

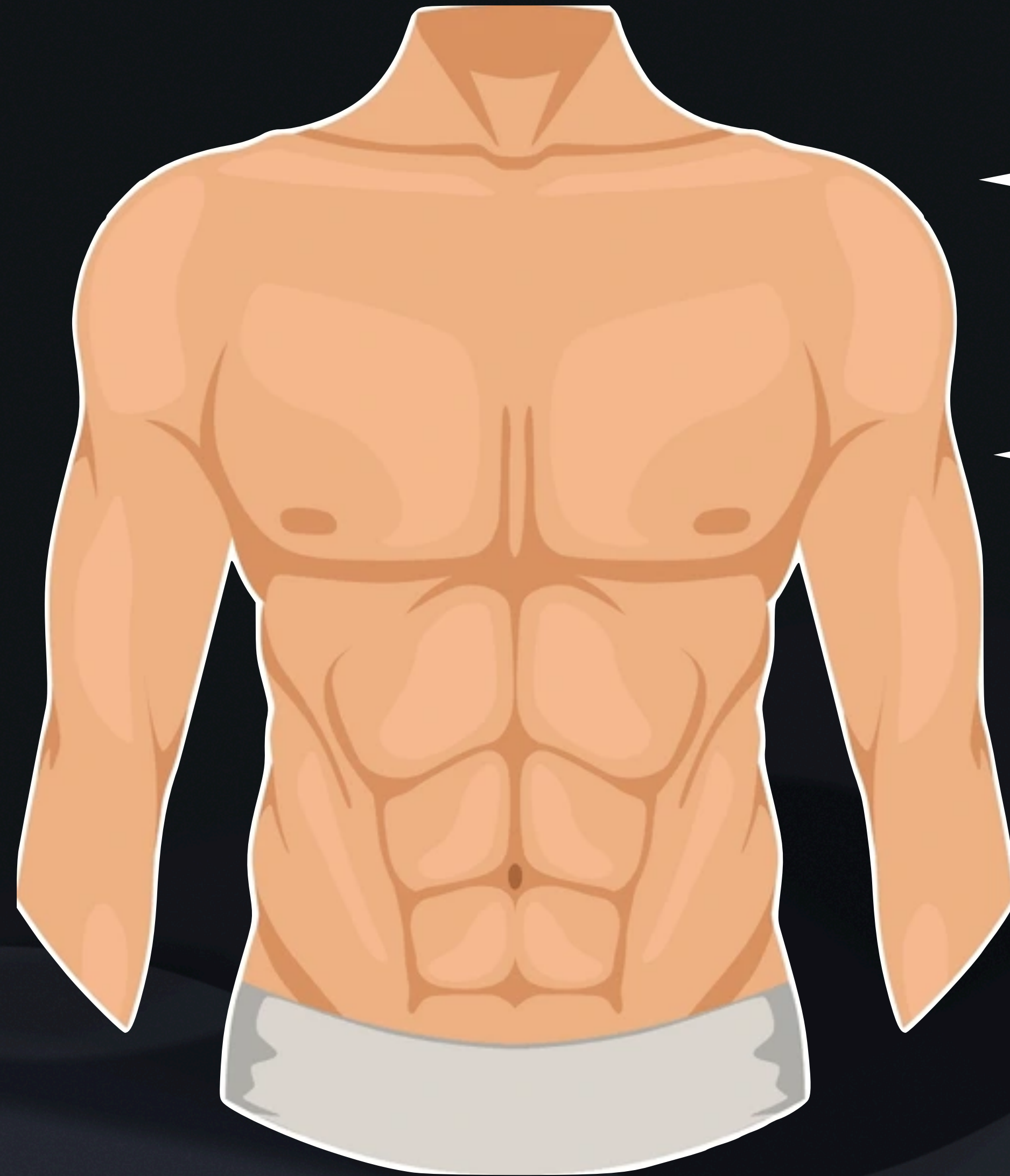


Korawee Khachornwattanakul, M.D. , FTCEP

Emergency Department
Maharaj Nakhon Si Thammarat Hospital

E-FAST

Extended –Focused assessment sonography for Trauma



Pneumothorax

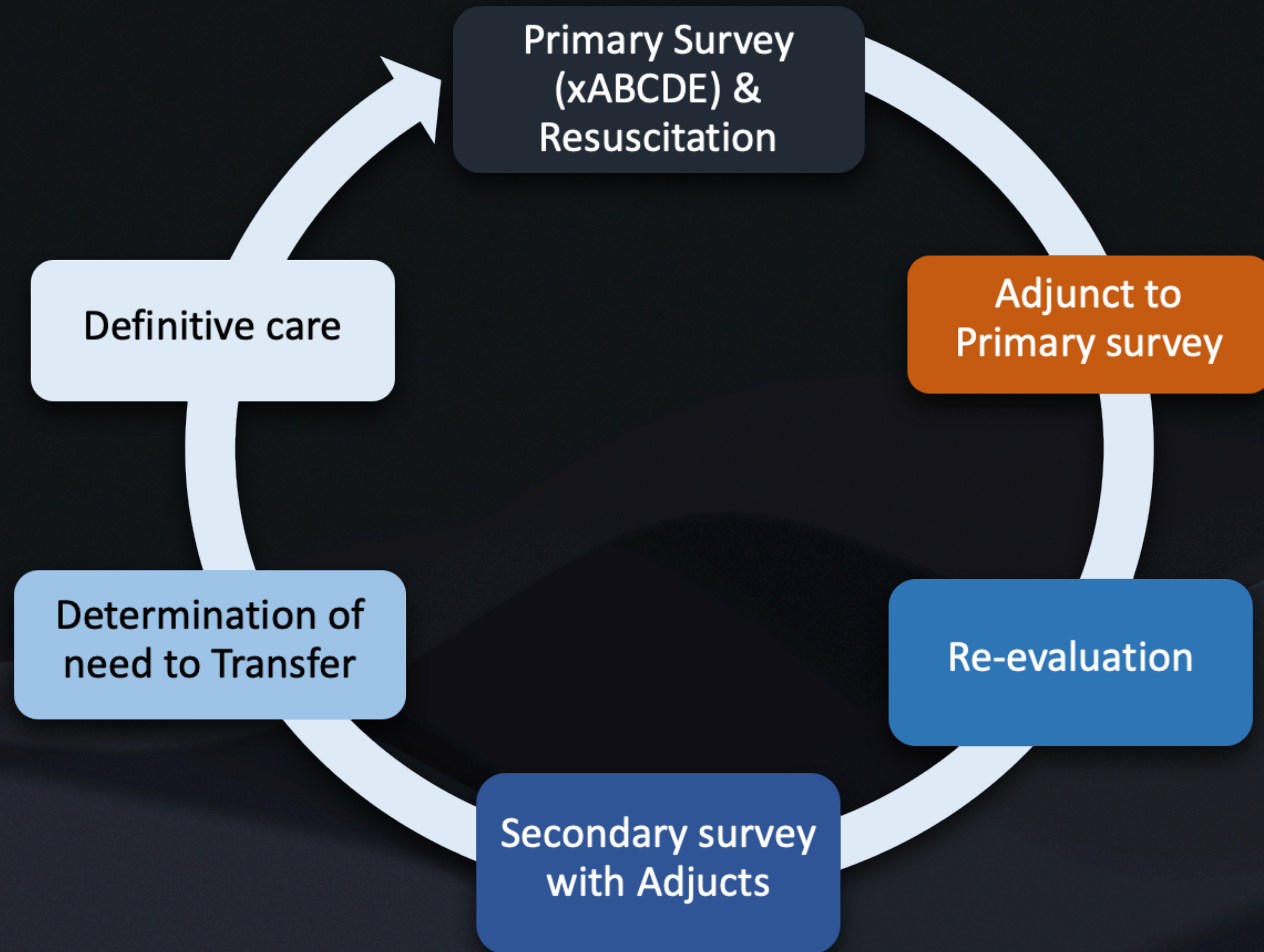
Cardiac tamponade

Hemoperitoneum

Indication

- Abnormal hemodynamics in blunt abdominal injury
- Penetrating thoracoabdominal trauma without other indication in immediate laparotomy

ATLS



- ECG monitoring
- SpO₂, EtCO₂, ABG
- **E-FAST**
- CXR, film Pelvis
- IV /IO access
- Splint, Spinal motion restriction

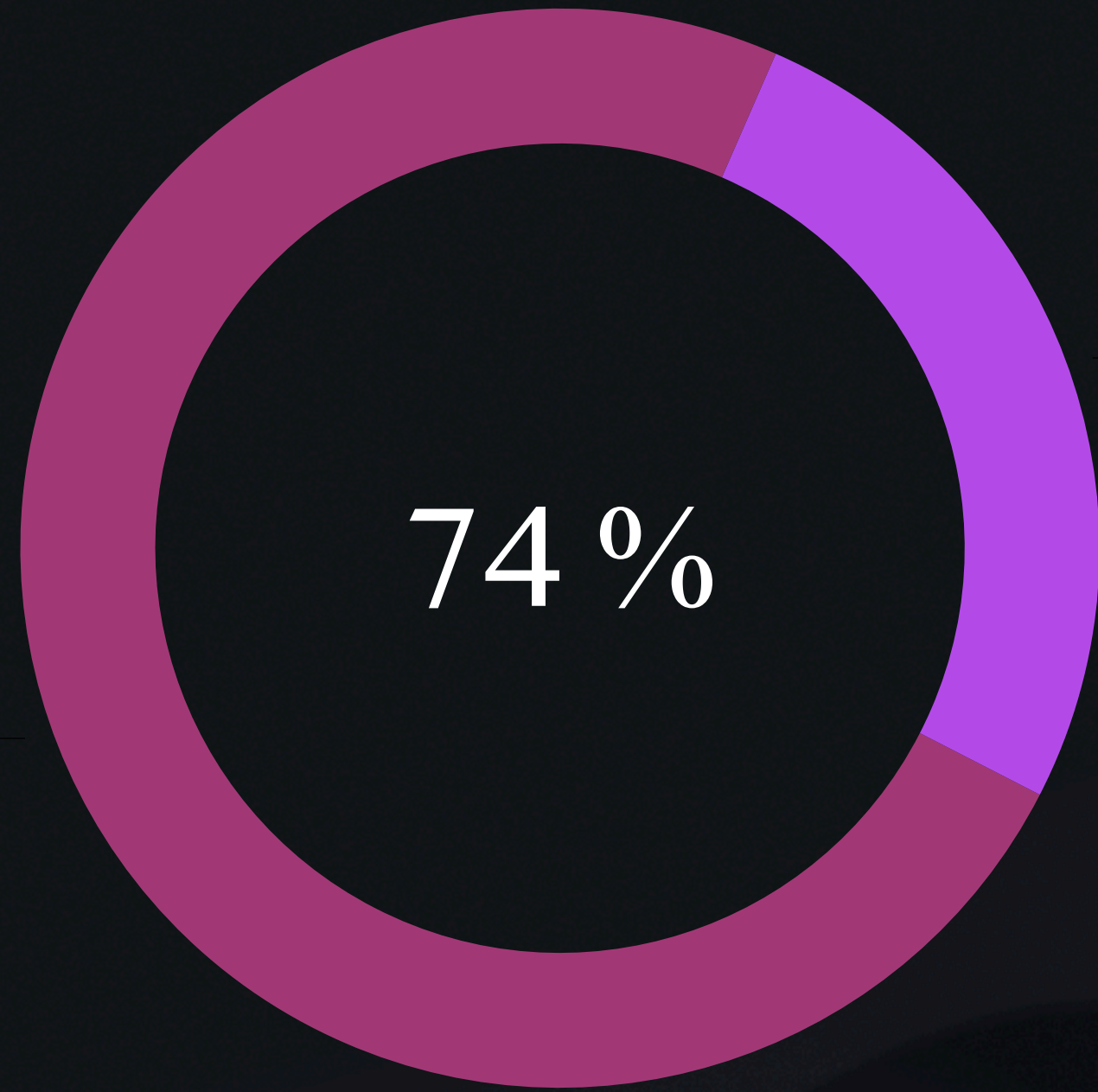
FAST

Advantage

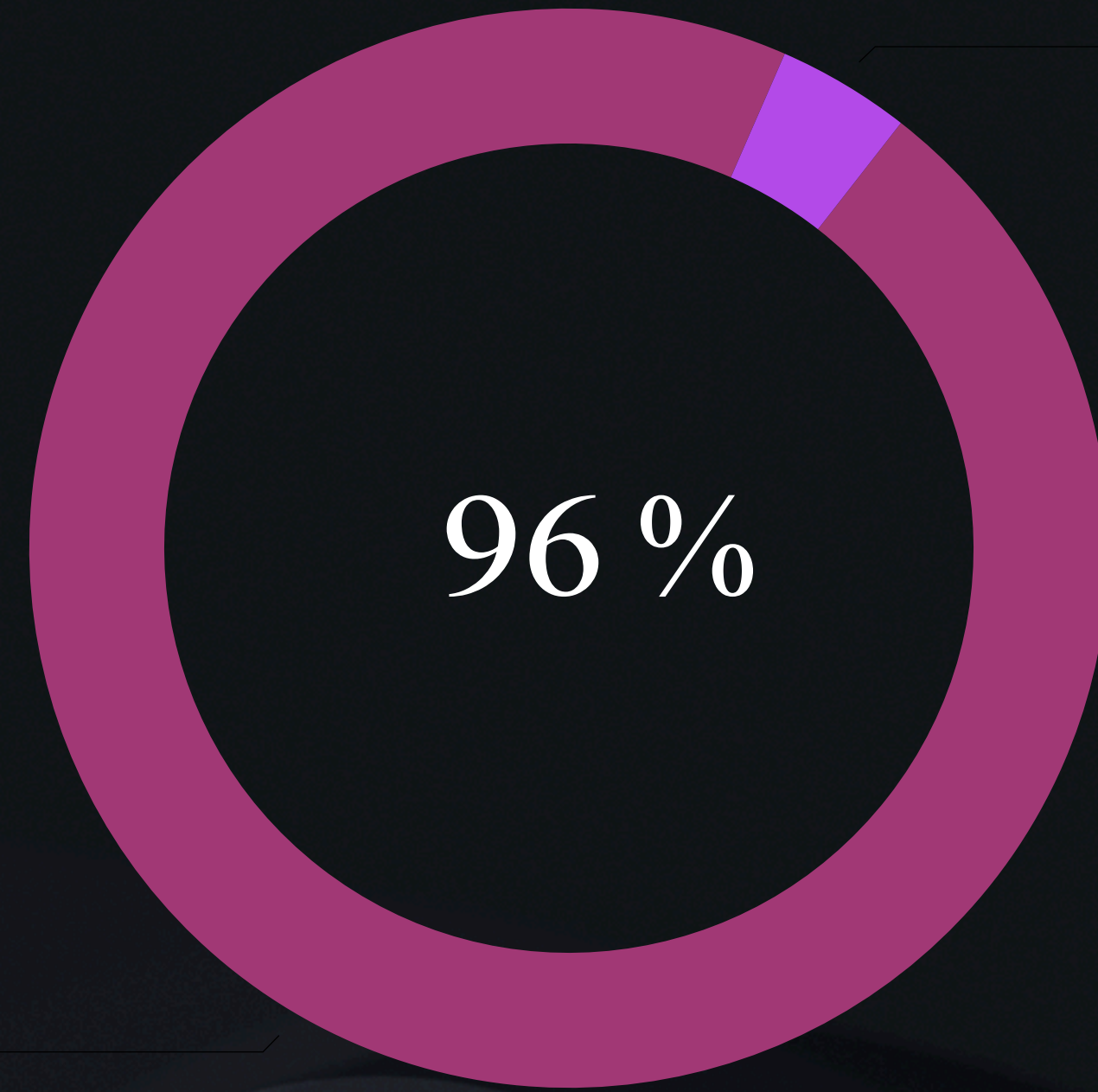
- Early operative
- Performed rapidly
- Non invasive
- Repeatable
- No need to transport from resuscitation area

Disadvantage

- Operator dependent
- Bowel gas and subcutaneous discord images
- Can miss diaphragm, bowel and pancreatic injury
- Not completely assess retroperitoneal organ
- Not visualize extraluminal air



Sensitivity

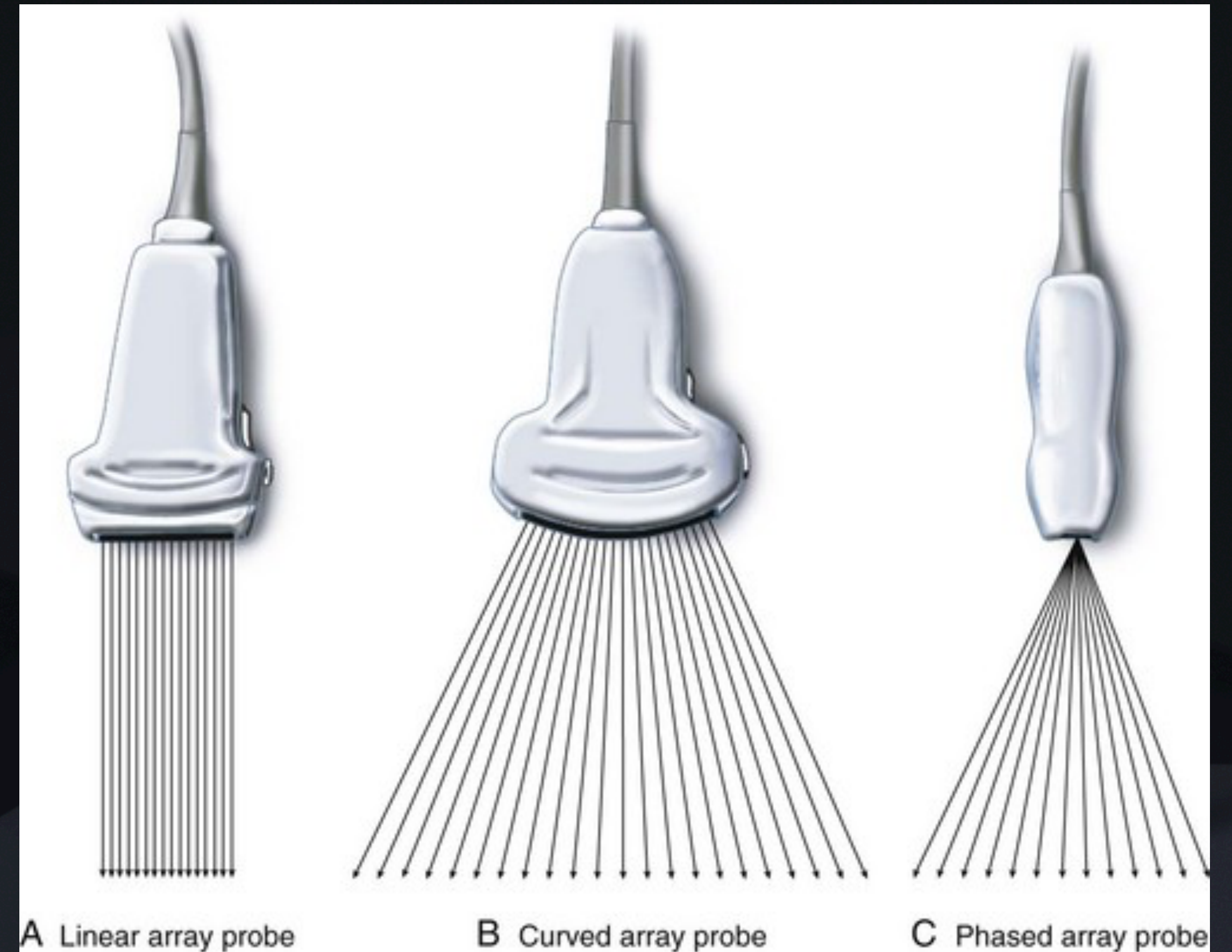


Specificity

Probe selection

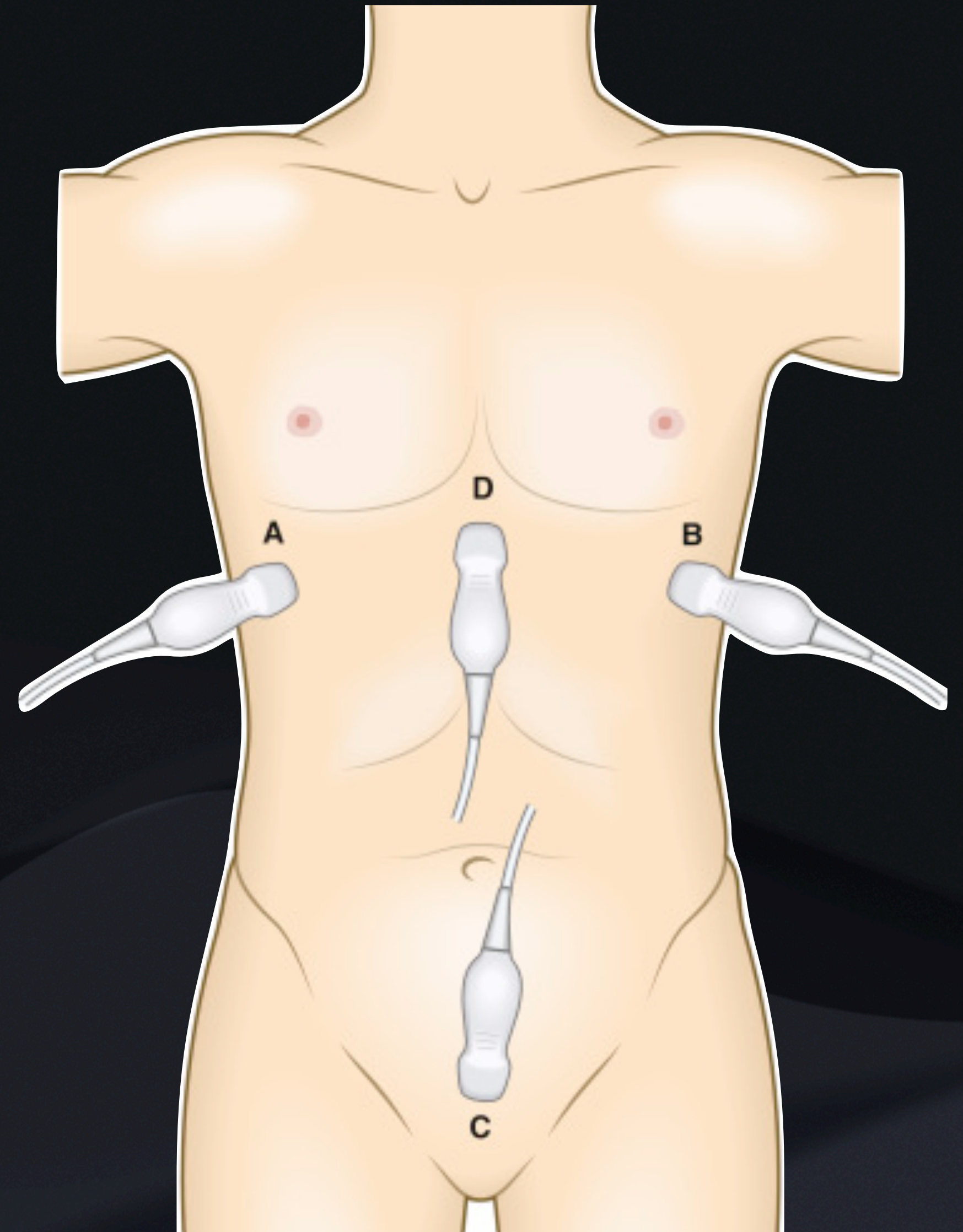
A low frequency probe

- Curvilinear (3-5 MHz)
- Phase array (3-4.5 MHz)



Position

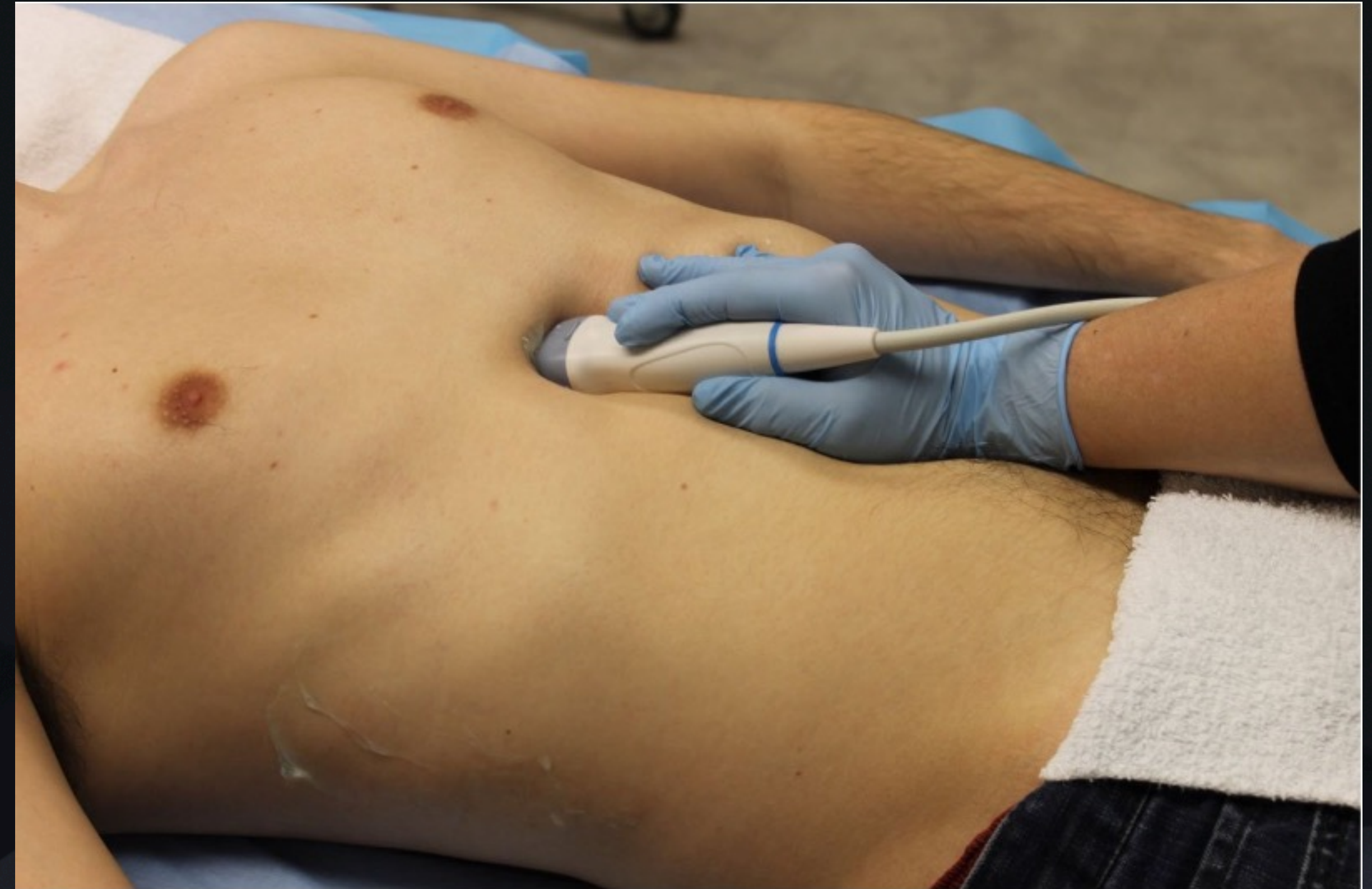
- Pericardium
- RUQ
- LUQ
- Pelvic
- Pleura



Pericardium

Transverse orientation just inferior to the xyphoid process

If xyphoid view is difficult to obtain, the PLAX view can be used

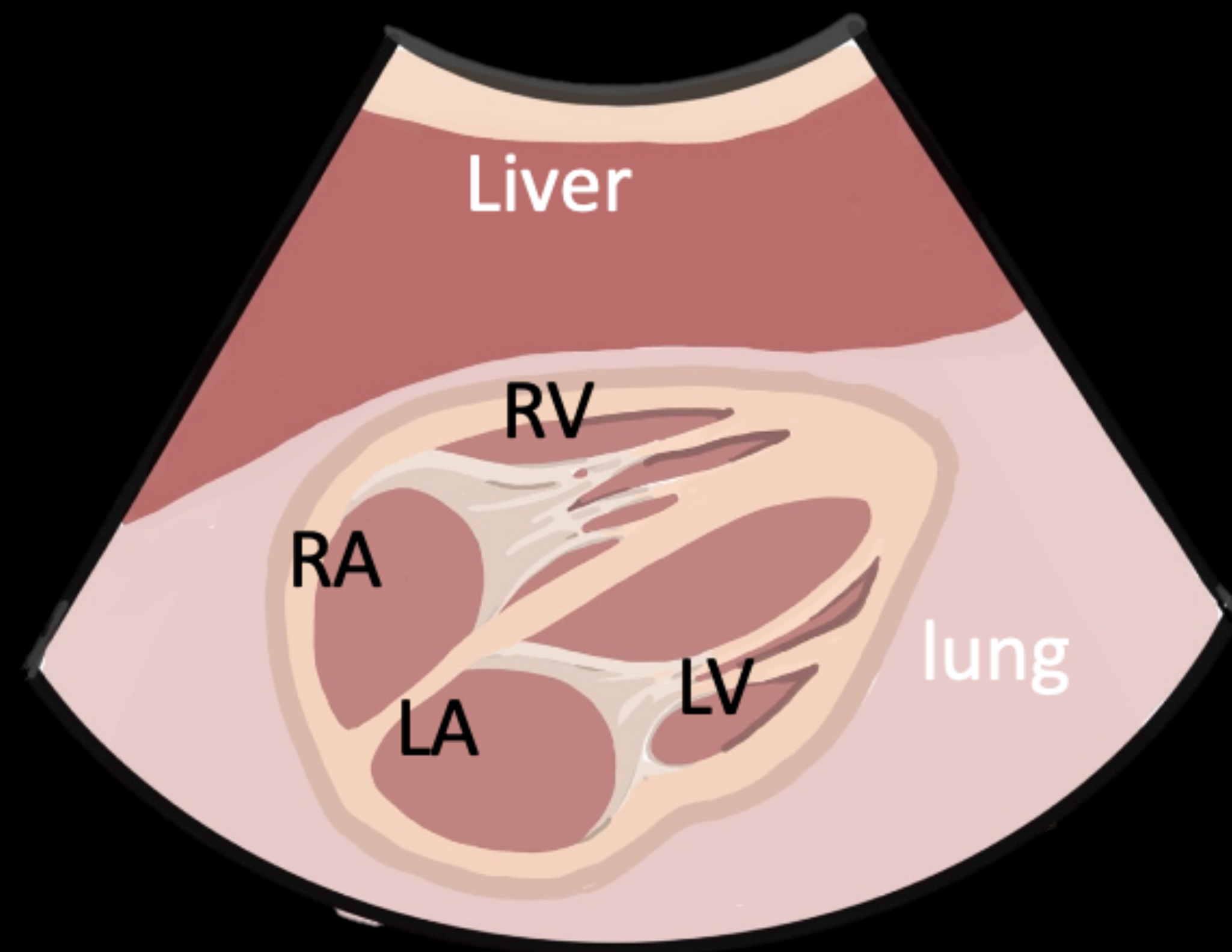
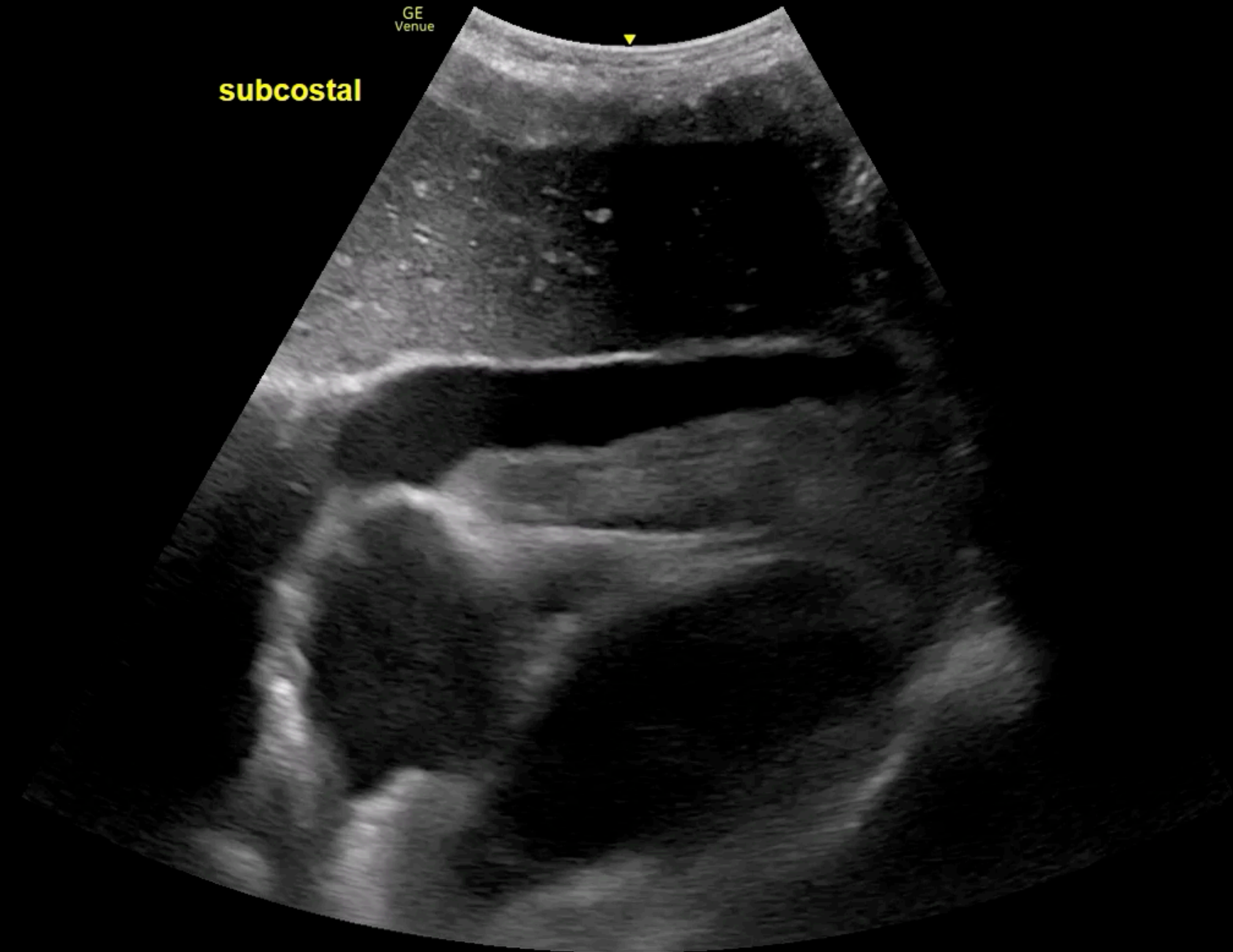


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02/04/2025 11:47:38

C1-5
*** Abdomen

GE
Venue

subcostal

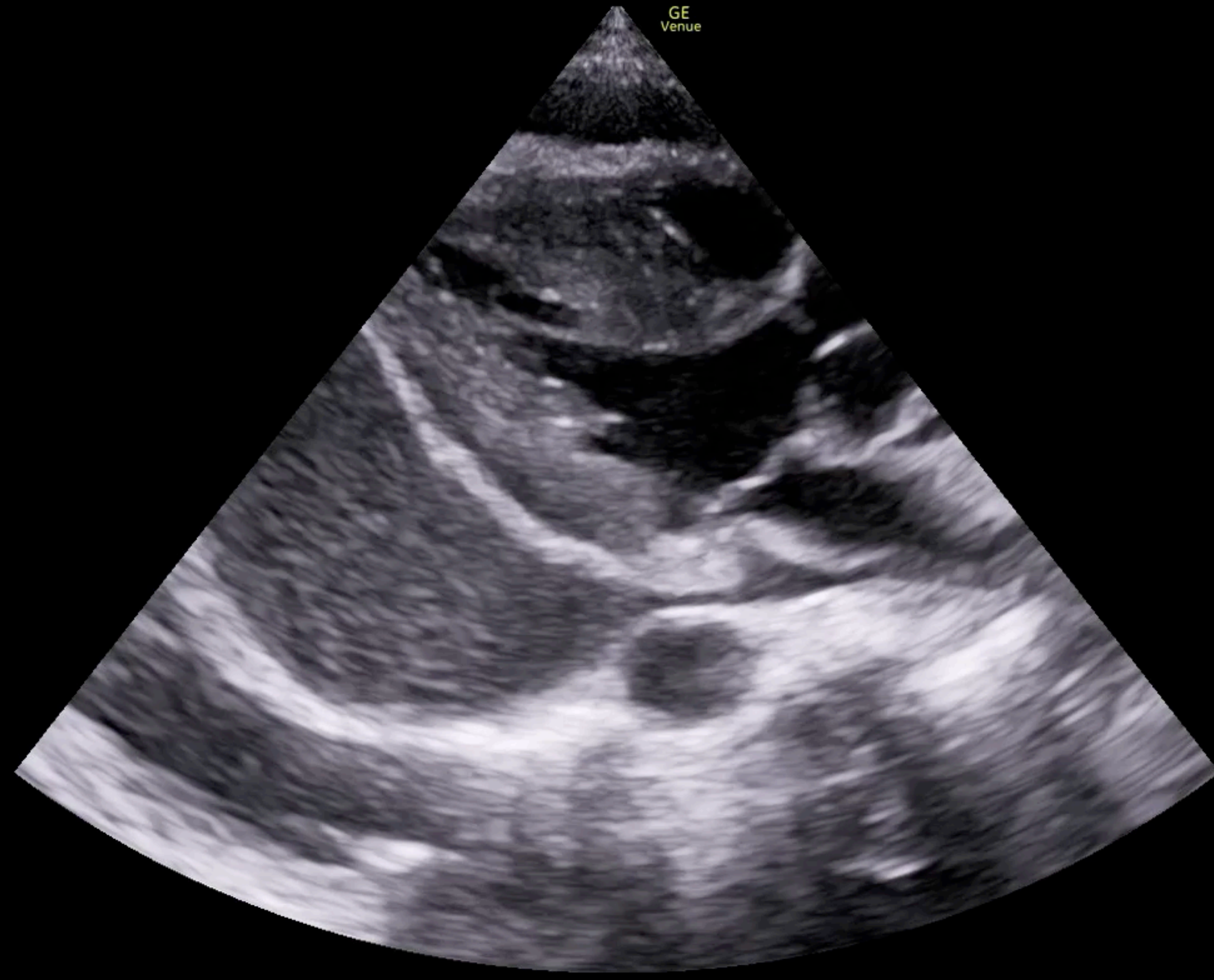


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15/04/2025 16:18:26

3Sc
*** Cardiac

MI 1.4
TI 0.6

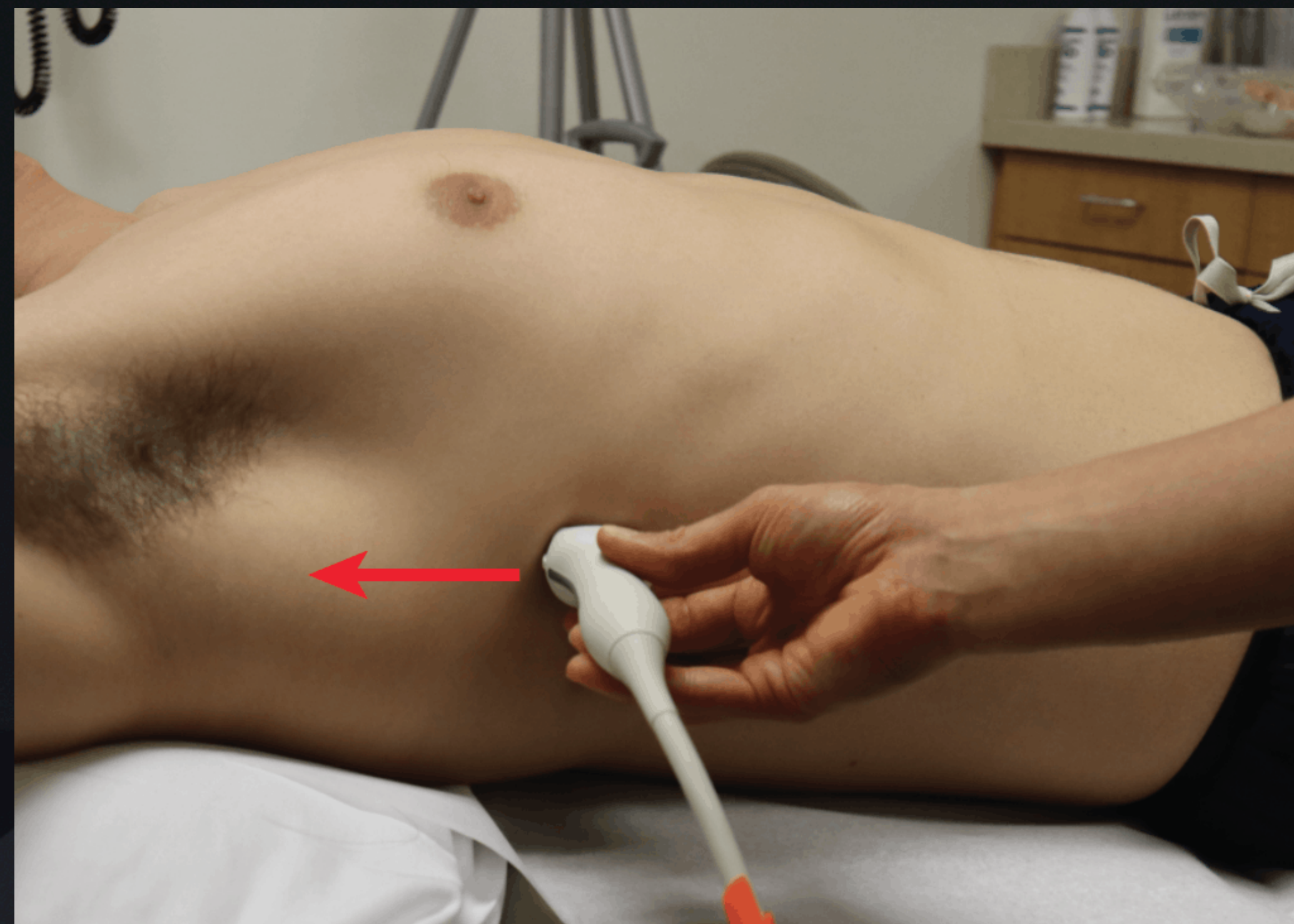
GE
Venue

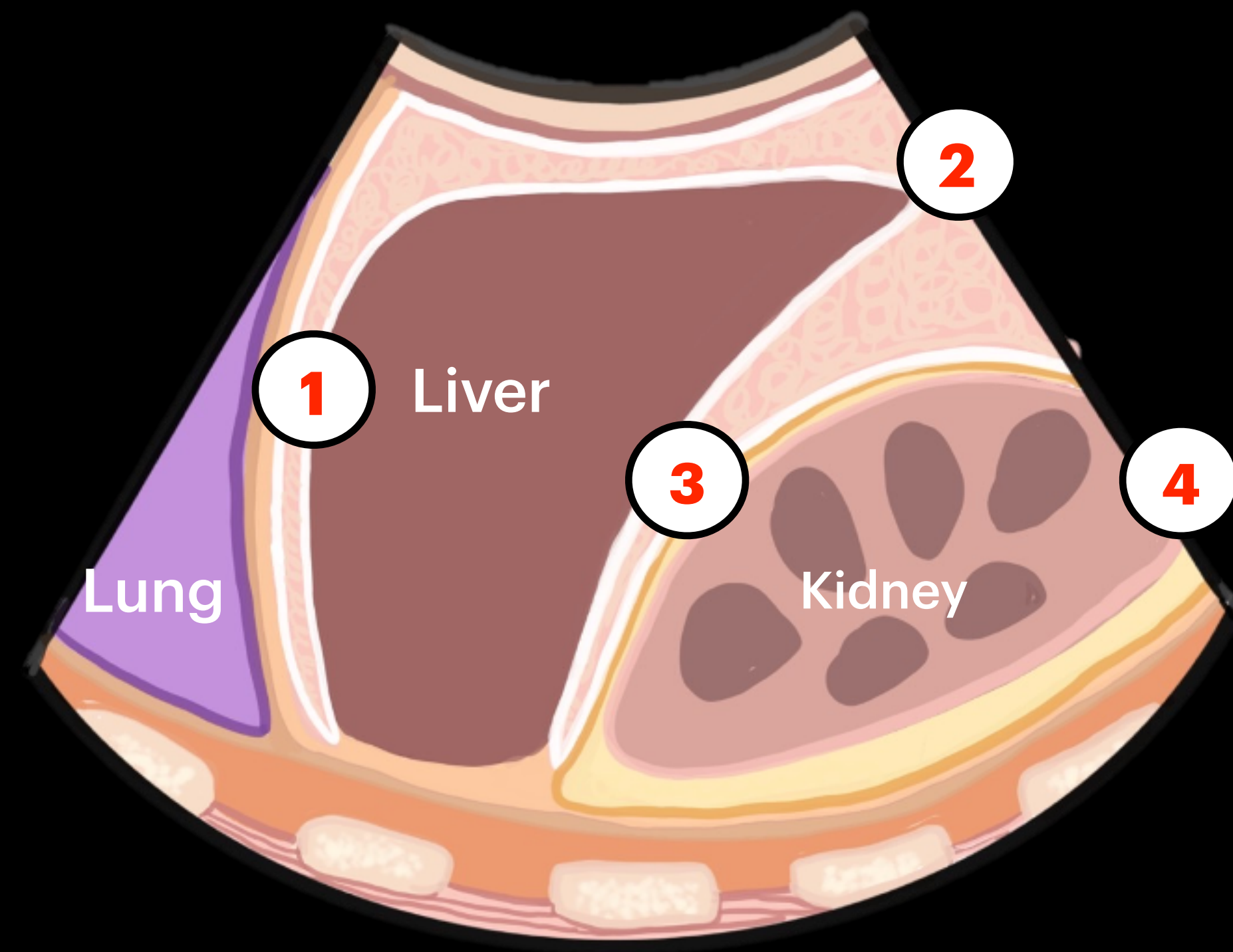


RUQ

Anterior to the right mid-axillary line
between the 7th-8th intercostal spaces

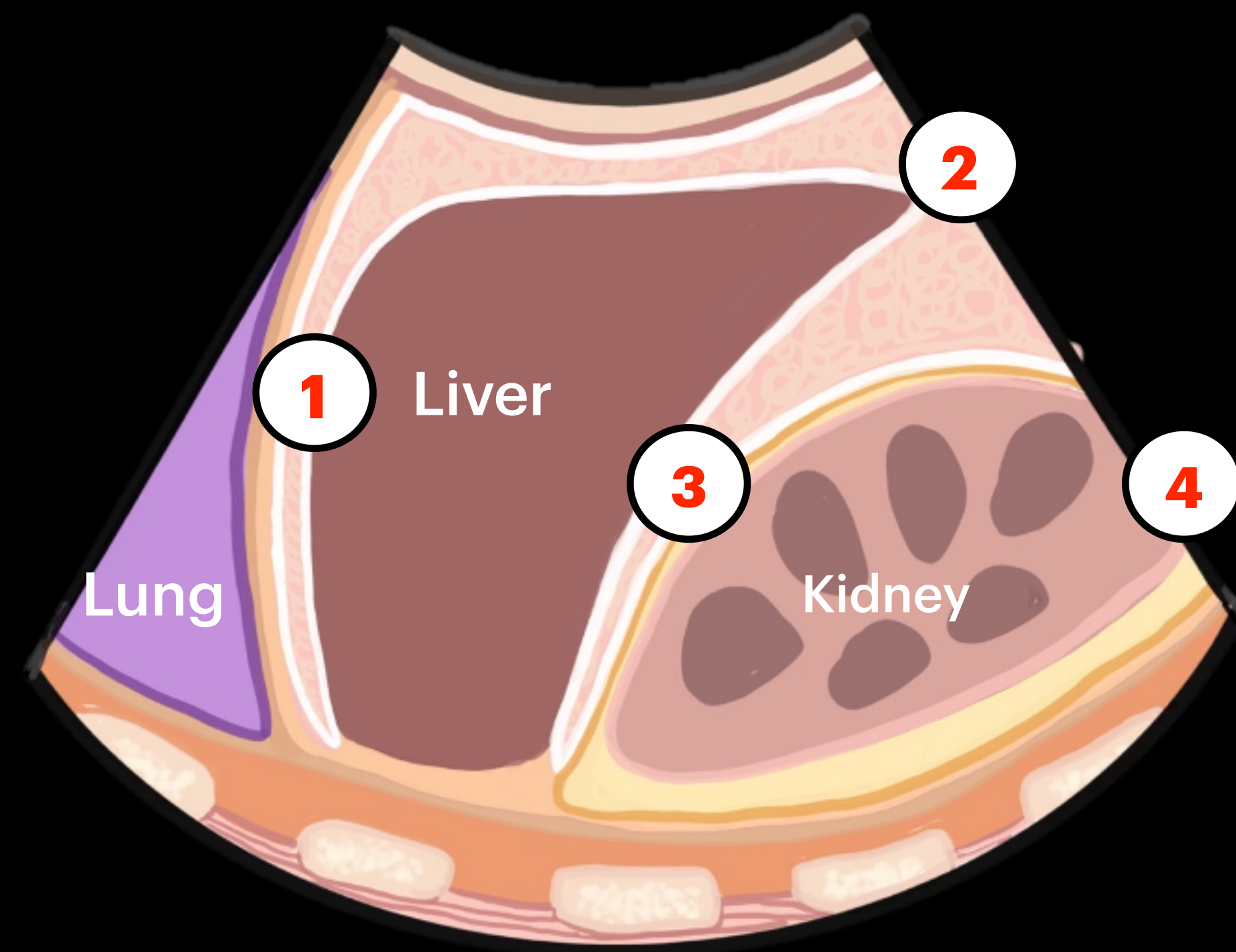
It's the most sensitive view for free
intraperitoneal fluid





Adequate view of RUQ

1. Subphrenic
2. Tip of liver
3. Hepatorenal space (Morison's pouch)
4. Inferior pole of kidney



The **caudal liver edge** and the **superior aspect of the right paracolic gutter** is the most sensitive indicator for free fluid

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07/03/2025 18:39:02

C1-5
*** Abdomen

MI 1.0
TI 0.3

GE
Venue



0

5

10

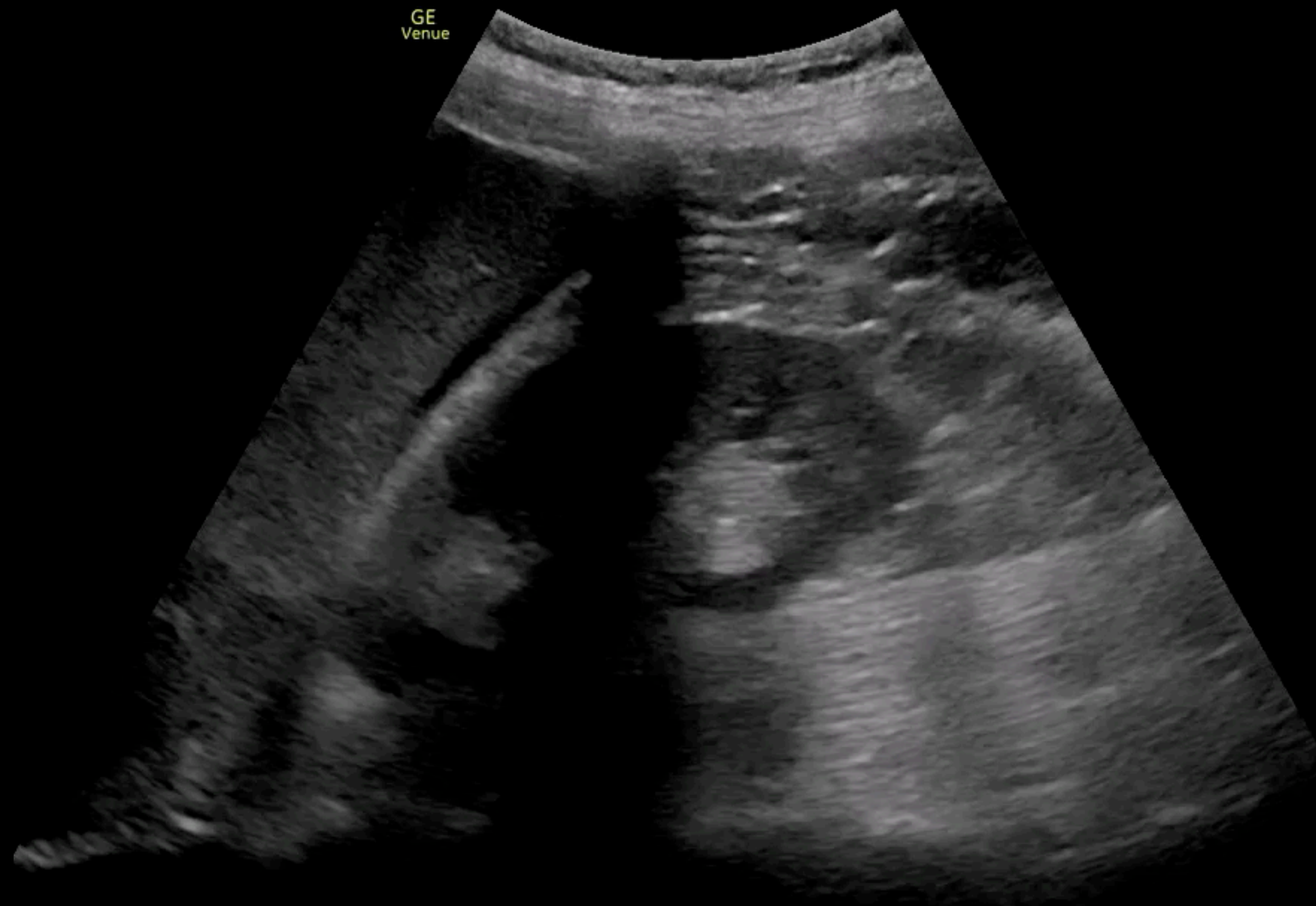
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C1-5
*** eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



0
5
10
15

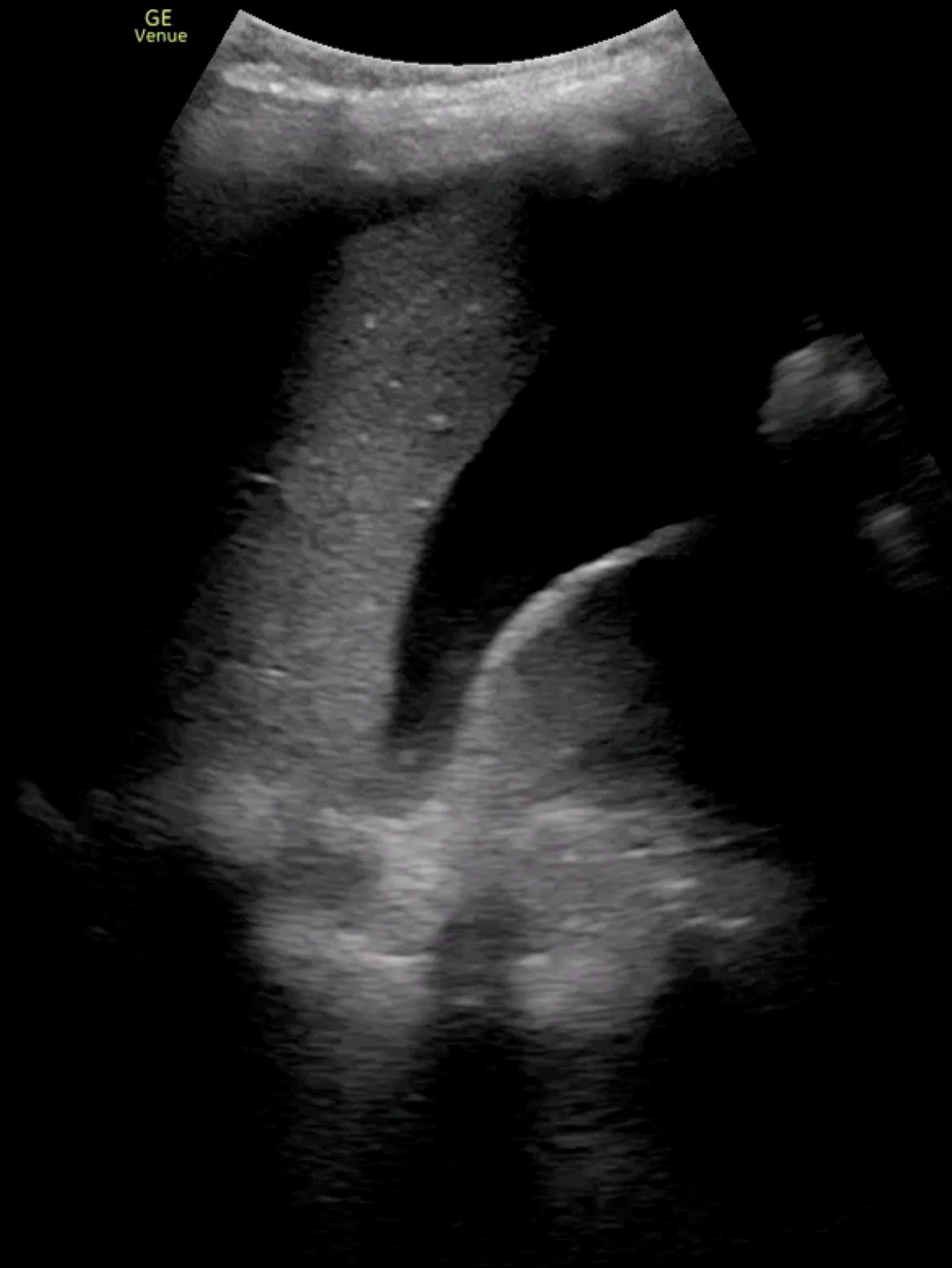
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C1-5
*** Abdomen

MI 1.0
TI 0.3

GE
Venue

Right



0

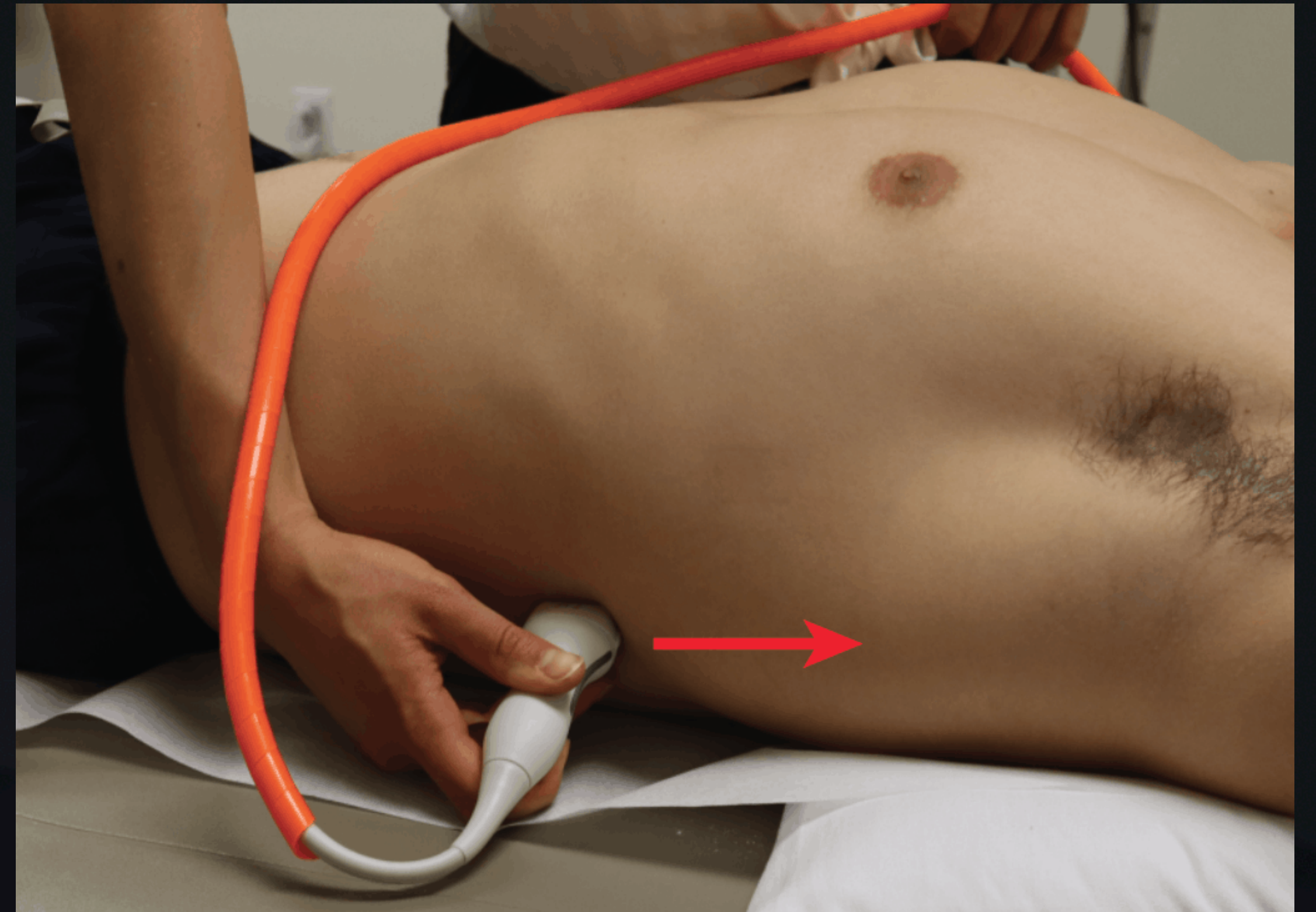
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10

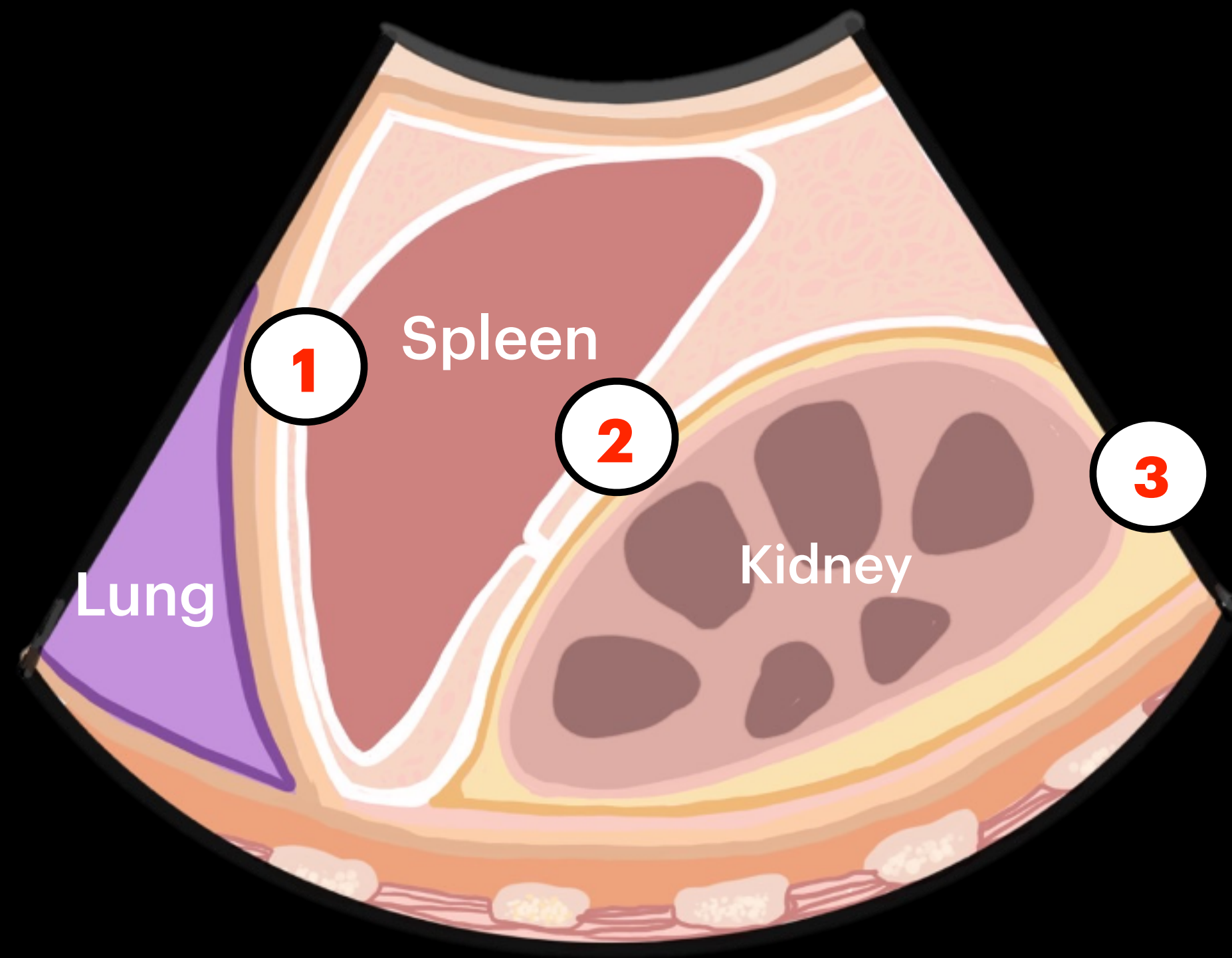
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LUQ

Mid to posterior axillary line
between the 7th–8th intercostal spaces



“Knuckles to the Bed”



Small fluid may be found in **subphrenic space**

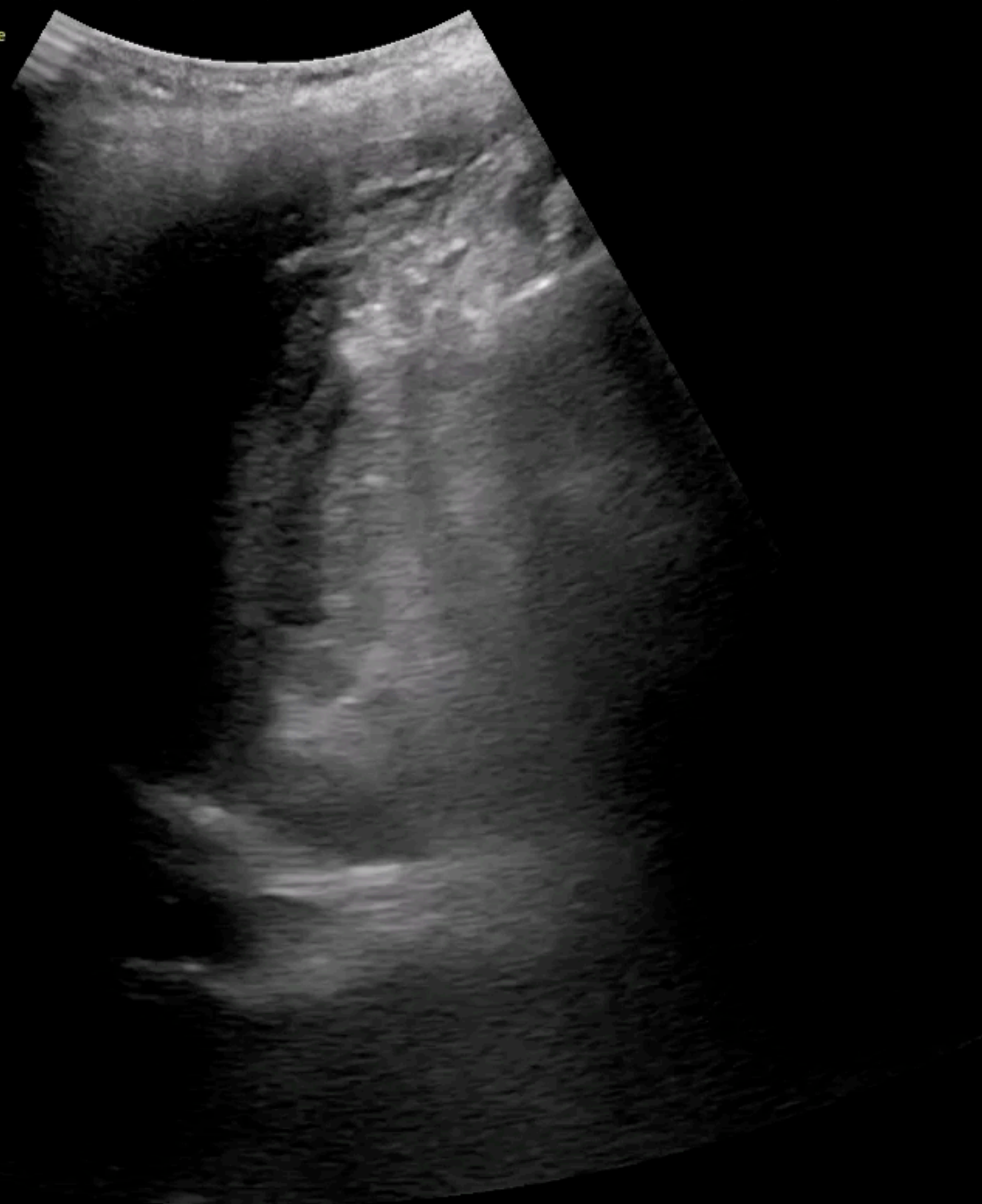
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C1-5
*** Abdomen

MI 1.0
TI 0.3

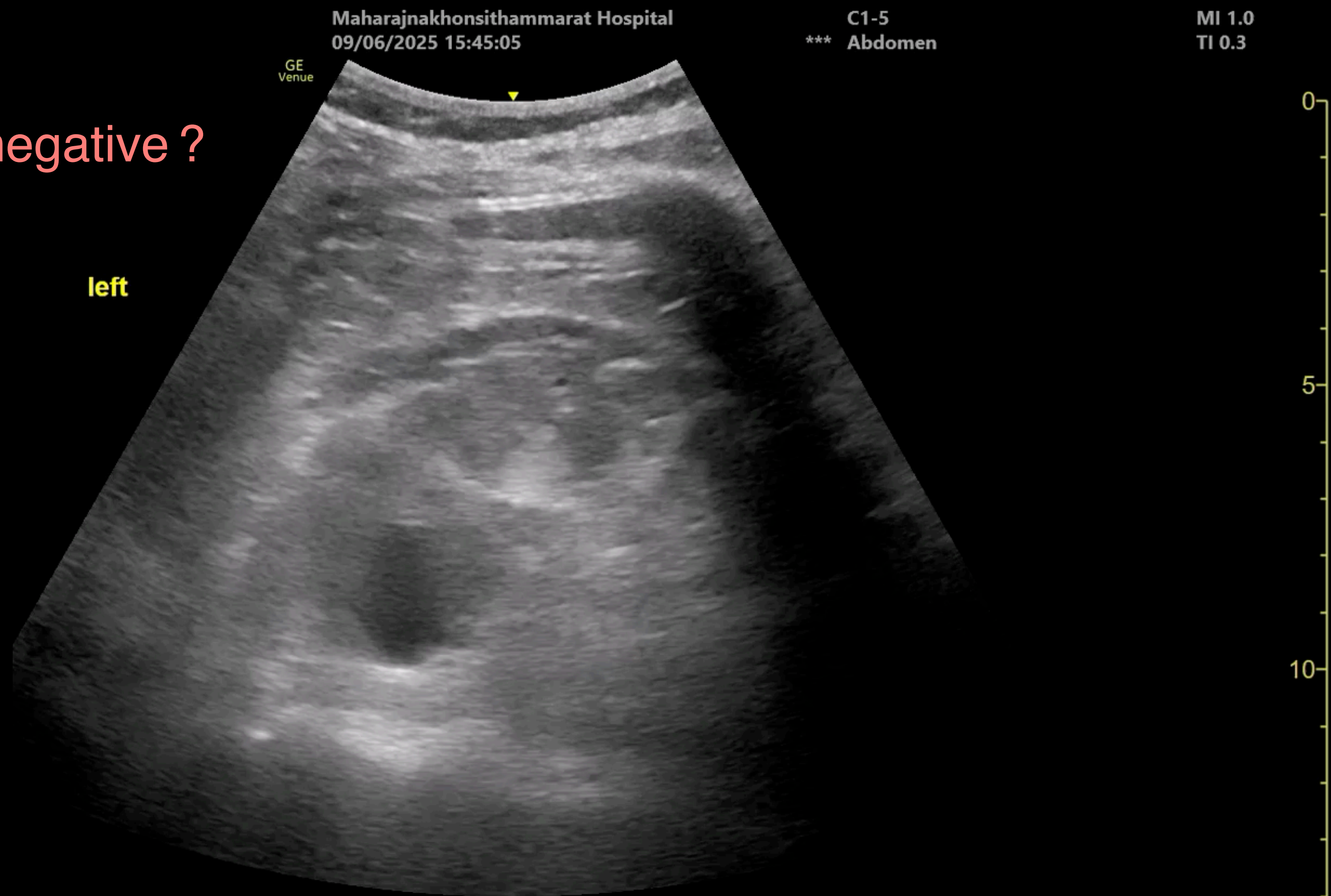
GE
Venue

Left



0
5
10
15

FAST positive or negative ?



The double-line sign (DLS)

- Caused by fascial planes encasing the hypoechoic perinephric fat pad
- It can be found in all ages and there is no correlation between the amount of perinephric fat and patient's BMI
- **False positive finding**

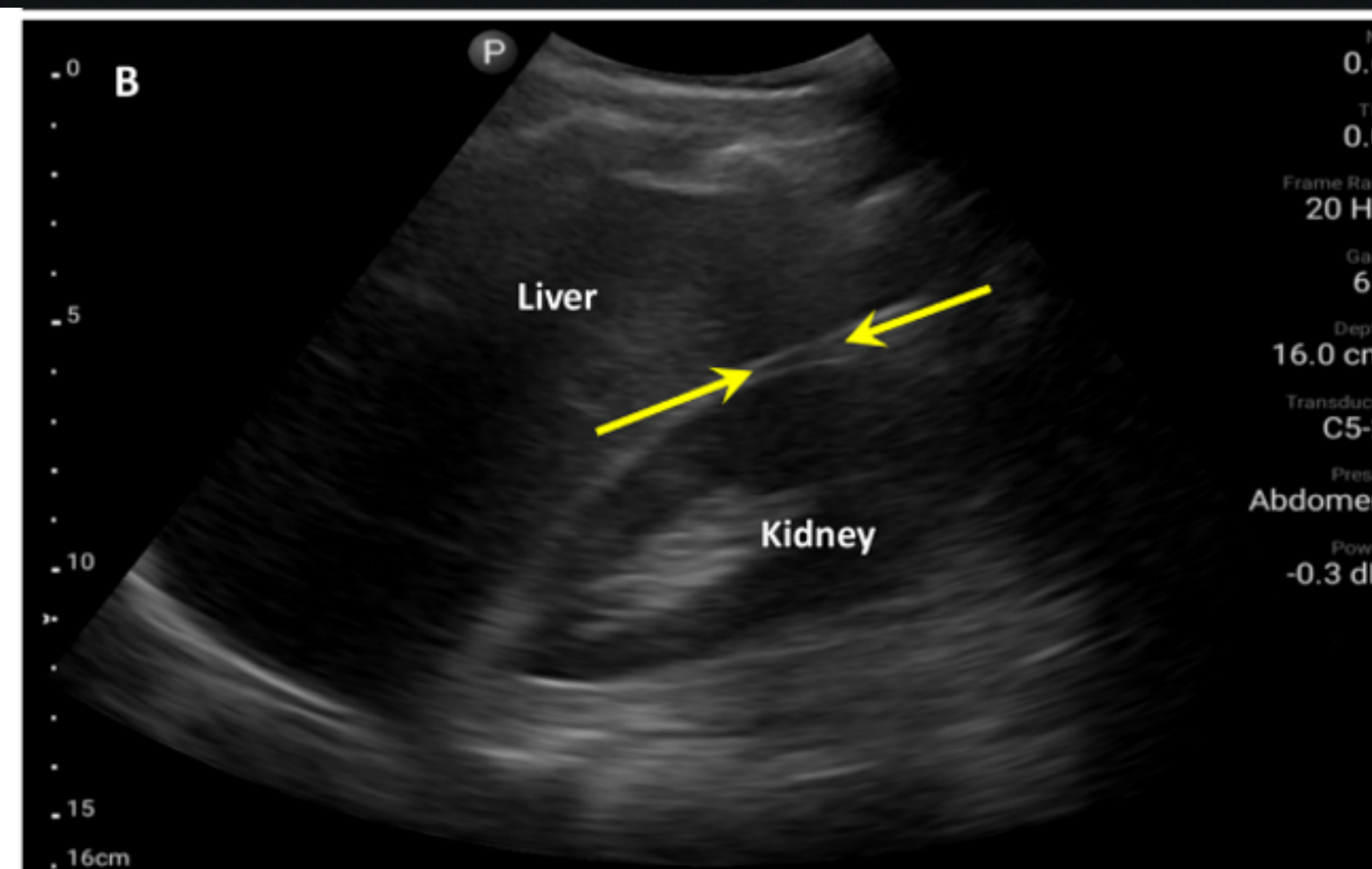
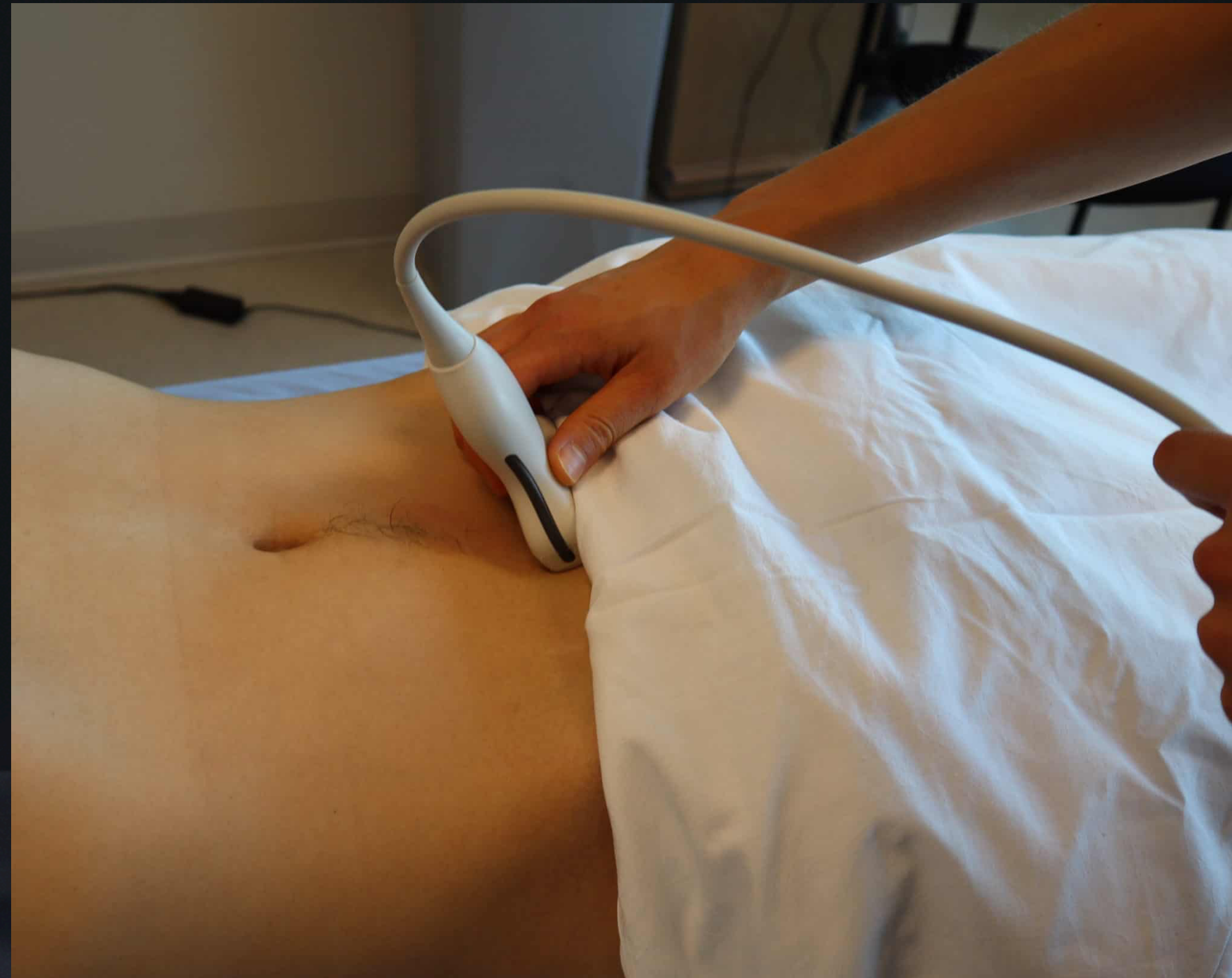
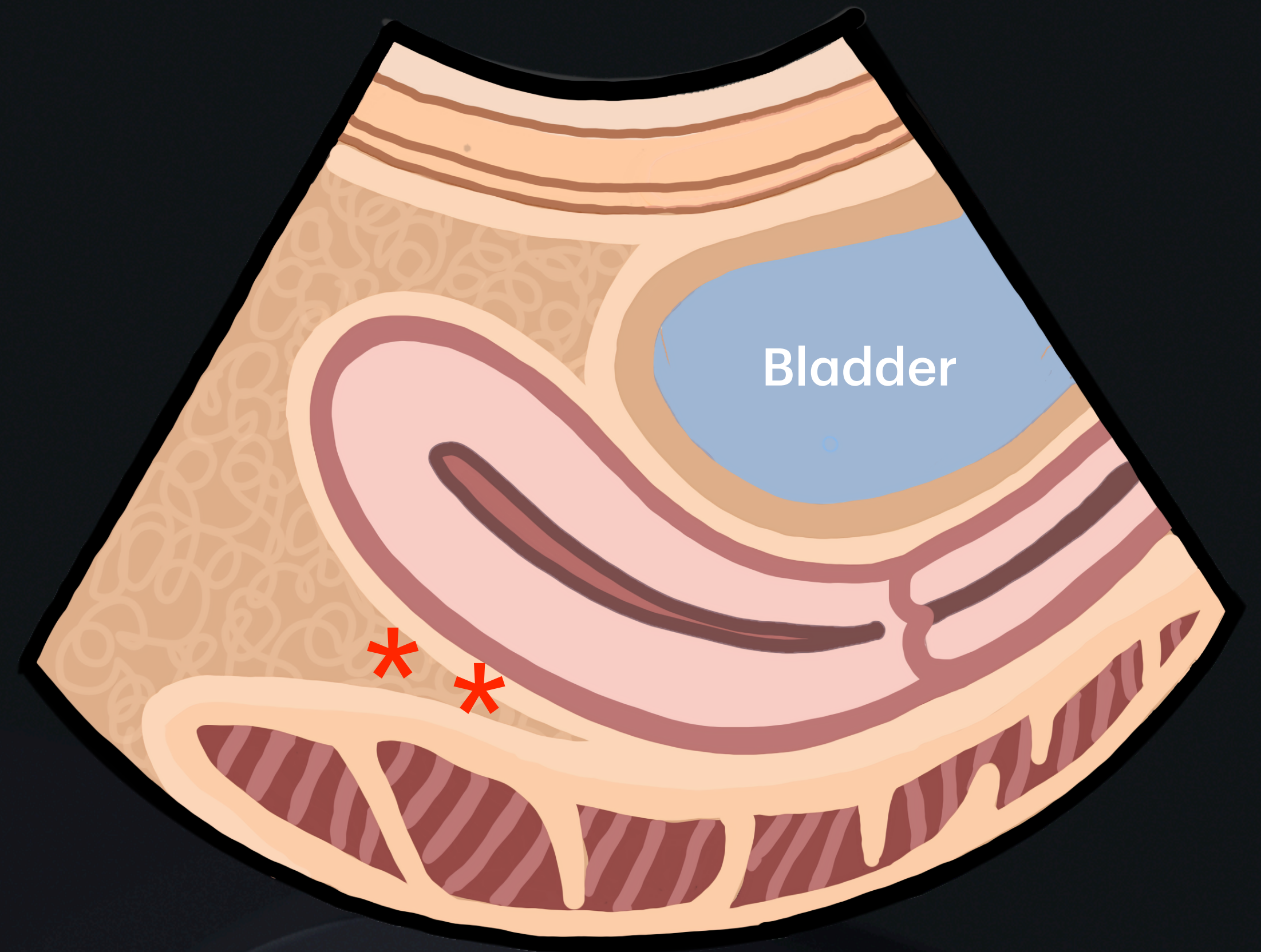
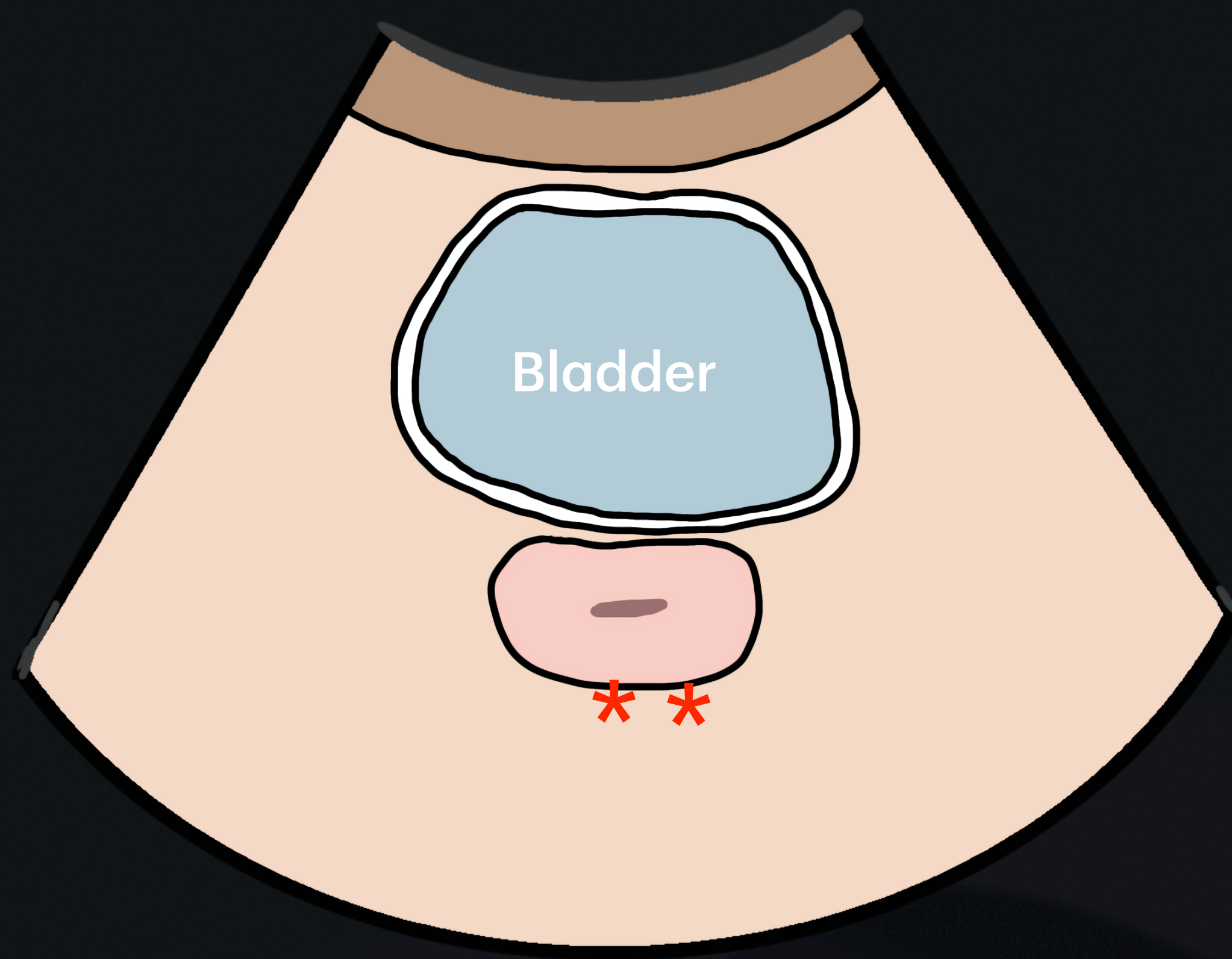


Figure 1. Right upper quadrant (RUQ) views acquired with a curvilinear transducer (C5-2) on a Philips Lumify device showing the lipliner sign (A), a thin hypoechoic line (indicated between two red arrows) tracking along the interface of the liver and kidney (Morison's pouch) toward the inferior border of the liver, and the double-line sign (B), a wedge-shaped hypoechoic region near Morison's pouch, outlined by two hyperechoic lines (indicated between two yellow arrows).

Pelvis





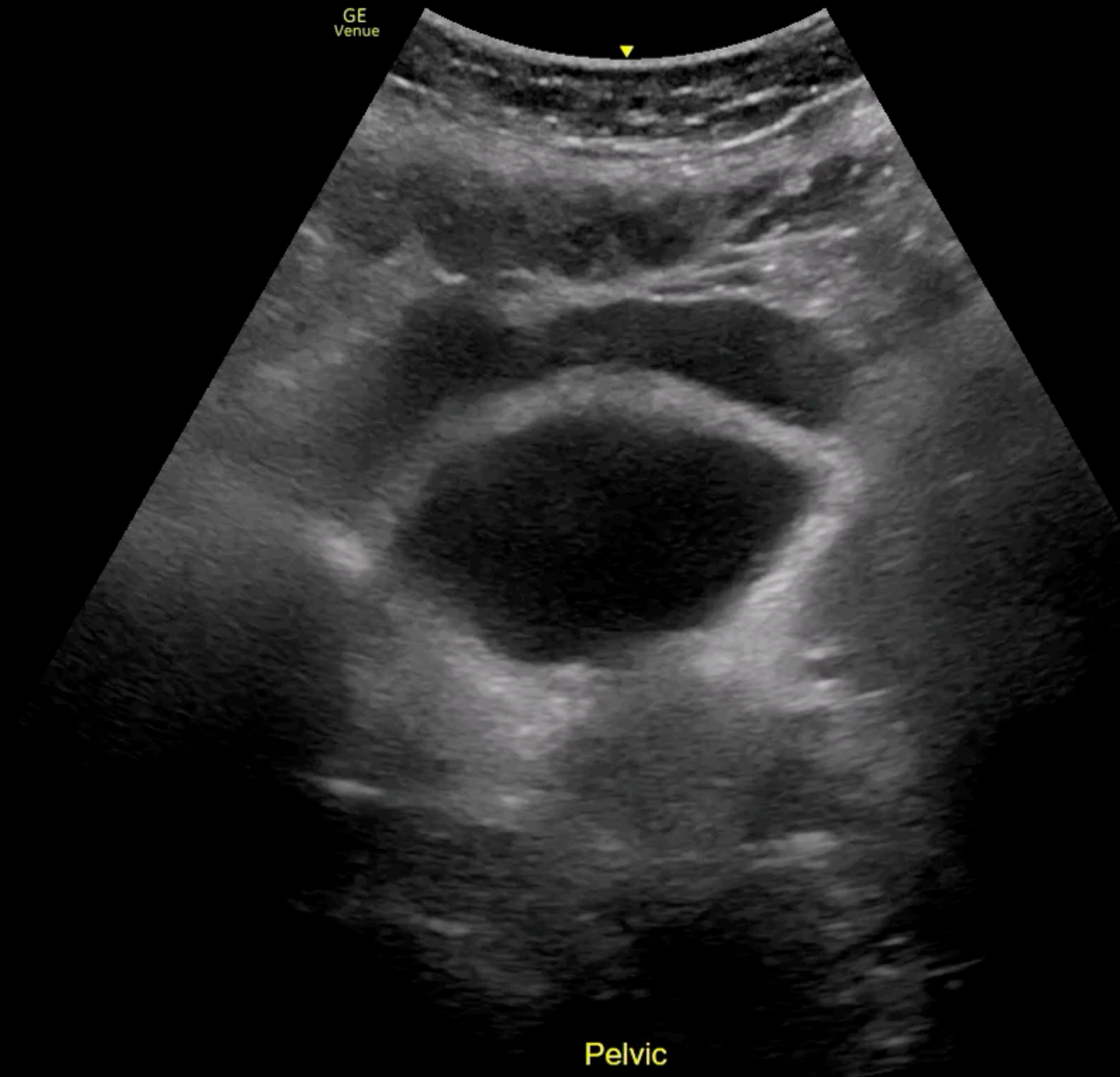
- In females, free fluid is seen posterior to the uterus, in the pouch of Douglas
- In reproductive age, free fluid of up to 50 ml is physiological in the pouch of Douglas

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11/07/2025 17:31:40

C1-5
ADM eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



Pelvic

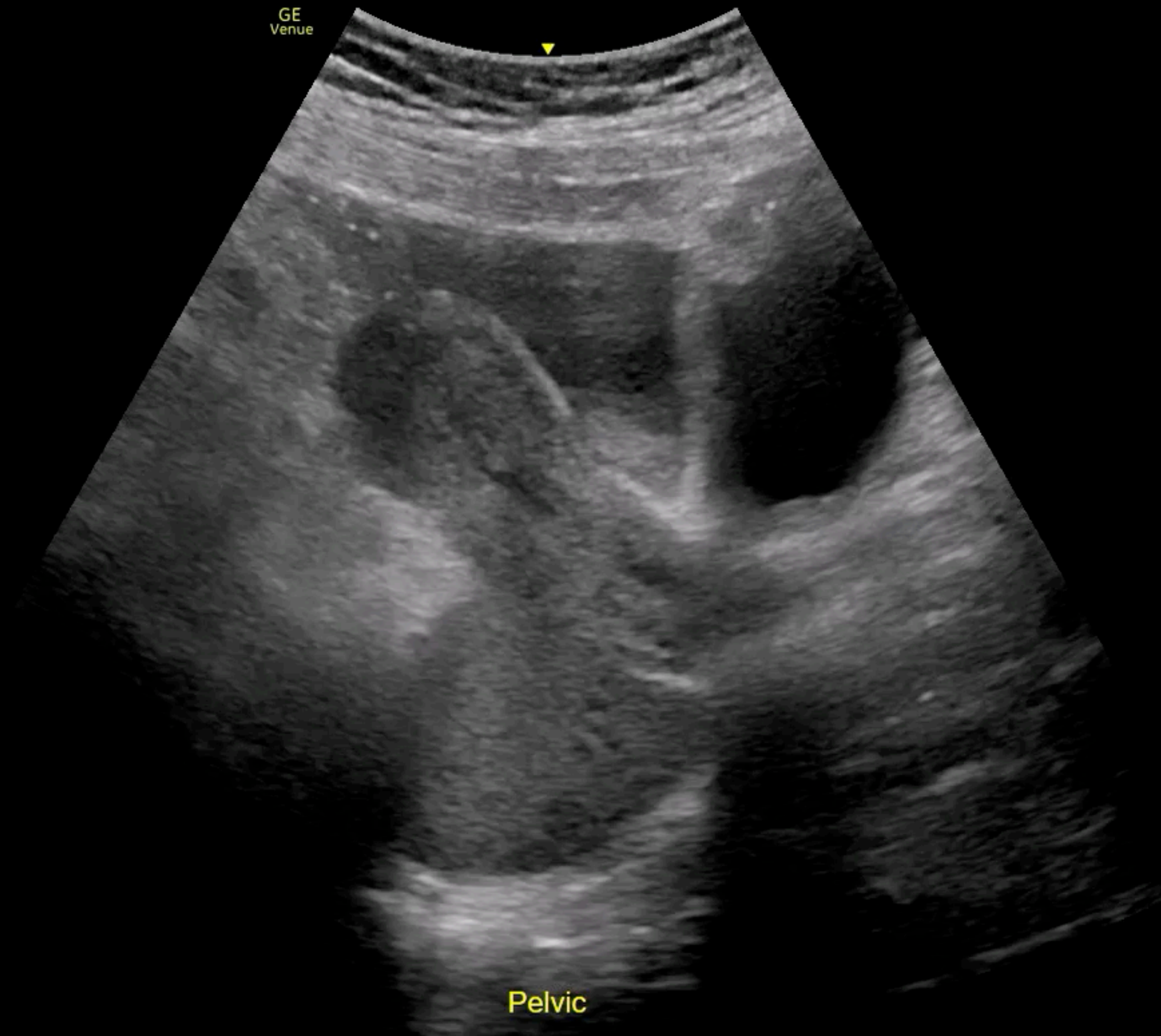
0
5
10
15

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11/07/2025 17:31:20

C1-5
ADM eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



Pelvic

0
5
10
15

GE
Venue



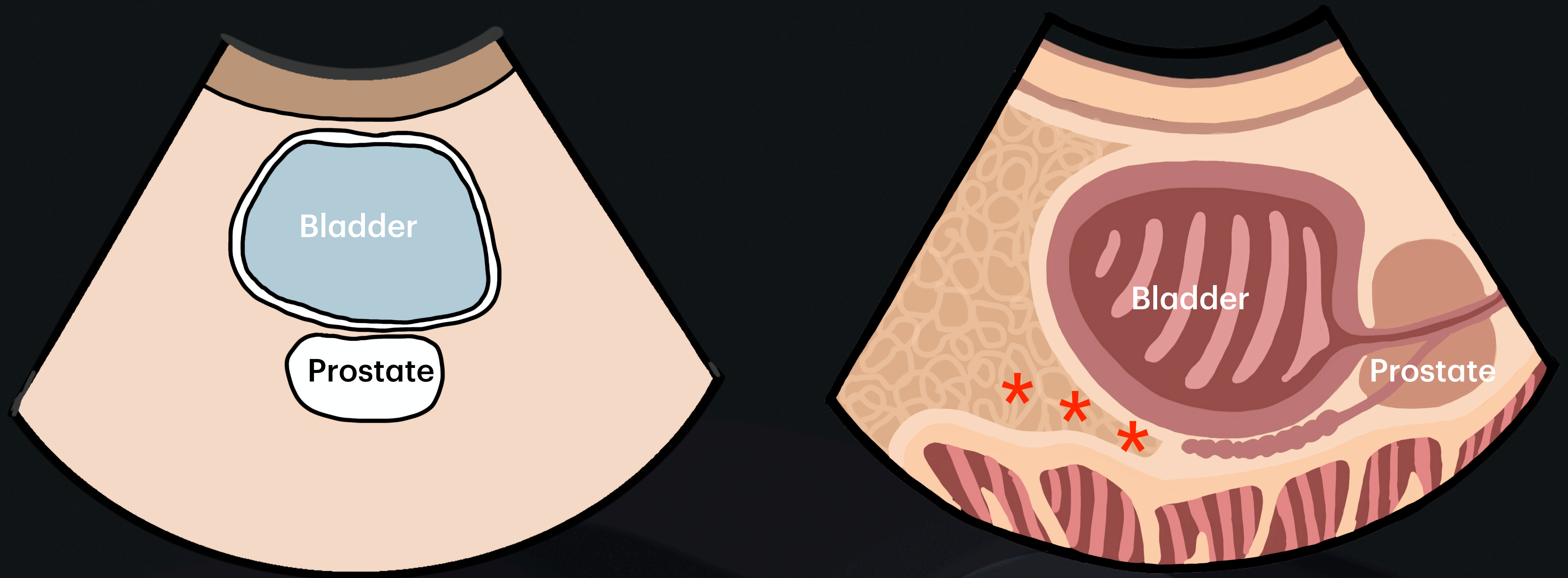
Bladder

Uterus



Pelvic





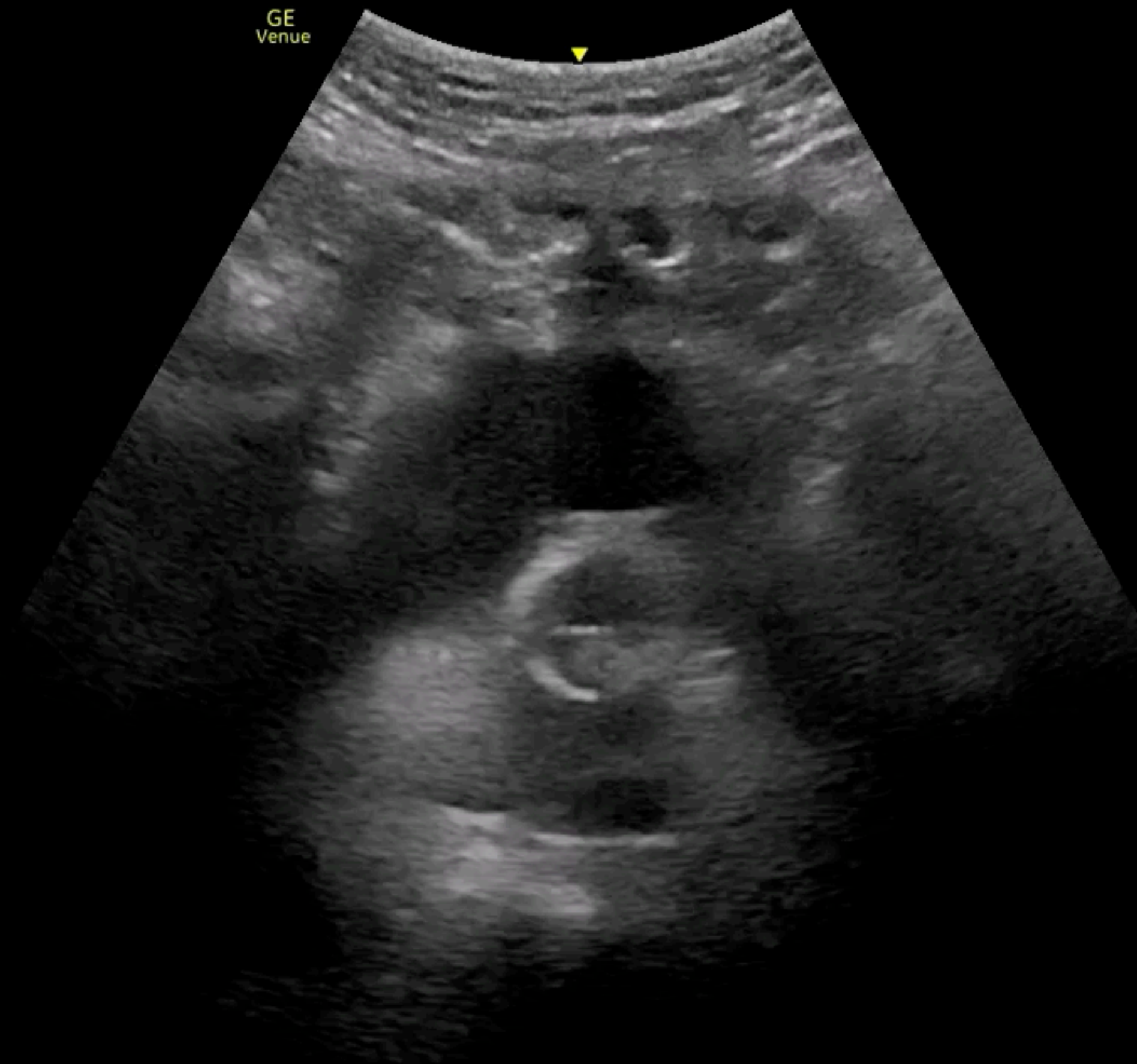
In males, intraperitoneal free fluid accumulates around the posterior wall of the bladder

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21/07/2025 02:31:10

C1-5
*** eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



0

5

10

15

Pelvic

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21/07/2025 02:32:21

C1-5
*** eFAST / Abdomen

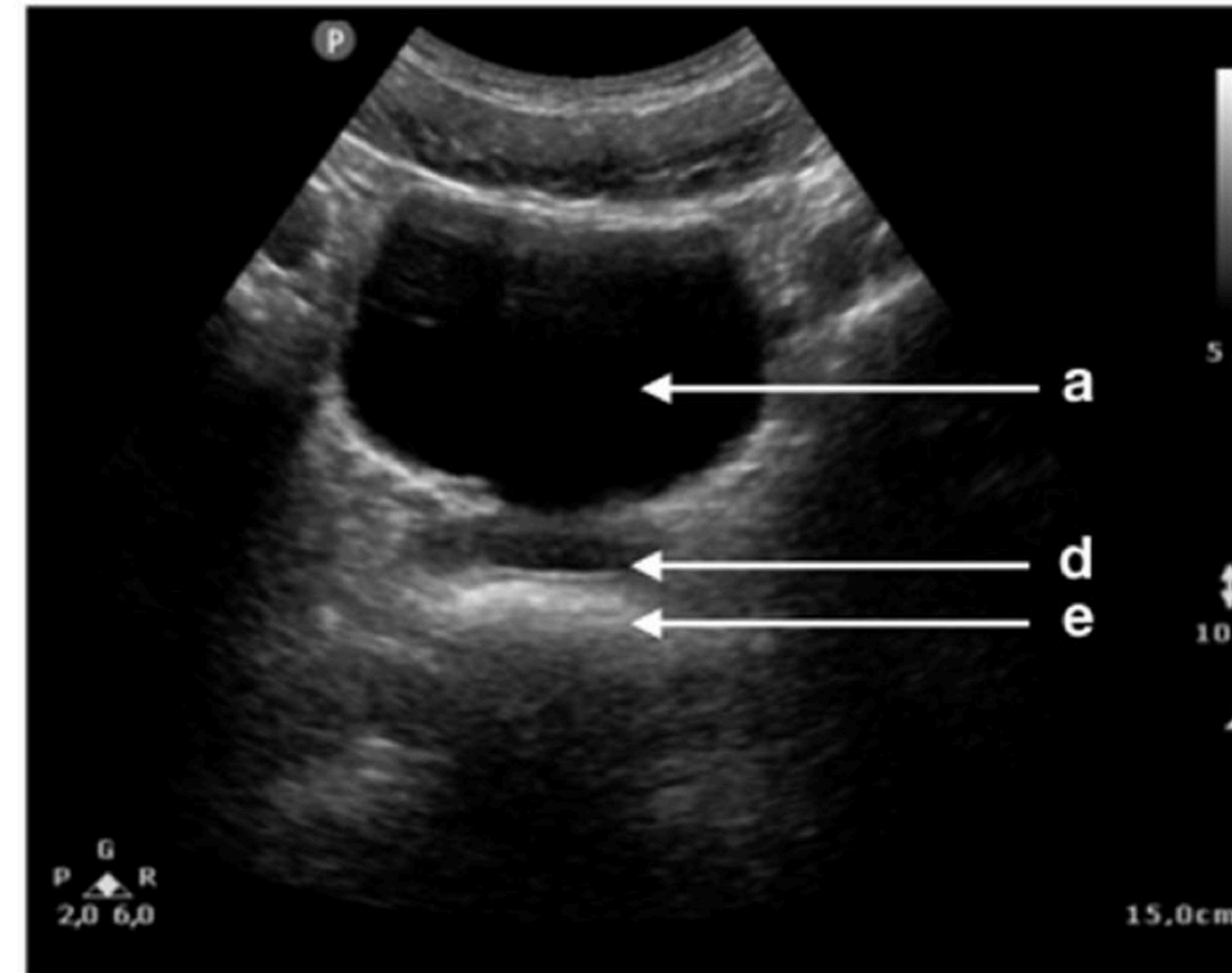
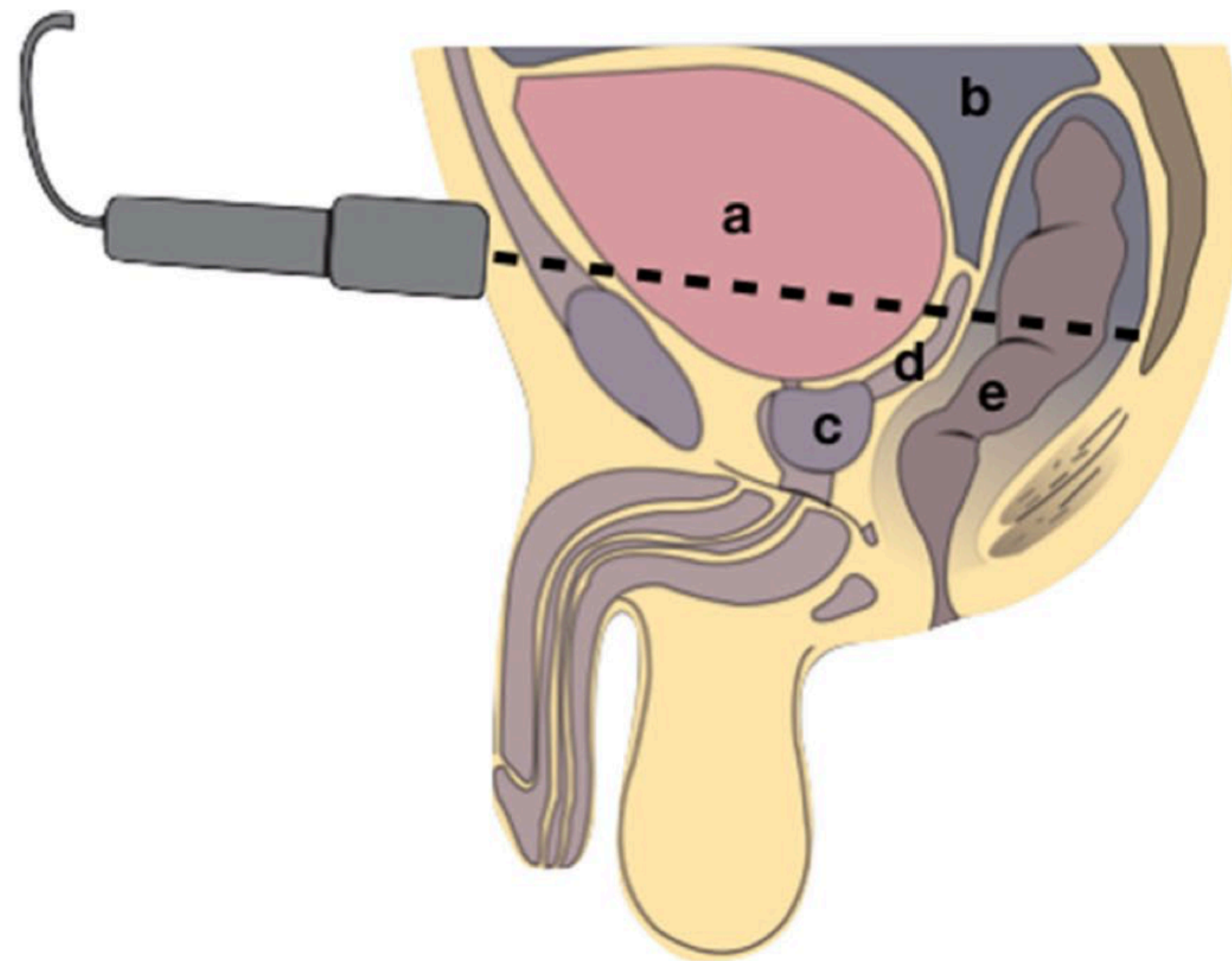
MI 1.0
TI 0.3

GE
Venue



0
5
10
15

Seminal vesicle



a: bladder, b peritoneal space, c prostate, d seminal vesicles, e rectum, f free fluid

Fig. 1 Transverse ultrasound view of the male pelvis—probe oriented towards the seminal vesicles

False positive

E-FAST

Pleura

Longitudinal view perpendicular
to the chest wall

Anterior and Anterolateral area

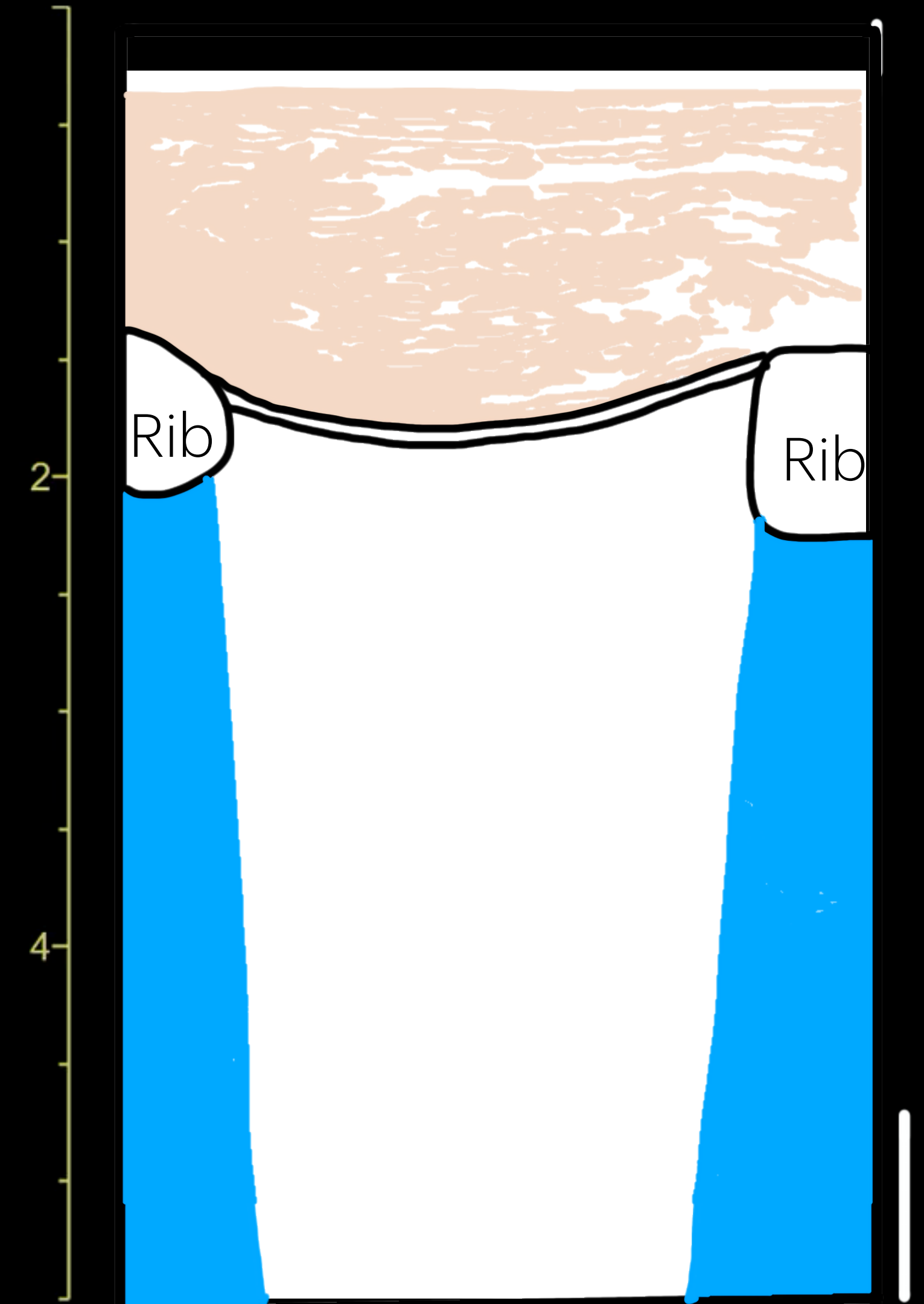
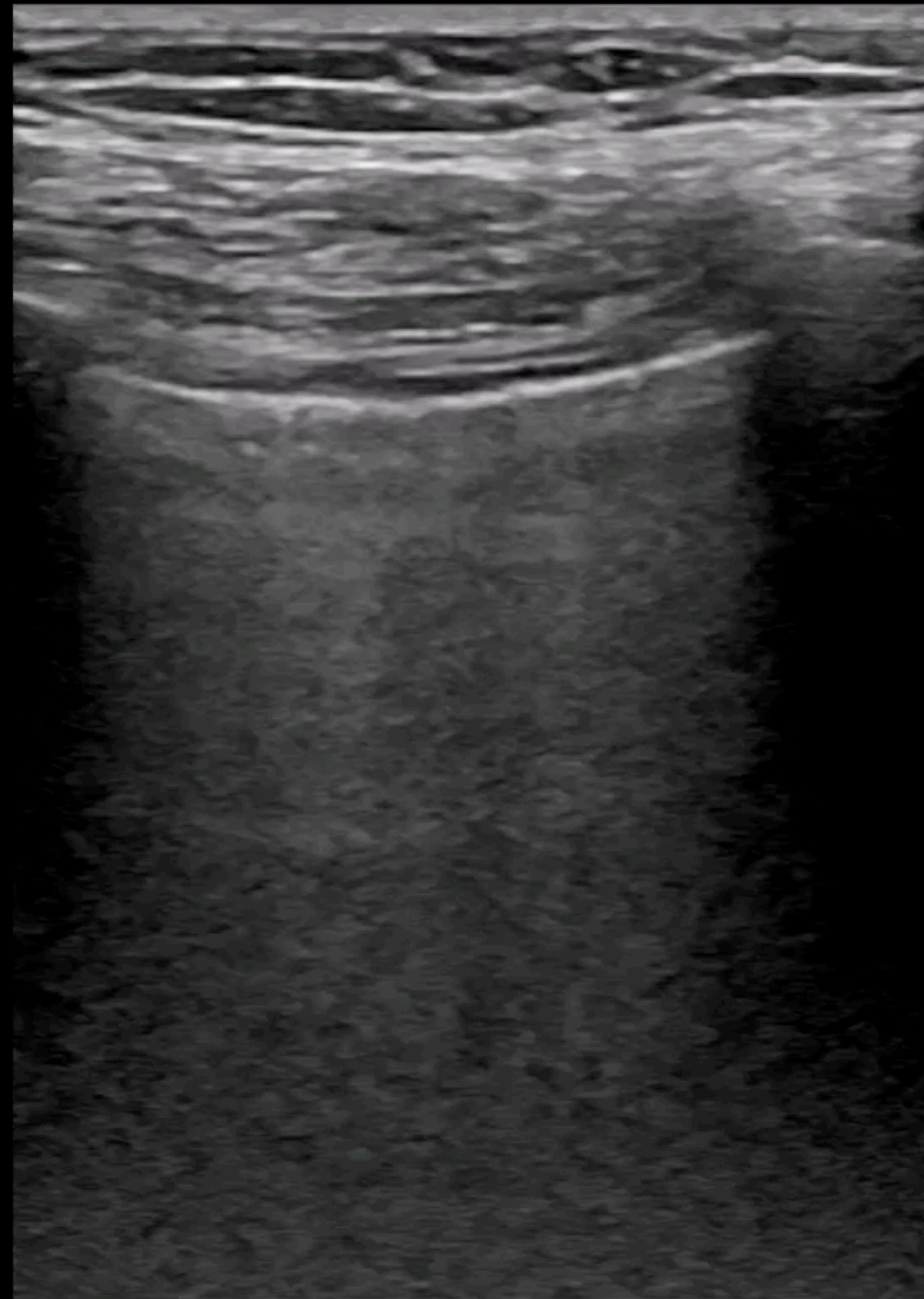


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11/07/2025 12:32:17

L4-12t
ADM Carotid

MI 1.3
TI 0.1

GE
Venue



Normal lung sliding + comet tail artifact = NPV 100%

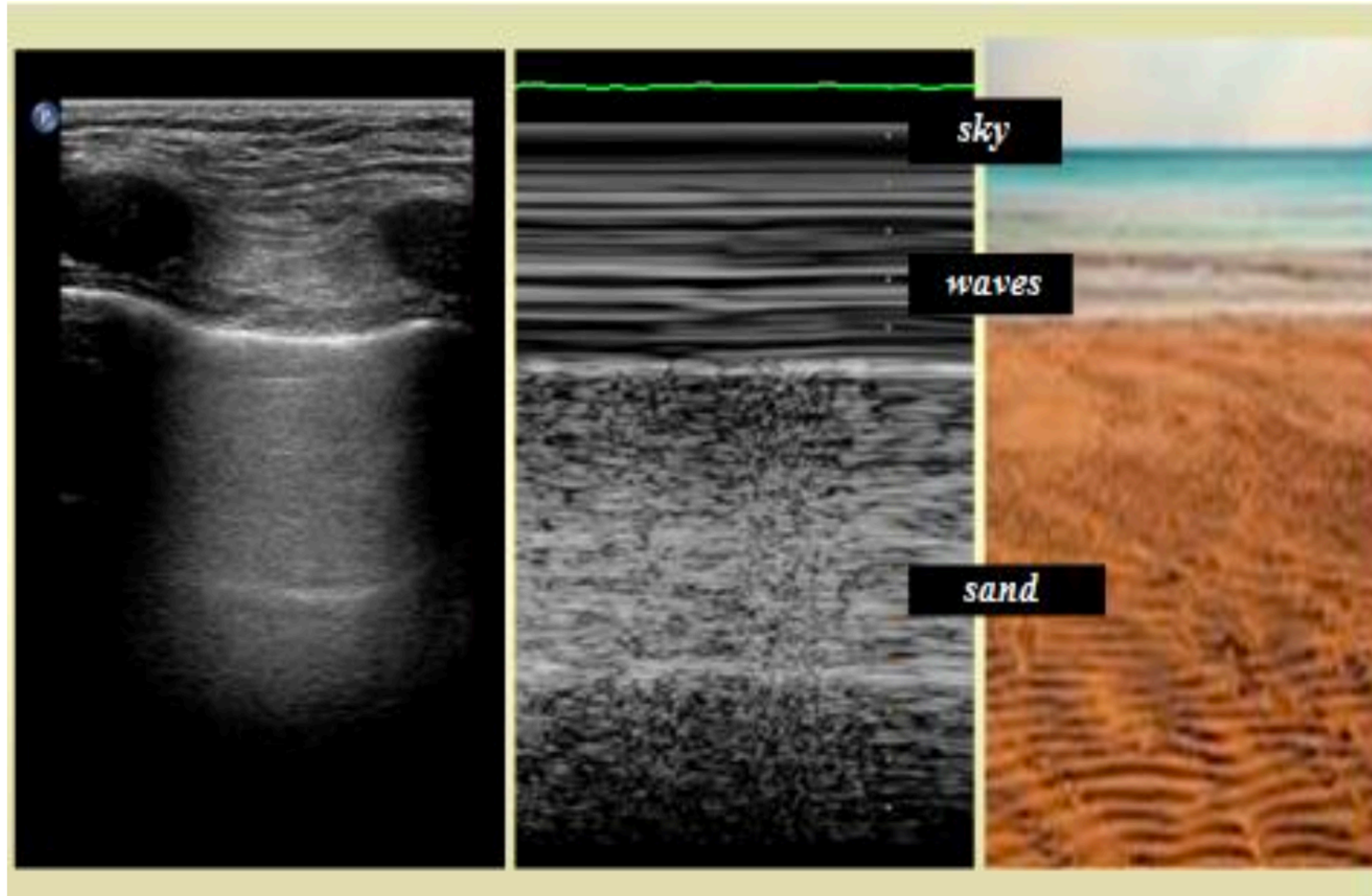


Fig. 6 – M-mode image of the lungs: seashore sign.

Above the pleura, the scan reveals wave-like lines, generated by the movement of muscles (waves) and the skin (sky).

Underneath the pleura, the image shows a grainy pattern resembling the sand, which is the result of lung sliding.

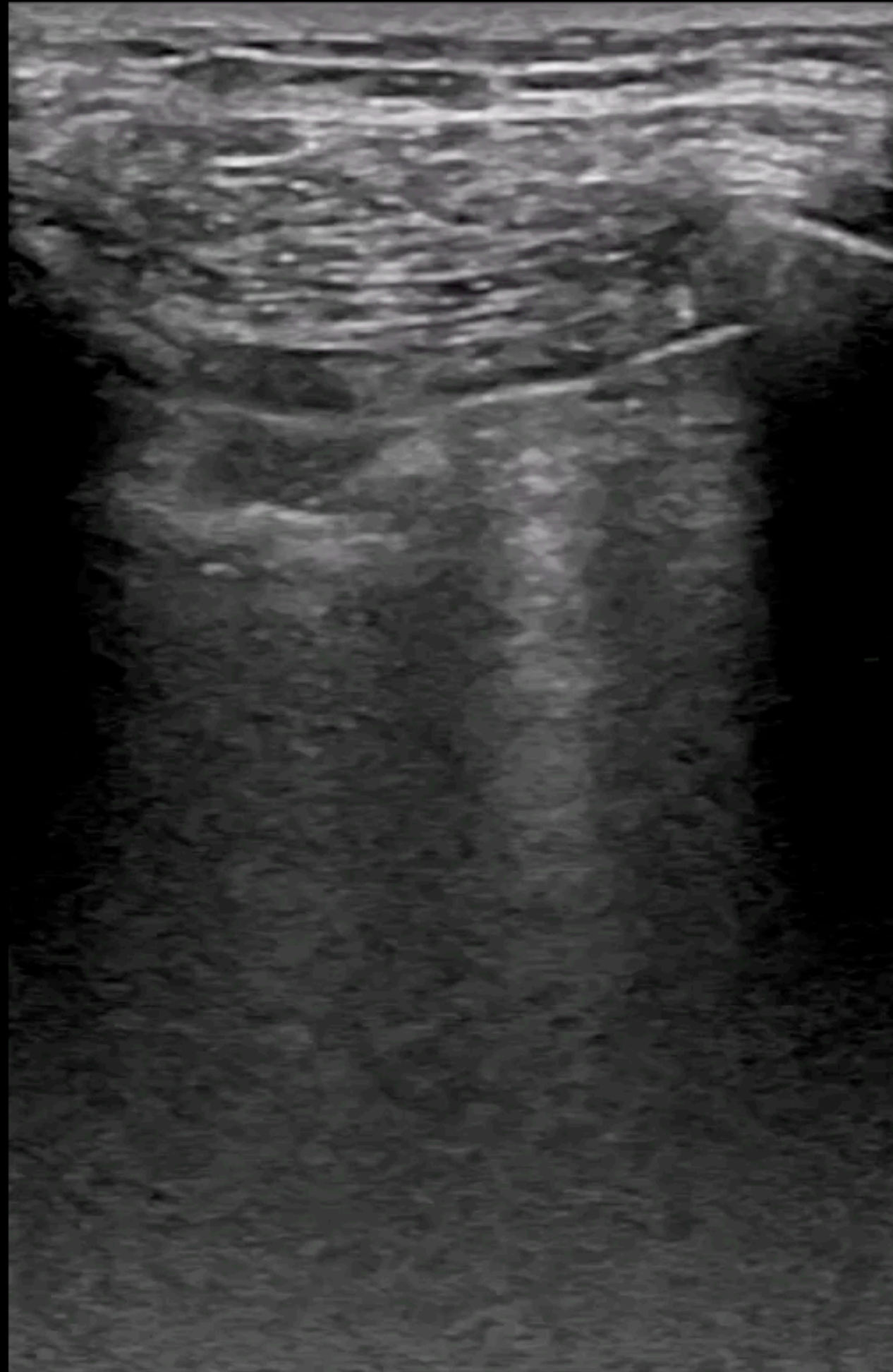
Pneumothorax

- •Absence of lung sliding
- •Barcode sign in M mode
- •Lung point is the most specific sign of pneumothorax
- •Overlook at area around the lung apices and bases
- •False positive : selective in intubation of contralateral lung

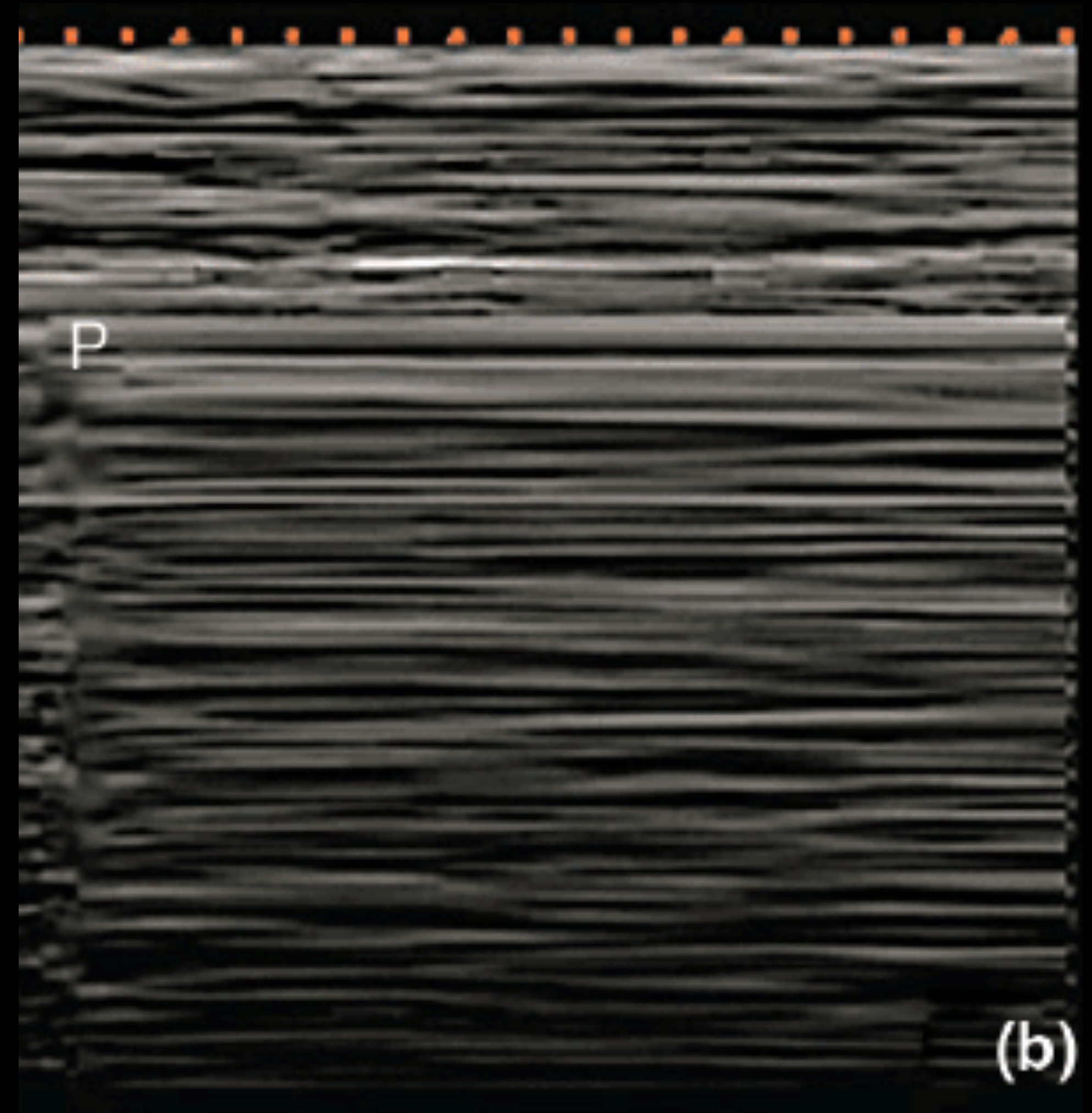
GE
Venue

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11/07/2025 13:00:25

L4-12t
ADM Carotid



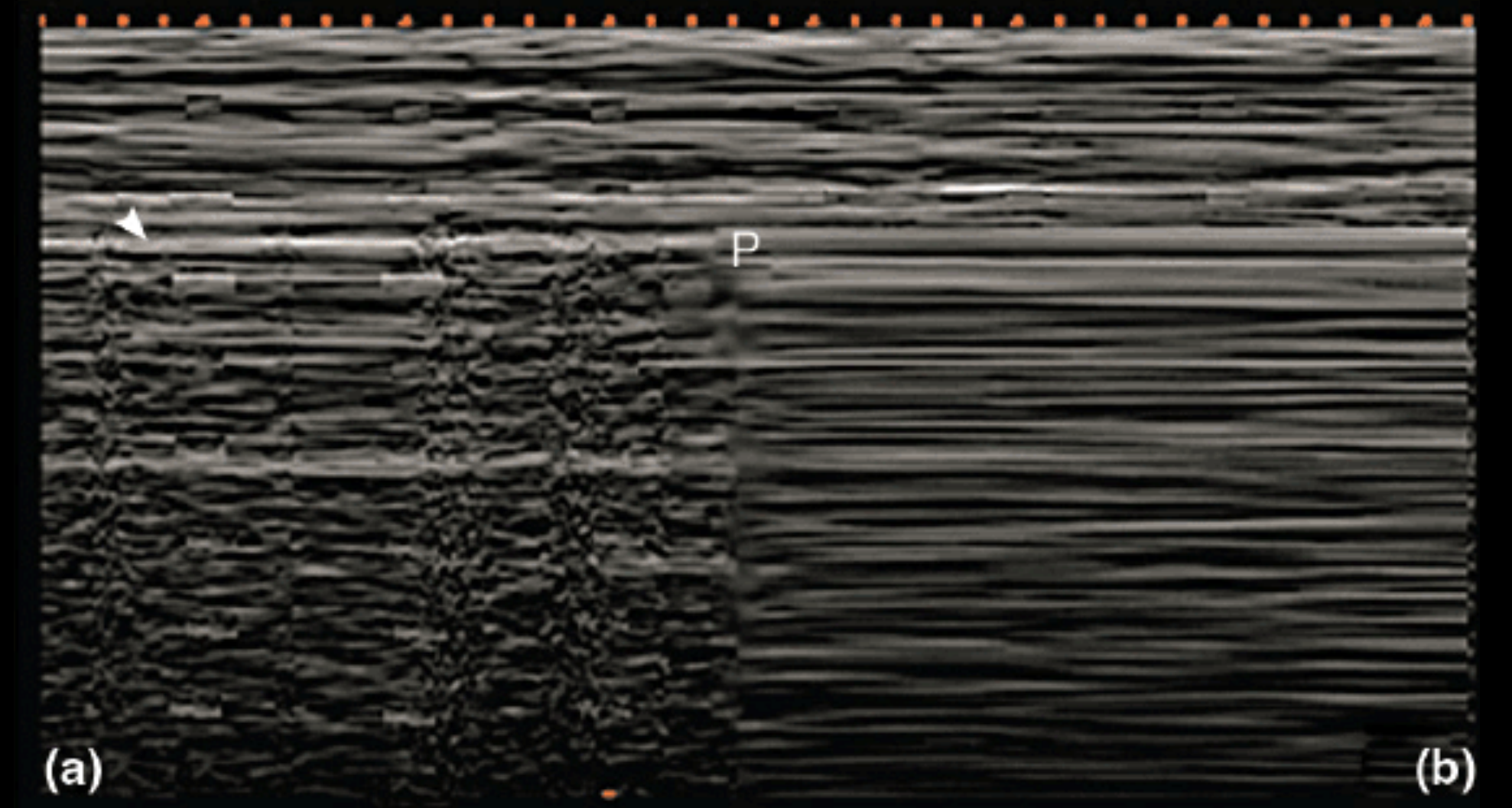
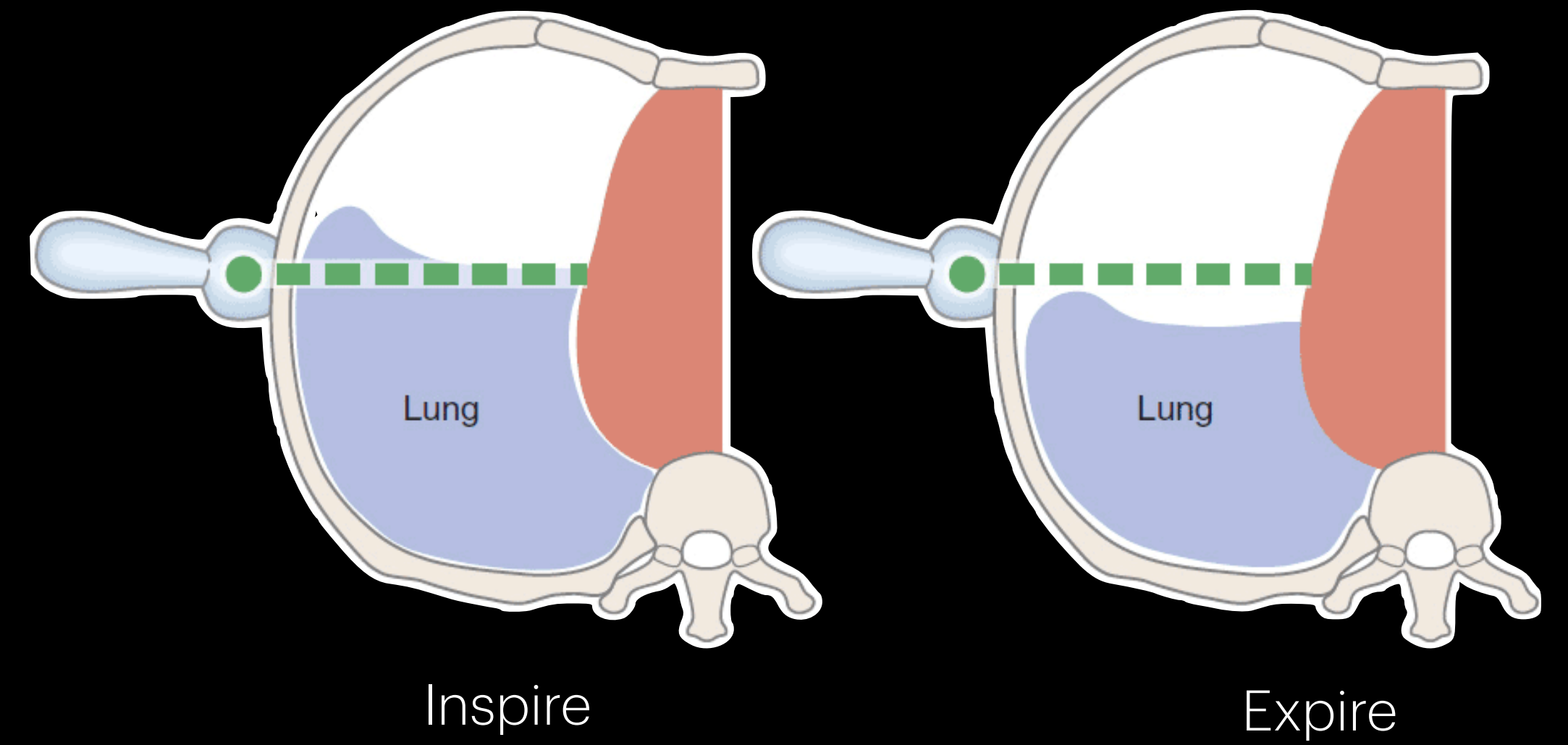
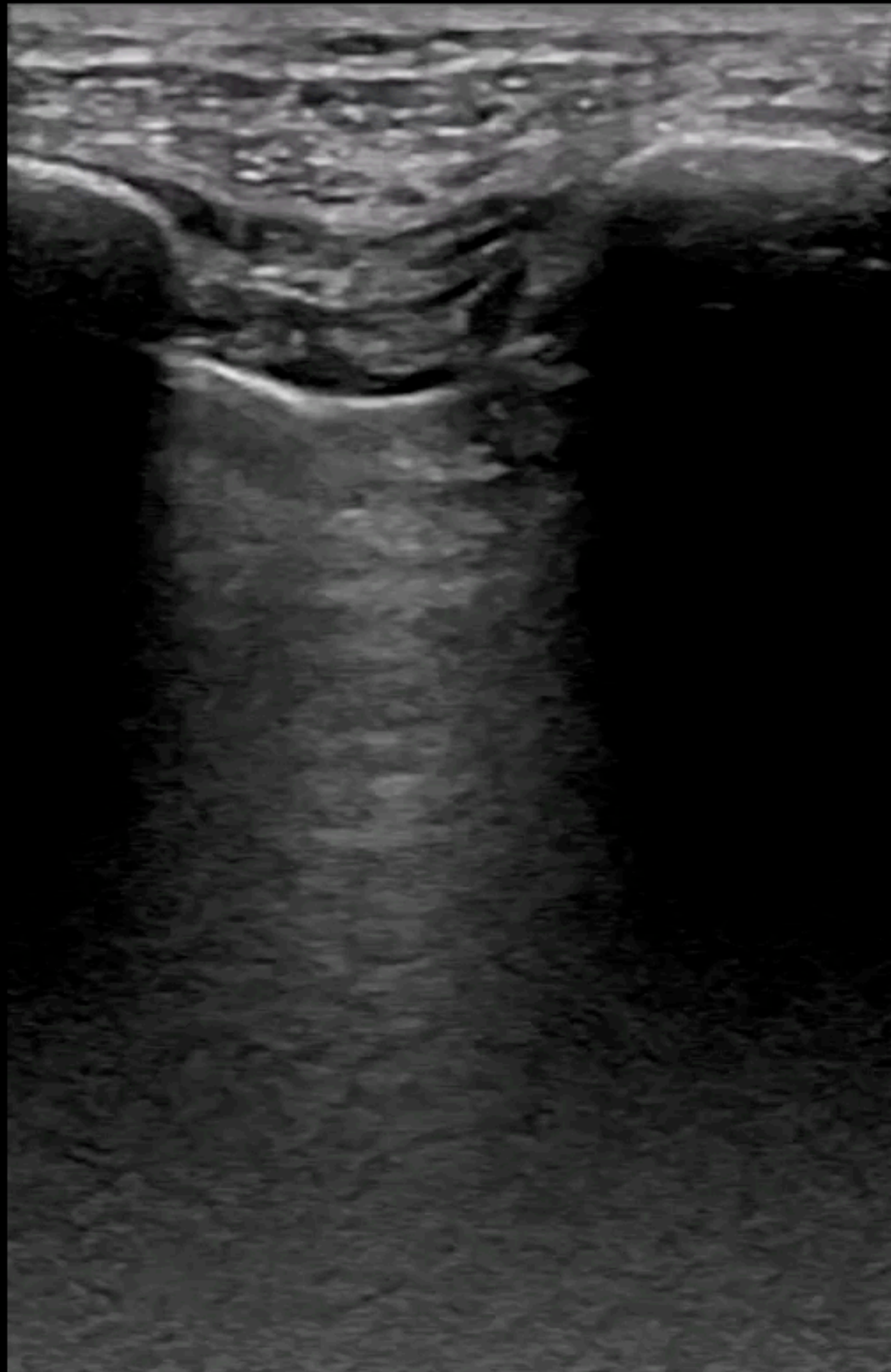
Absence of lung sliding



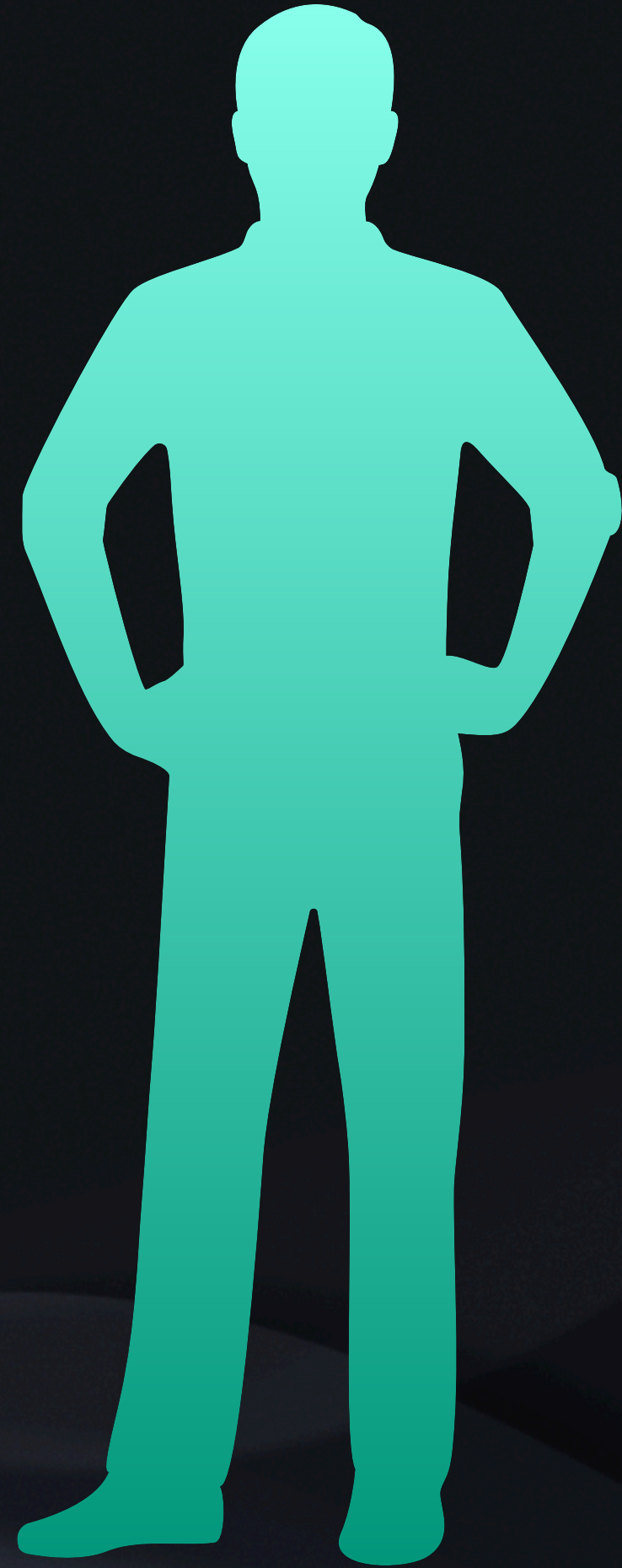
Barcode sign in M mode

Lung point

GE
Venue



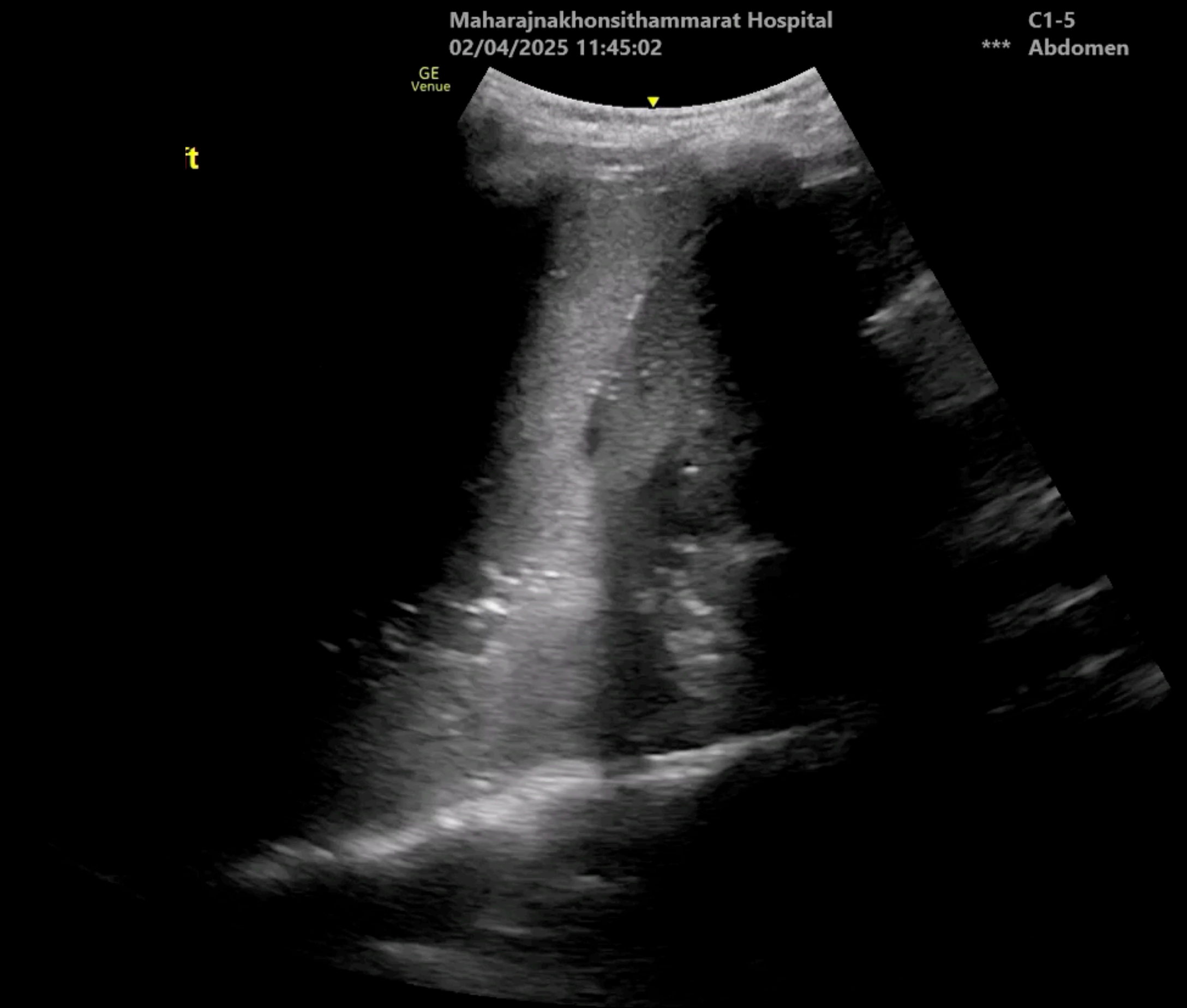
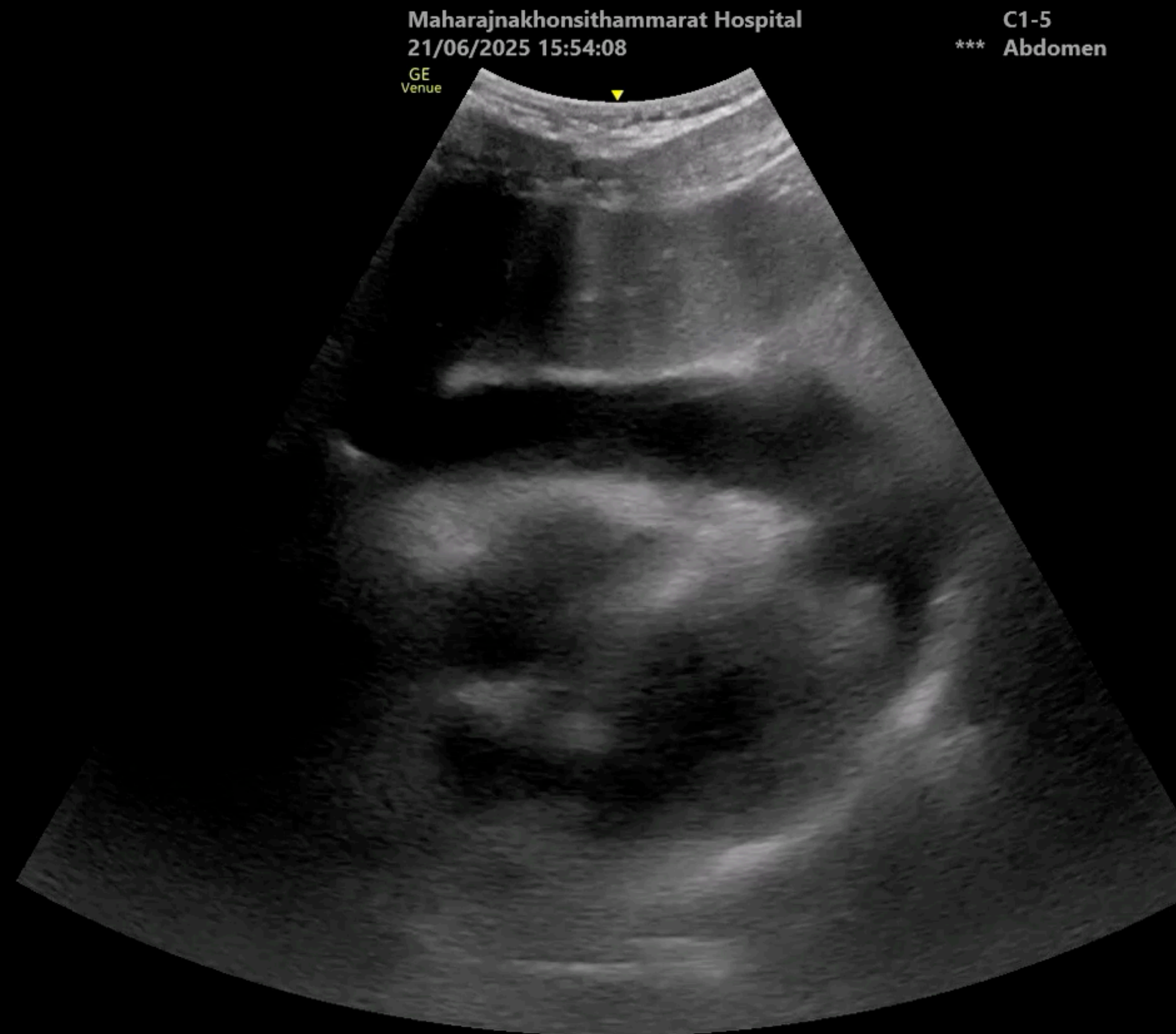
CASE 1



Stab wound at cardiac box
BP 80/50 mmHg, HR 120



A 40 years old man with stab wound at cardiac box



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02/04/2025 11:45:02

C1-5
*** Abdomen

MI 1.0
TI 0.3

GE
Venue

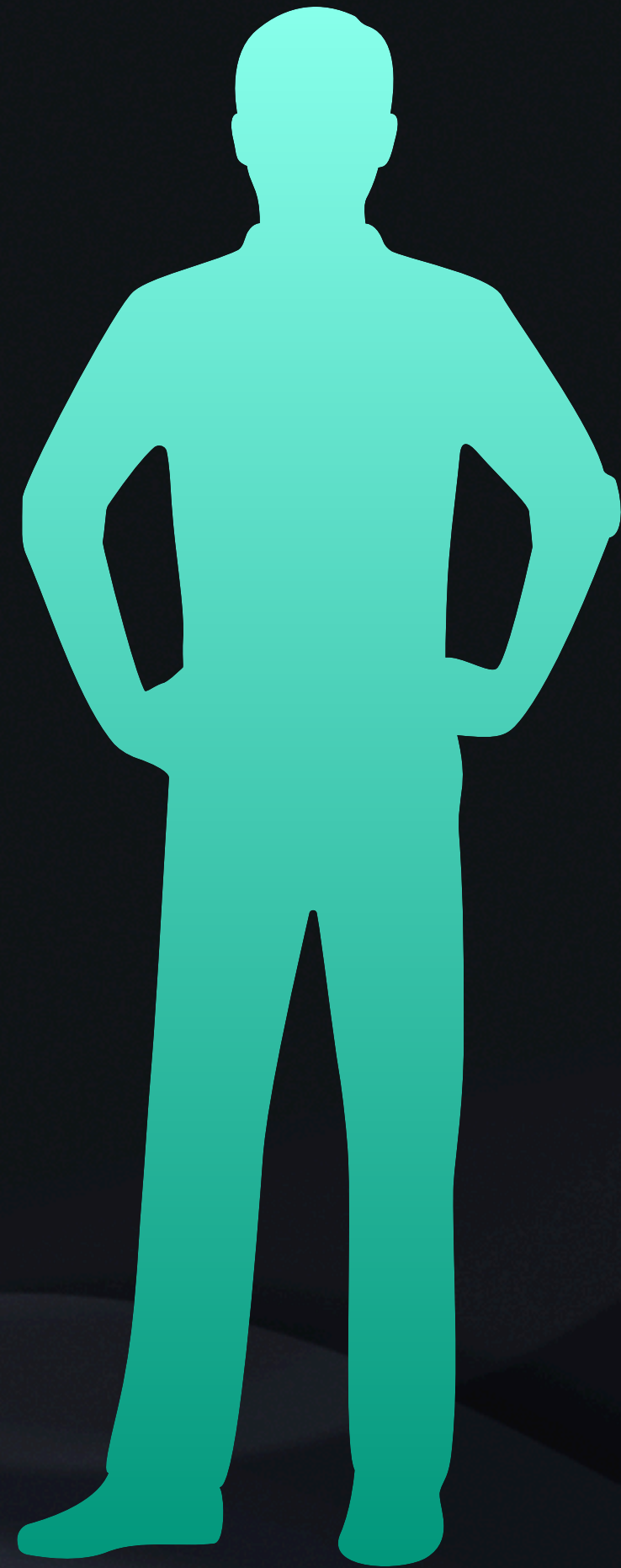
spleen

Kidney

Pleural effusion

Spine sign

0
5
10
15



Stab wound at cardiac box
BP 80/50 mmHg, HR 120

Cardiac tamponade with Left hemothorax

Median thoracotomy with LV repair

CASE 2



MCA with blunt abdominal injury

BP 70/50 mmHg, HR 130

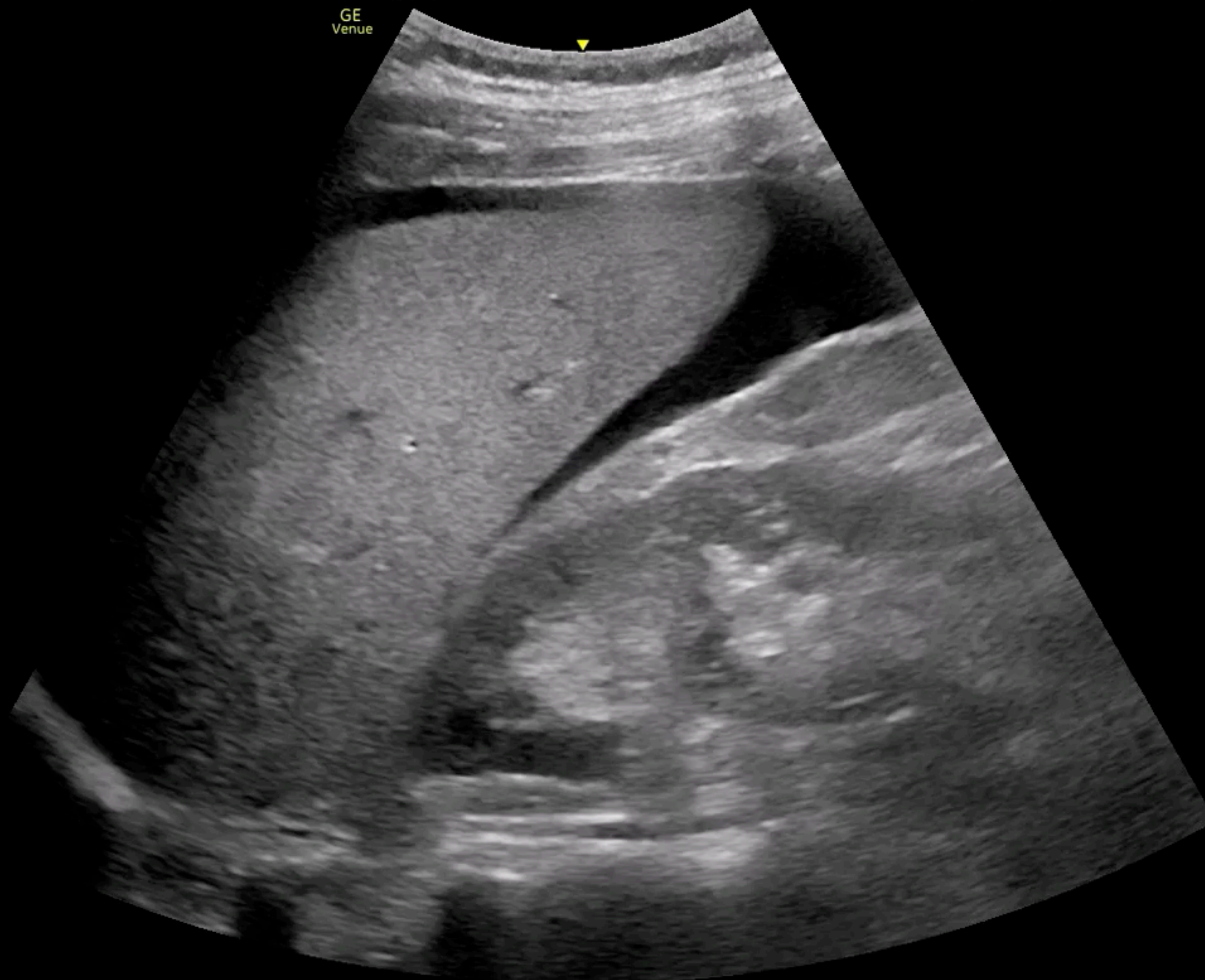
ABD - generalized tender, soft, no guarding

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21/07/2025 02:22:08

C1-5
*** Abdomen

MI 1.0
TI 0.3

GE
Venue



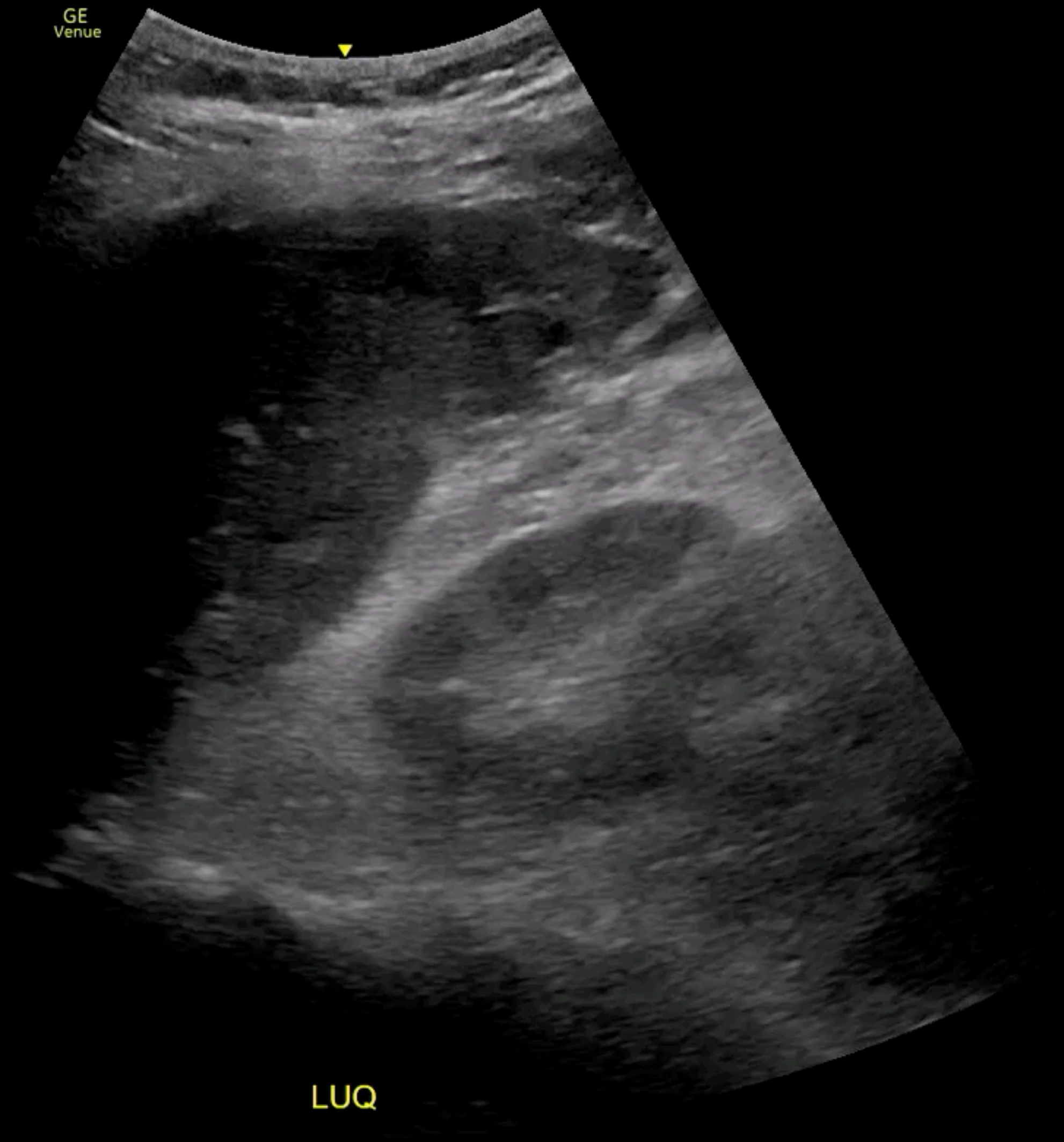
0
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15

Maharajakhonsithammarat Hospital
21/07/2025 02:29:26

C1-5
*** eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



LUQ

0
5
10
15

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21/07/2025 02:32:21

C1-5
*** eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue





MCA with blunt abdominal injury

BP 70/50 mmHg, HR 100

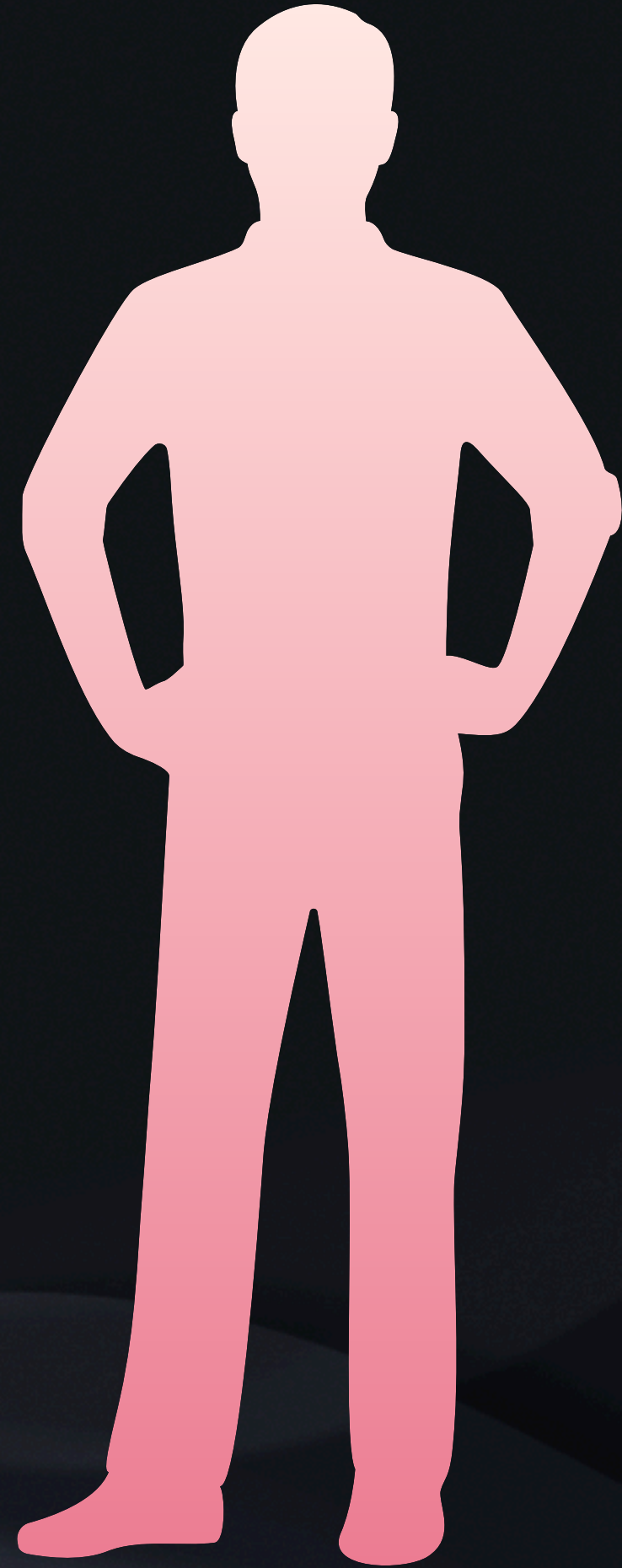
ABD - generalized tender, soft, no guarding

FAST positive at RUQ, LUQ, pelvic

Explore lap

Splenic injury grade IV

CASE 3



MCA with blunt abdominal injury

BP 110/70 mmHg, HR 130

ABD - generalized tender, soft, no guarding



0647944

Maharajnakhonsithammarat Hospital
11/07/2025 17:33:10

C1-5
ADM eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



LUQ

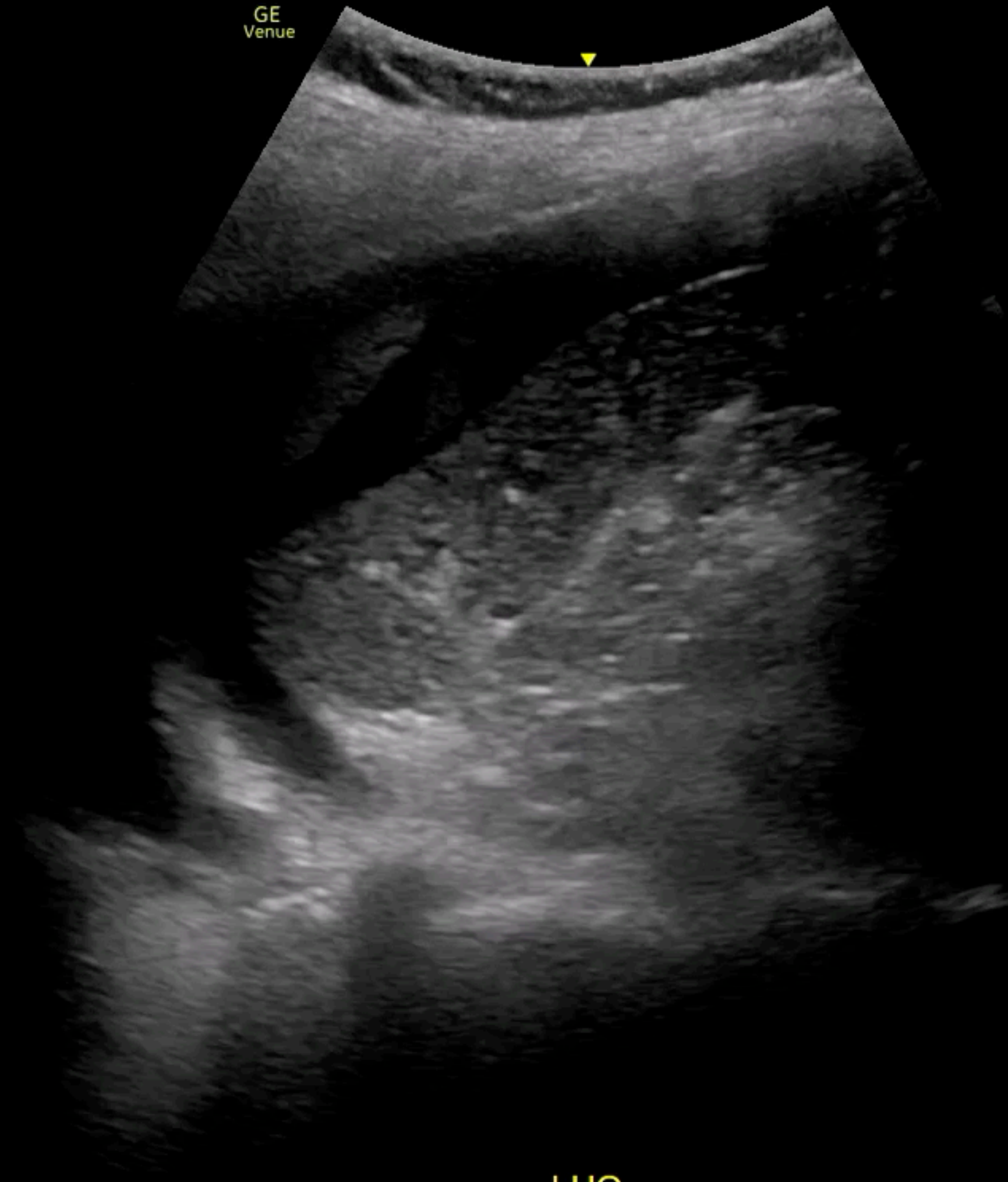
0
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15

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11/07/2025 17:37:12

C1-5
ADM eFAST / Abdomen

MI 1.0
TI 0.3

GE
Venue



LUQ

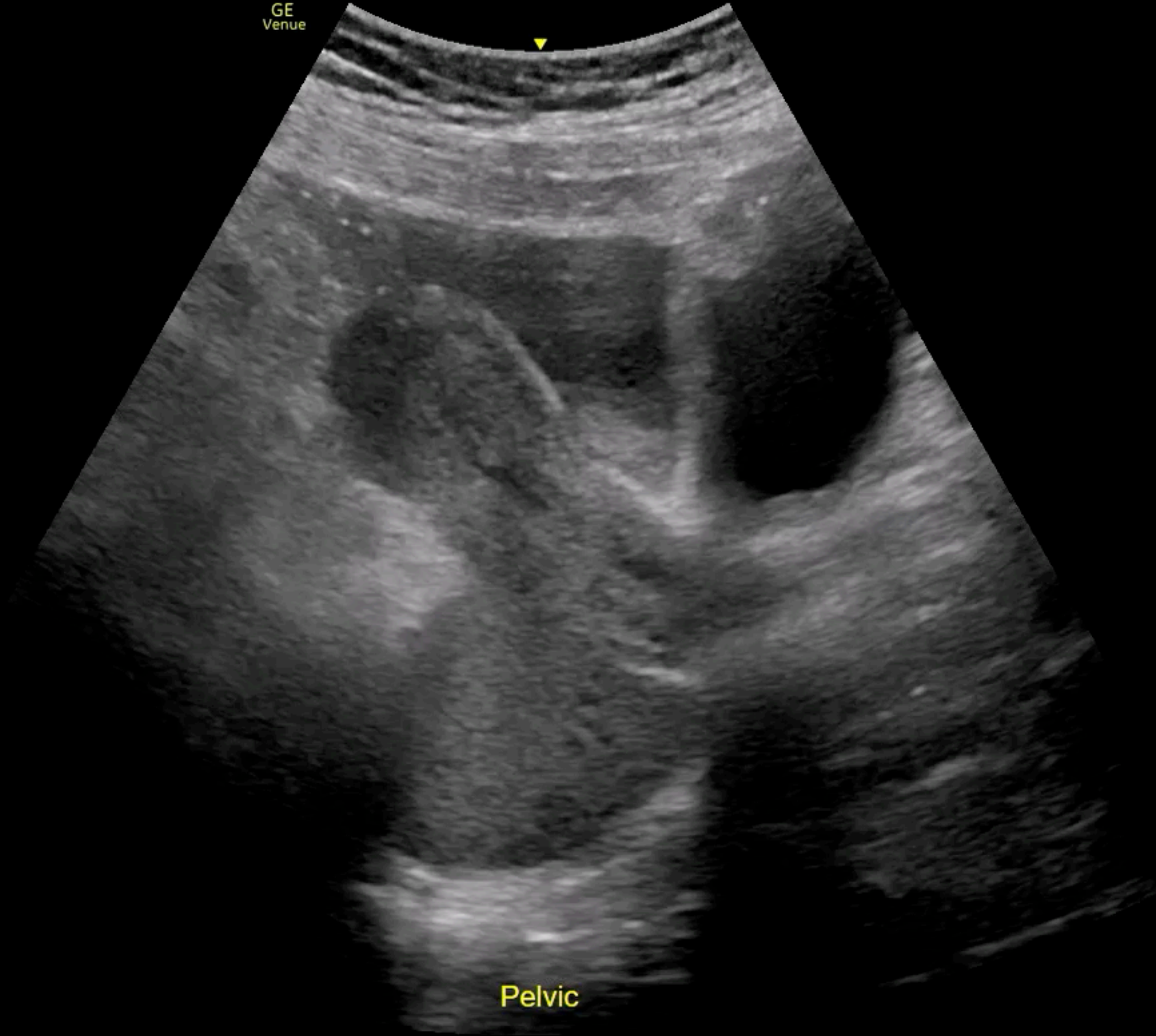


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C1-5
ADM eFAST / Abdomen

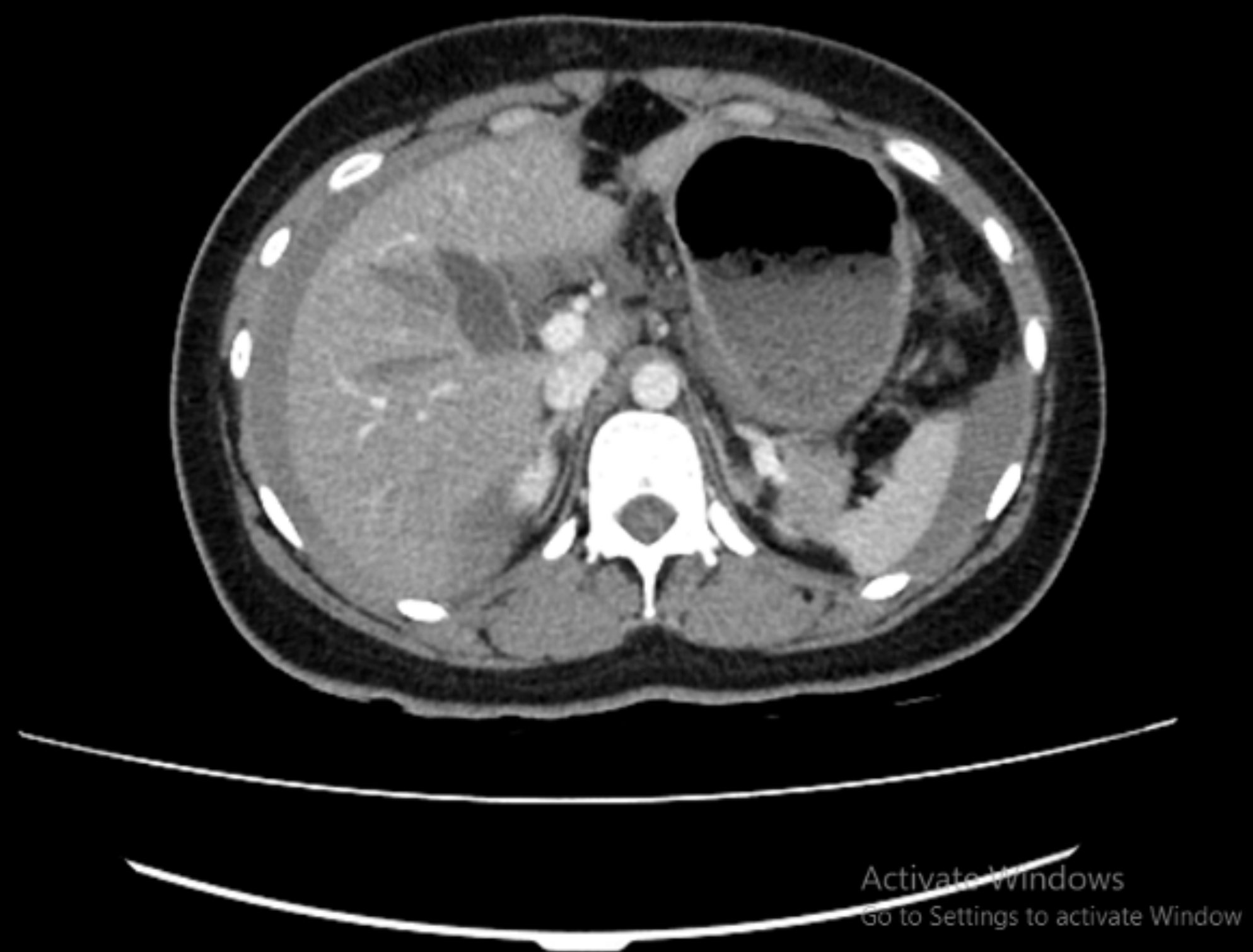
MI 1.0
TI 0.3

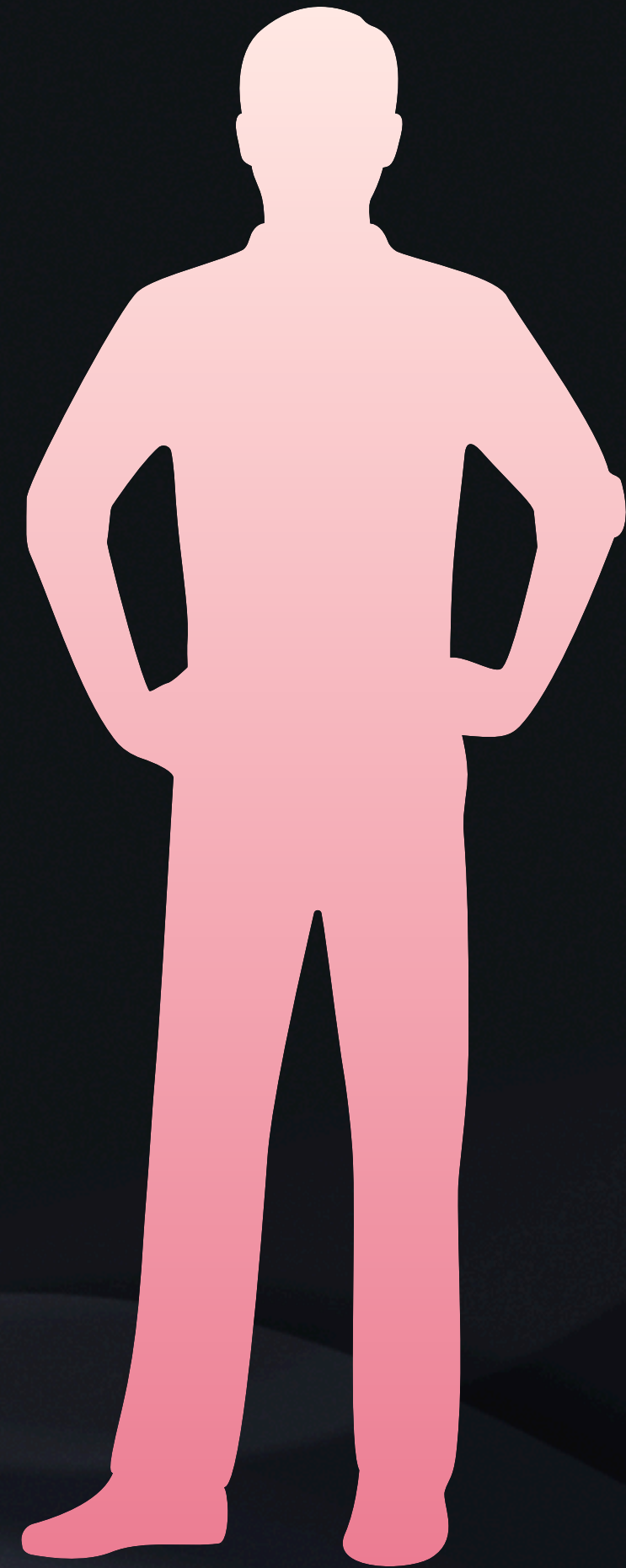
GE
Venue



Pelvic

0
5
10
15





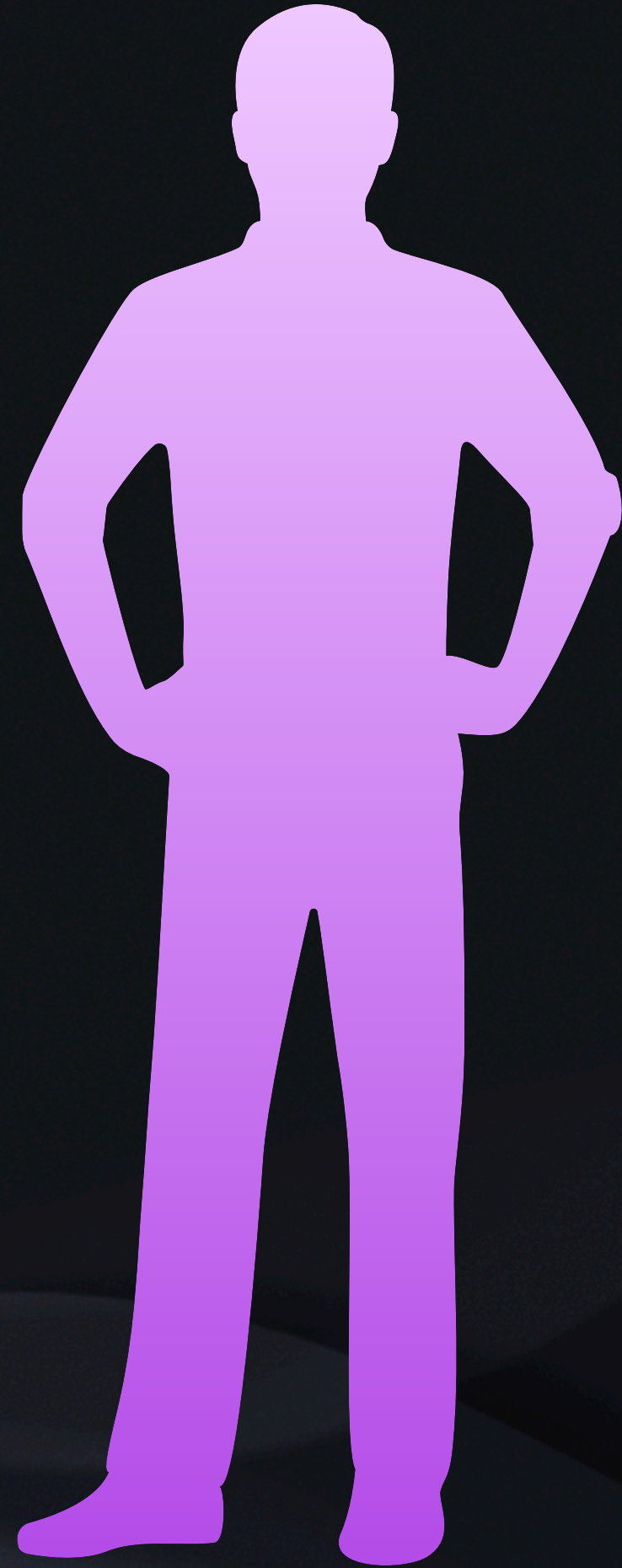
MCA with blunt abdominal injury
BP 110/70 mmHg, HR 130
ABD - generalized tender, soft, no guarding

FAST positive at RUQ, LUQ, pelvic

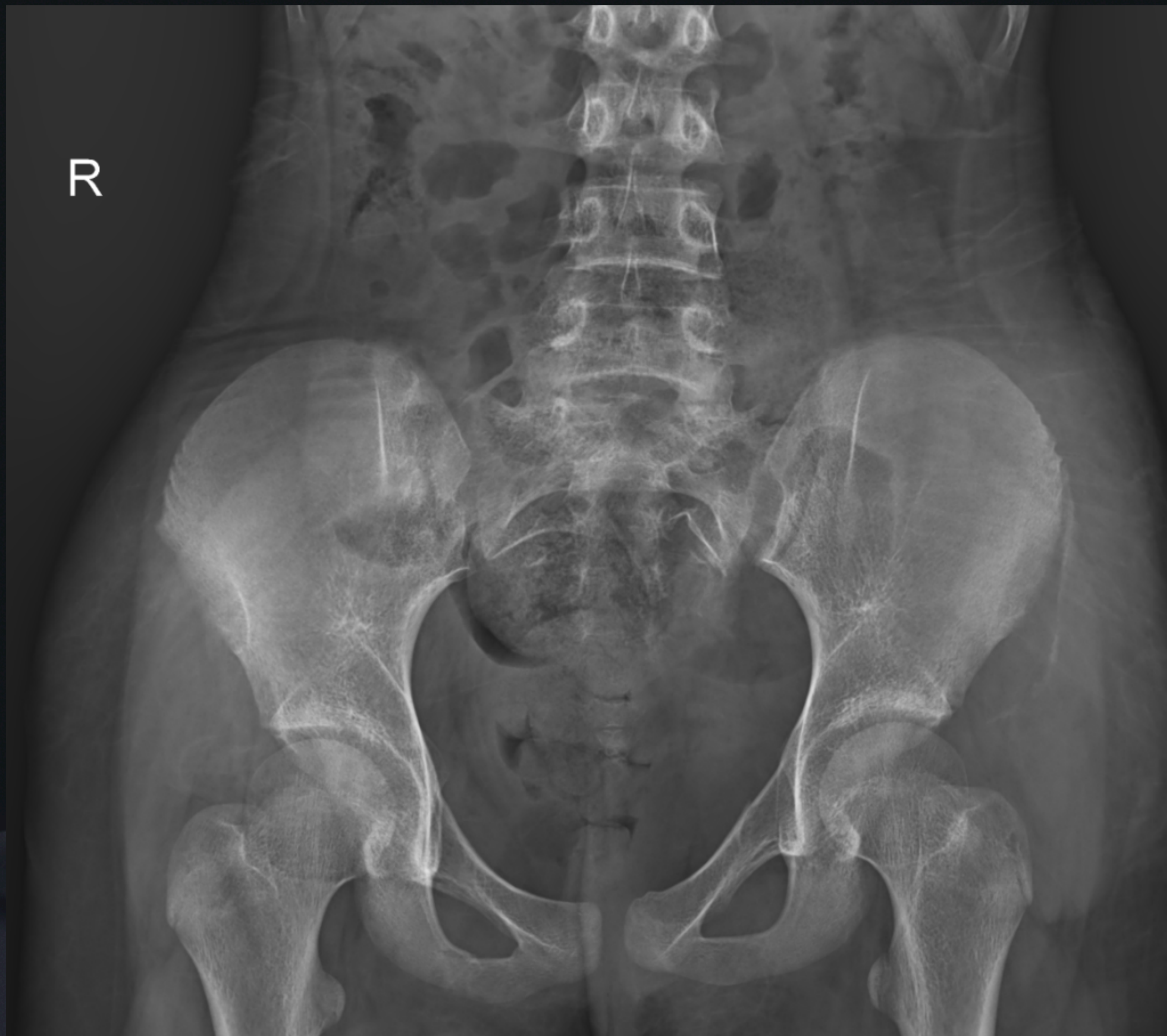
CTWA CE : Liver injury grade 3

Conservative treatment

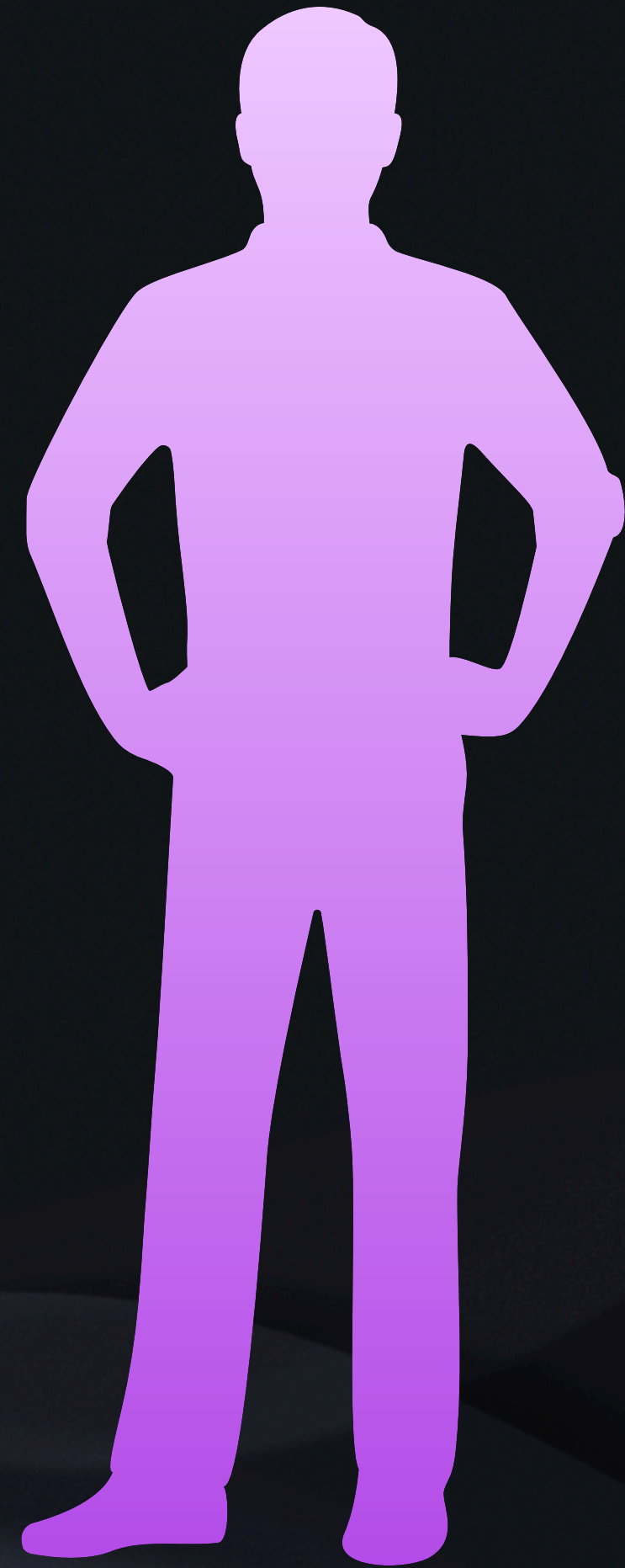
CASE 4



MCA with blunt abdominal injury
BP 70/50 mmHg, HR 130
ABD - not tender, soft, no guarding



- E-FAST negative
- CTWA : Hematoma at extraperitoneal space at anterior lower abdomen, along left psoas and iliacus muscles



MCA with blunt abdominal injury
BP 70/50 mmHg, HR 130
ABD - not tender, soft, no guarding

FAST negative

Film pelvis : Lt sacral bone fracture with
Sacroiliac joint widening

CTWA CE : Hematoma at extraperitoneal space
at anterior lower abdomen, along left psoas
and iliacus muscles

For patients with **unstable hemodynamics**, FAST can be quickly performed and its result might perform the surgeons on the potential site of hemorrhage

For **hemodynamically stable patients**, CT is generally used after a positive FAST examination to evaluate for the organ injury

FAST can not be used to rule out intra-abdominal injury

Take home message

- Technique : Poor image gain , Suboptimal depth, Backward orientation
- Perform FAST with caution : Limitation, False positive / False negative



Thank you