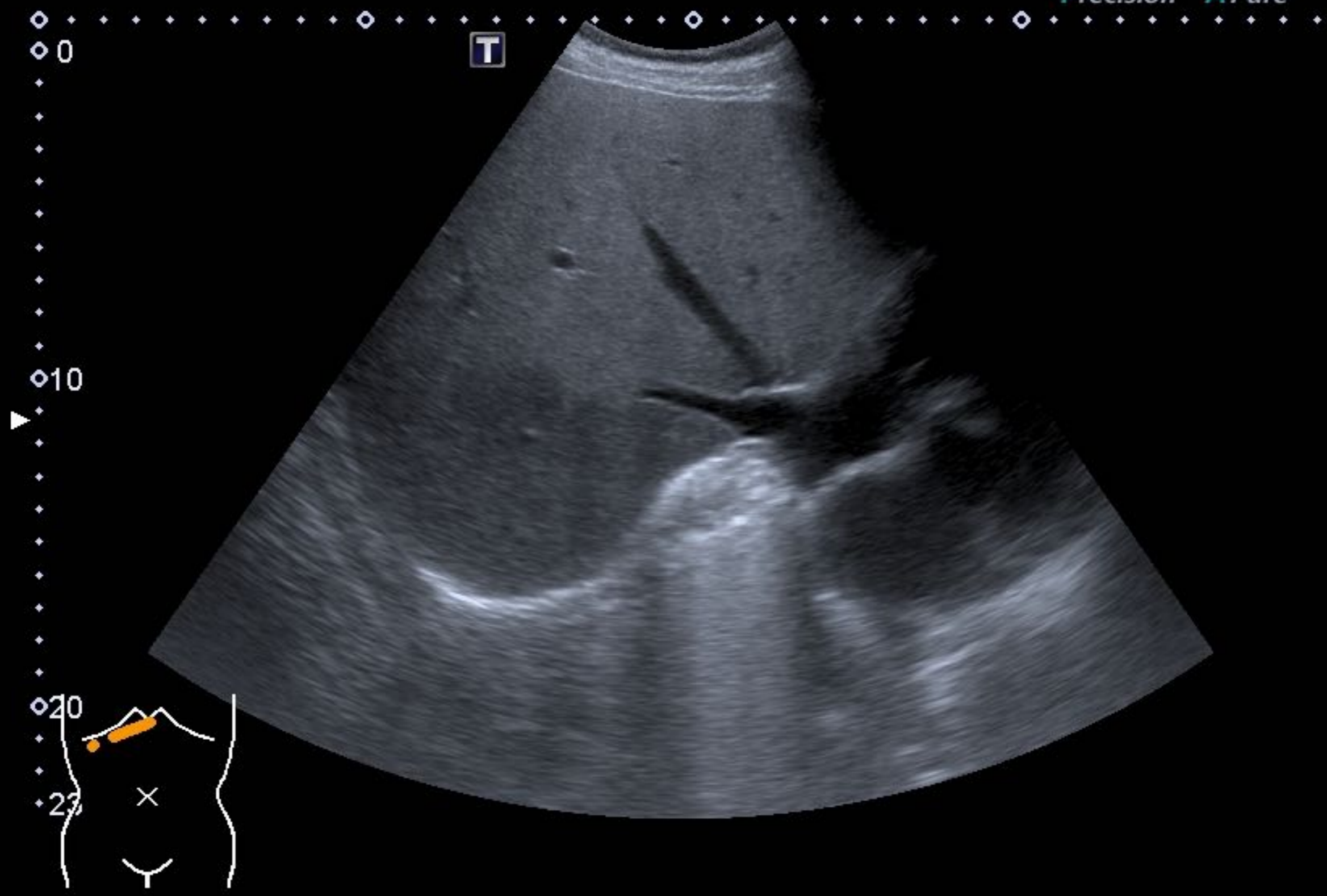
CRP 8.5

R





Precision A Pure



6C1
T5.0
12 fps
G:85
DR:65
A:2
P:1



T

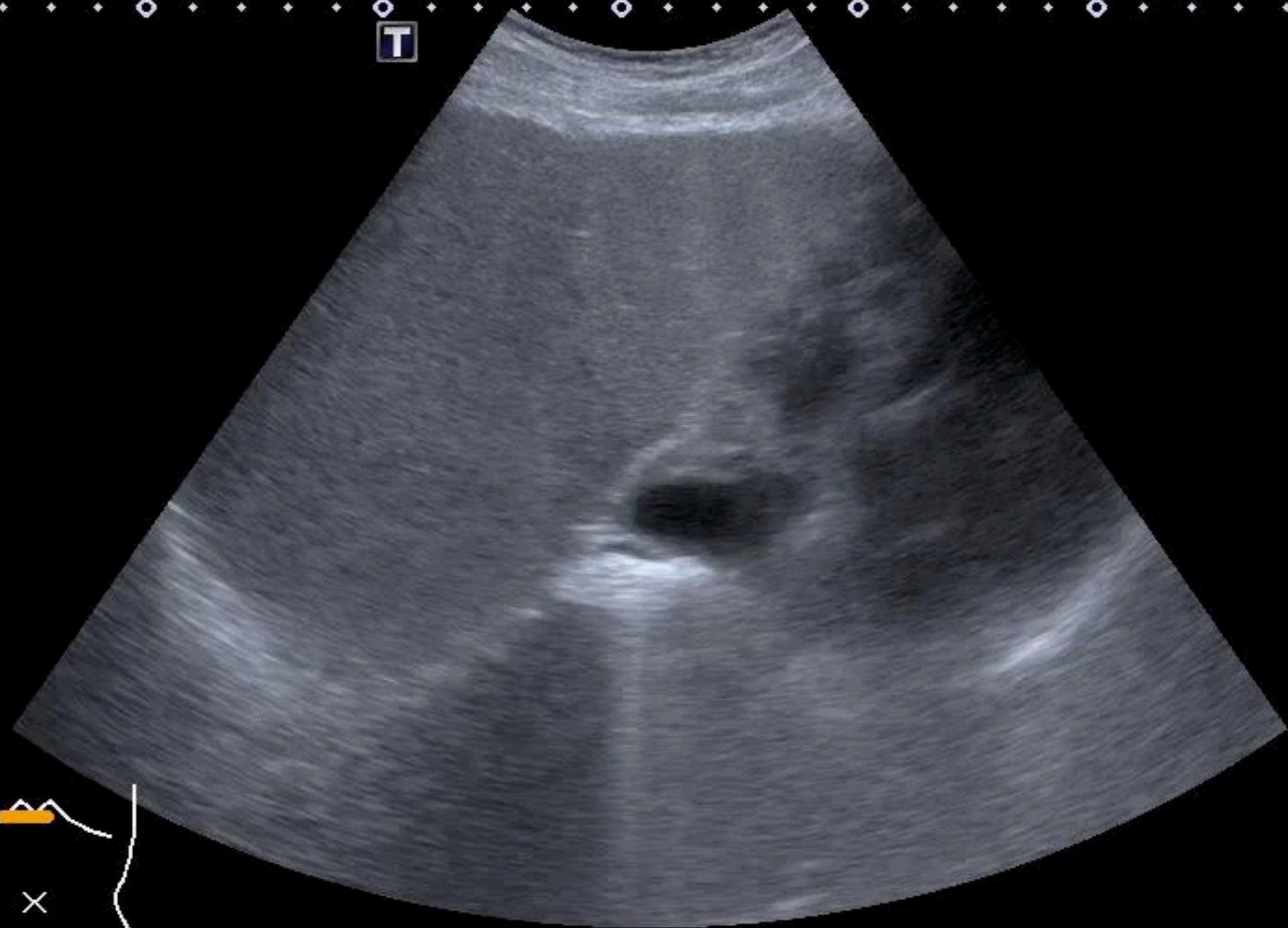
0

5

10

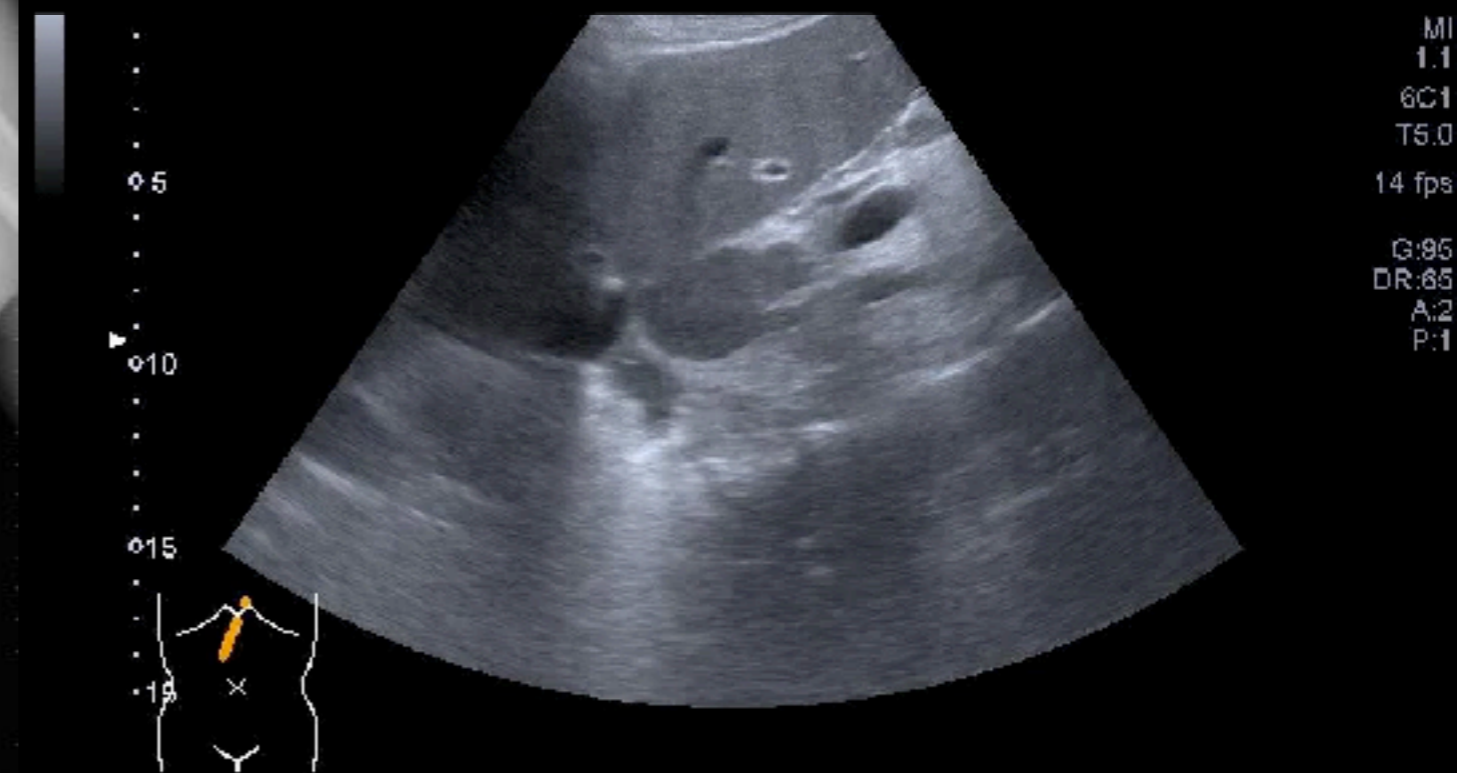
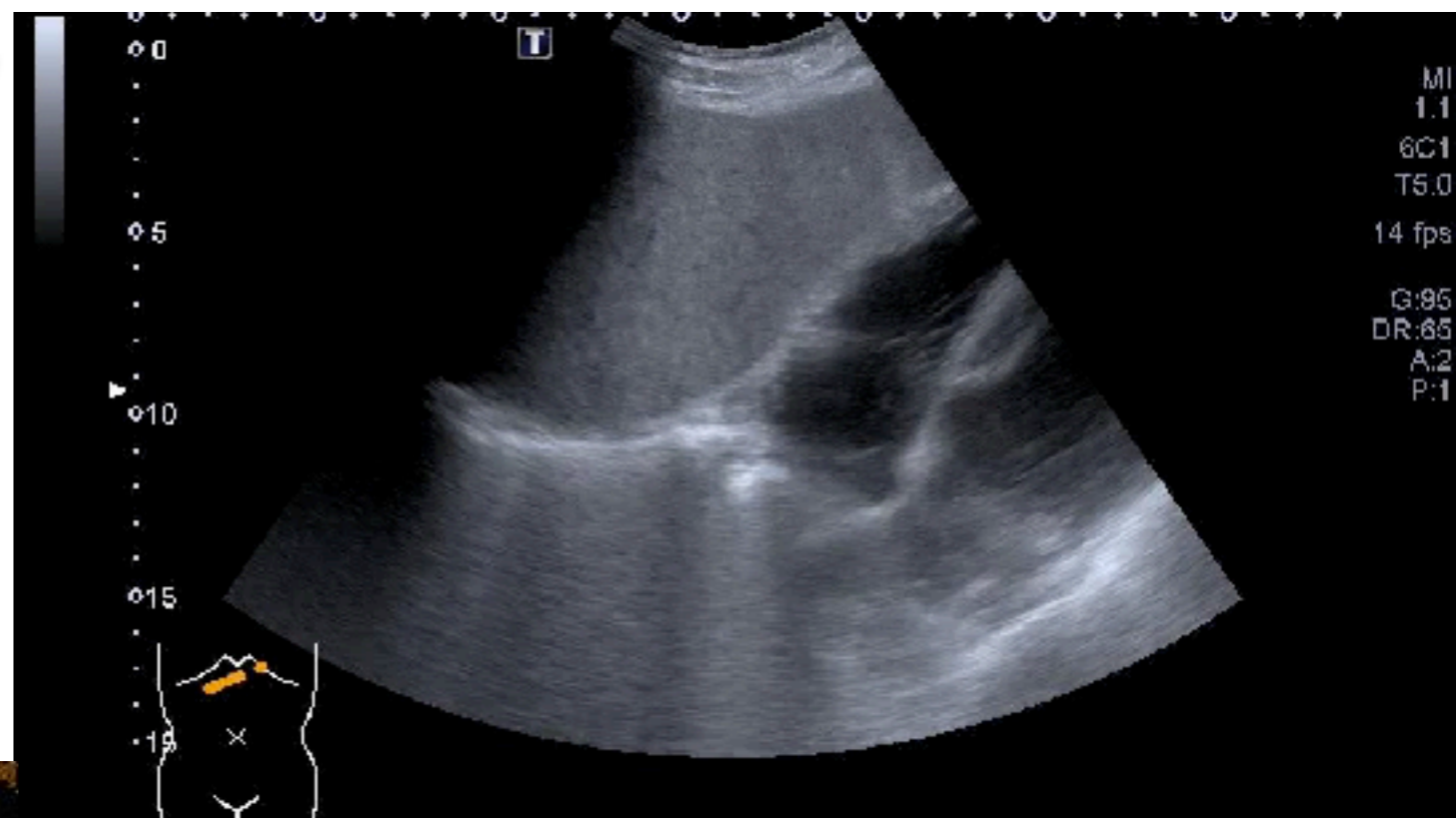
15

18



15
D

2nd WINDOW (肝 & 背)



52M, RUQ pain

Abd Gen2
C5-1
31 Hz
17.0cm

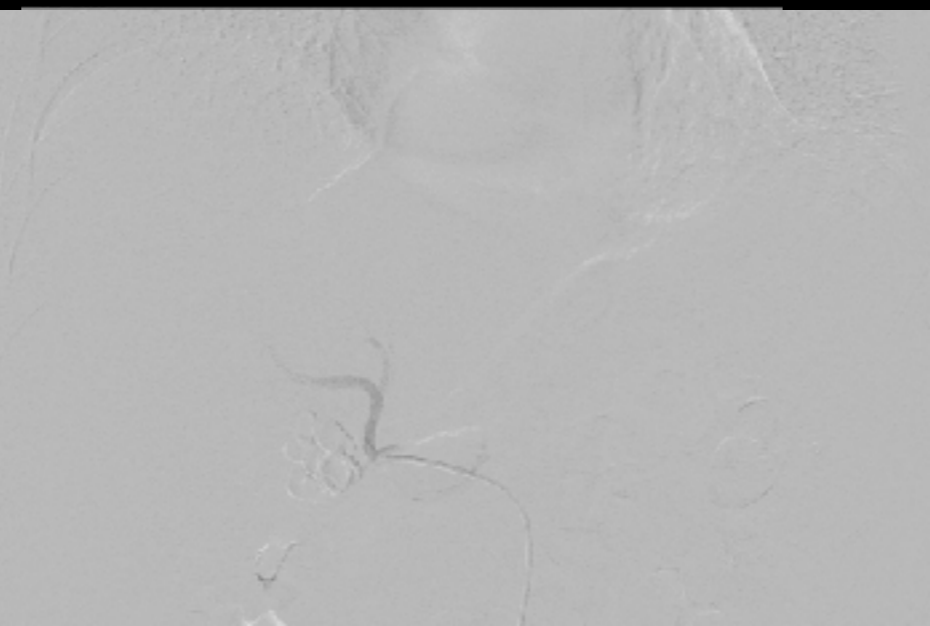
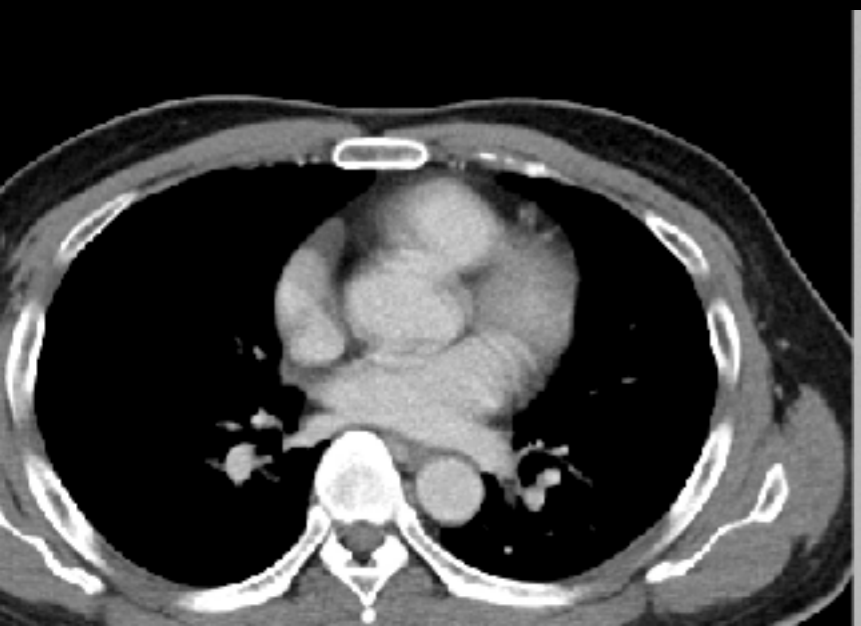
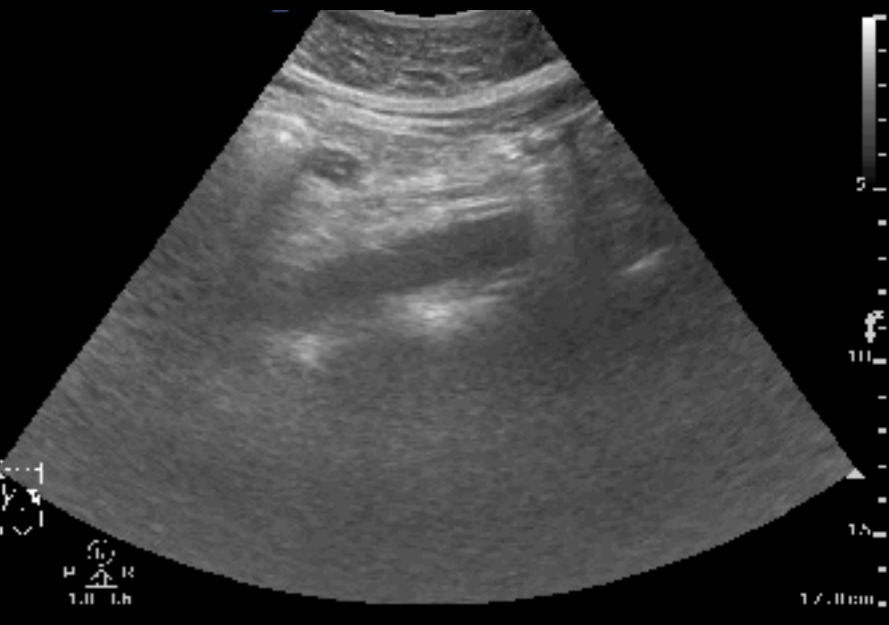
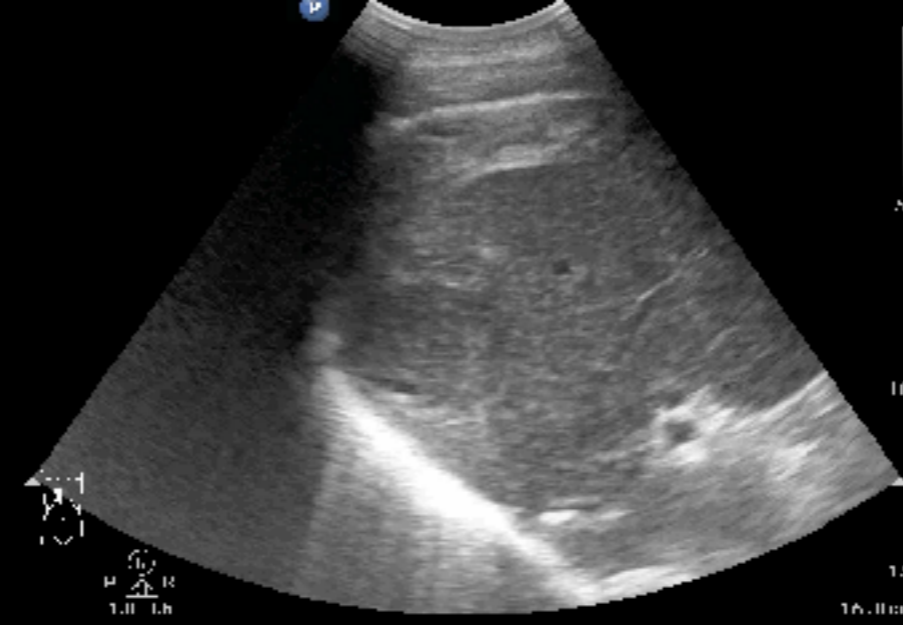
2D

HGen
Gn 86
C 56
3/3/3



G
P R
1.8 3.6

17.0cm



Premature closure

Abd Gen2
C5-1
31 Hz
17.0cm

2D

HGen
Gn 86
C 56
3 / 3 / 3



G
P R
1.8 3.6

17.0cm



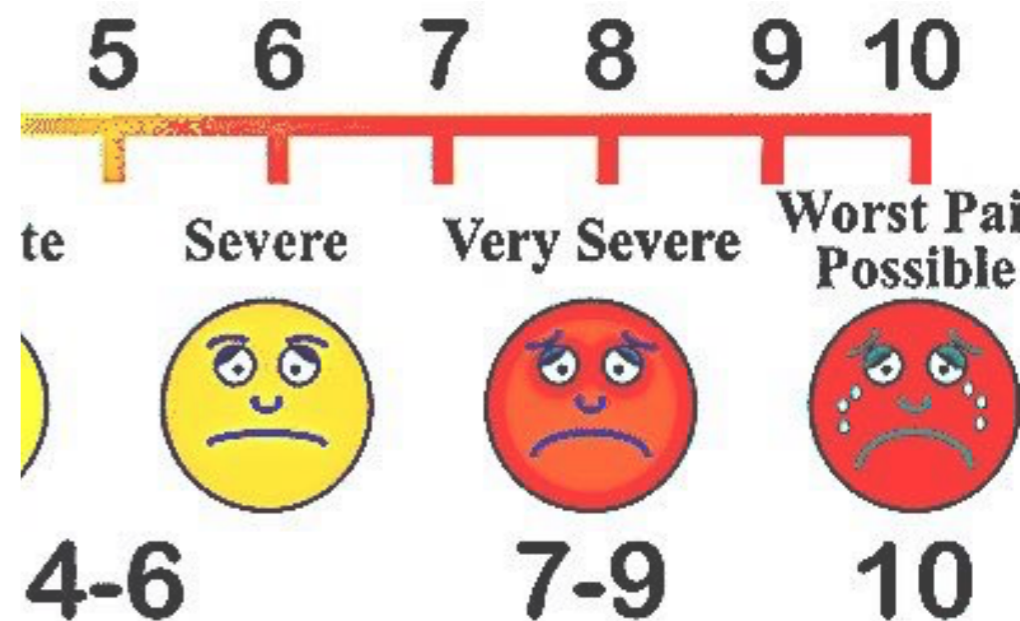
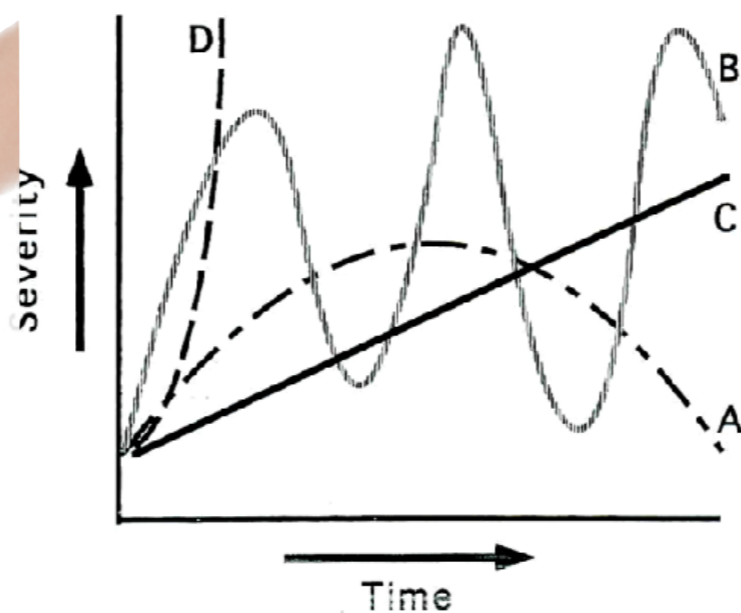
病史詢問



POCUS



理學檢查



POCUS

for

Acute

ABDOMEN

A for aorta

B for biliary

D for diaphragm

O for bowel obstruction

M for moving fluid & air

E for ectopic pregnancy

N for nephropathy



POCUS幫你【透視】急性腹痛

