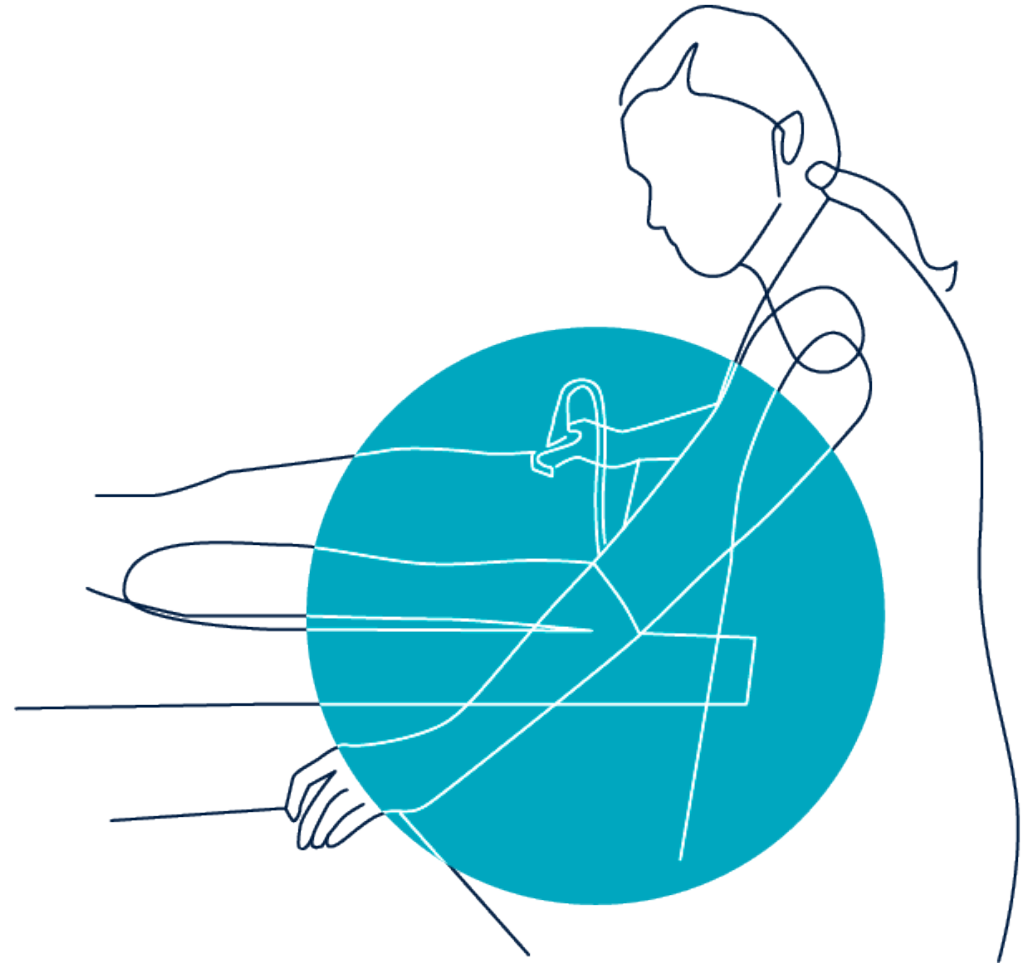


The Adult Abdomen

Kevin Fairbairn

June 14th, 2024 | 12:00

Intended for
intermediate PoCUS users



THE UNIVERSITY OF BRITISH COLUMBIA

Continuing Professional Development

Faculty of Medicine

LAND ACKNOWLEDGMENT

We acknowledge that we work on the traditional, ancestral and unceded territory of the Ktunaxa, Syilx, and Sinixt Nations.



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PRESENTER DISCLOSURES

Relationships with commercial interests:

- Medical Lead HOUSE program UBC CPD



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MITIGATION OF BIAS

- All content developed as part of this program was reviewed for potential bias by the members of the program planning committee.
- Relationships do not affect my choices in developing content.
- Financial relationships are unrelated to presentation.
- Not speaking about any products or medications.



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LEARNING OBJECTIVES

- Develop an approach to using PoCUS for abdominal pain
- Identify 3 different diagnoses that can be found on abdominal PoCUS
- Understand when to use PoCUS when assessing for diverticulitis



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AN APPROACH TO ABDOMINAL POCUS



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AN APPROACH TO ABDOMINAL POCUS

WHAT WE ARE **NOT** GOING TO TALK ABOUT

- <https://ubccpd.ca/nov-19-2021-pocus-and-small-bowel-obstruction>
- <https://ubccpd.ca/jan-14-2022-pocus-kidney-and-bladder>
- <https://ubccpd.ca/apr-22-2022-gallbladder-ultrasound>
- <https://ubccpd.ca/sept-23-2022-fast-pipes-ivc-aorta-ultrasound-shock>
- <https://ubccpd.ca/feb-23-2024-appendicitis>



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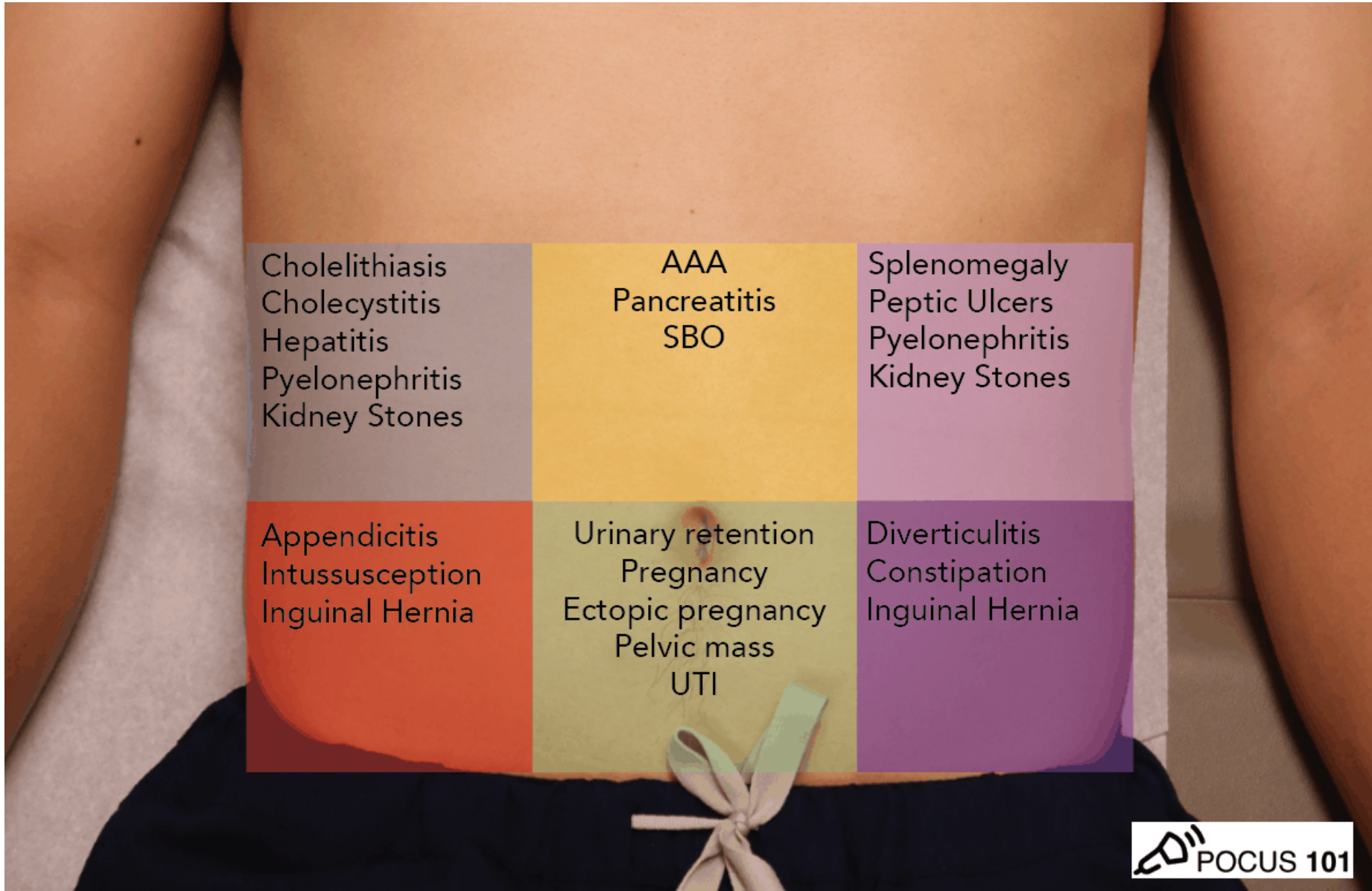


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AN APPROACH TO ABDOMINAL POCUS



Cholelithiasis
Cholecystitis
Hepatitis
Pyelonephritis
Kidney Stones

AAA
Pancreatitis
SBO

Splenomegaly
Peptic Ulcers
Pyelonephritis
Kidney Stones

Appendicitis
Intussusception
Inguinal Hernia

Urinary retention
Pregnancy
Ectopic pregnancy
Pelvic mass
UTI

Diverticulitis
Constipation
Inguinal Hernia



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AN APPROACH TO ABDOMINAL POCUS

- AAA/IVC
- eFAST (pelvic)
- Gallbladder
- Lawnmower
- Point of maximal tenderness



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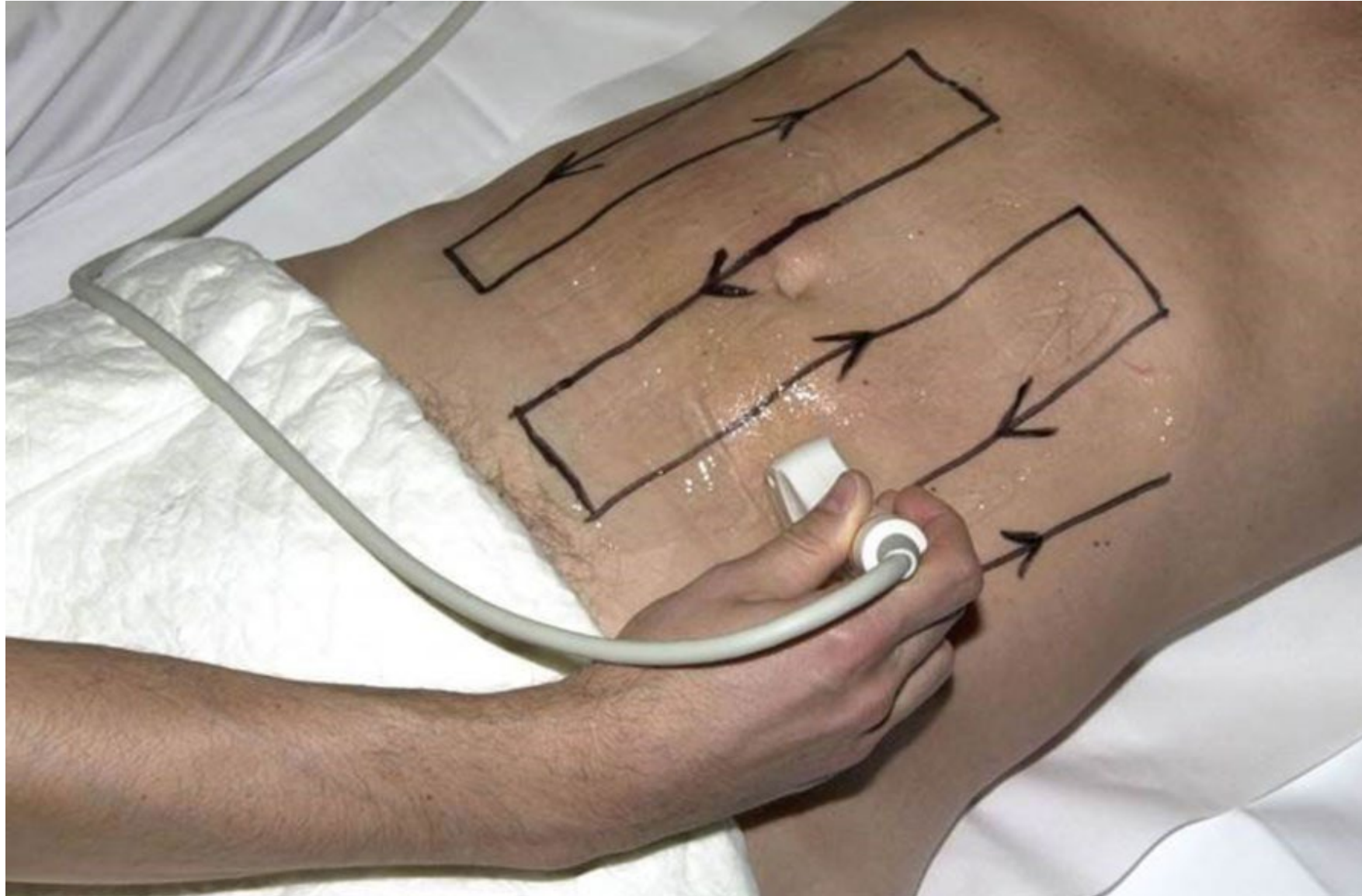
CURVILINEAR PROBE



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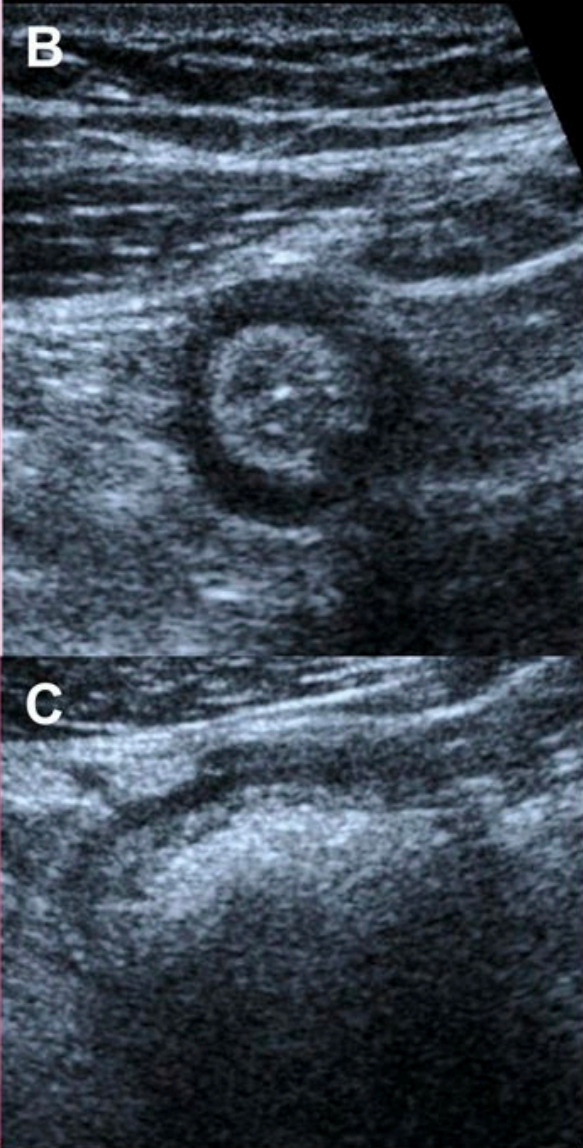
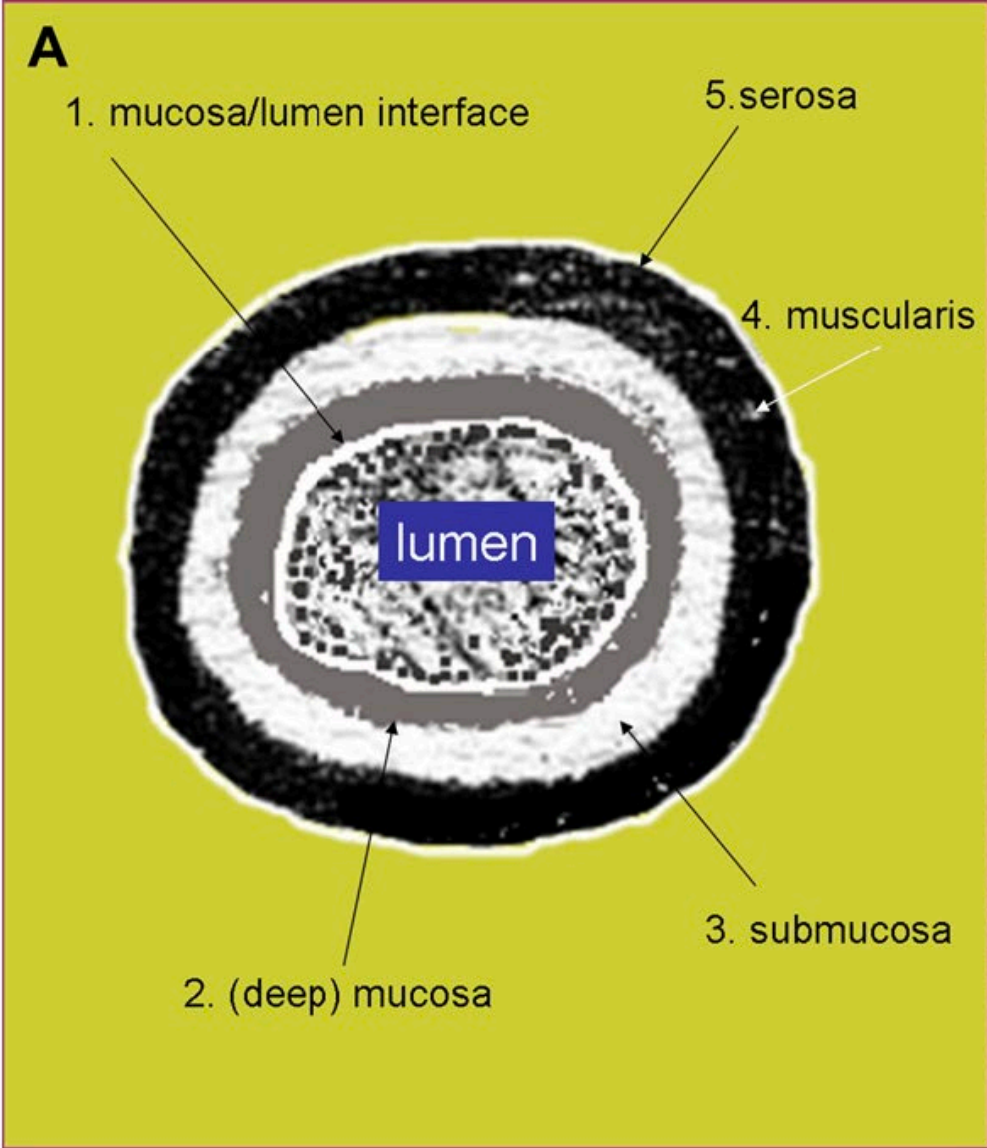
HOW TO SCAN



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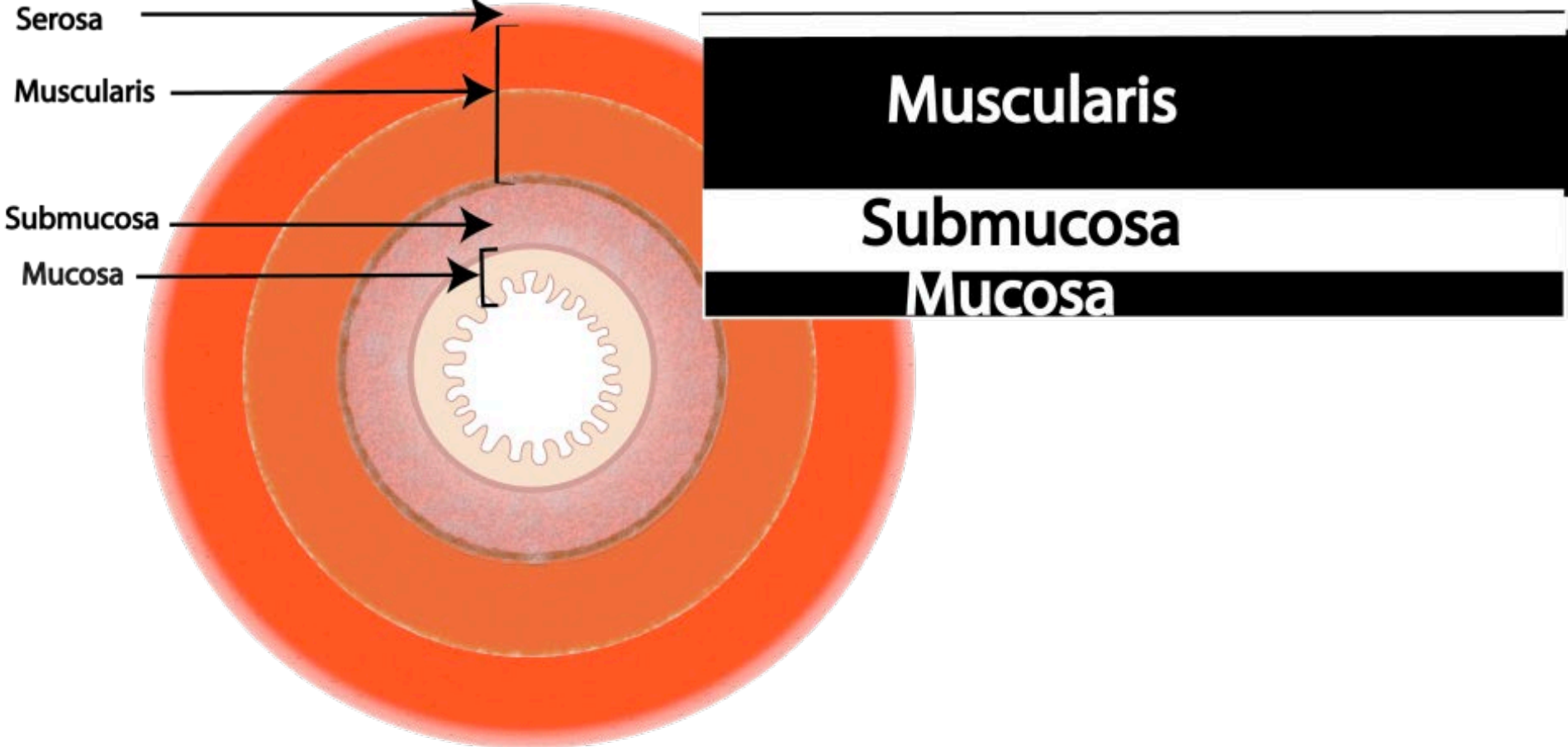
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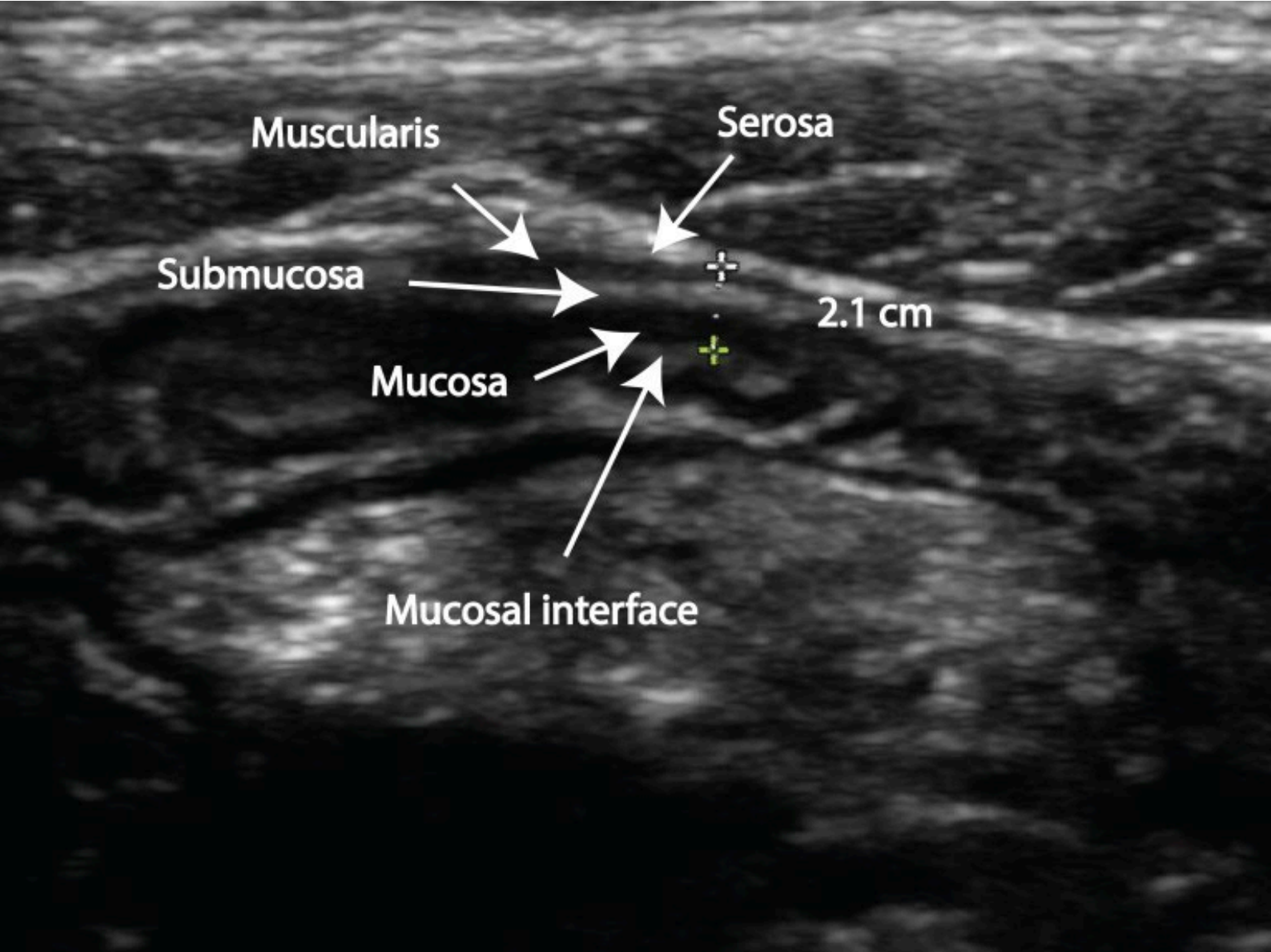
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DEVELOPMENT



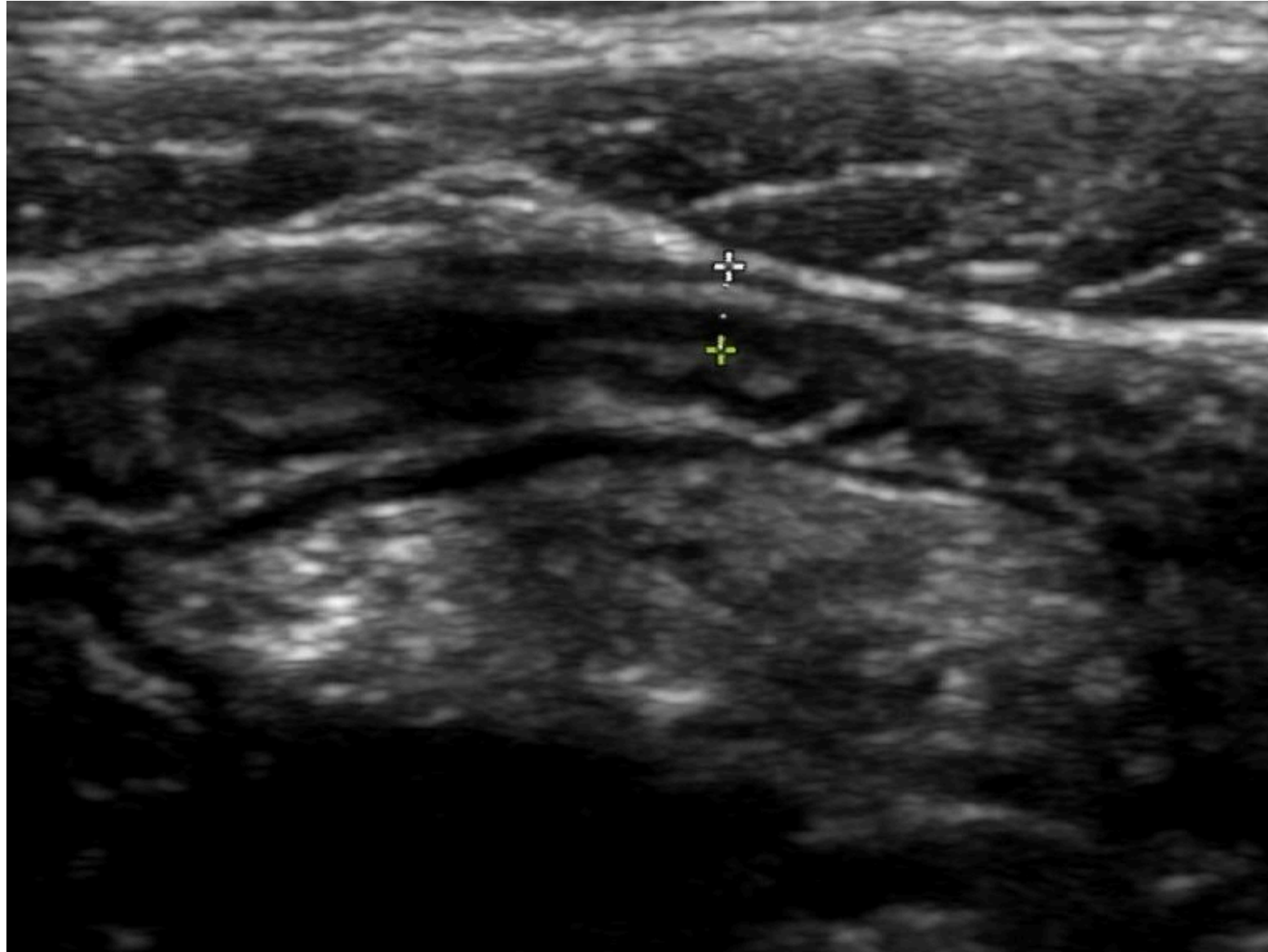
BOWEL SIGNATURE



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BOWEL SIGNATURE



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CASE #1

64 yo male

Presents with 36 hours of LLQ pain

Worse when mowing the lawn



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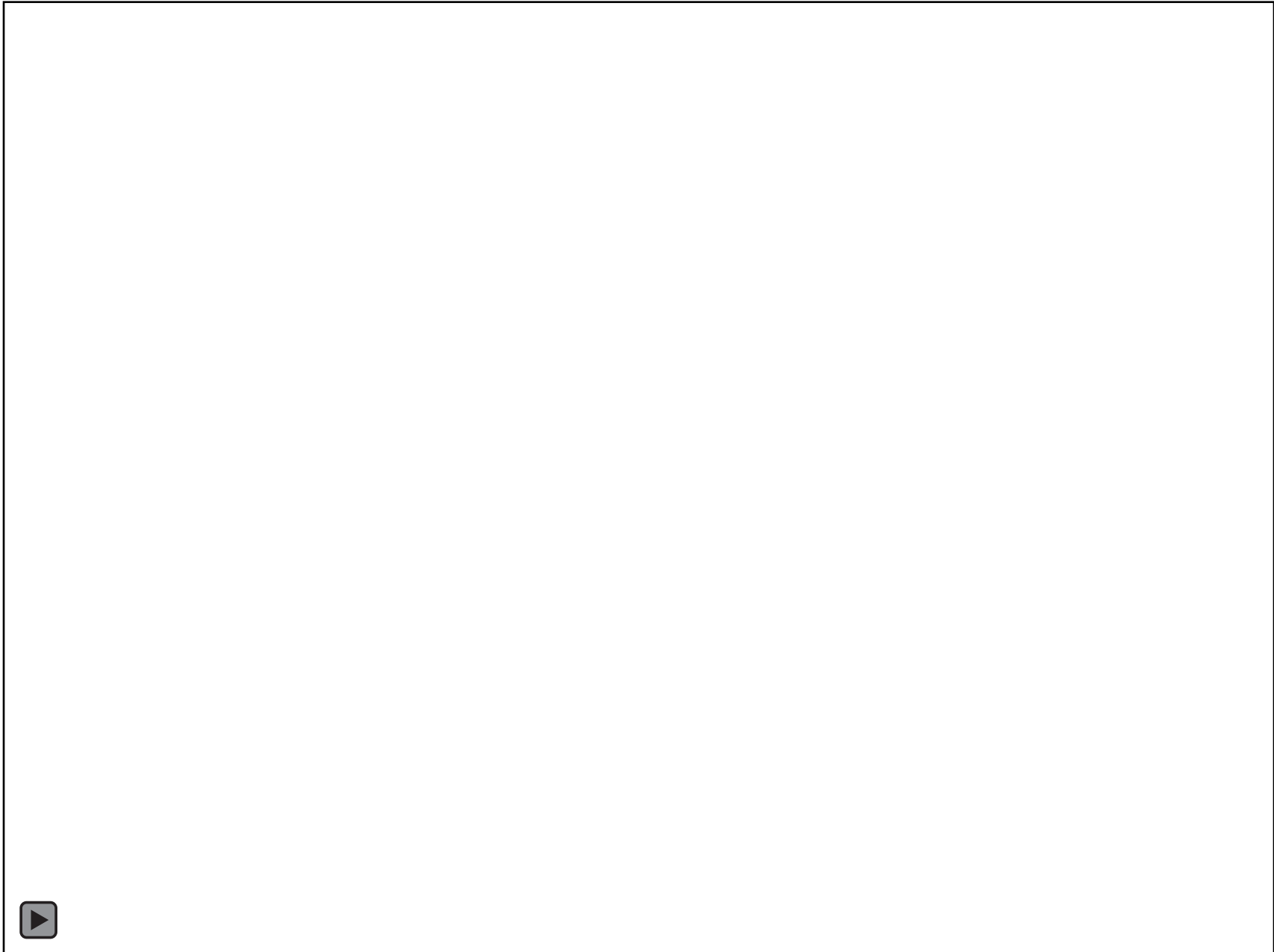
CASE 1



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CASE 1



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DEVELOPMENT



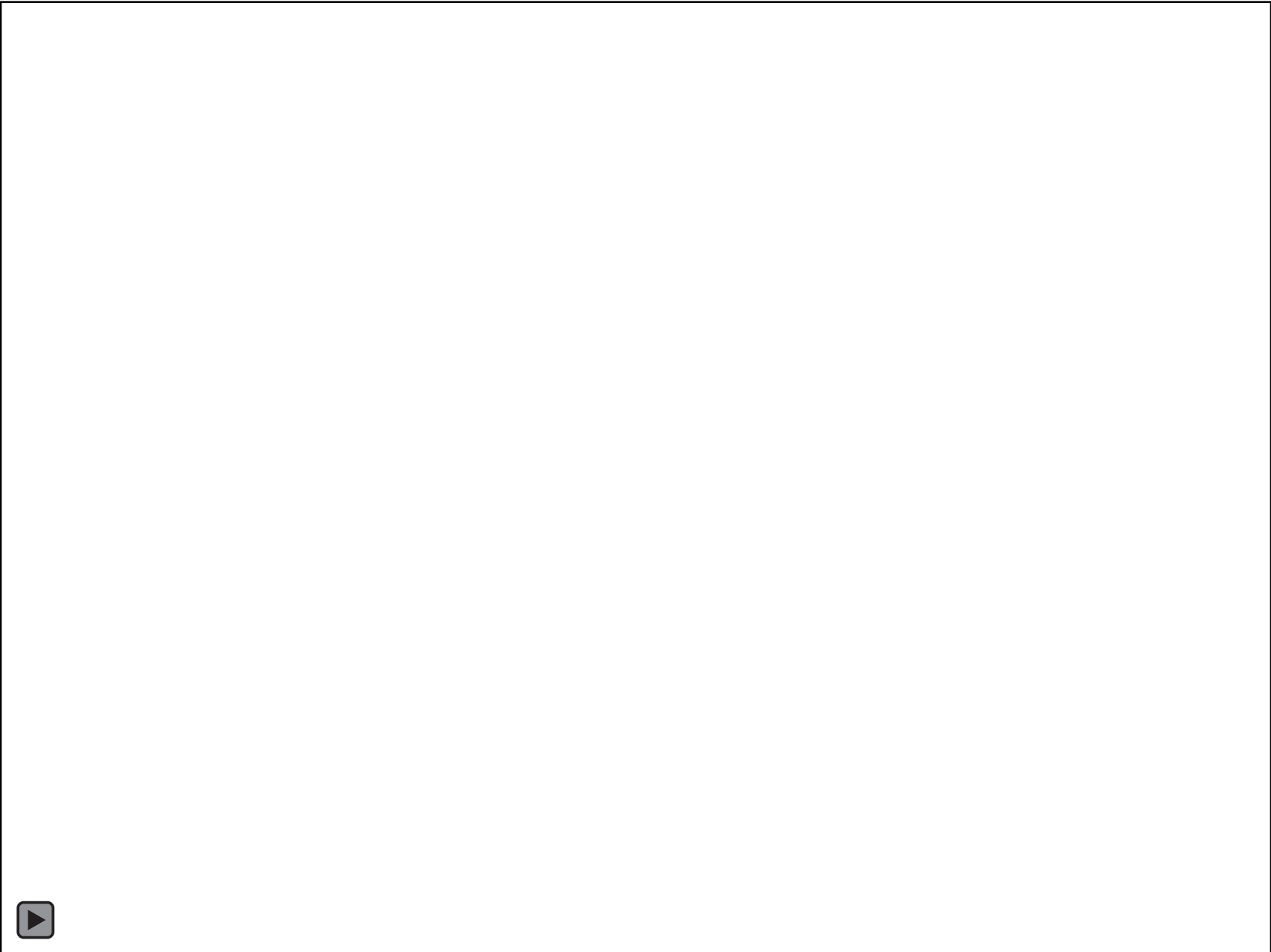
CASE 1



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CASE 1



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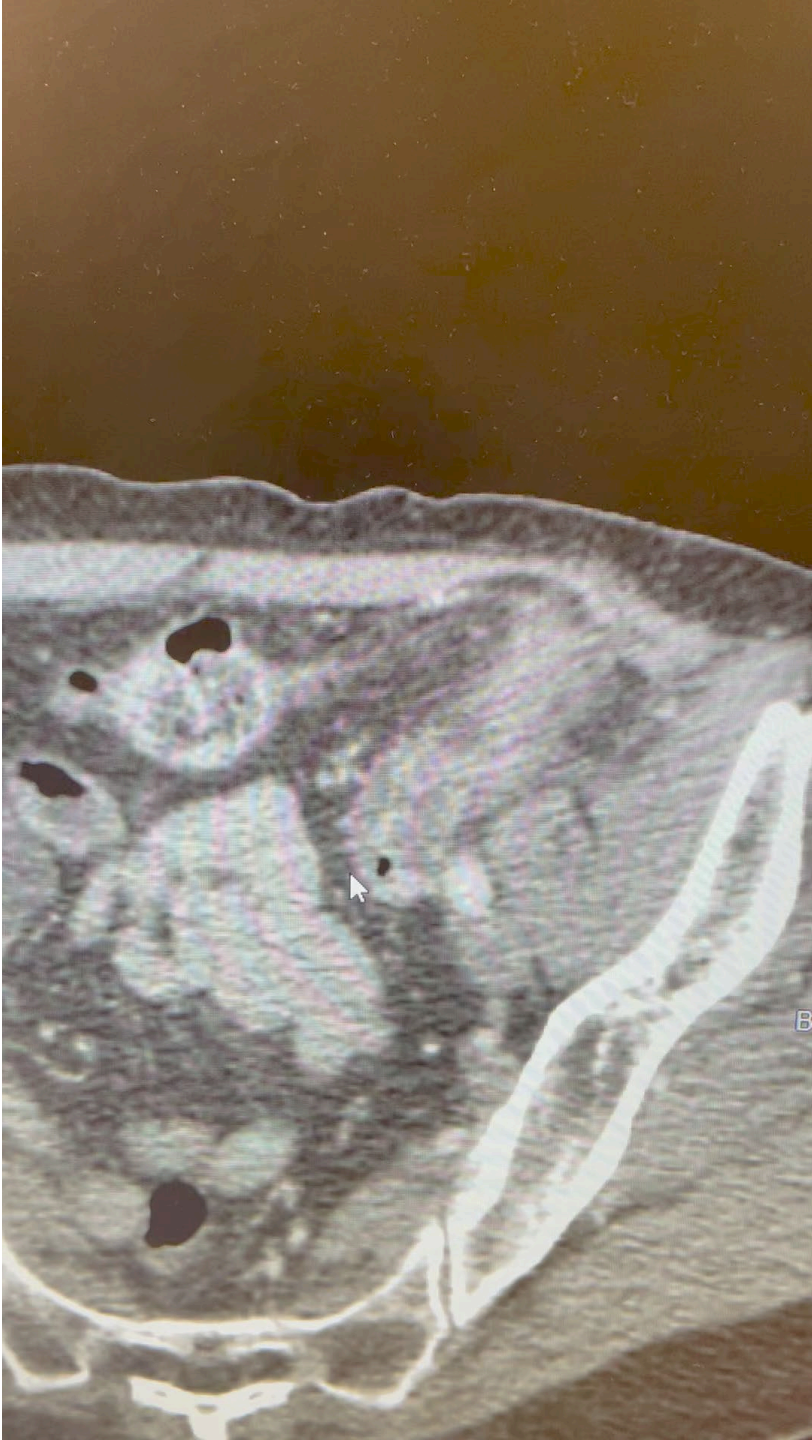
CASE 1



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CASE 1



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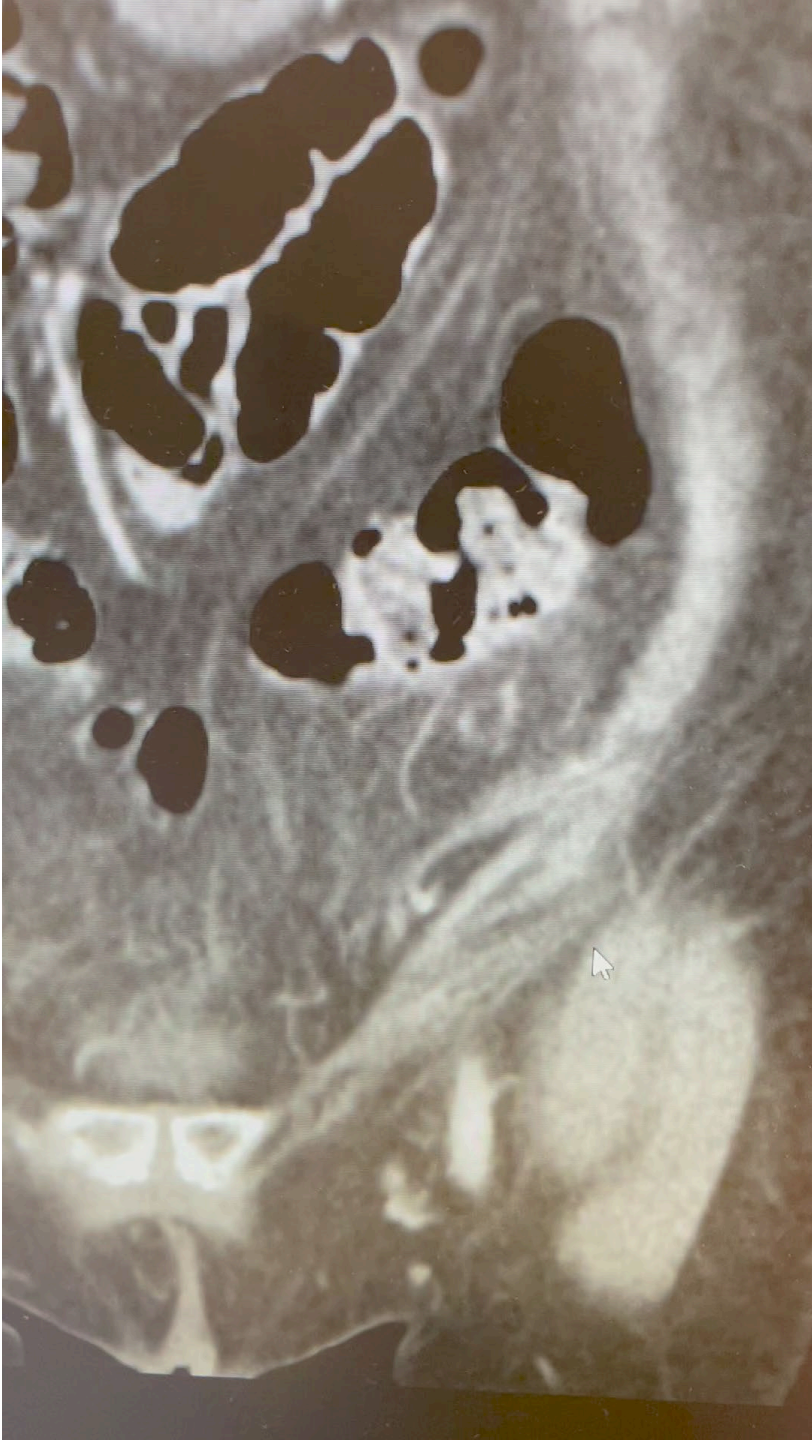
CASE 1



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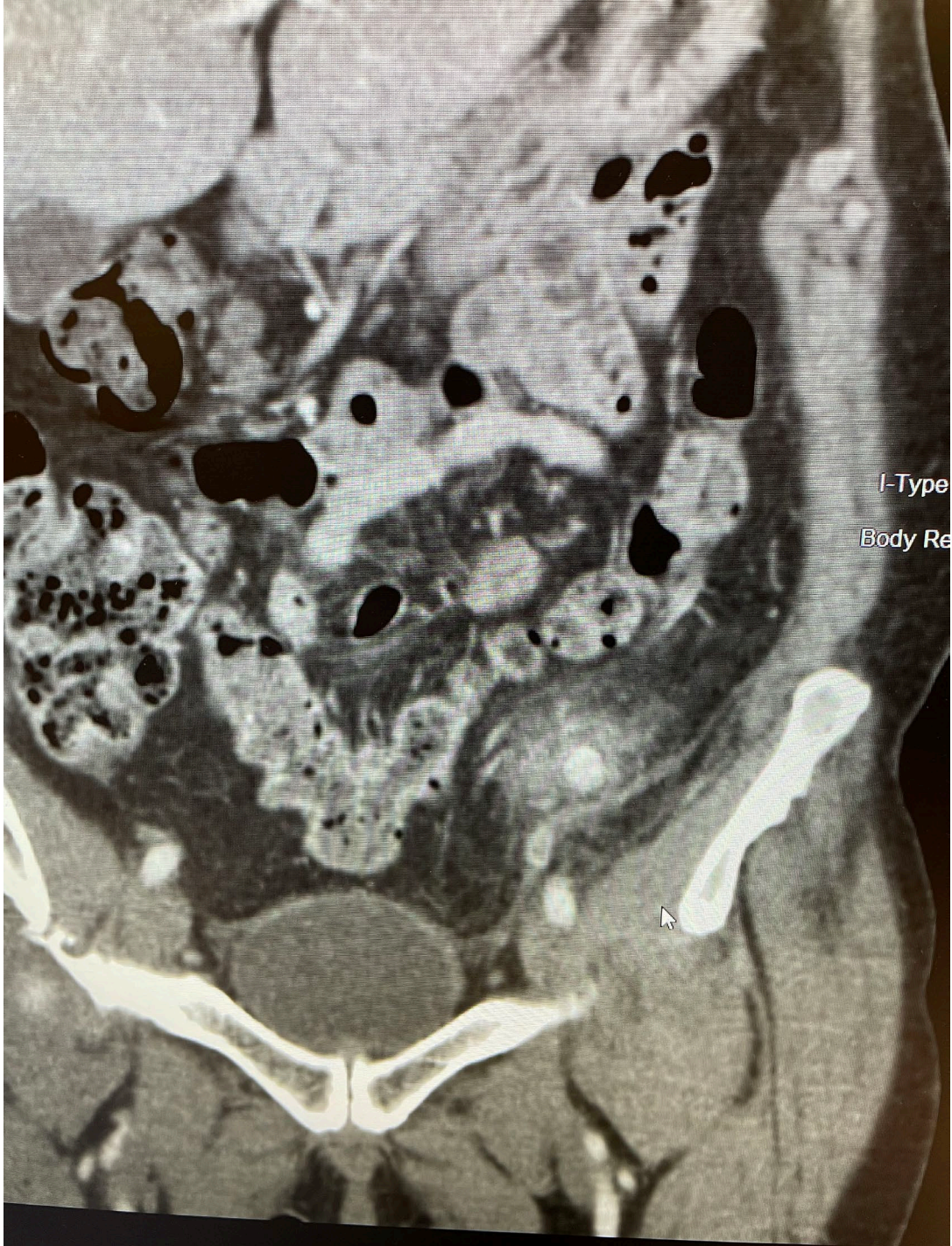
CASE 1



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CASE 1



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DIVERTICULITIS

- Bowel wall edema > 5 mm surrounding a diverticula
- Enhancement of pericolonic fat
- Sonographic tenderness to palpation
- (Dome or pseudo kidney sign)



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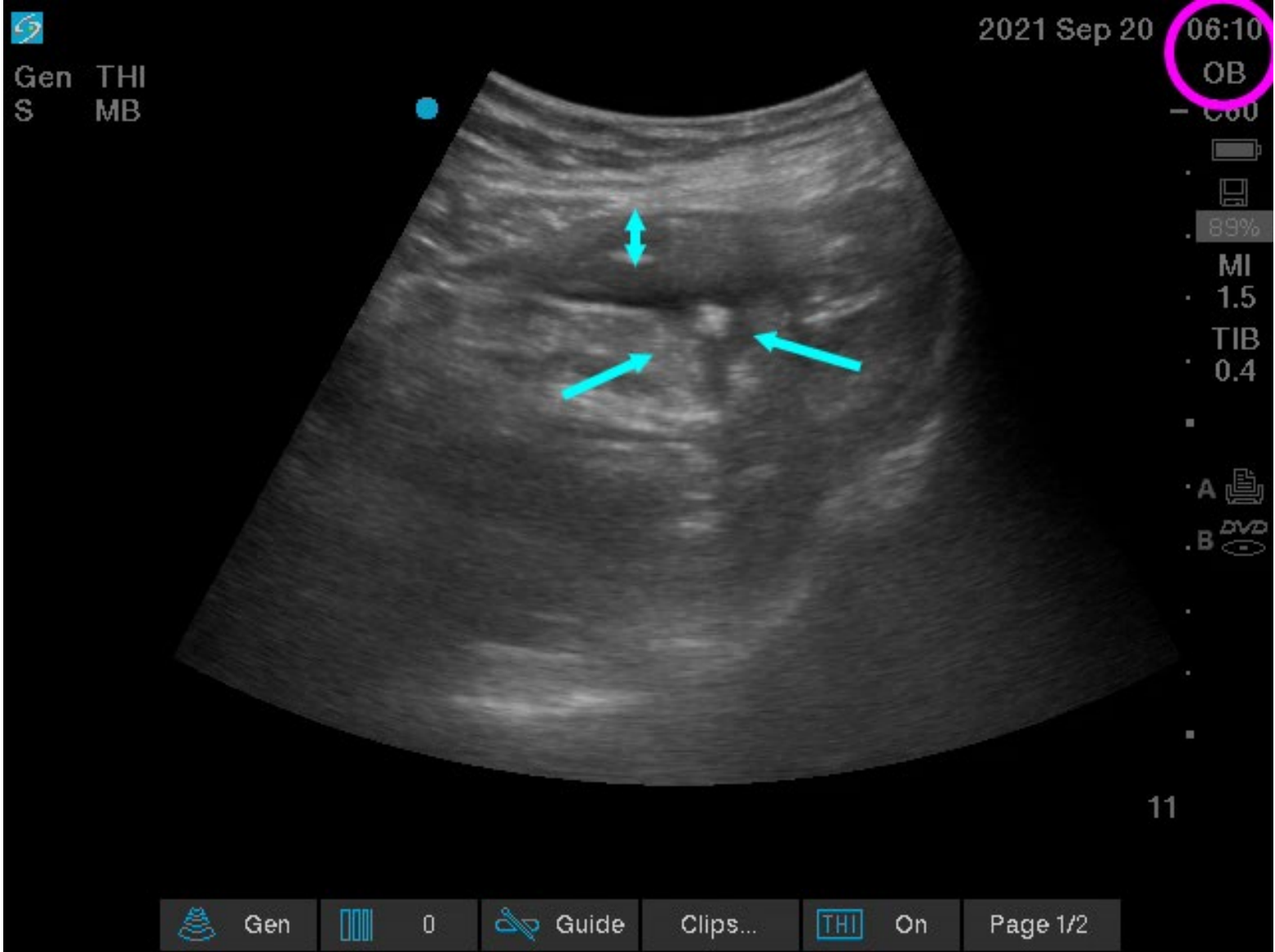
DIVERTICULITIS



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DIVERTICULITIS



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DIVERTICULITIS

- Sensitivity 0.92 (0.88–0.96)
- Specificity 0.97 (0.94–0.99)
- LR+ 30.67
- LR- 0.08



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Cohen 2020, Ann Emerg Med

DIVERTICULITIS

- Consider 'PoCUS First' approach



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DIVERTICULITIS - POCUS LIMITATIONS

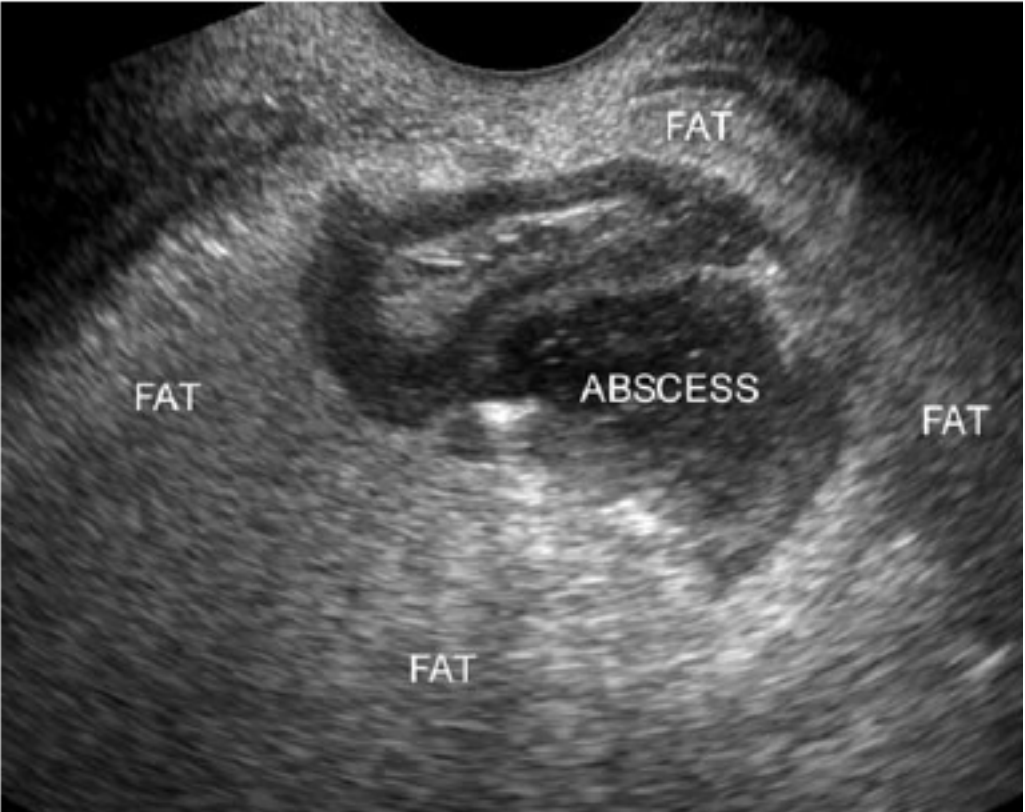
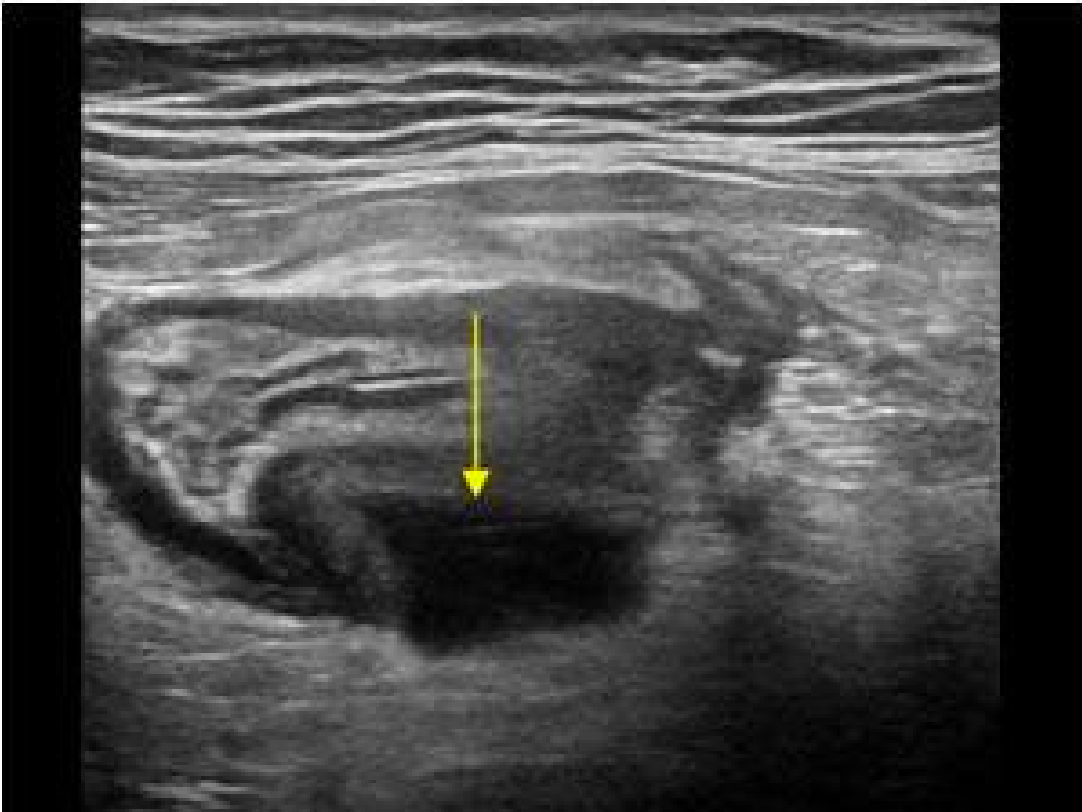
- May not pick up complicated diverticulitis
 - perforation
 - abscess etc
- Sp is decreased for the cecum and ascending colon



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DIVERTICULITIS - POCUS LIMITATIONS



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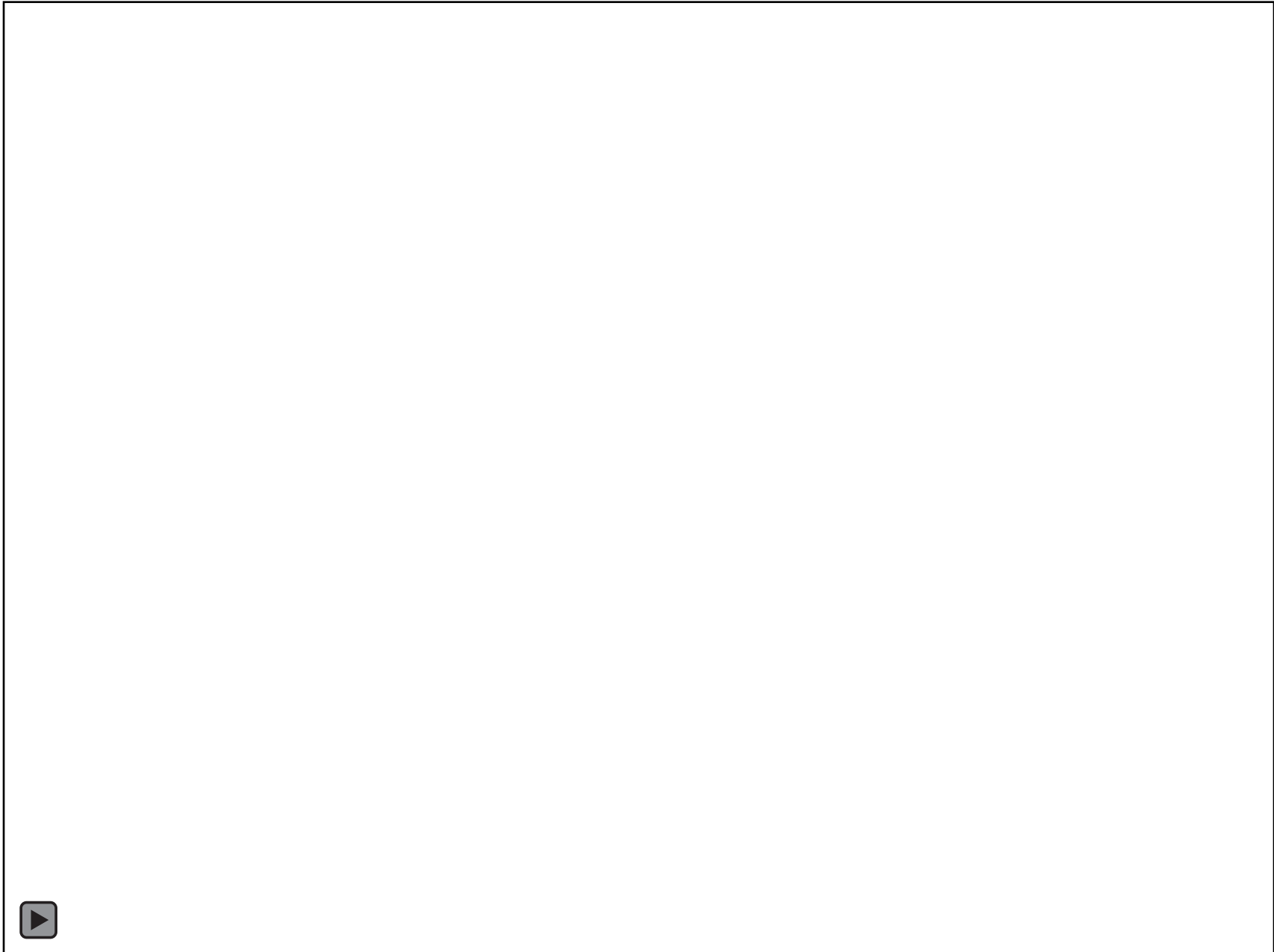
CASE 2



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CASE 2



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DEVELOPMENT



CASE 2



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DEVELOPMENT



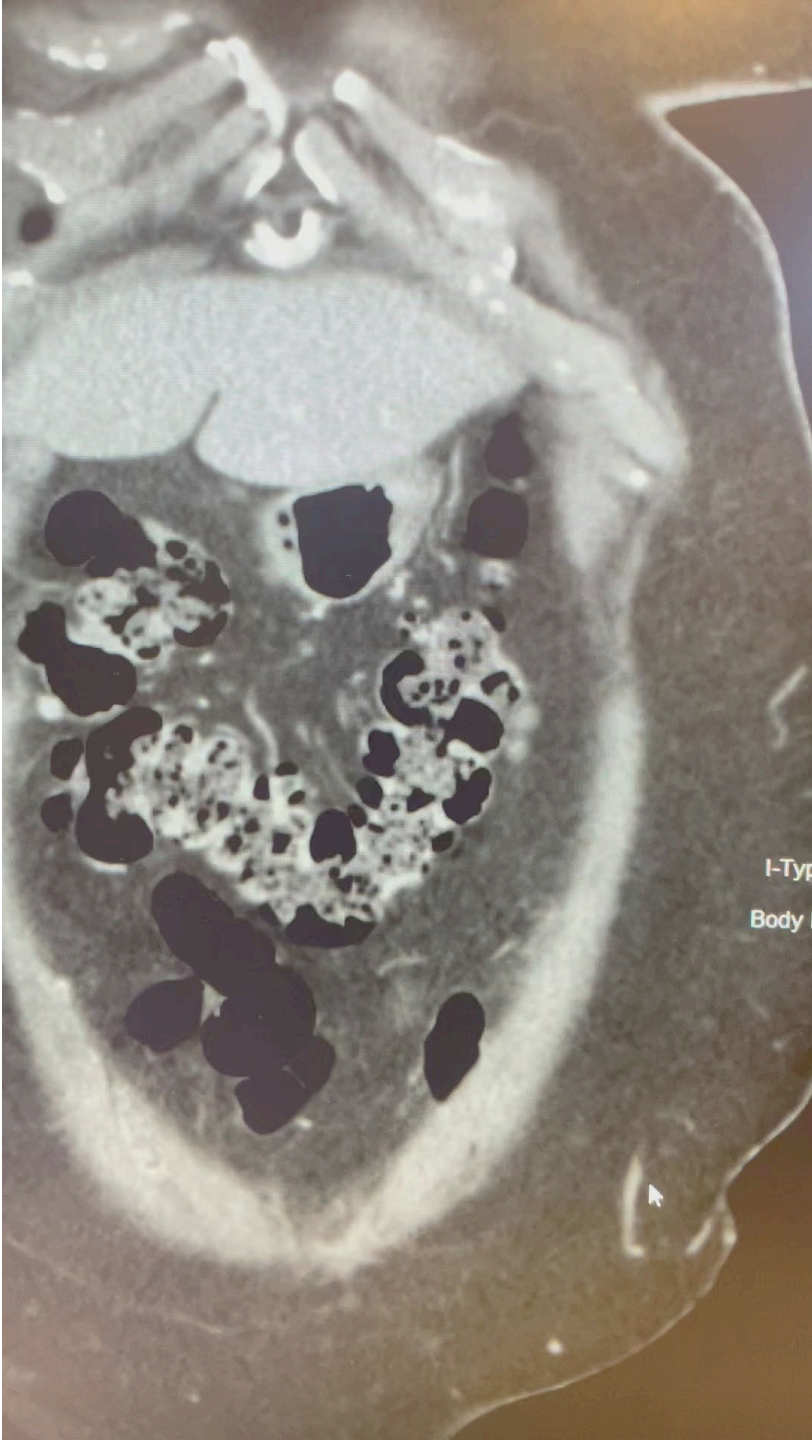
CASE 2



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DEVELOPMENT



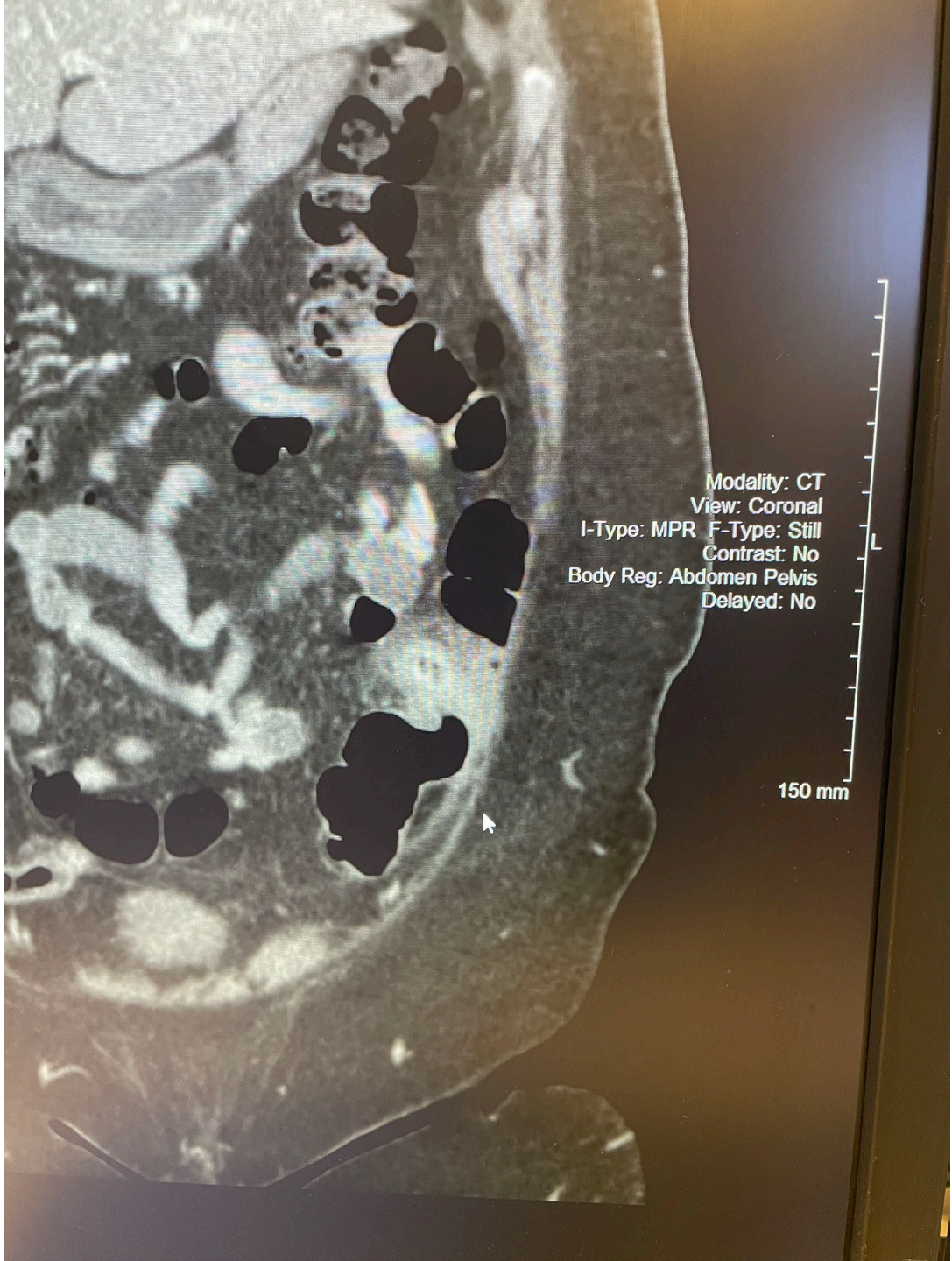
CASE 2



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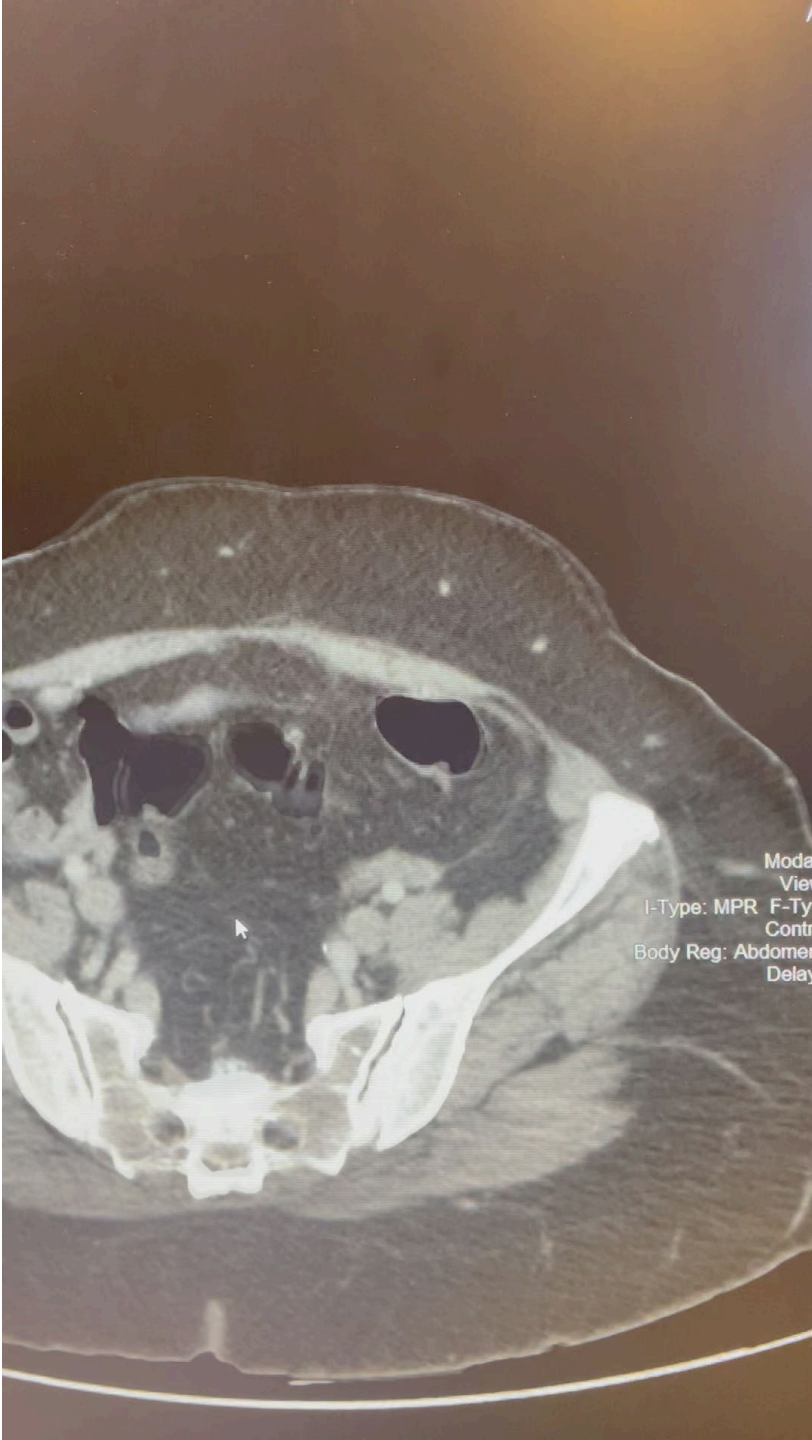
CASE 2



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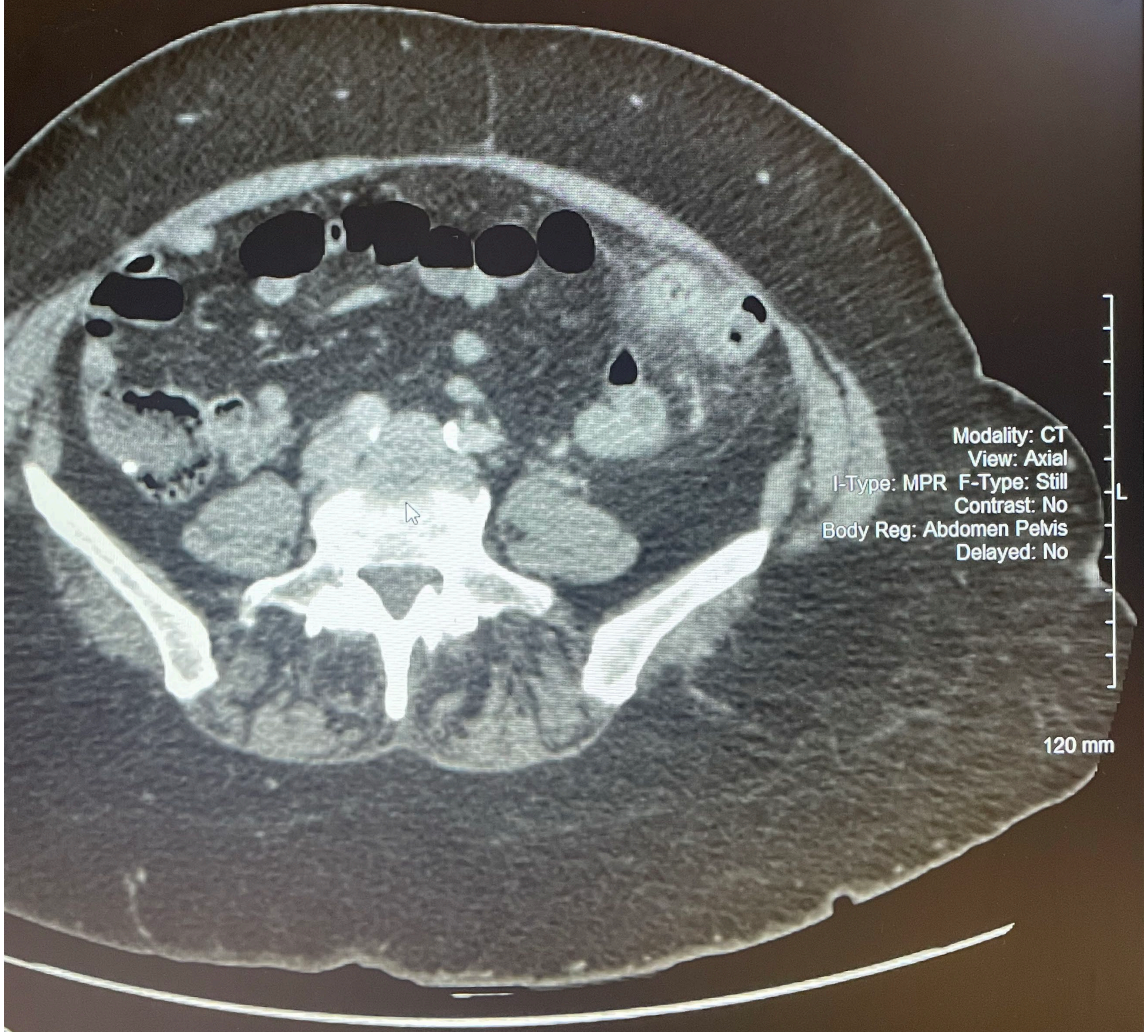
CASE 2



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CASE 2



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CASE #3

61 yo male

Presents with 12 hours of RUQ pain

Worse when mowing the lawn



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CASE 3



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CASE 3



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INTUSSUSCEPTION

- Appearance: Cross section (target, sushi or cinnamon roll)
longitudinal (pancake stack, hot dog)
- Hypoechoic edema, hyperechoic fatty core
- >2cm diameter (ileocolic)



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INTUSSUSCEPTION

- A lymph node may act as a lead point
- Small bowel to small bowel may have a similar appearance but will usually be less than 2cm and often self reduces



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CASE #4

61 yo male

Presents with 6 hours of central abdominal pain

Noticed after lifting his lawn mower in a fit of rage



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CASE 4



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CASE 4



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DEVELOPMENT



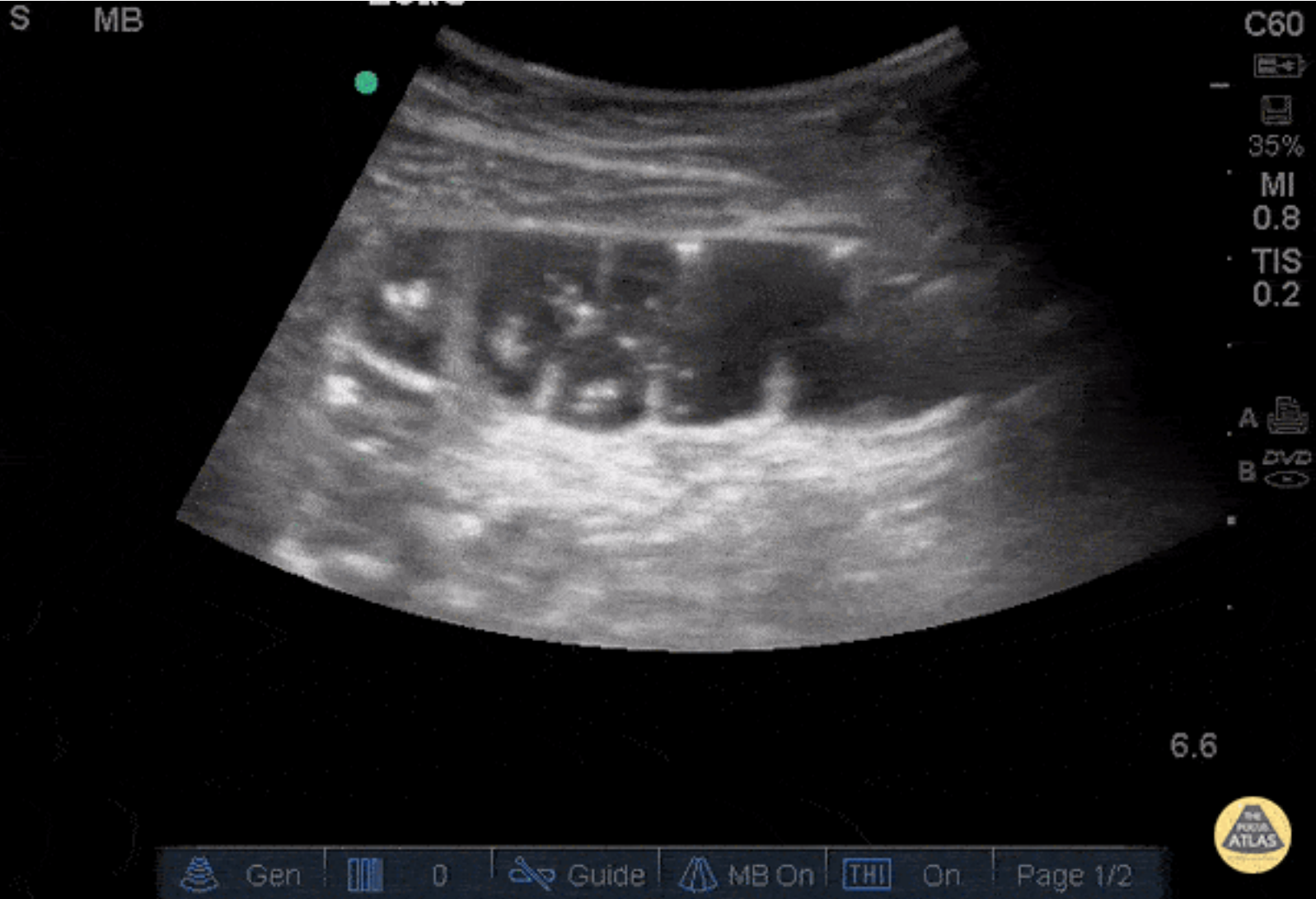
CASE 4



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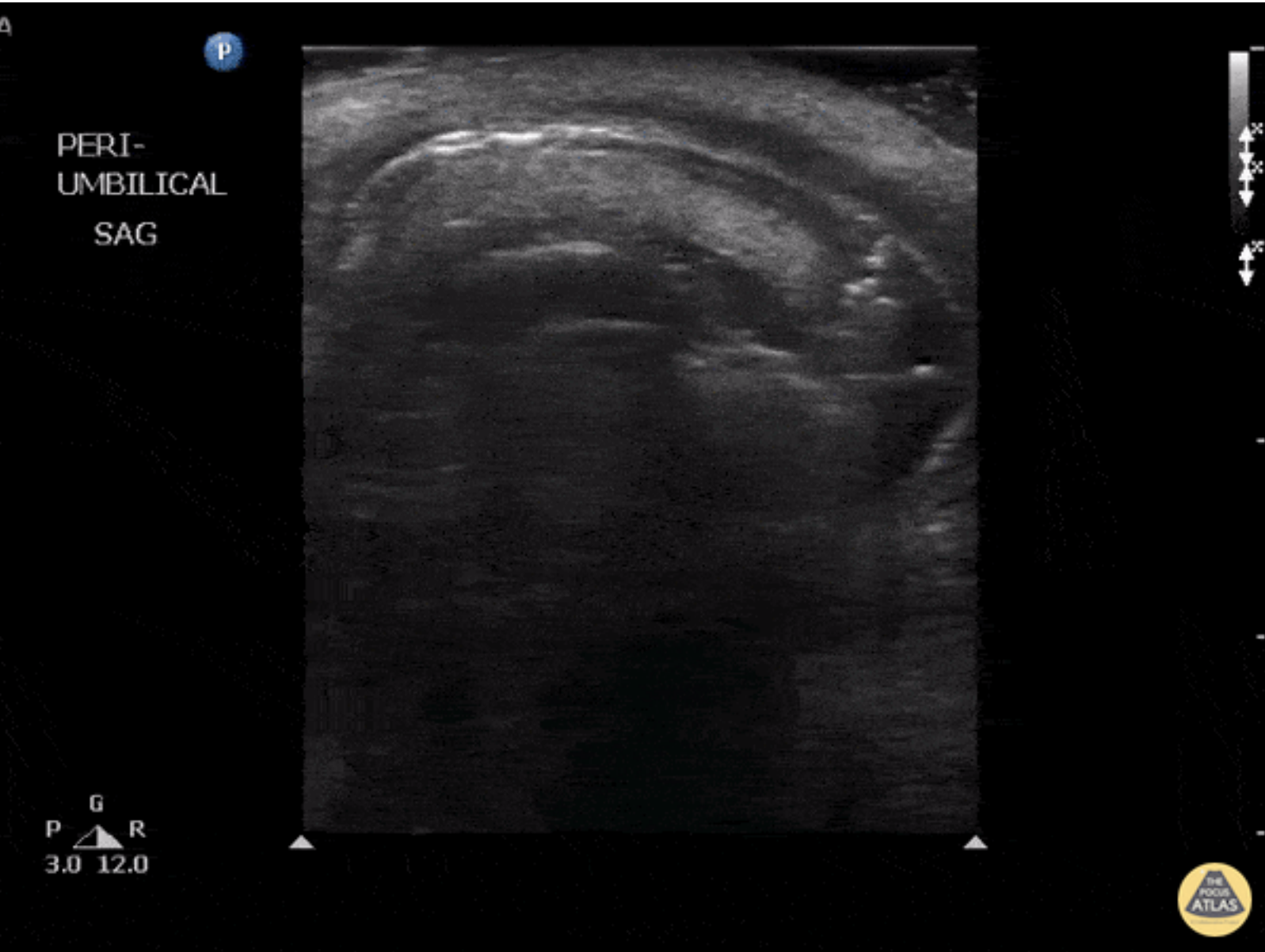
CASE 4



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CASE 4



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CASE #5

54 yo male

Presents with 1 day hx of diffuse abdominal pain

Drinks 12-18 beers daily (while mowing the lawn)



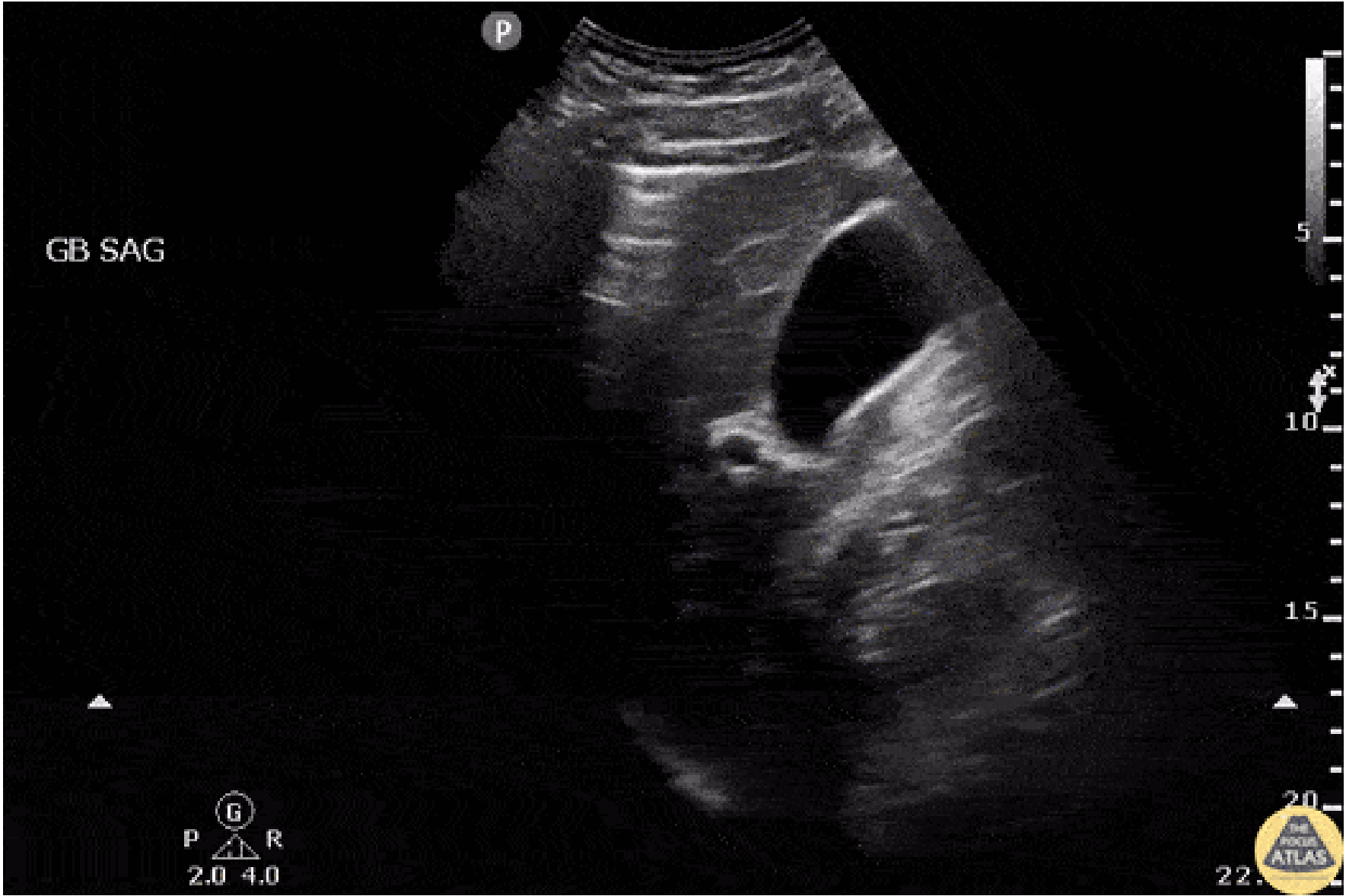
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Medicine

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DEVELOPMENT

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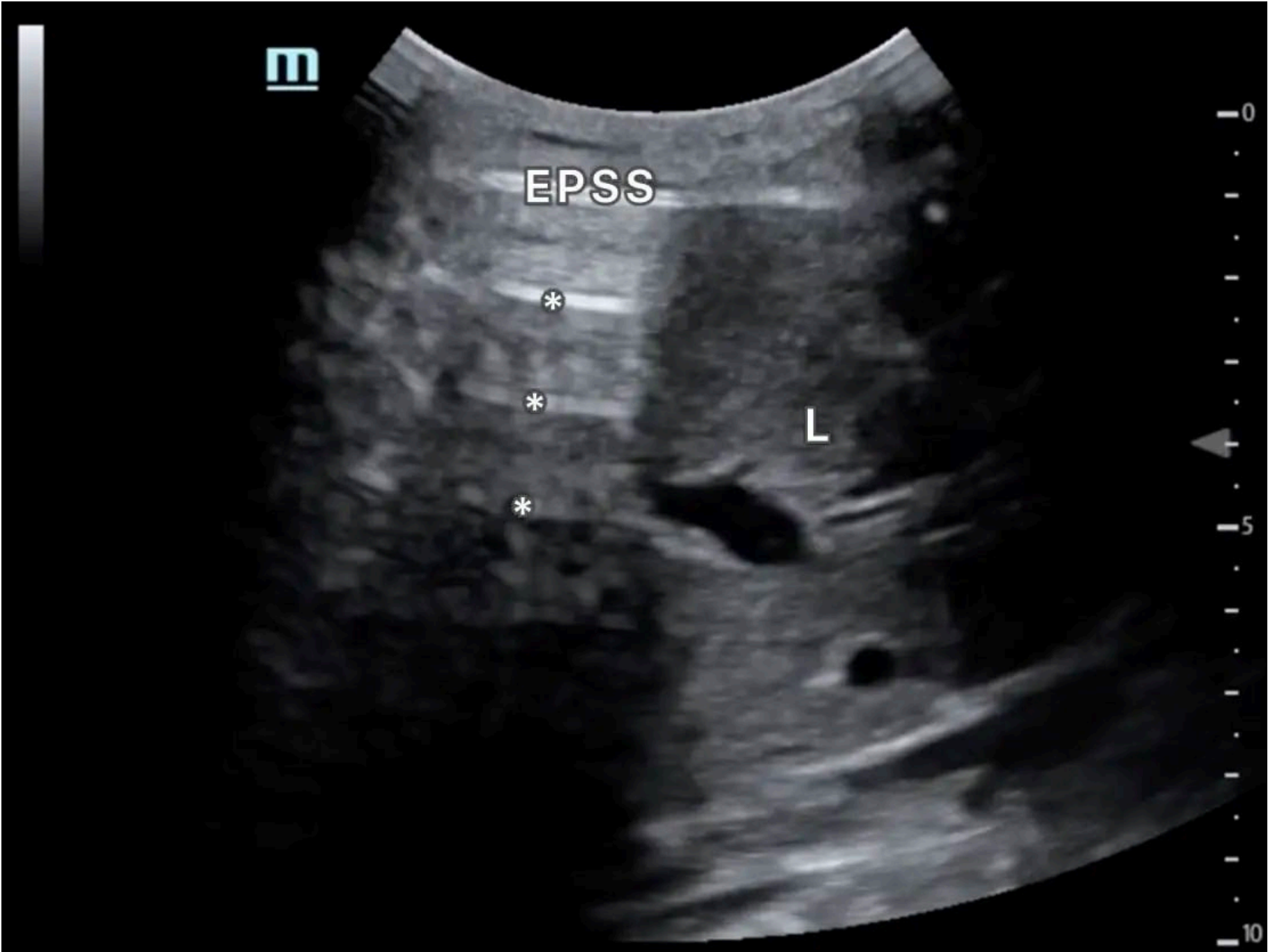
CASE 5



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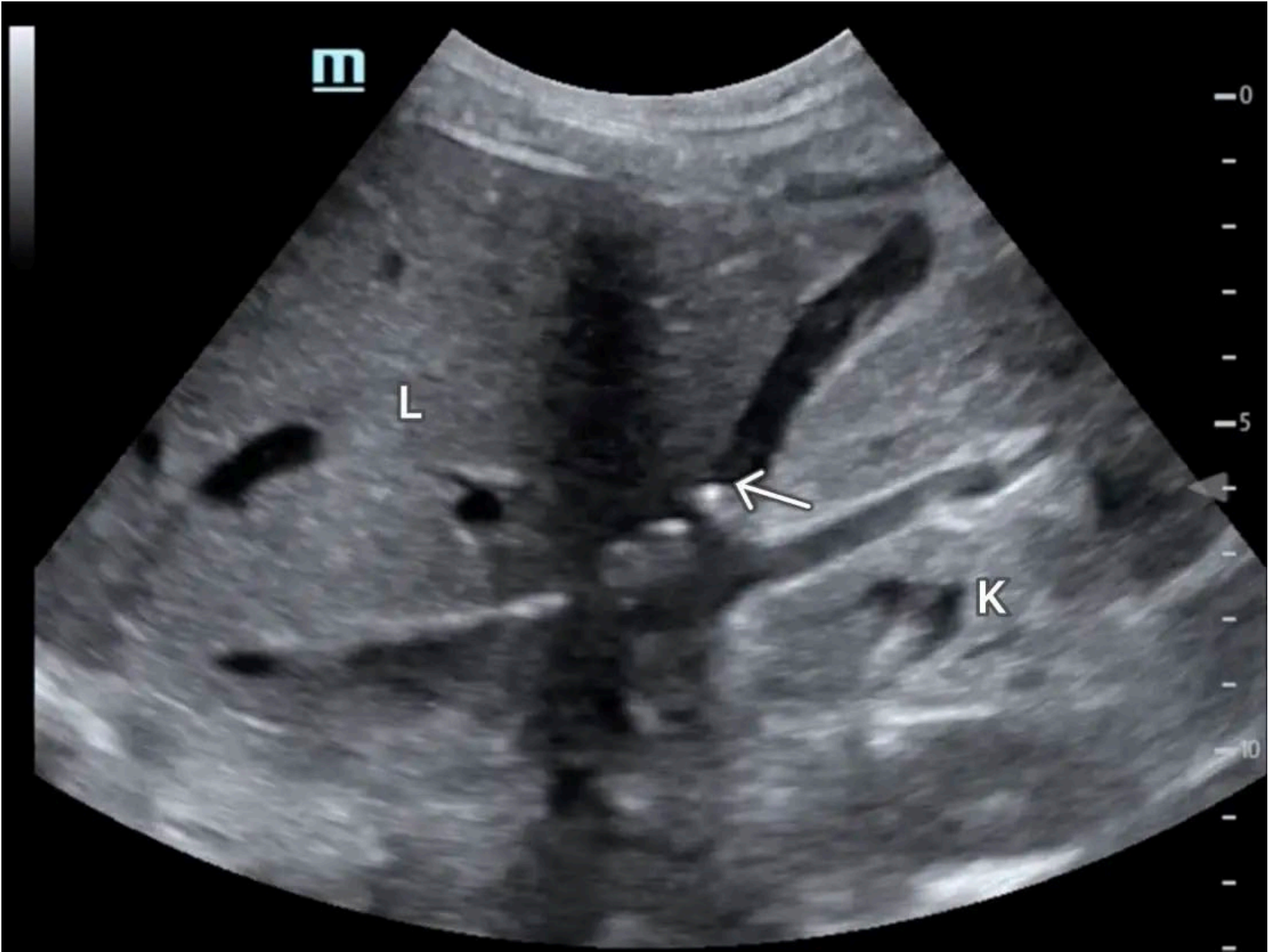
CASE 5



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CASE 5



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PNEUMOPERITONEUM

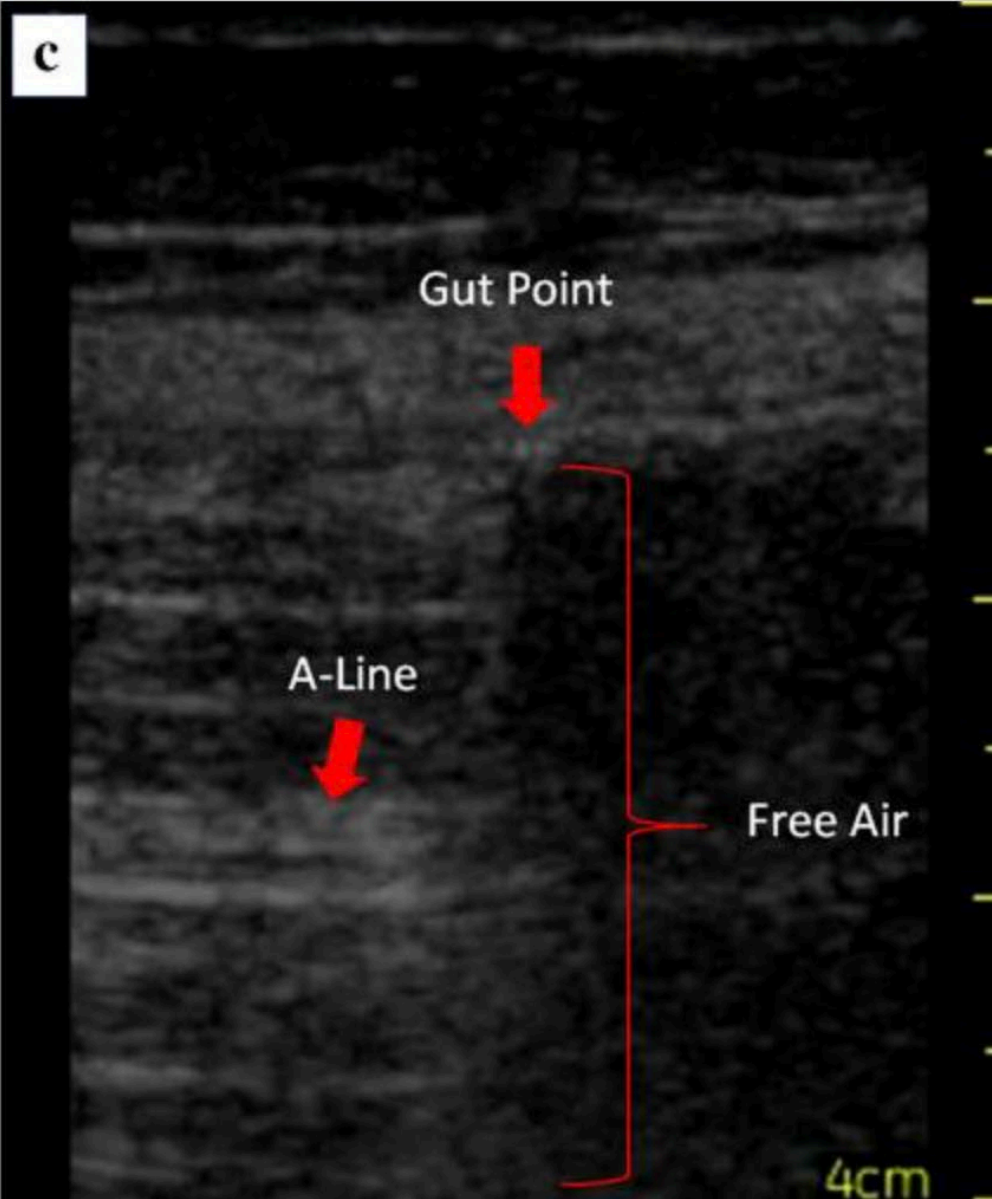
- Linear probe
- Enhanced Peritoneal Stripe Sign
 - (A lines in the abdomen)
- Consider left lateral decubitus
 - Obliteration of liver window
- Scissors maneuver



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PNEUMOPERITONEUM

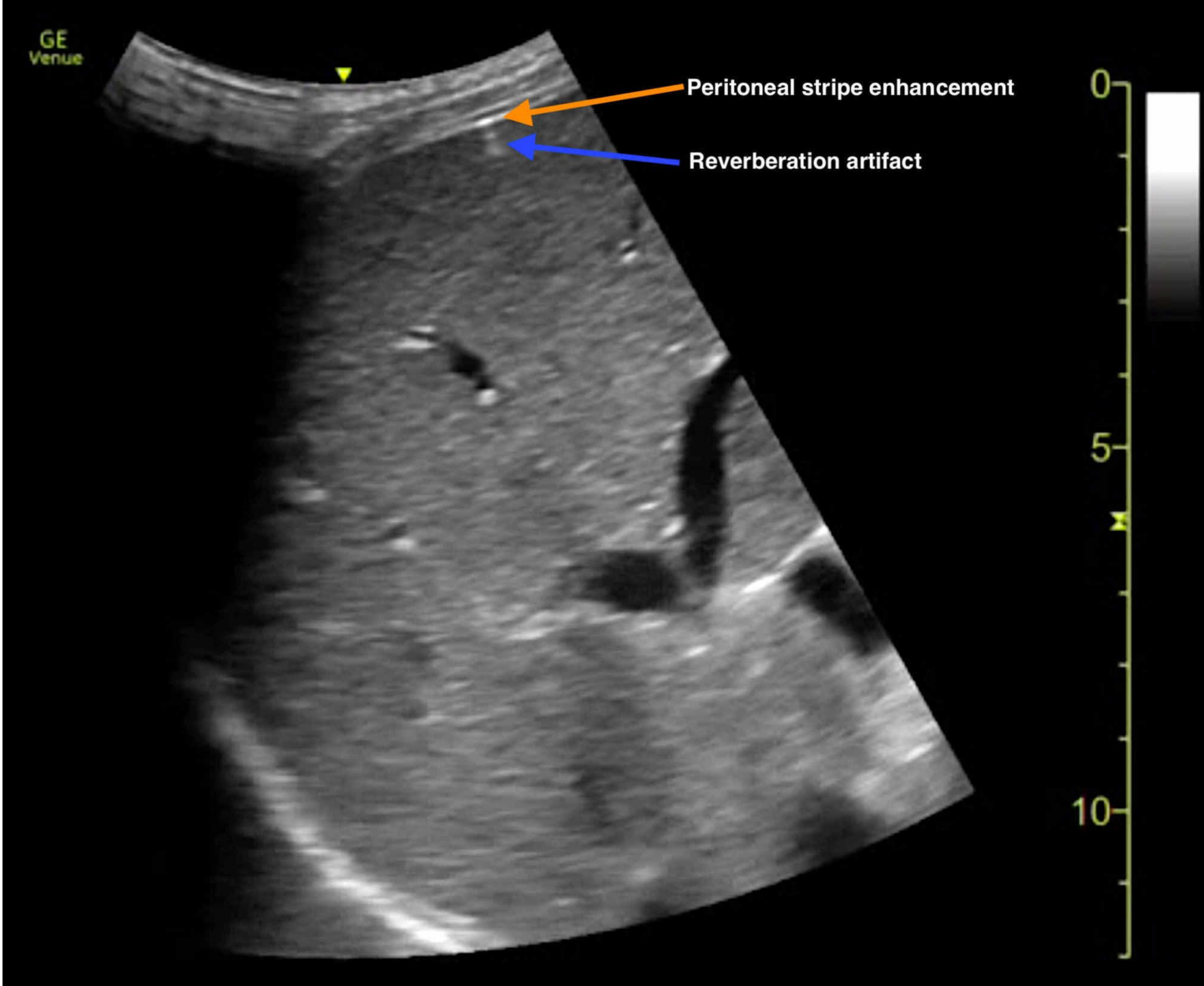


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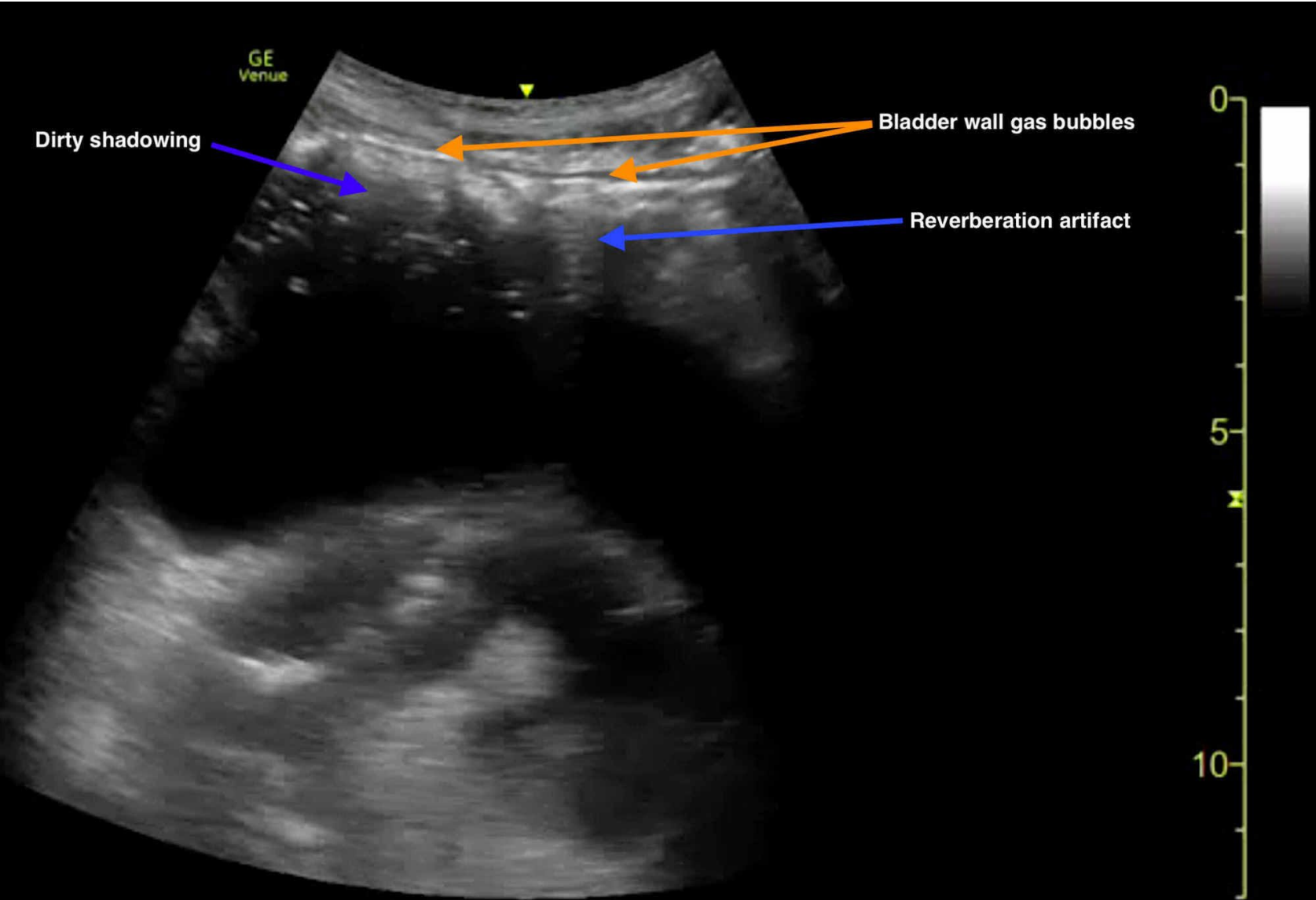
PNEUMOPERITONEUM



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PNEUMOPERITONEUM



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135

PNEUMOPERITONEUM



Question

What are the test characteristics for contrast-mode ultrasound software (C-mode) compared to standard B-mode for detecting pneumoperitoneum?

Note: no actual contrast is used when applying C-mode software.

Methods

Prospectively enrolled 157 consecutive ED patients with acute abdomen. Each patient underwent B-mode/C-mode ultrasound by two skilled radiologists then CT interpreted by a third blinded radiologist. Primary outcome was accuracy of C-Mode/B-Mode ultrasound for detecting pneumoperitoneum compared to reference standard of CT or surgery.

N = 157

Results

	C Mode	B Mode	CT
Sensitivity	93	70	97
Specificity	98	88	100

20% of patients had GI perforation

Inter-observer agreement for C-mode was 0.98

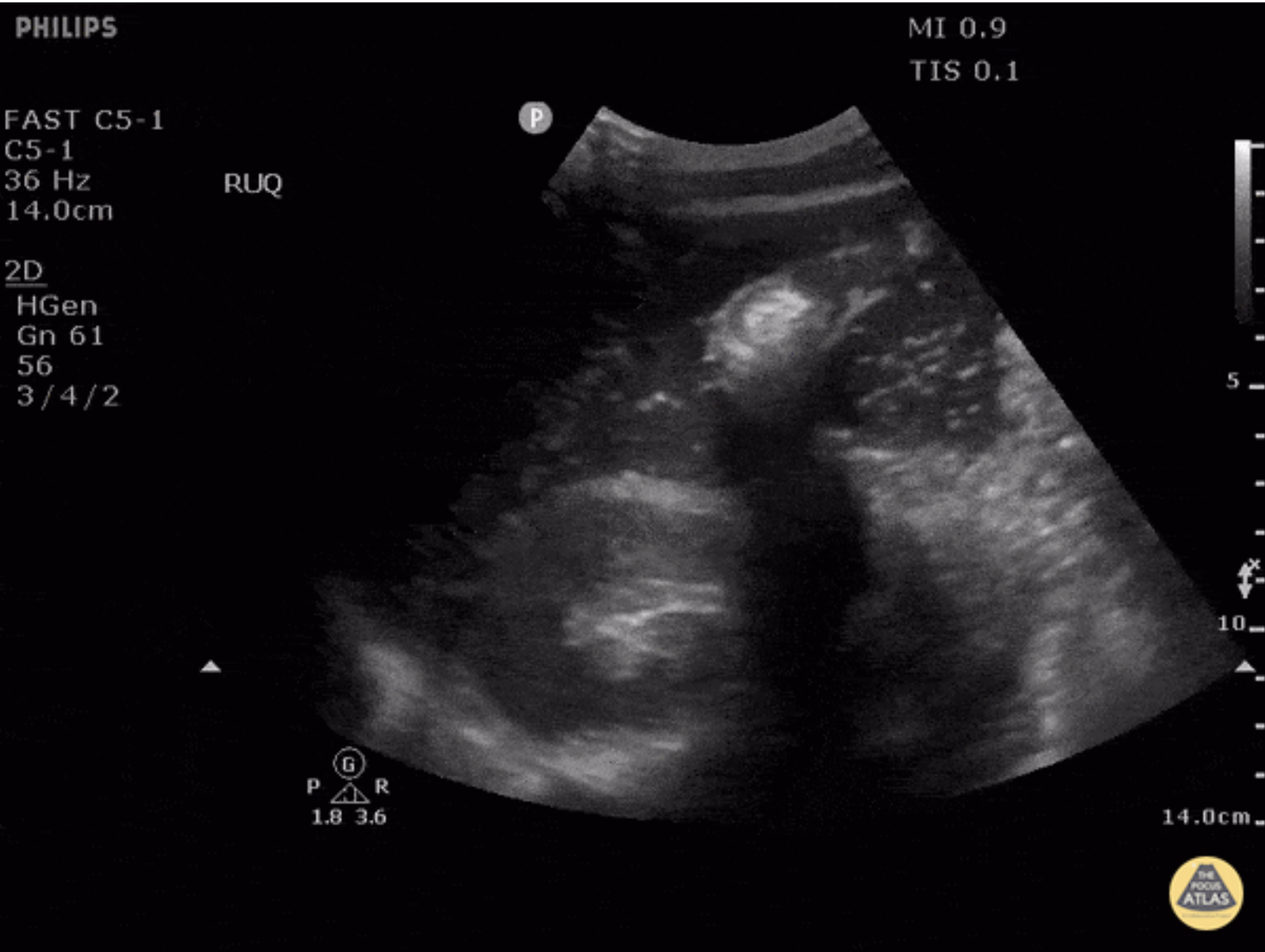


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CASE 5



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CASE #6

Same guy from case 5 is back...

Now central abdominal pain radiating to the back...



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CASE 6



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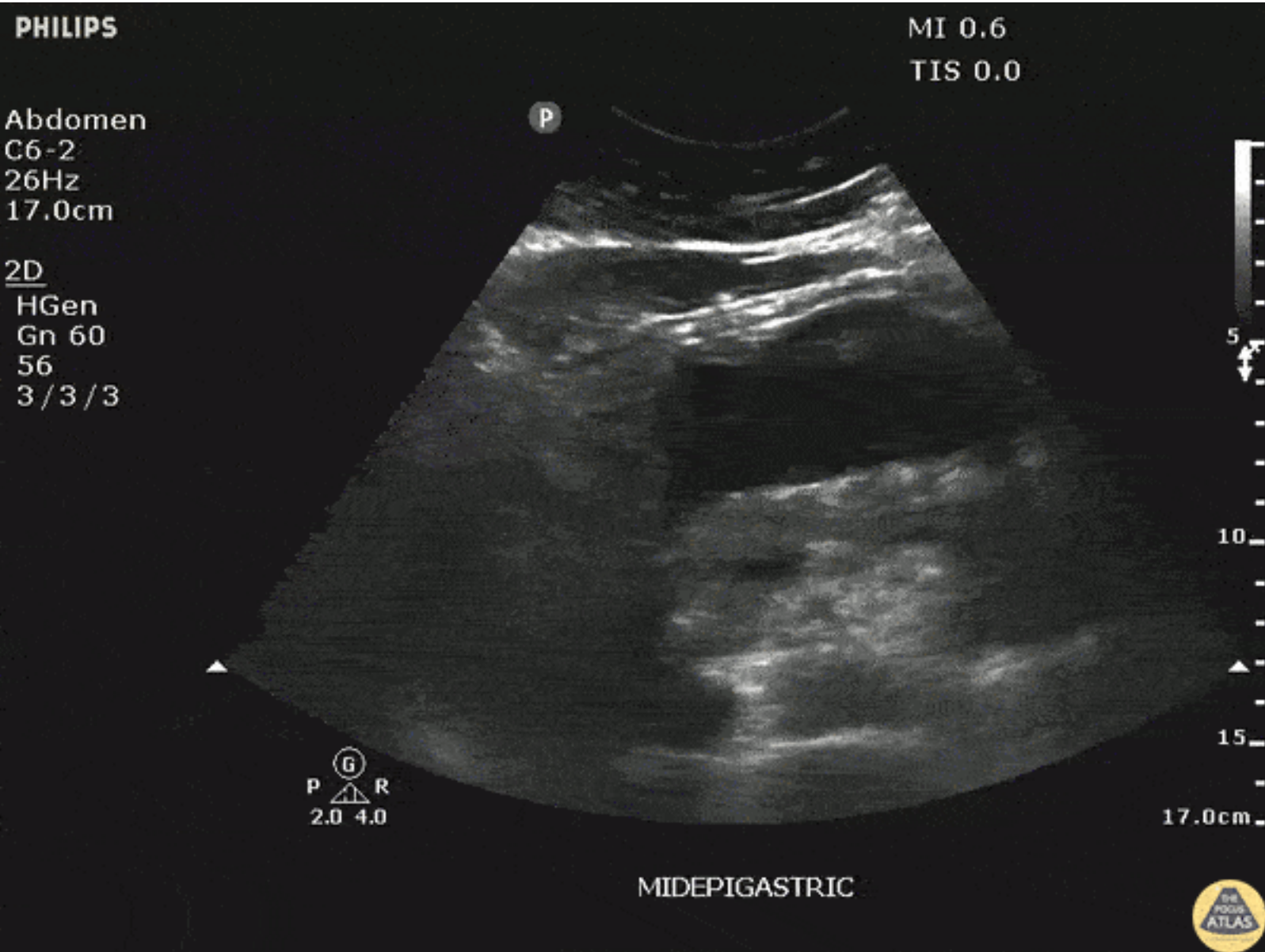
CASE 6



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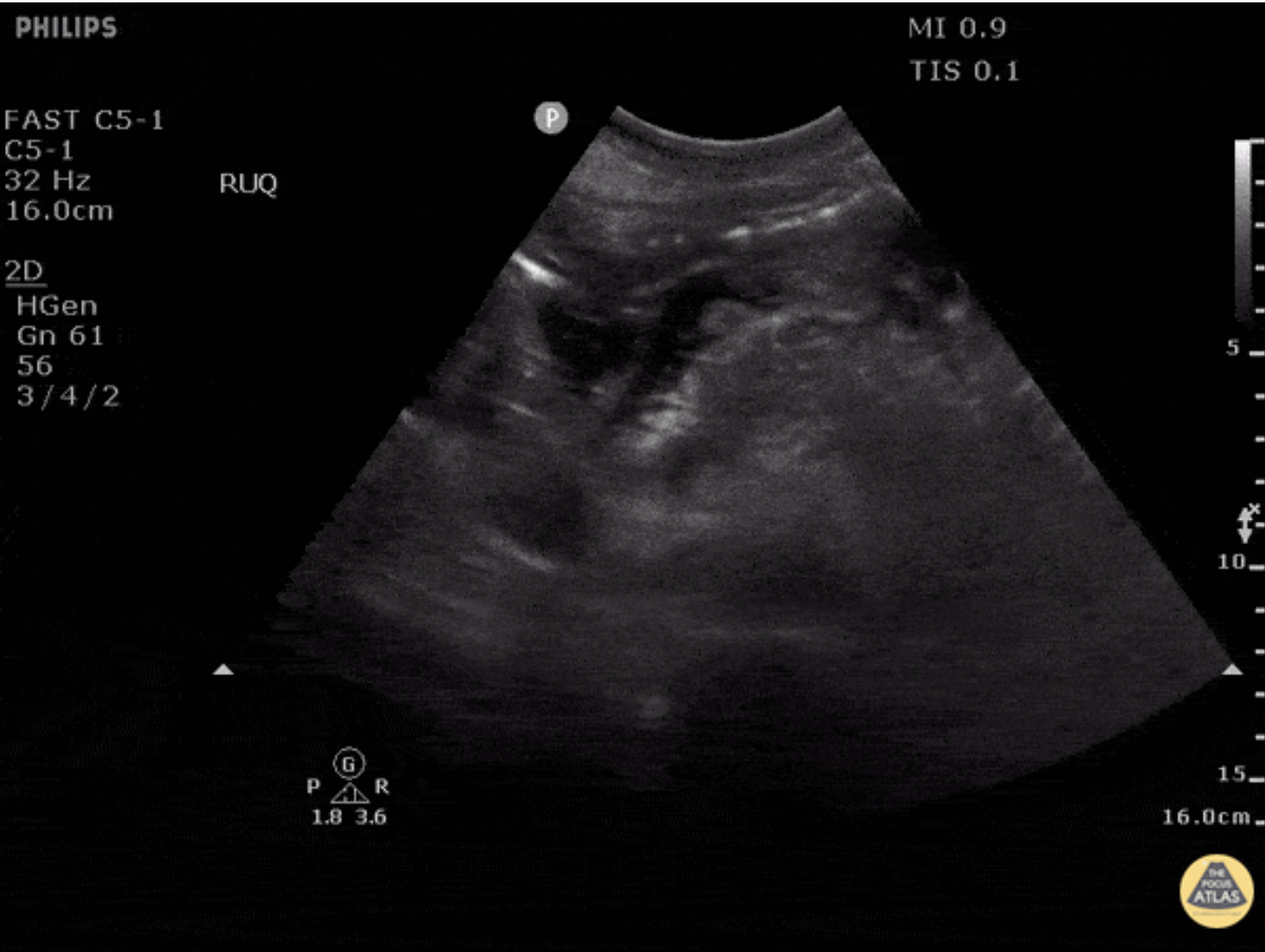
CASE 6



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CASE 6



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CASE #7

59 yo female

Presents with 1 month hx N/V and epigastric pain

Noticed after purchasing a new riding mower



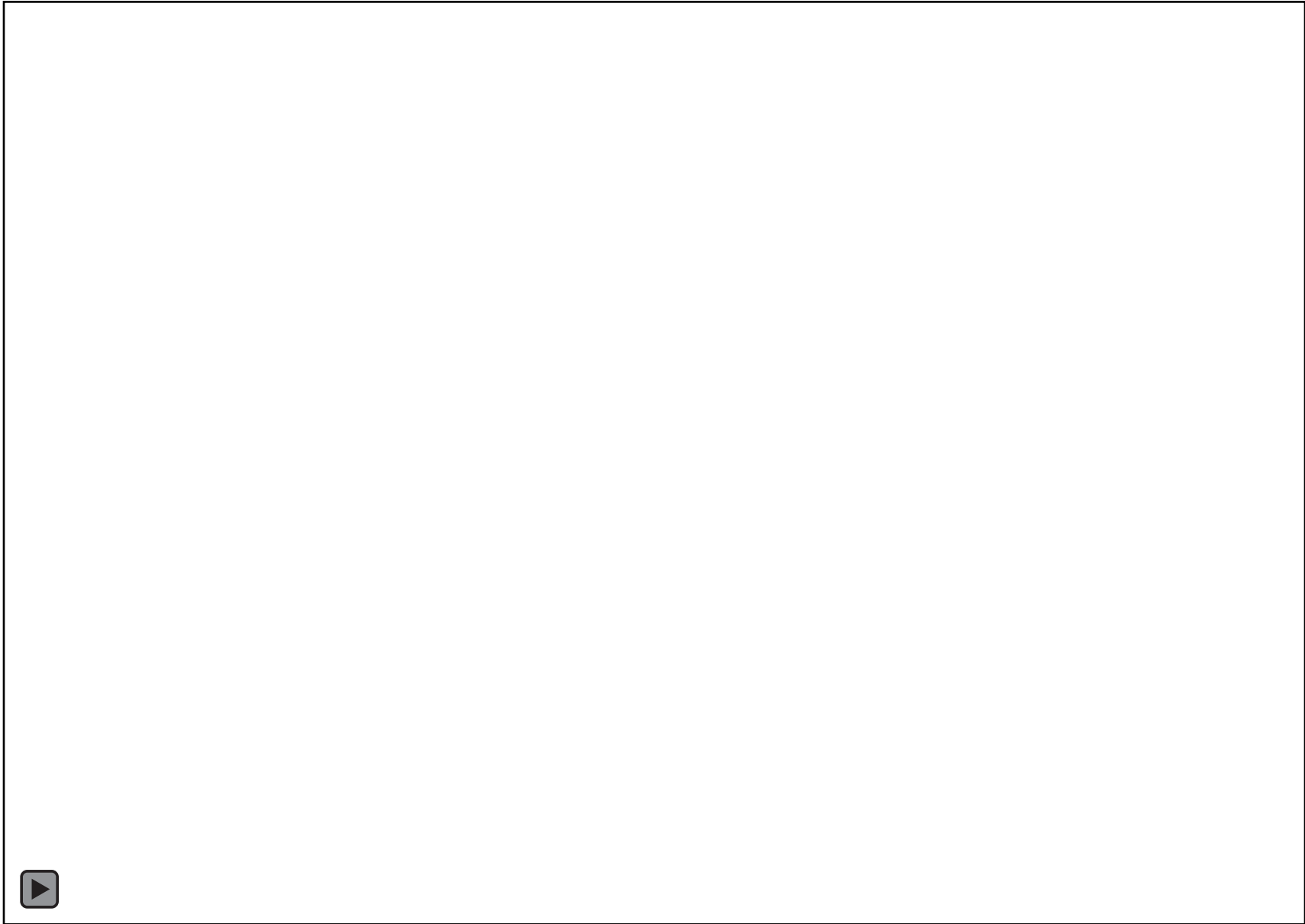
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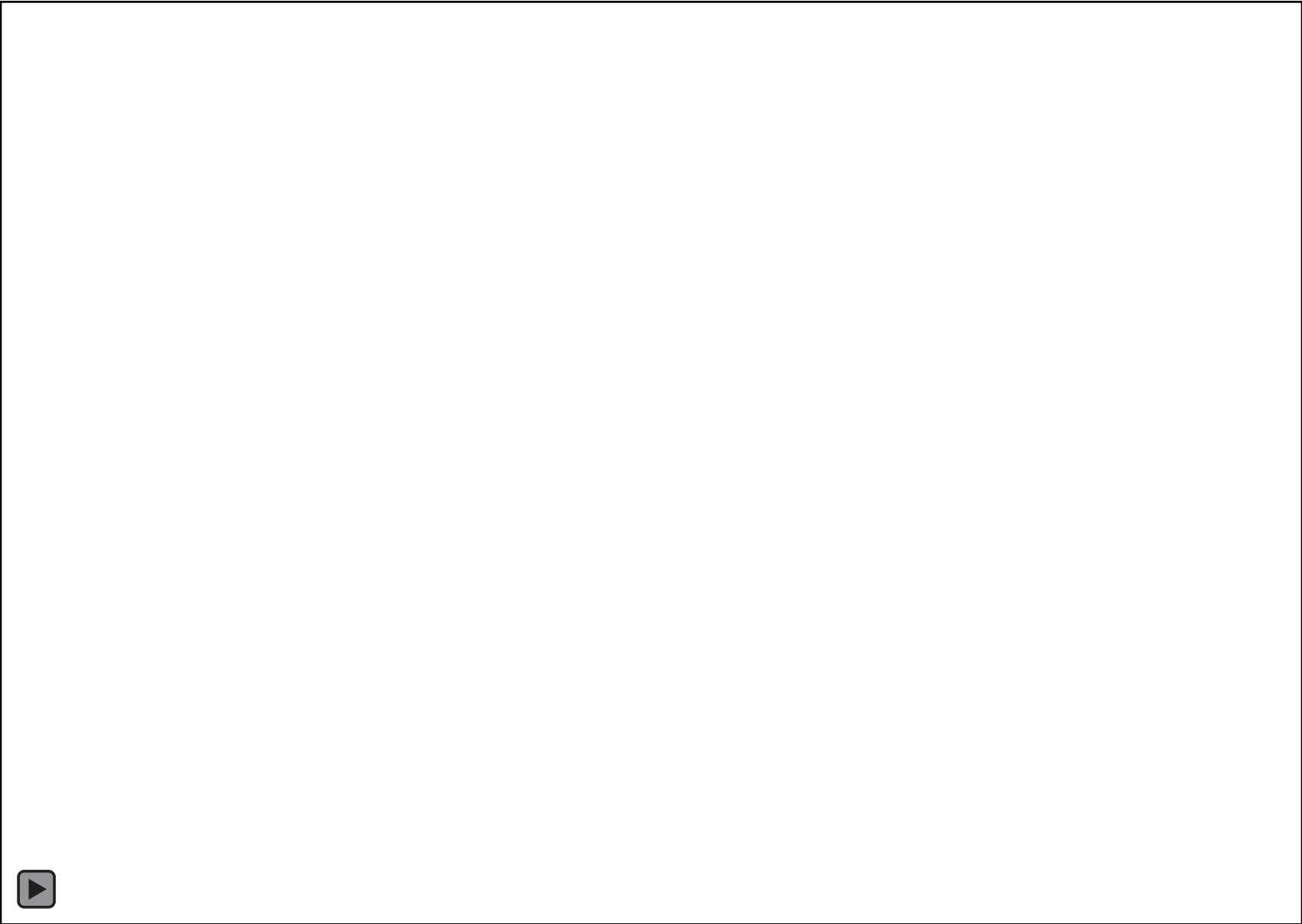
CASE 7



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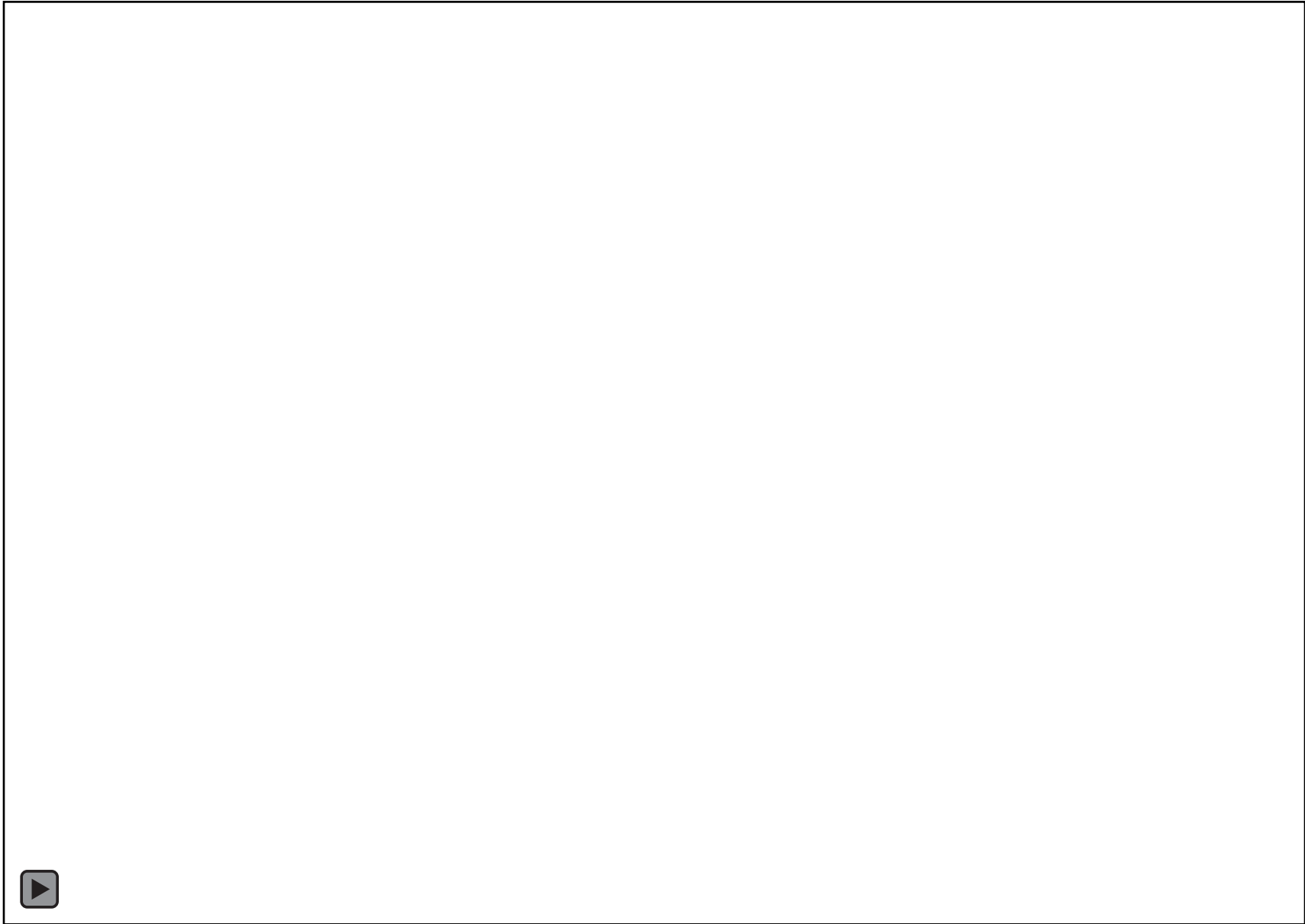
CASE 7



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CASE 7

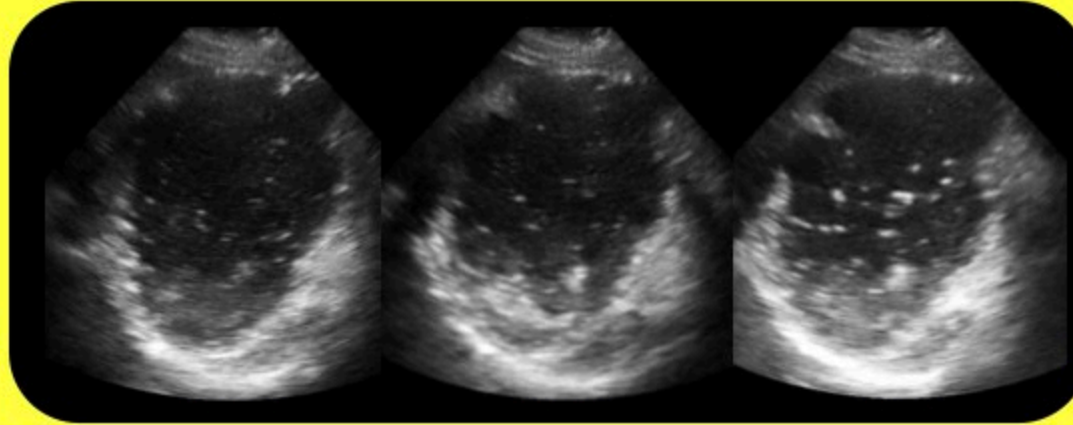


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GASTRIC CONTENT



Question:

Can point of care gastric ultrasound accurately identify or rule out a full stomach in healthy volunteers?

Methods:

Prospective, randomized, single blinded study. Healthy volunteers assigned to fasting state or food/liquid ingestion. Blinded sonologist determined presence or absence of full stomach.

N = 80

Results

Sens (%)	Spec (%)	-LR	+LR
100	97.5	0	40



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CASE #8

67 yo female

Presents with 1 month hx N/V and epigastric pain

Noticed after driving to Kansas for lawnmower convention



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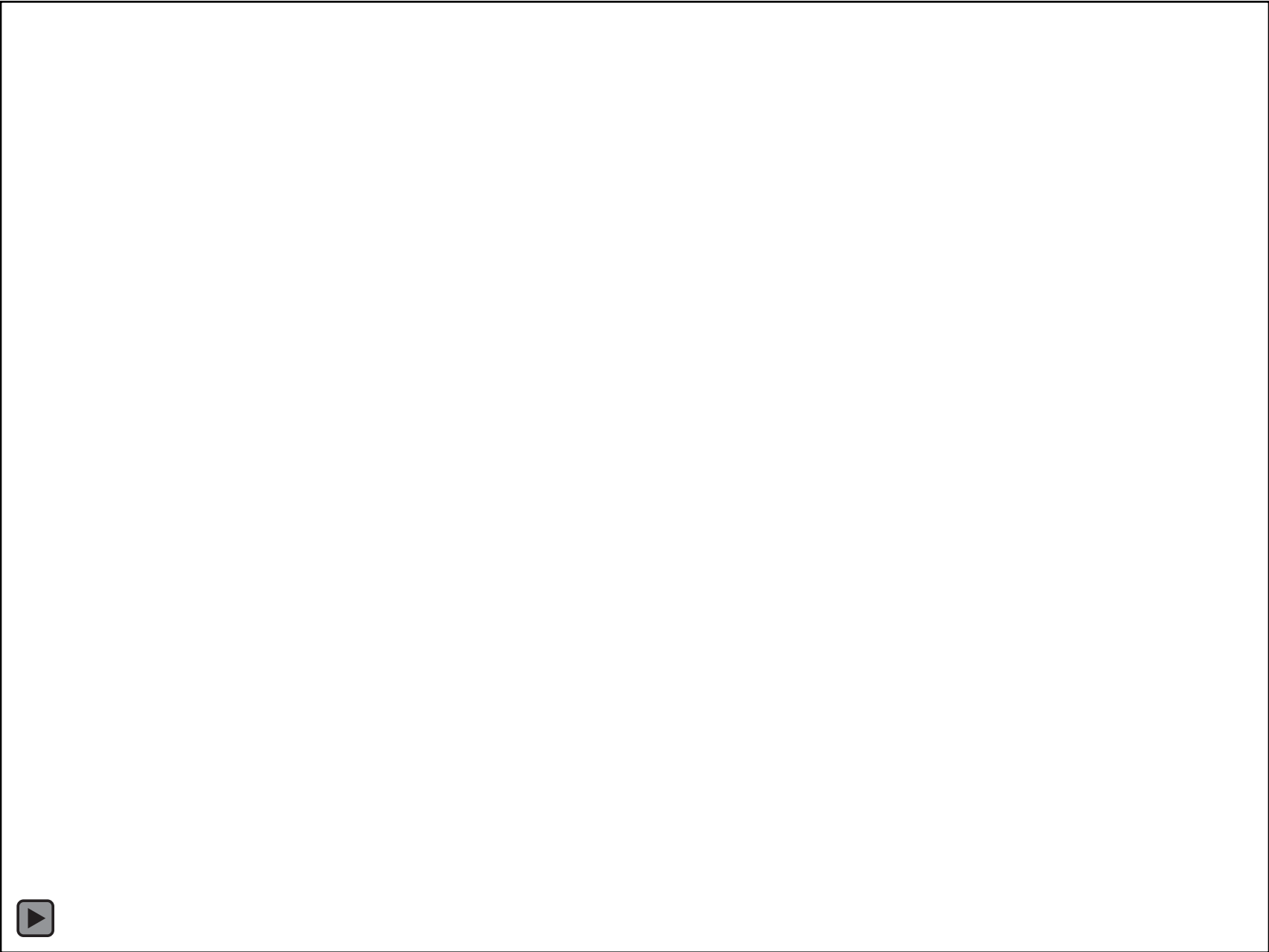
CASE 8



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CASE 8



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DEVELOPMENT



CASE 8



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OTHER PATHOLOGY

- Constipation
- Intra abdominal abscess
- Tumors
- Colitis / IBD
- Epiploic appendagitis

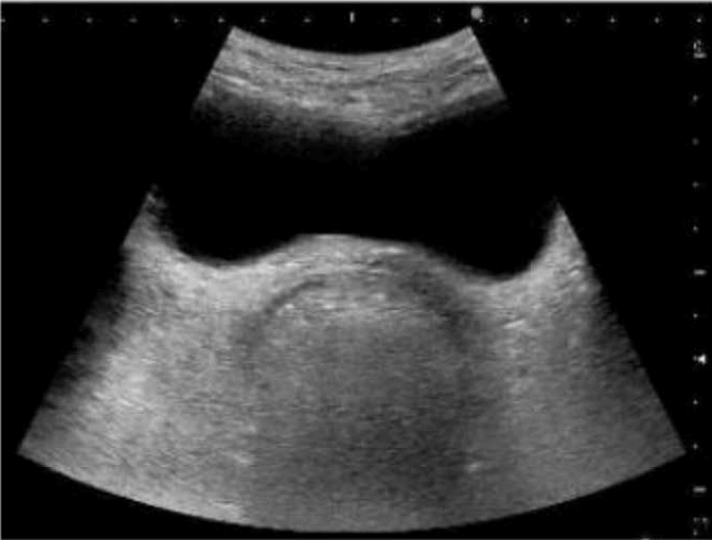


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CONSTIPATION

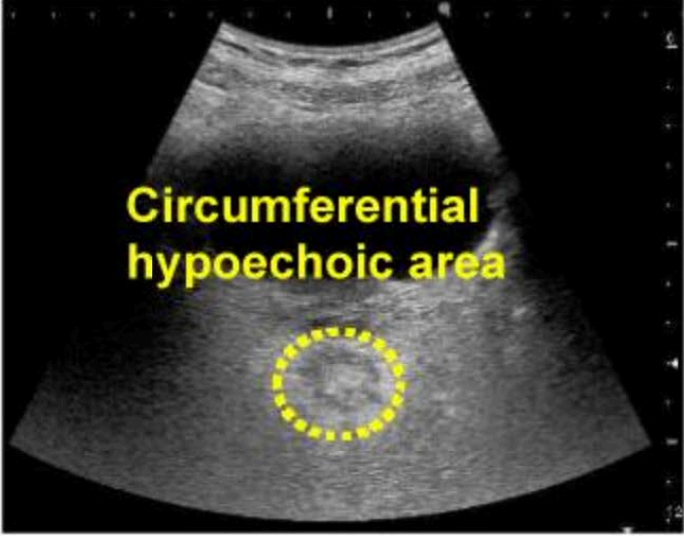
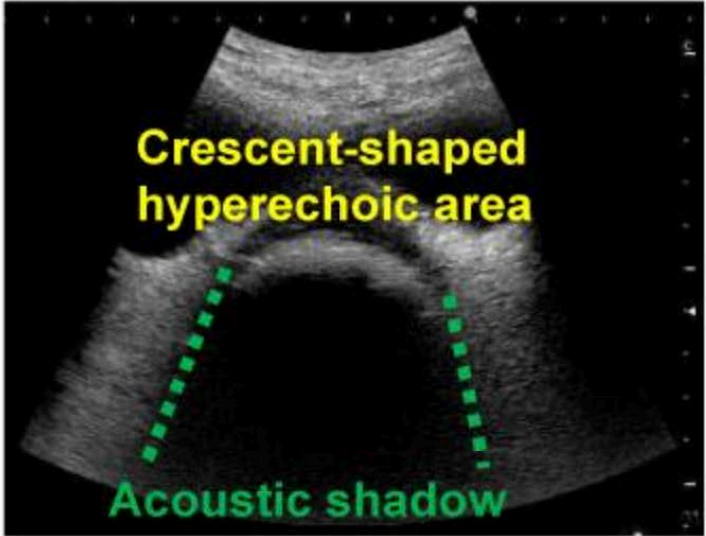
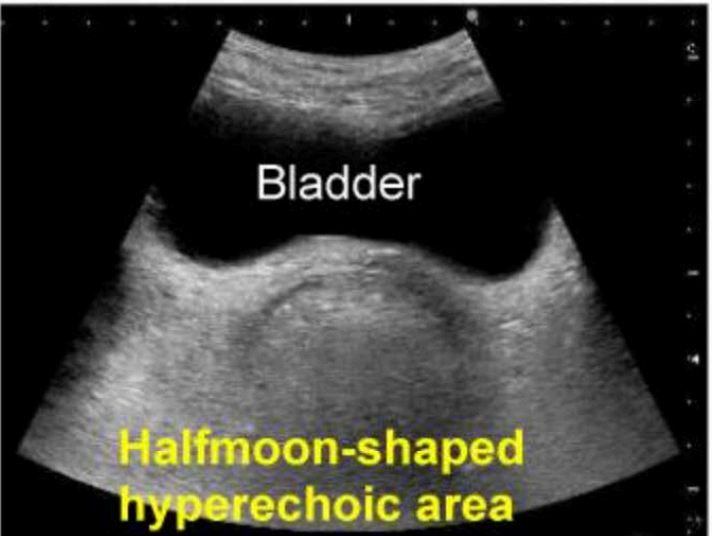
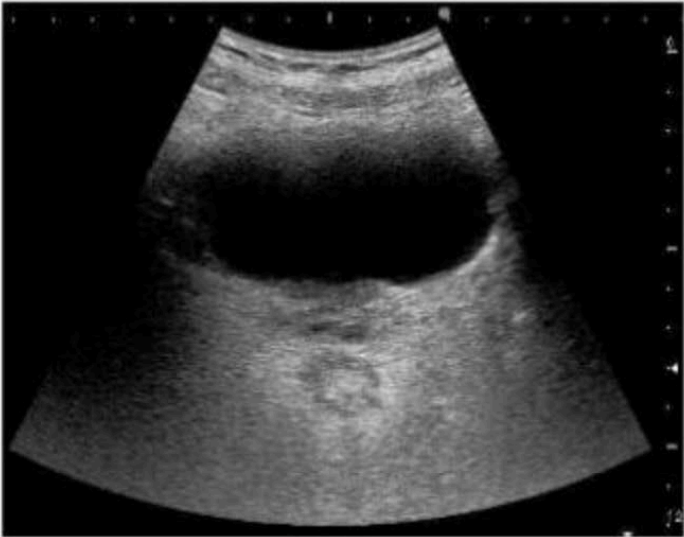
A. Stool retention



B. Hard stool retention



C. No retention



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CONSTIPATION

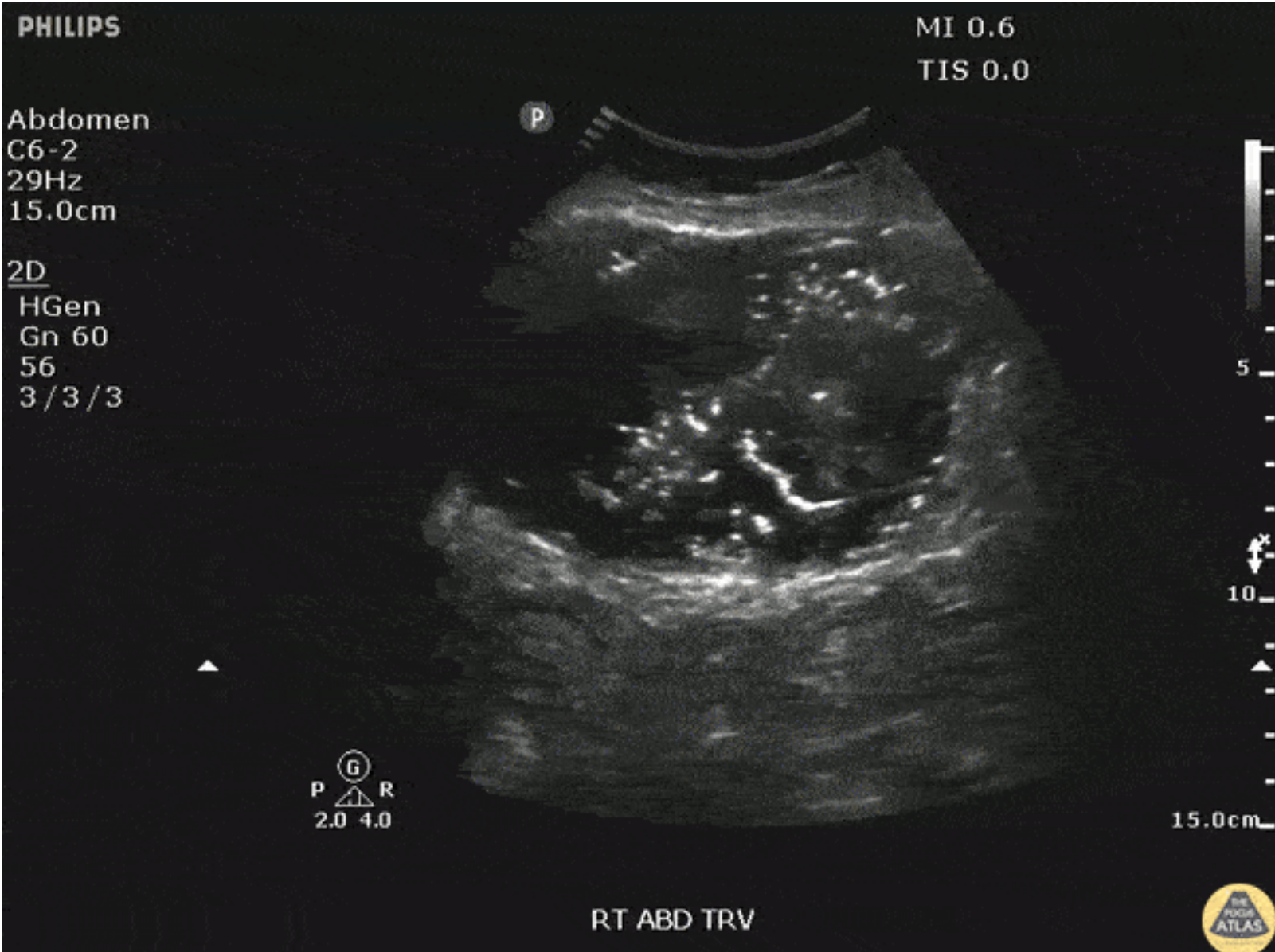
- Peds (4-17yo)
- Transrectal diameter >3.8cm
- Sn 86% Sp 71%



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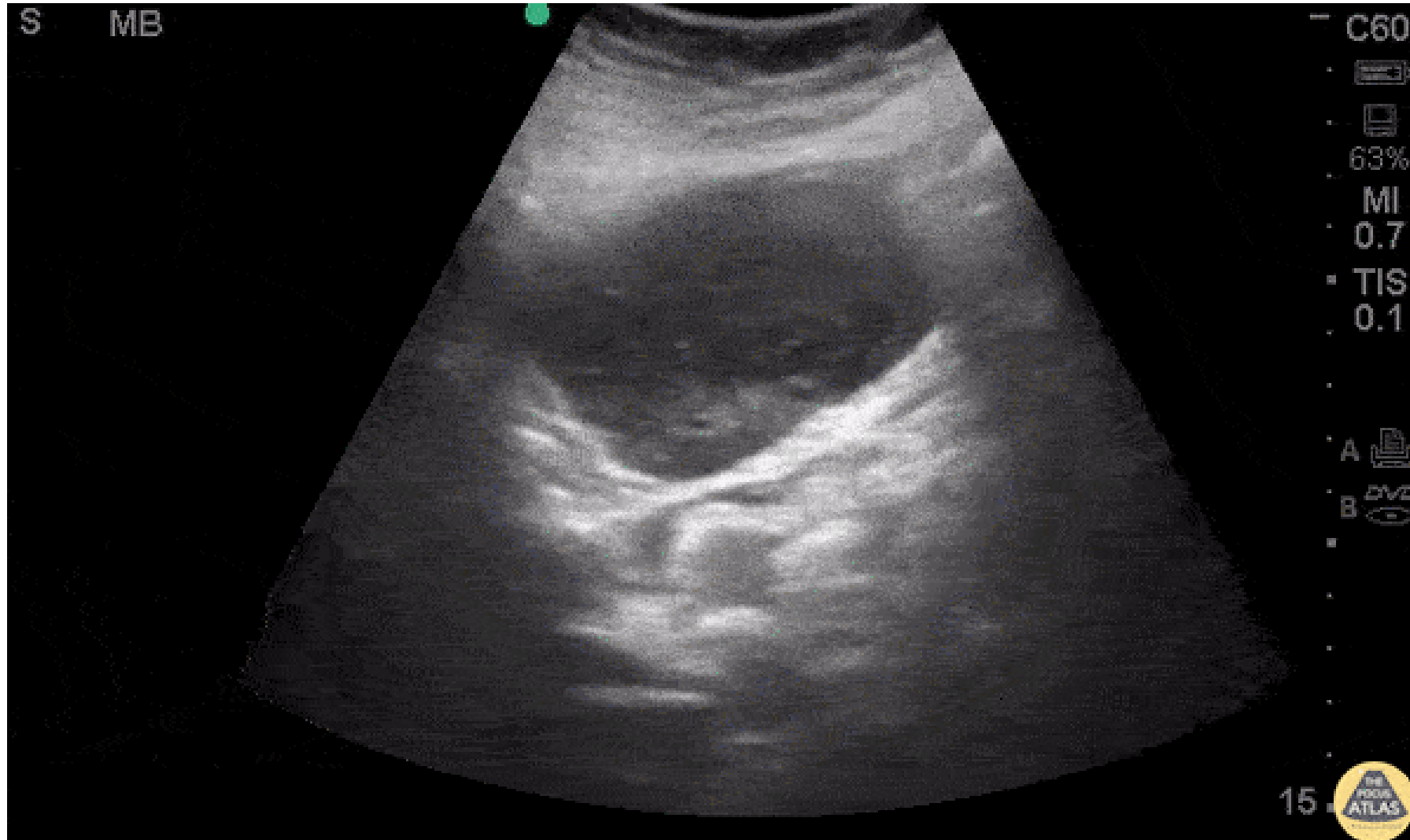
INTRA ABDOMINAL ABSCESS



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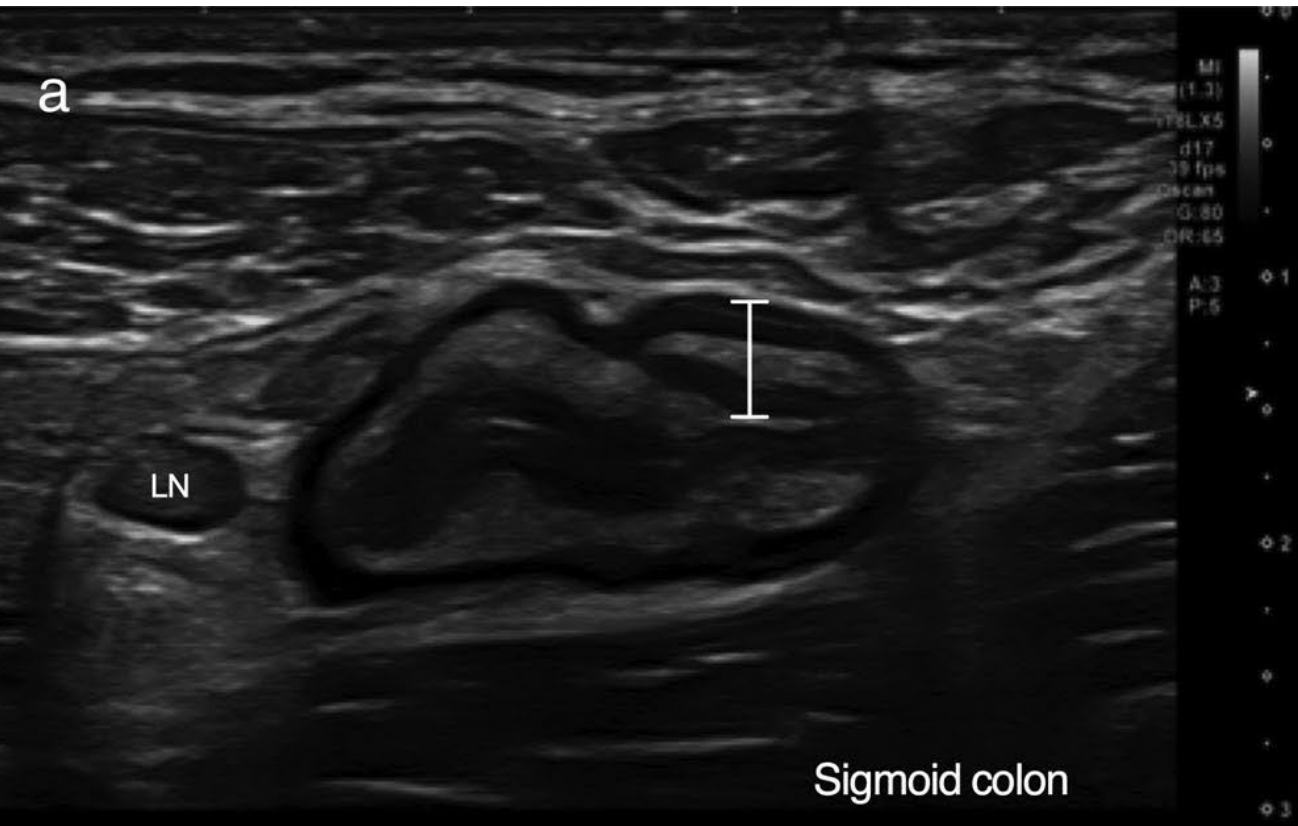
TUMORS (GIST)



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COLITIS / IBD



COLITIS / IBD

- Bowel wall >3-4mm
- Increased colour flow

- Sn 91%
- Sp 83 %

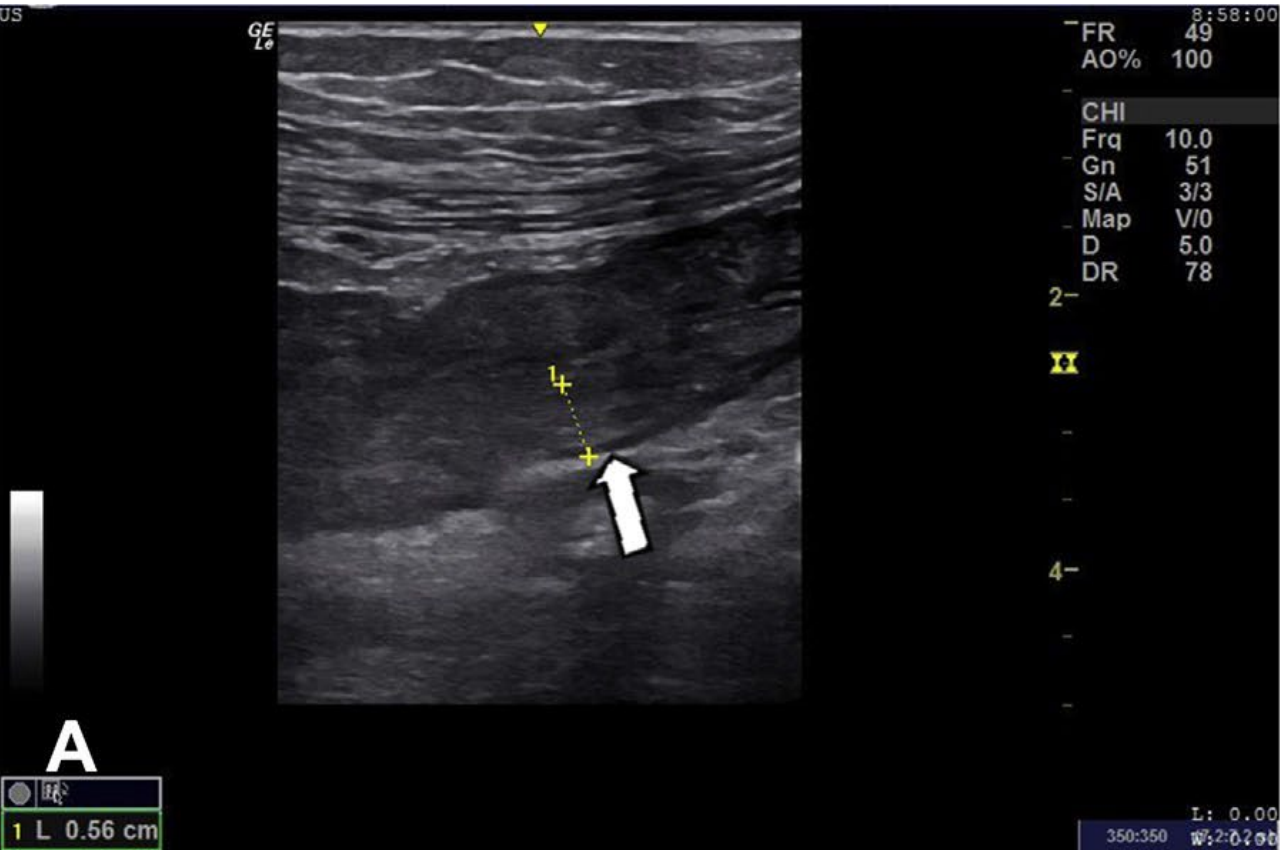


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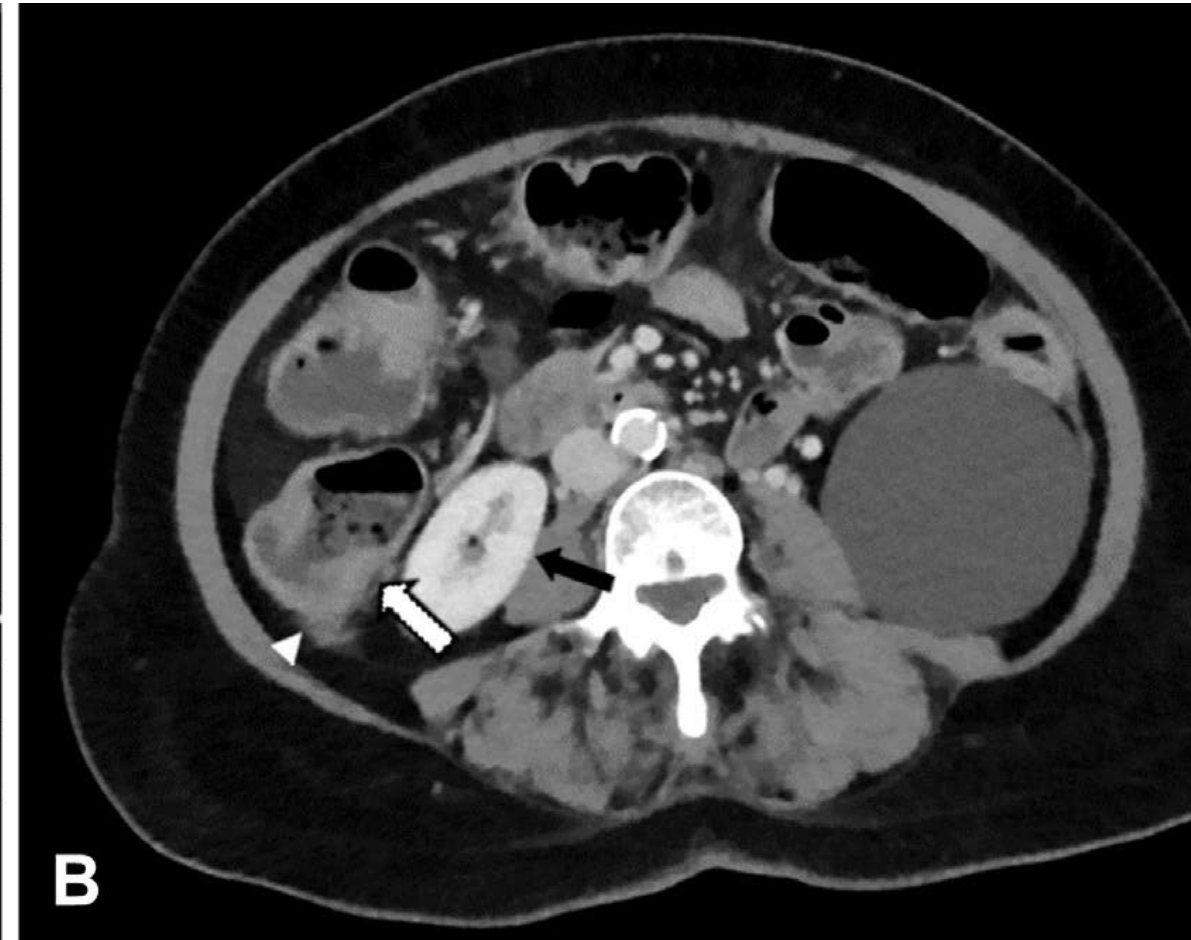
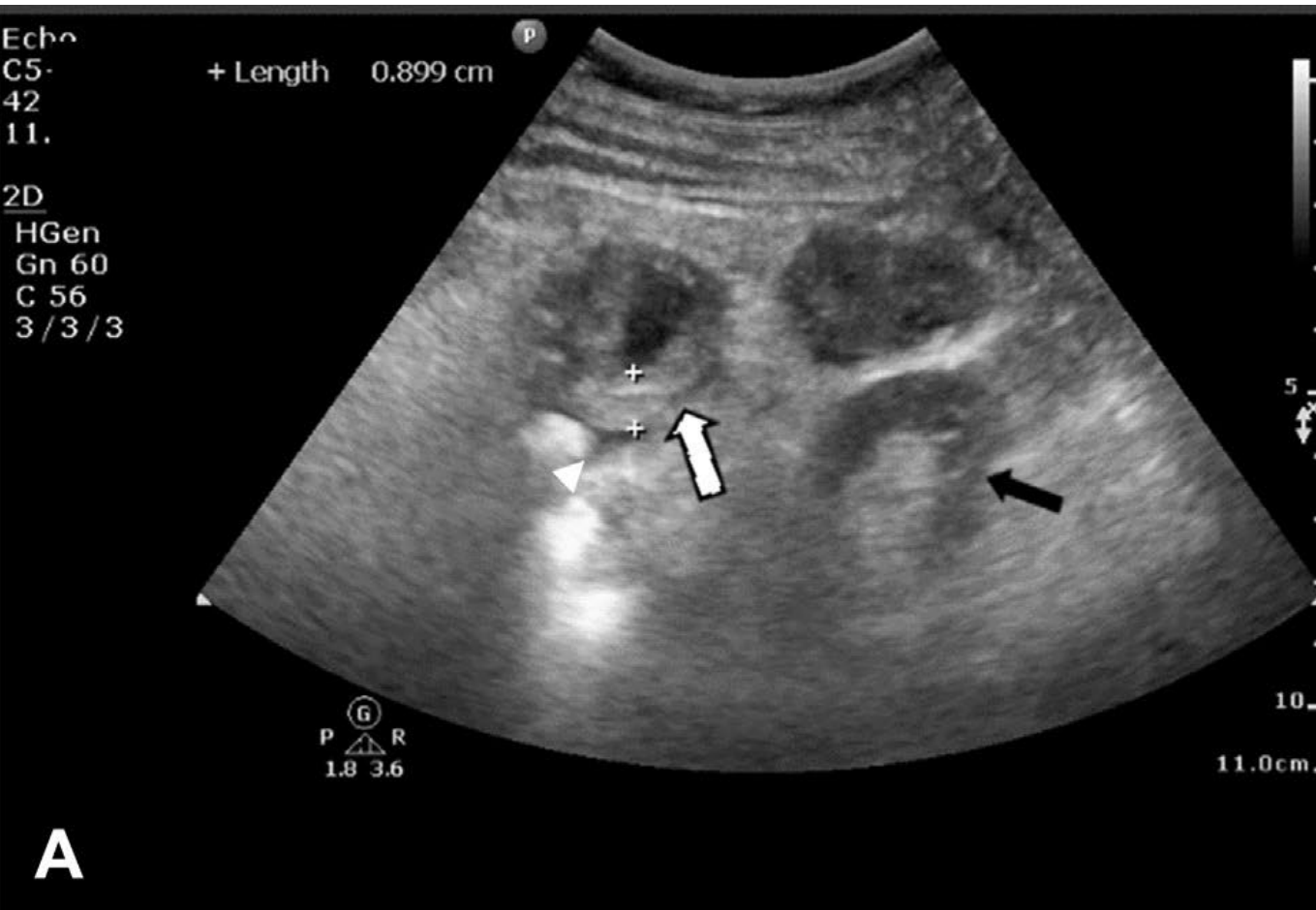


Sathananthan 2019, JGH Open

COLITIS / IBD



COLITIS / IBD



COLITIS / IBD



COLITIS / IBD

Table 1. Differentiating Between the Different Etiologies of Colitis

	Inflammatory Bowel Disease	Ischemic Colitis	Infectious Colitis	Pseudomembranous Colitis
Location	<ul style="list-style-type: none"> • CD: ileocecal region primarily affected although all regions may be affected • UC: colon primarily affected particularly the left colon 	Left colon > right colon	Right colon or pancolitis; <i>Yersiniosis</i> : particularly in the ileocecal region; <i>CMV colitis</i> : particularly right colon; <i>Amebic colitis</i> : pancolitis	Primary pancolitis May affect only left colon
Hyperechoic adjacent mesenteric fat	Very sensitive sign and marker of active inflammation mainly in CD . Less common in UC	May be present, more common in severe cases	May be present	Not well described (present in 50% of patients in one study)
Ascites	May be present	May be present. More common in severe cases	Not common	Common
Abscess/fistula	Relatively common in CD	–	–	–
Color Doppler flow	Increased in active disease	May be absent	Not well described	Not well described

CD = Crohn’s disease; UC = ulcerative colitis.



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EPIPLOIC APPENDAGITIS

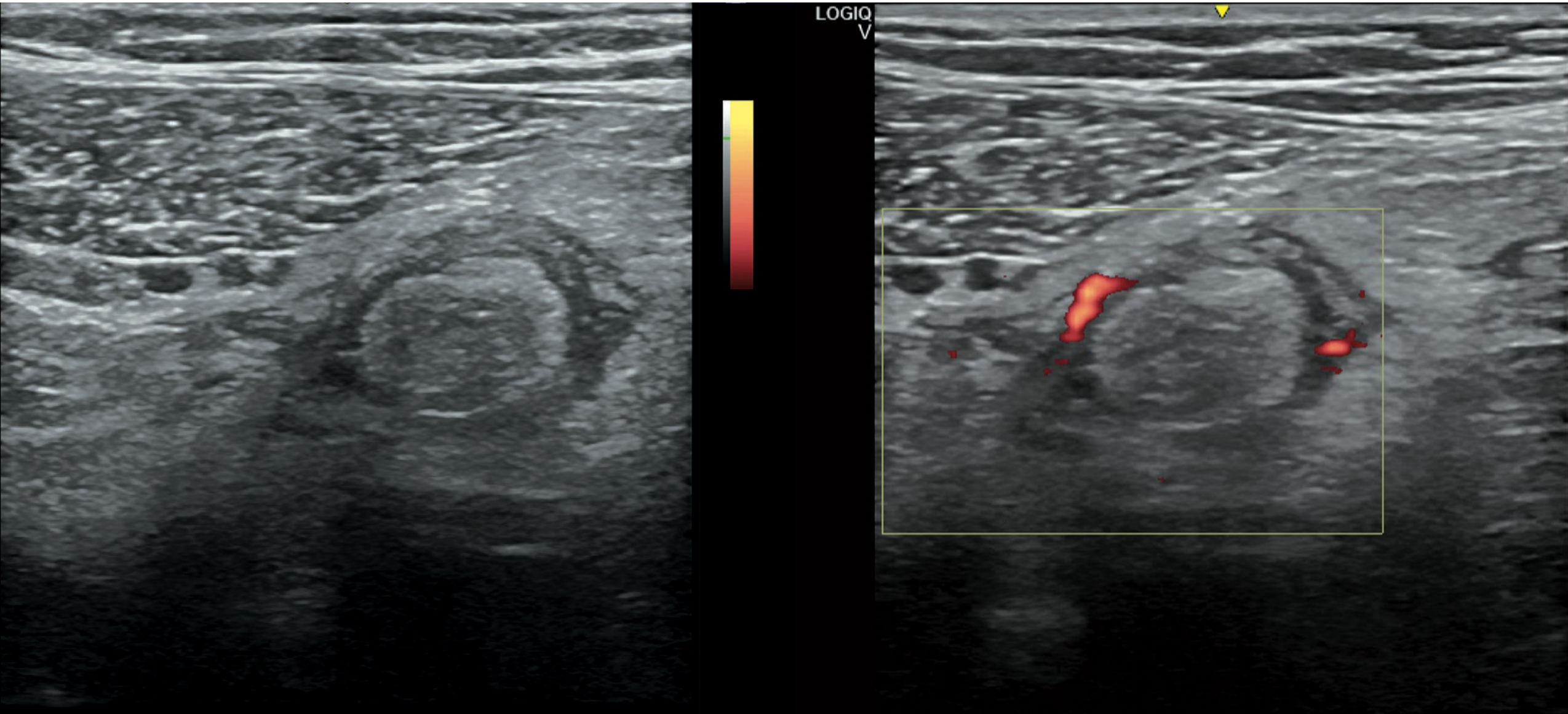
- Hyperechoic (ovoid) mass (2-4cm diameter)
- Minimal internal vascularity
- Noncompressible
- Adherent to colon wall
- Hypoechoic halo



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EPIPLOIC APPENDAGITIS



REVIEW

- An abdominal PoCUS Approach:
 - AAA/IVC
 - eFAST (pelvic)
 - Gallbladder
 - Lawnmower
 - Point of maximal tenderness

- Consider PoCUS for diverticulitis (be mindful of complications)



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Upcoming Rural PoCUS Rounds:

Fall 2024

<https://ubccpd.ca/rural-pocus-rounds>



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Rural Coordination
Centre of BC



QUESTIONS



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RESOURCES MENTIONED

- <https://www.bcpocus.ca/>
- <https://www.ultrasoundgel.org/>
- <https://www.thepocusatlas.com/>
- <https://coreultrasound.com/>
- <https://www.pocus101.com/>



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RESOURCES MENTIONED

- <https://www.pocus101.com/abdominal-ultrasound-made-easy-step-by-step-guide/>
- <https://www.ultrasoundgel.org/posts/SFPsfN9yJ-9uSp640QIWtg>
- <https://www.aliem.com/ultrasound-for-the-win-46m-abdominal-pain-us4tw/>
- <https://coreultrasound.com/pneumoperitoneum/>
- <https://www.ultrasoundgel.org/posts/iJe02ux9TPyPc9K14gZvXg>
- <https://kwaktalk.org/sono-sundays/diverticulitis>



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