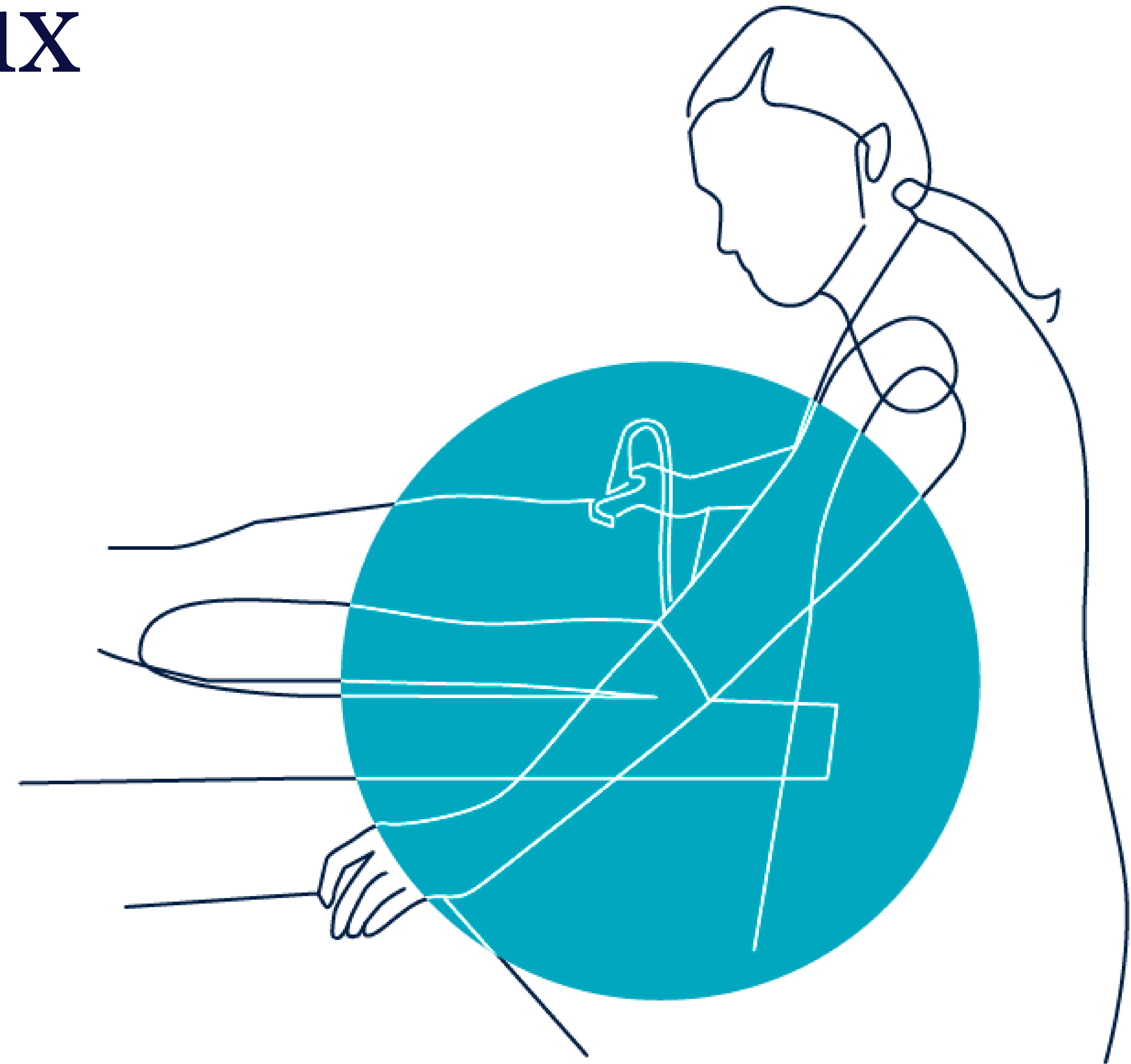
POCUS of the Appendix



Dr. Virginia Robinson

Feb 2024

THE UNIVERSITY OF BRITISH COLUMBIA
Continuing Professional Development
Faculty of Medicine

I acknowledge that I work on the traditional, ancestral and unceded territory of the K’tunaxa Nation.

UBC CPD
Medicine
CONTINUING
PROFESSIONAL
DEVELOPMENT

DISCLOSURES

- Supercluster Project Rural Lead that partnered with Clarius Ultrasound and Change Healthcare
- Honoraria for Clarius Webinars

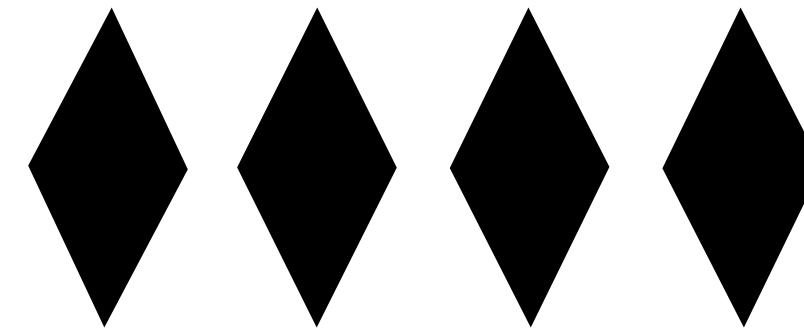
WARNING: NOT AN EXPERT

NOT EVEN CLOSE

MITIGATION OF BIAS

- Not speaking about any products or medications

POCUS OF THE APPENDIX:

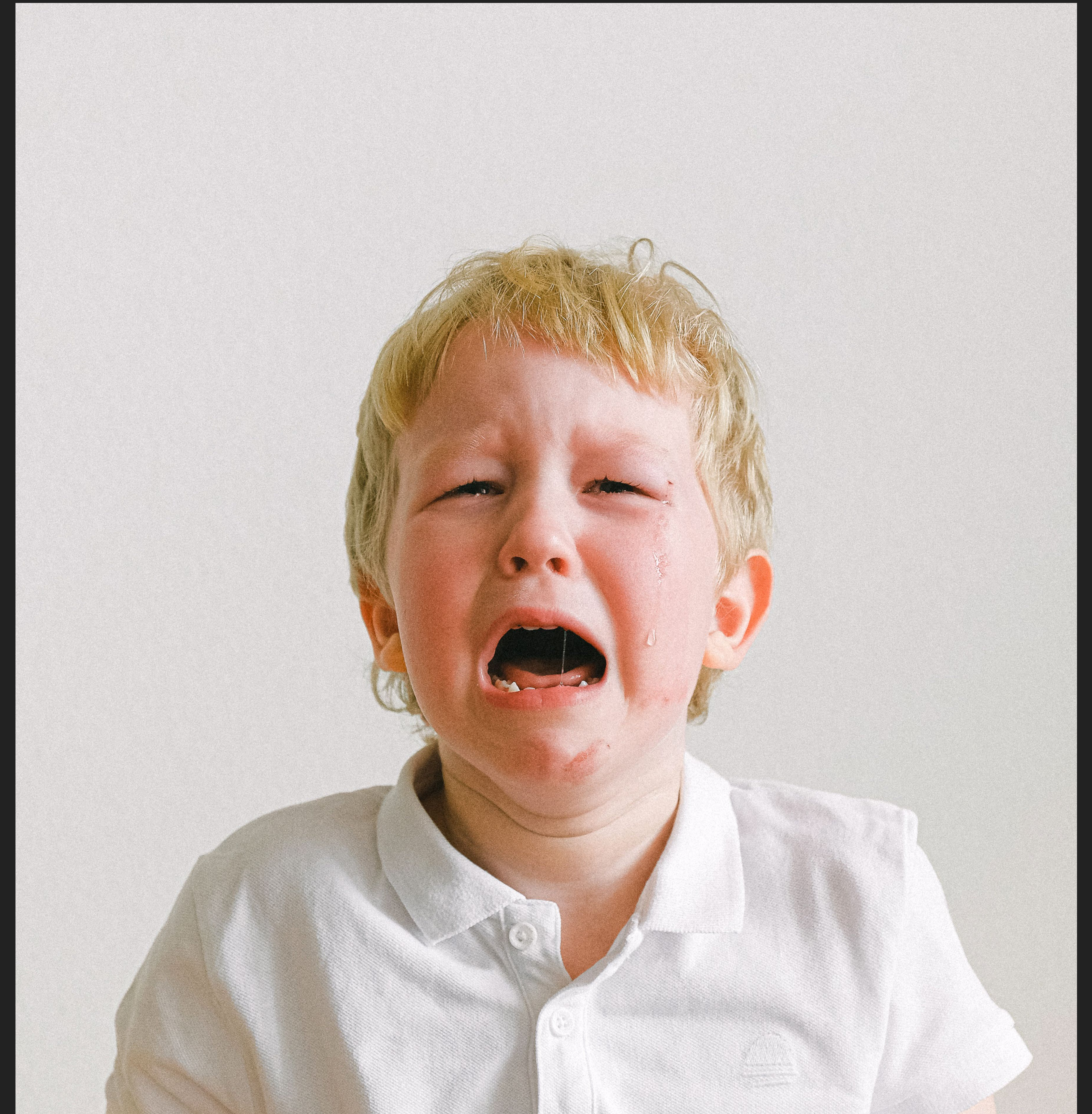


LEARNING OBJECTIVES

- Identify the sonographic anatomy of the appendix
- Interpret sonographic image of the RLQ
- Demonstrate how to find the appendix using POCUS
- Discuss how to integrate POCUS into the clinical picture.
- Review the literature of POCUS for the appendix

CASE #1

- 8 yo boy with RLQ pain and constipation for 2 days
- Afebrile
- HR: 112bpm —-> 105bpm.
- RLQ tenderness
- +ve iliopsoas
- +ve obturator



THE PHYSICAL EXAM

- Rovsing's Sign
  - Sens: 22-68%, Spec: 58-96%
- Obturator Sign = flexion of the R hip
  - Sens: 8%, Spec: 94%
- RLQ/McBurney's Point Tenderness:
  - Sens: 75%, Spec: 80%
- Iliopsoas Sign = passive extension iliopsoas muscle.
    - Sens: 30%, Spec: 85%

LABS

- 80% of patients with appendicitis have elevated WBC
- 40% of patients with appendicitis have +ve UA

INVESTIGATIONS

- CT
  - Sens: 95%, Spec: 96%
- Ultrasound:
  - Sens: 85%, Spec: 90%
- POCUS:
  - Sens: 74-85%, Spec: 63%

ORIGINAL RESEARCH

Accuracy of Point-of-care Ultrasound in Diagnosing Acute Appendicitis During Pregnancy

Sensitivity: 66% Specificity: 96%

SCORES

- PAS: Pediatric Appendicitis Score

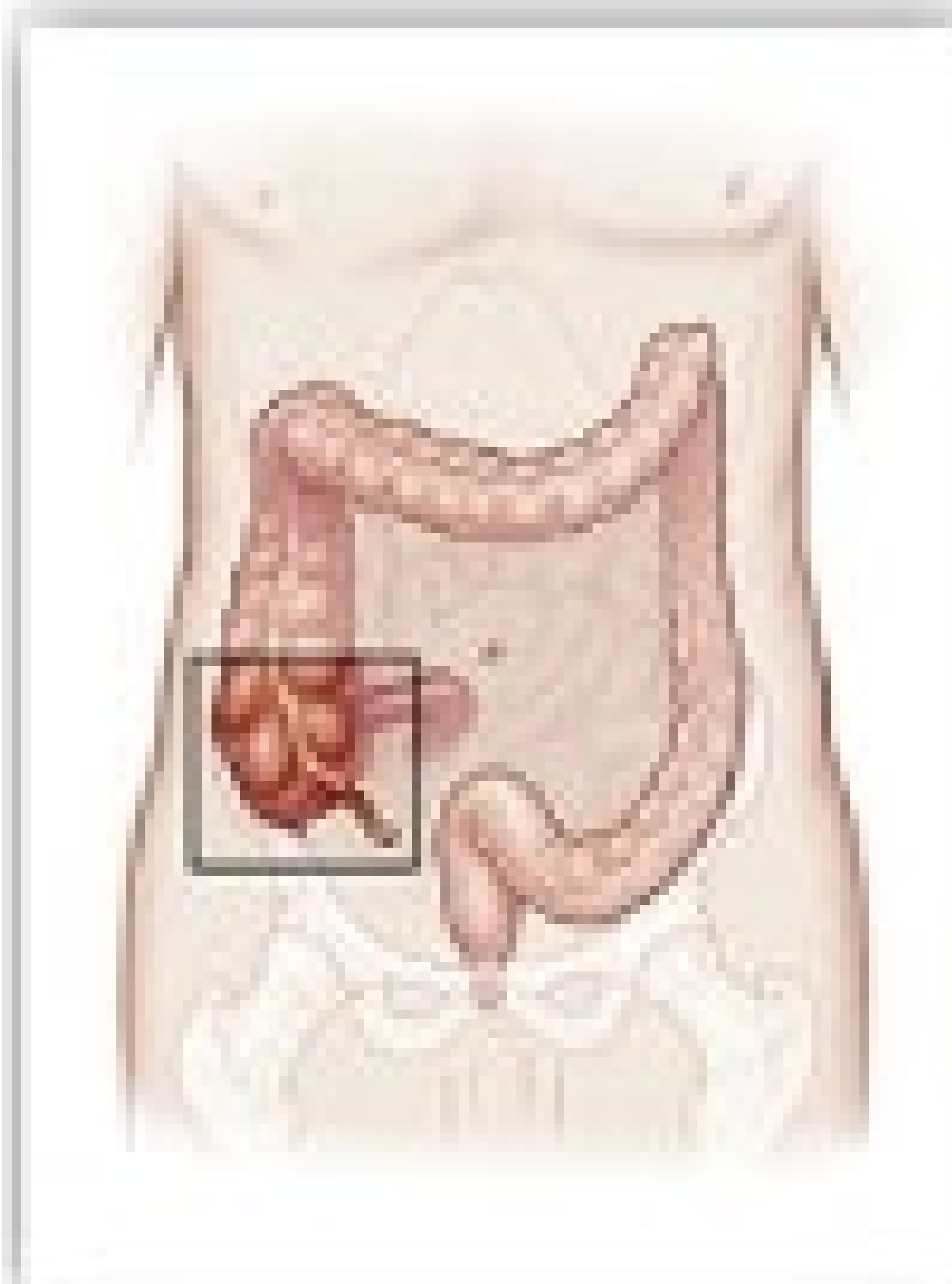
Parameter	Score
Anorexia	1
Nausea/ emesis	1
Fever	1
Migration of pain	1
Tenderness in right lower quadrant	2
Cough/ percussion/ hop tenderness	2
Leucocytosis	1
Neutrophilia	1
Total	10

Alvarado score	
Symptoms	
Abdominal pain that migrates to the right iliac fossa	1
Anorexia (loss of appetite) or ketones in the urine	1
Nausea or vomiting	1
Tenderness in the right iliac fossa	2
Signs	
Rebound tenderness	1
Fever of 37.3 °C or more	1
Laboratory	
Leukocytosis > 10,000	2
Neutrophilia > 70%	1
TOTAL	**10**

PHILIPS

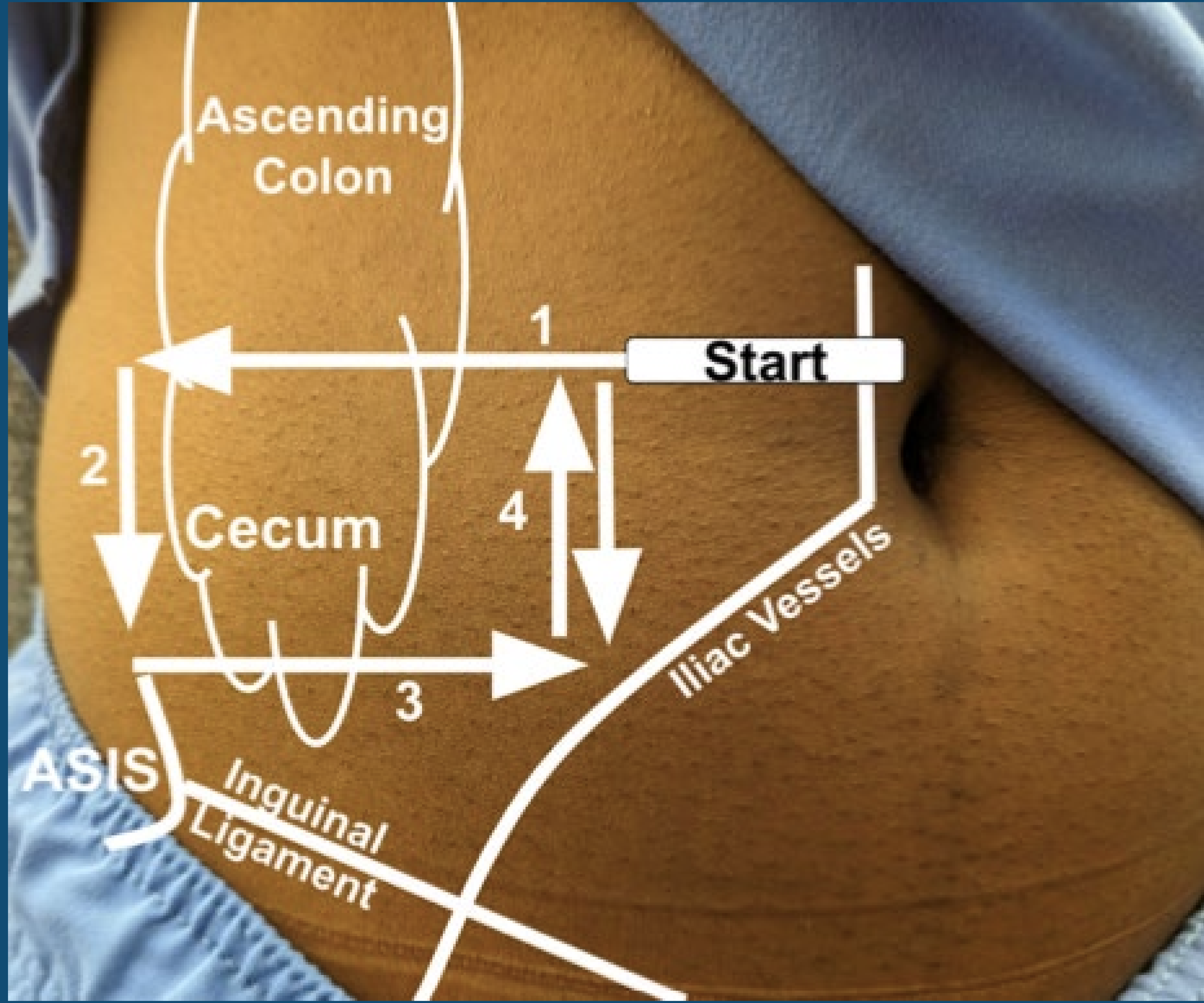
HOW DO YOU FIND THE APPENDIX?

- Beginner’s Mind: Plop the linear probe where the patient says it hurts
- The money view: Identify the Psoas muscle and iliac vessels and look around there
- Anatomical landmarking: Identify the ascending colon in longitudinal and follow it back to the ileocecal valve then turn in transverse.

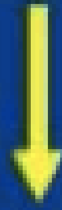


Teniae coli

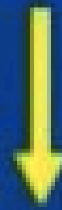
Variations in appendix position


Ascending Colon
Start
1
2
4
Cecum
3
Iliac Vessels
ASIS
Inguinal Ligament

Luminal obstruction

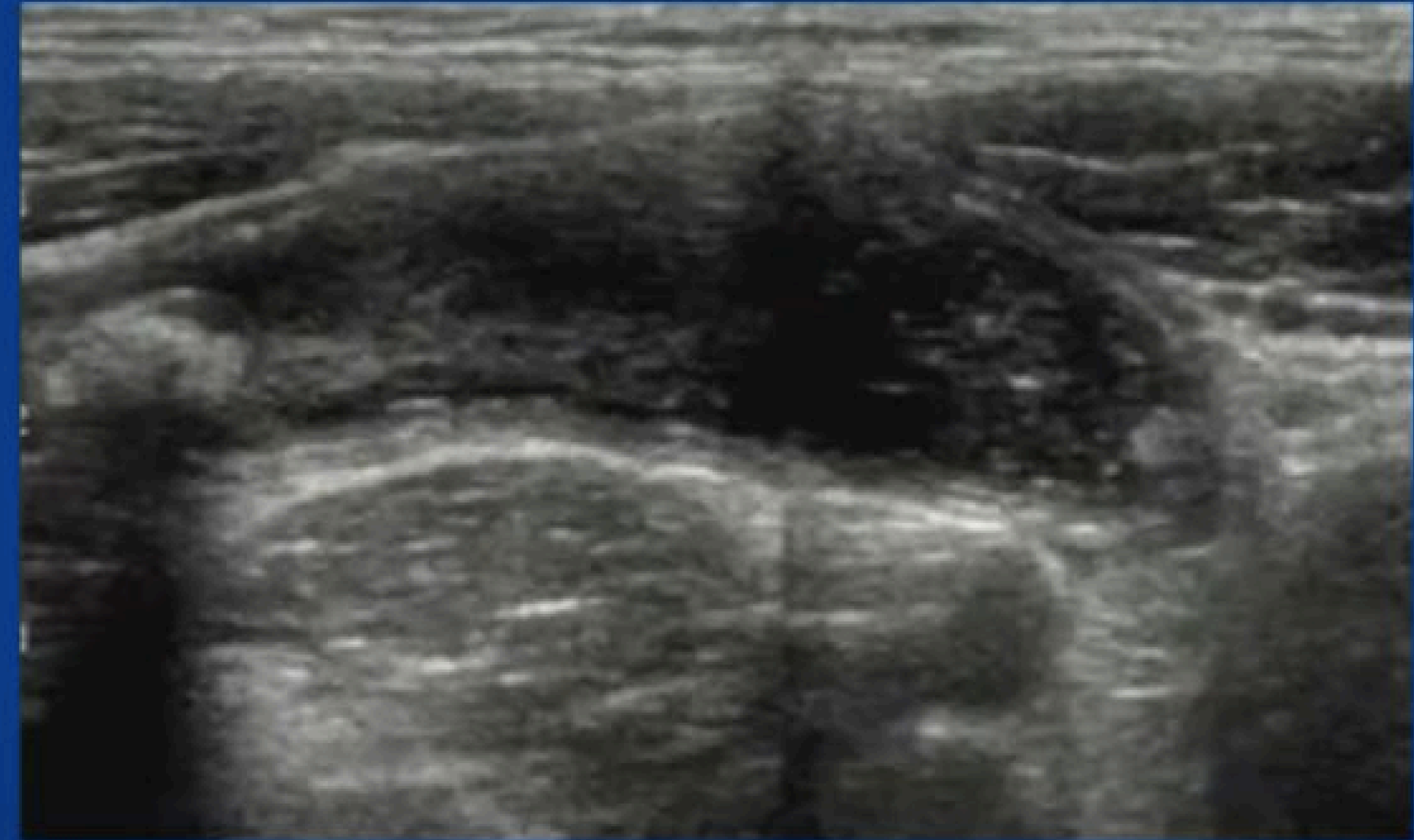


High intraluminal pressure



Ischemia and necrosis

Perforation



Fecoliths are important

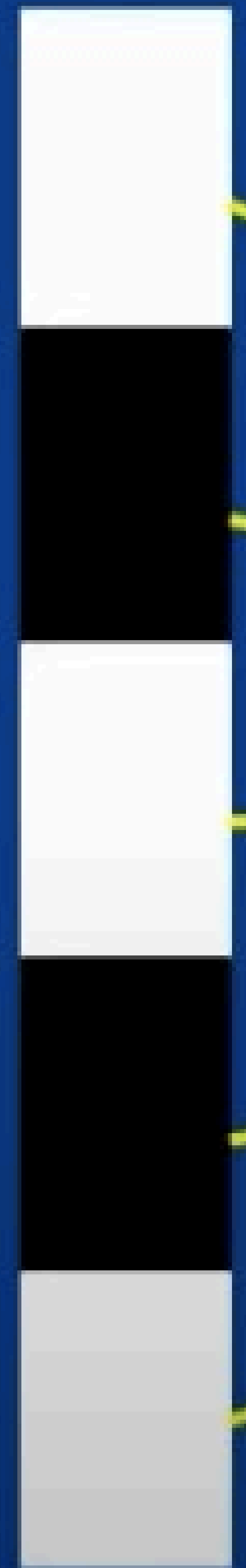
Interface of mucosa

Mucosa

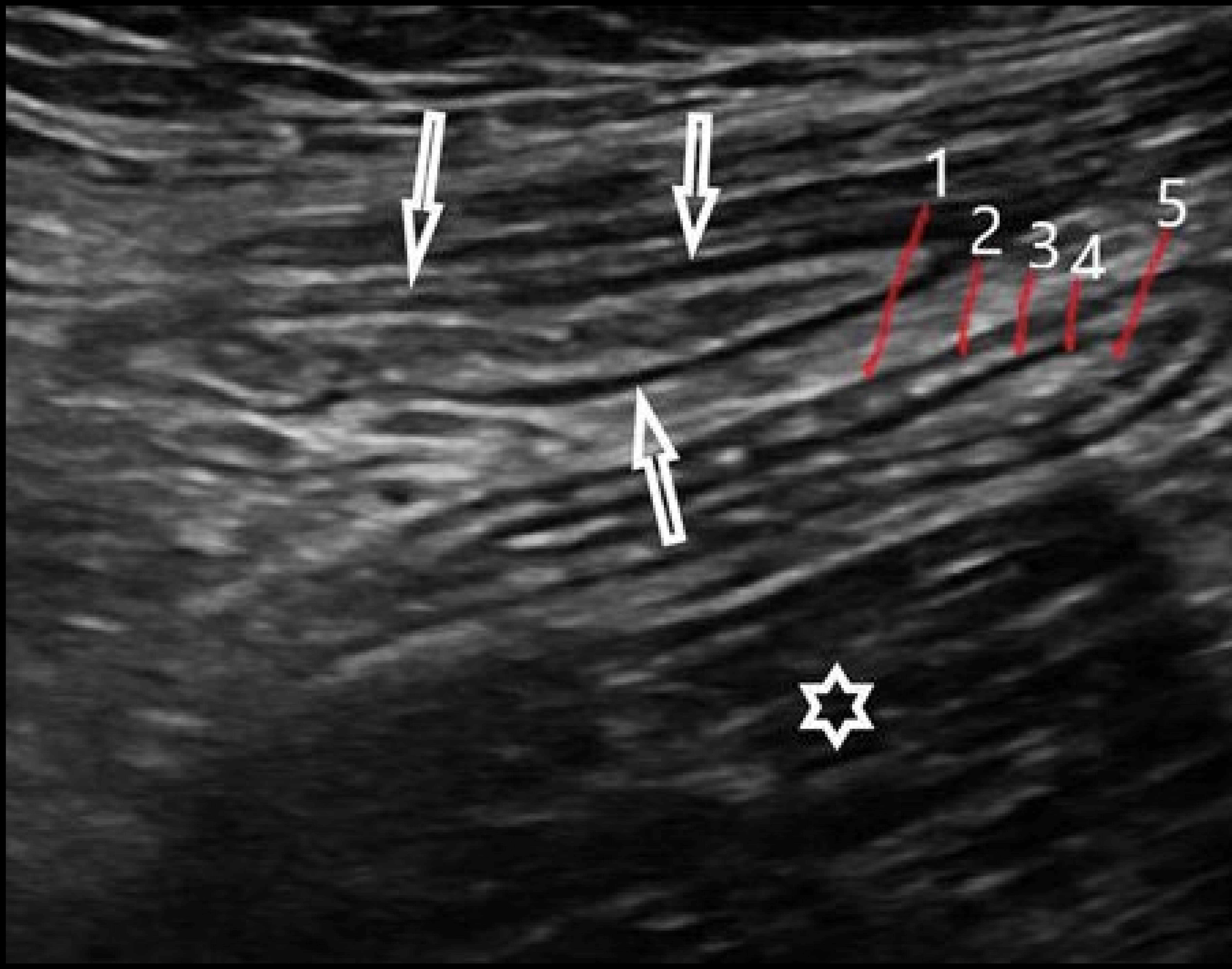
Submucosa

Muscularis

Serosa



Normal Appendix



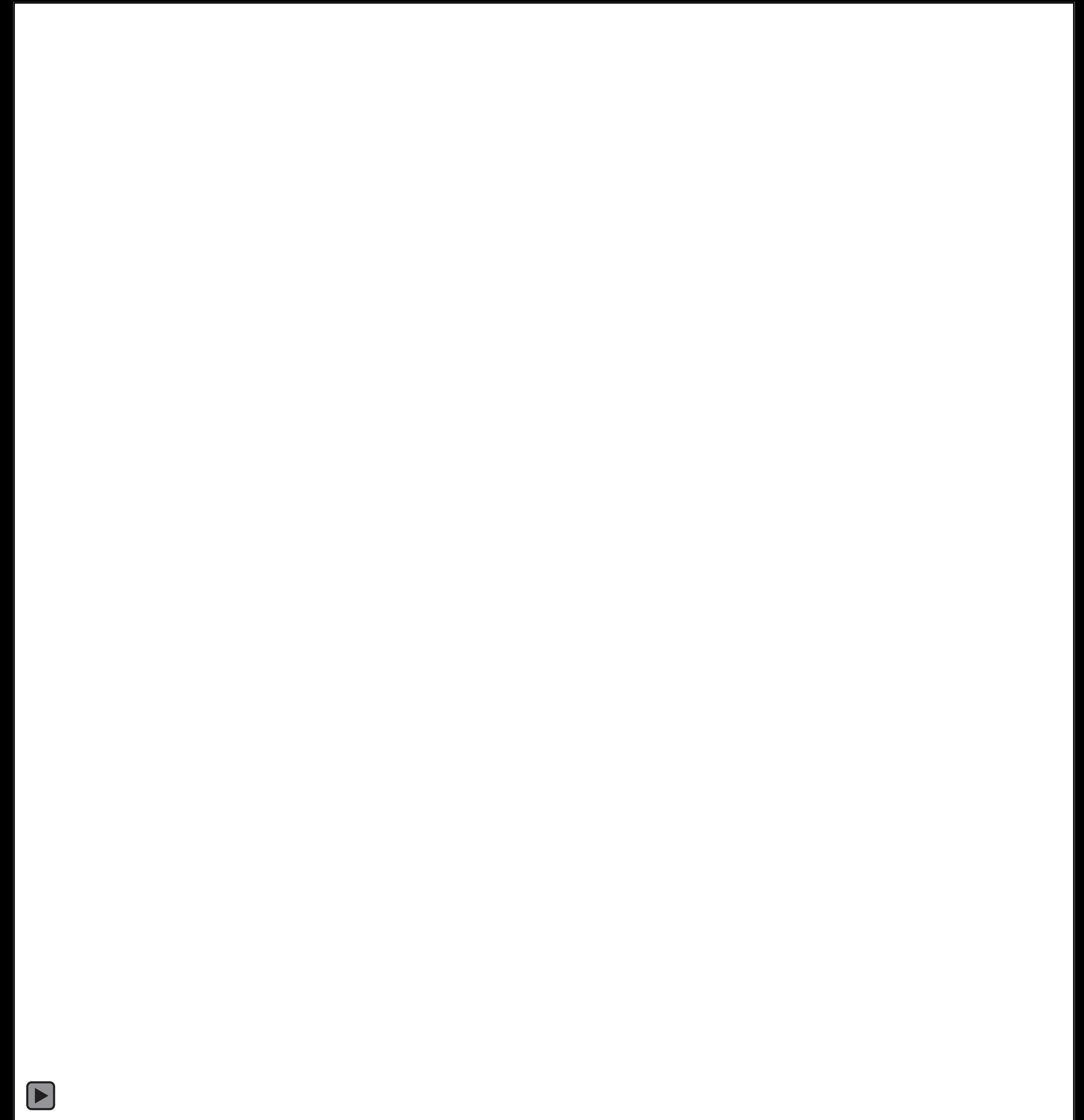
1
2
3
4
5

FEATURES OF THE APPENDIX / APPENDICITIS

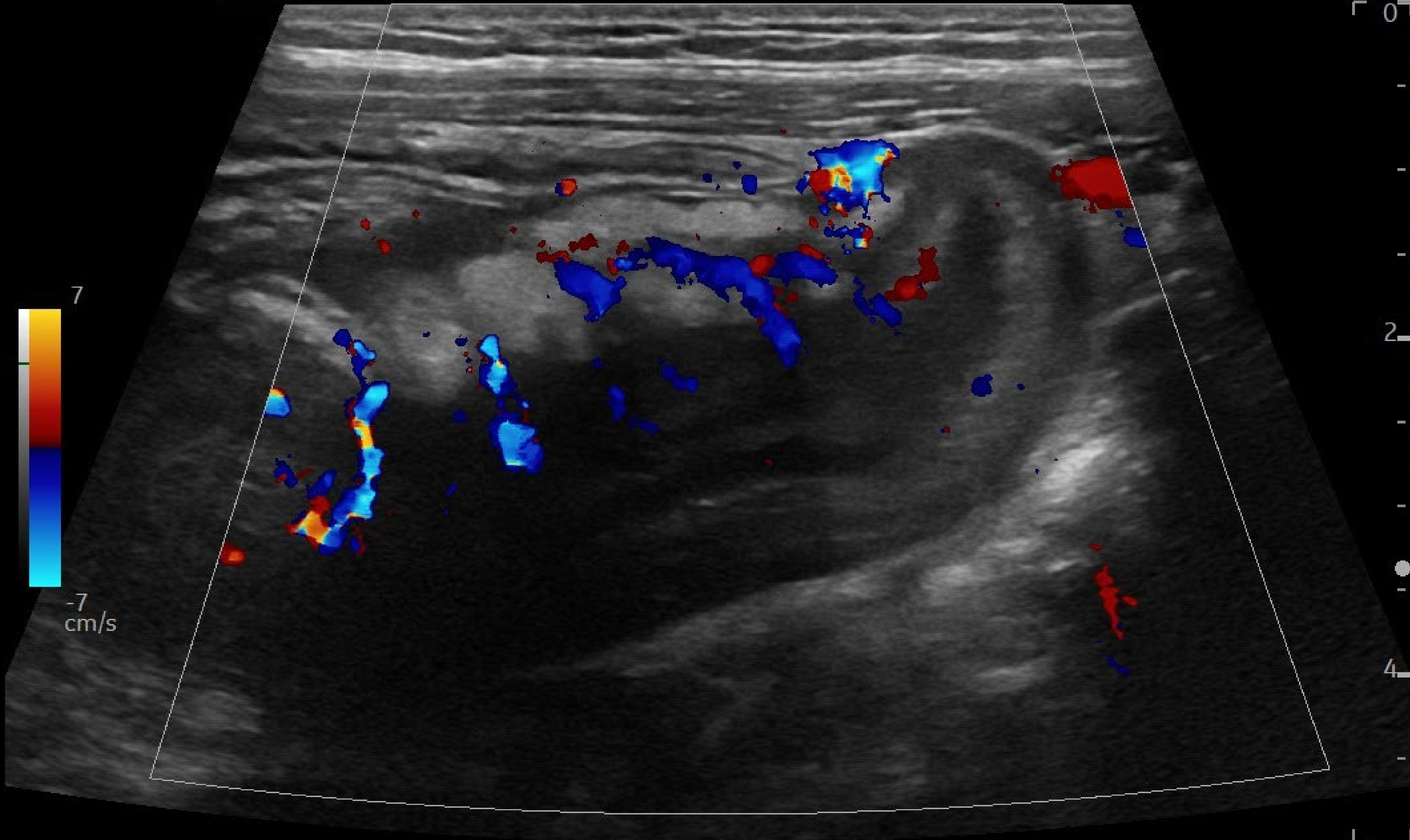
1. Non-compressible blind-ended tube
2. Attached to the cecum
3. Absence of peristalsis
4. Inflammation: echogenic mesenteric fat or colour enhancement
5. Diameter greater than 6mm
6. Presence of free fluid
7. Presence of an appendicolith
8. Enlarged lymph nodes in proximity

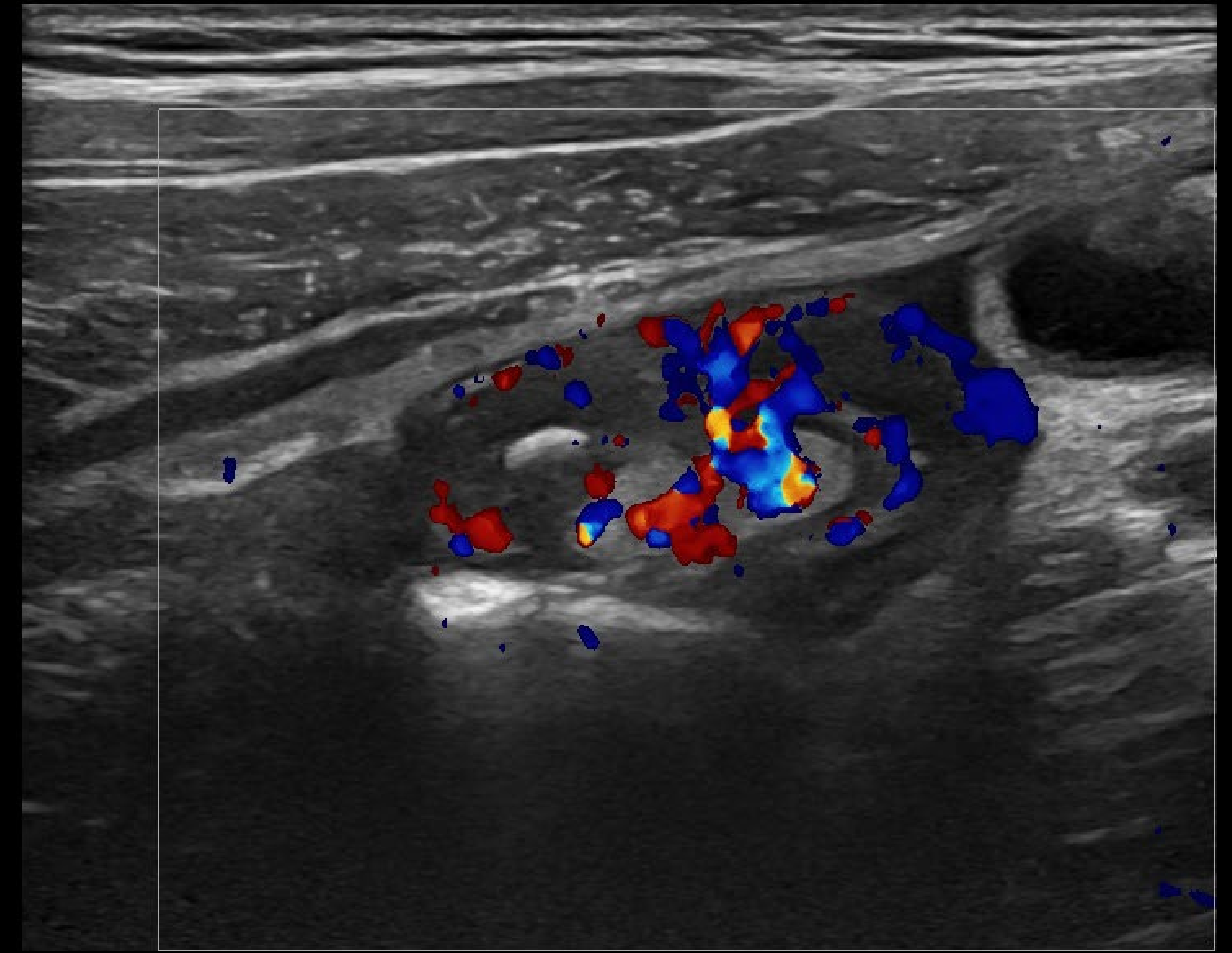
1. Blind Ended Tube 2. Attached to the Cecum

3. Absence of Peristalsis



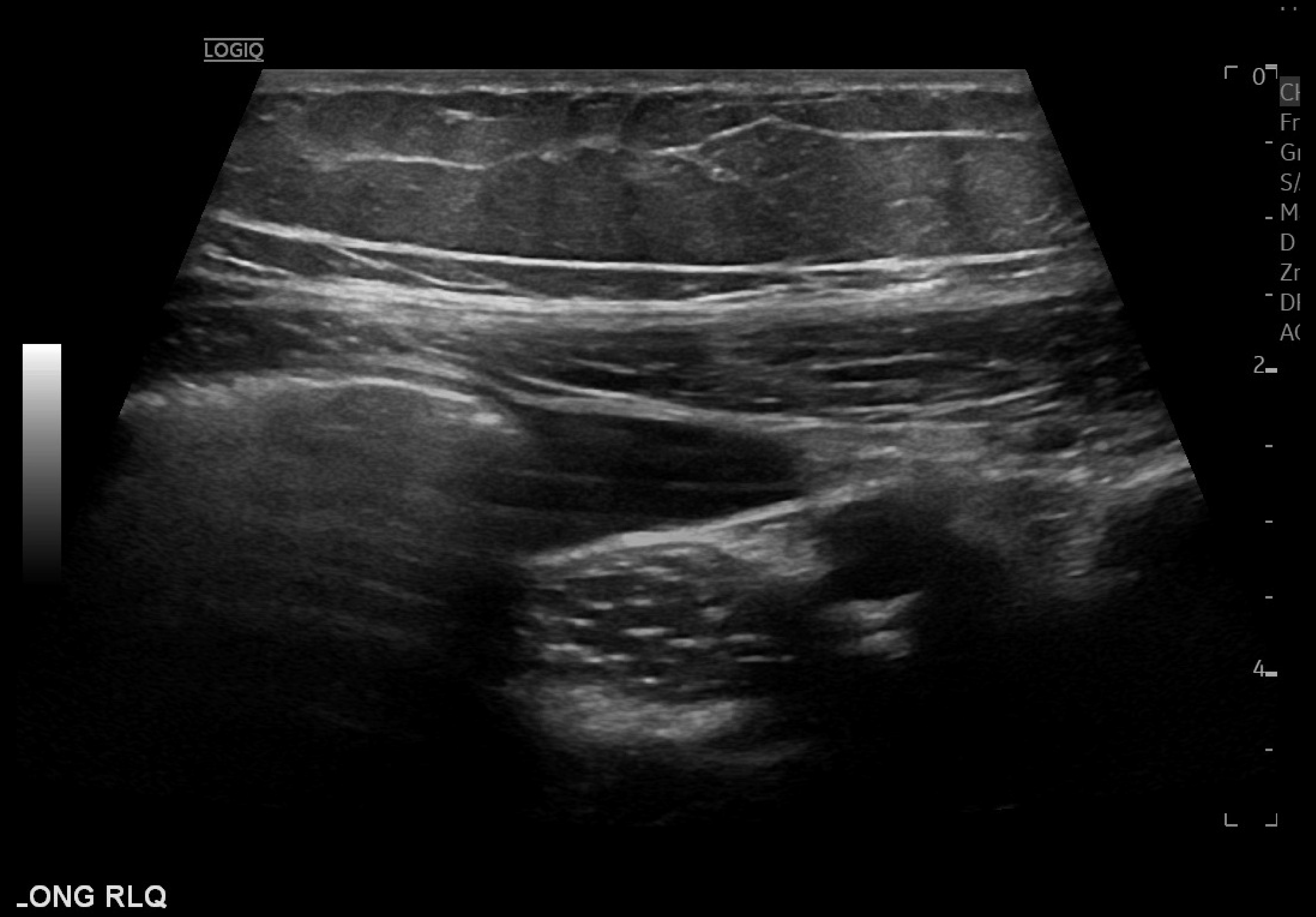
4. Inflammation: echogenic fat and ring of fire on colour doppler





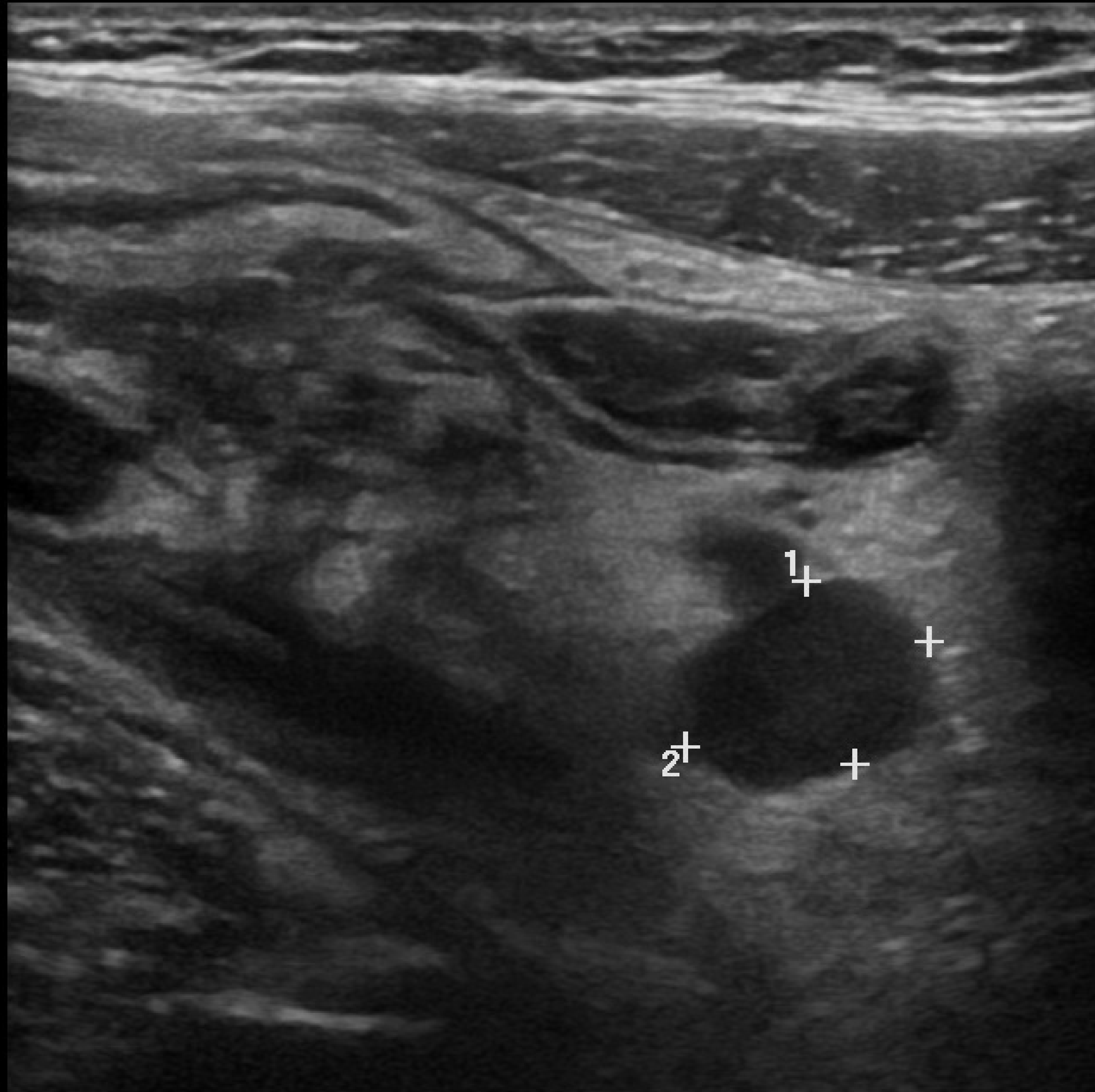
5. Diameter greater than 6mm

6. Free Fluid



7. Presence of Fecolith

8. Enlarged Lymph Nodes



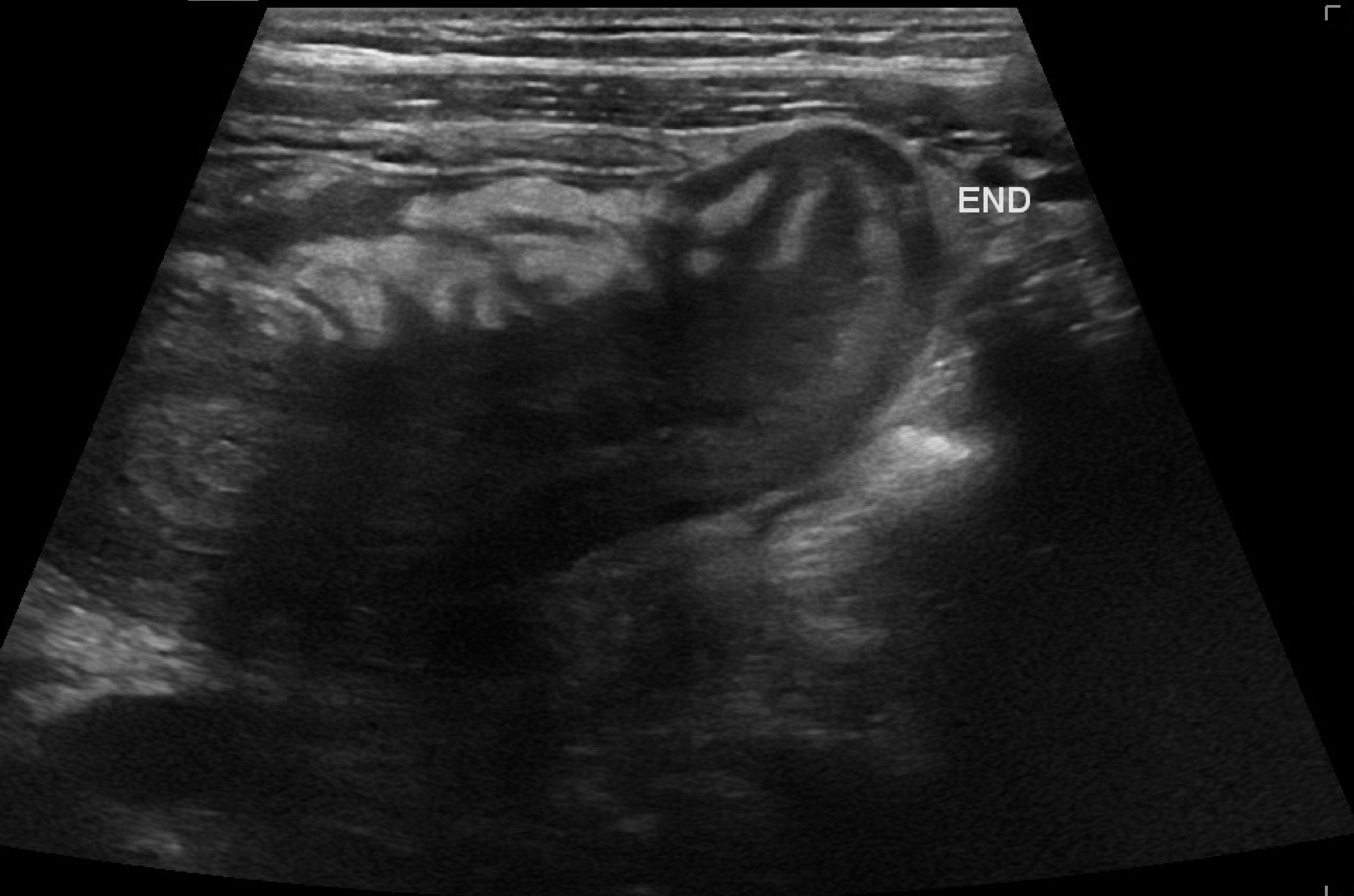
8 YO OLD

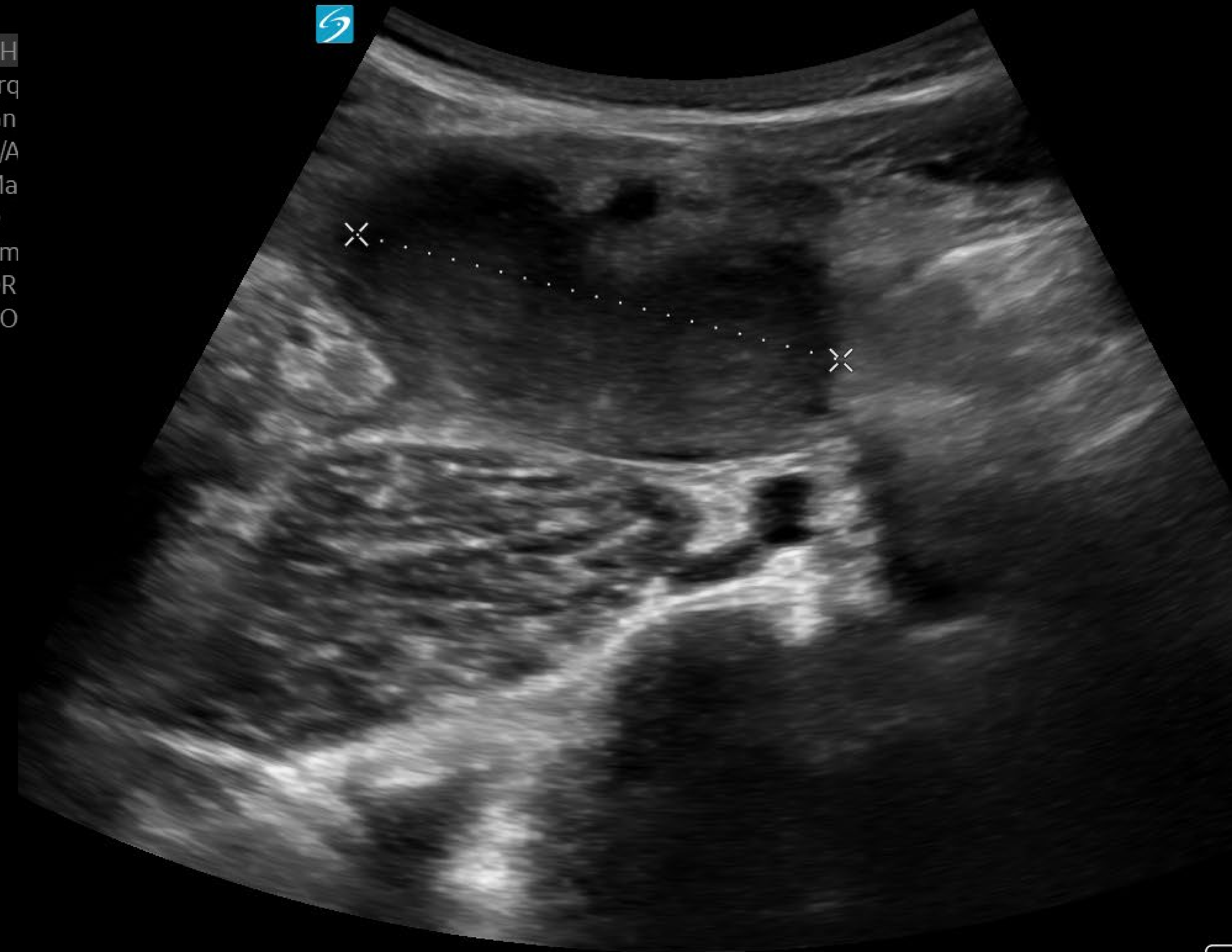
PAS Score: 7/8, no f

- WBC: 21,000

Final PAS Score: 9/10

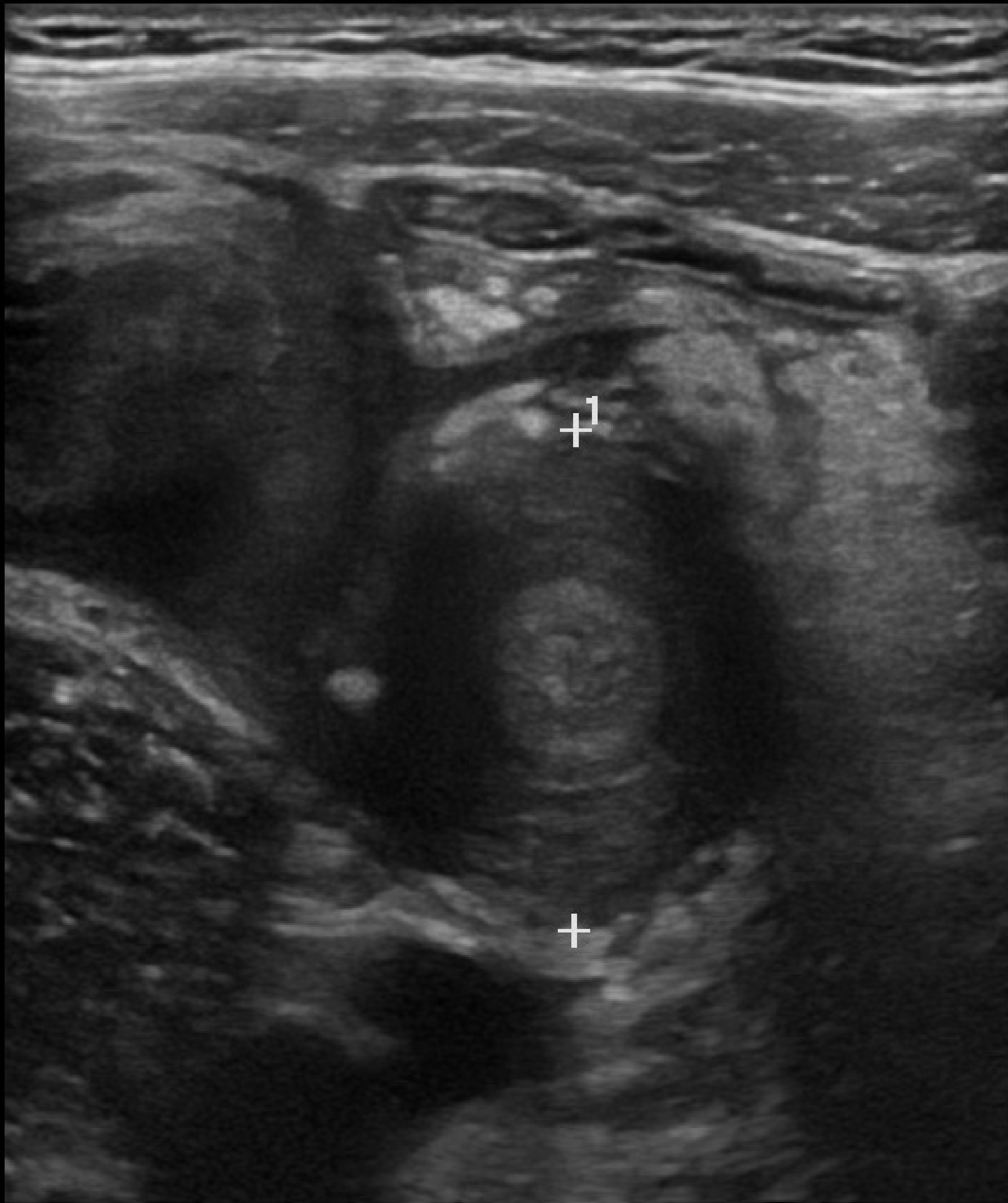
12/10/23 10:43:07AM KH Bowel



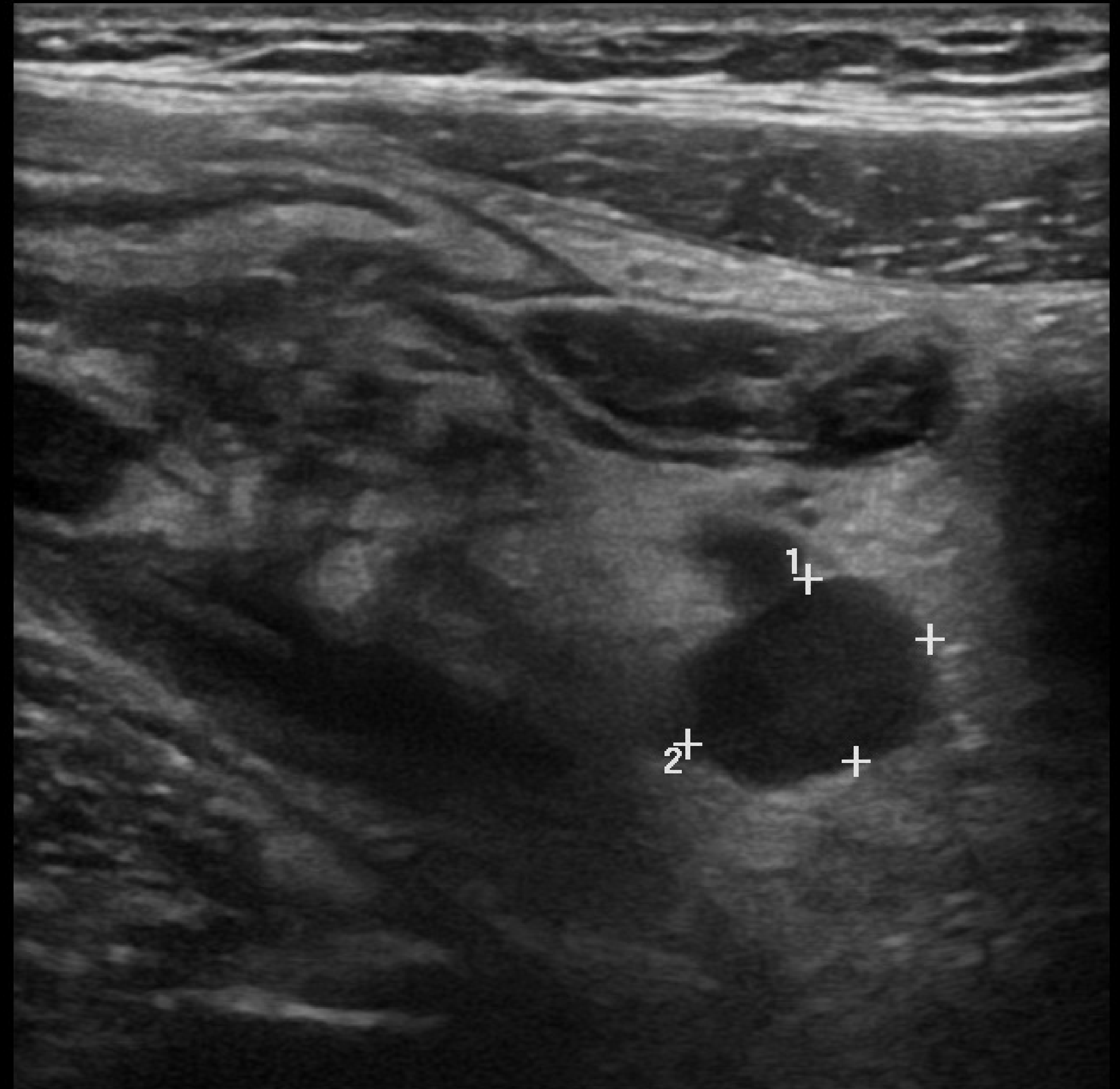


Emerg
Elk Valley Hospital

C5-1
Abdomen
MI: 1.5 TIS: 0.3



TRANS APPENDIX



Lymph Node

CASE #2 10 YO BOY RLQ PAIN

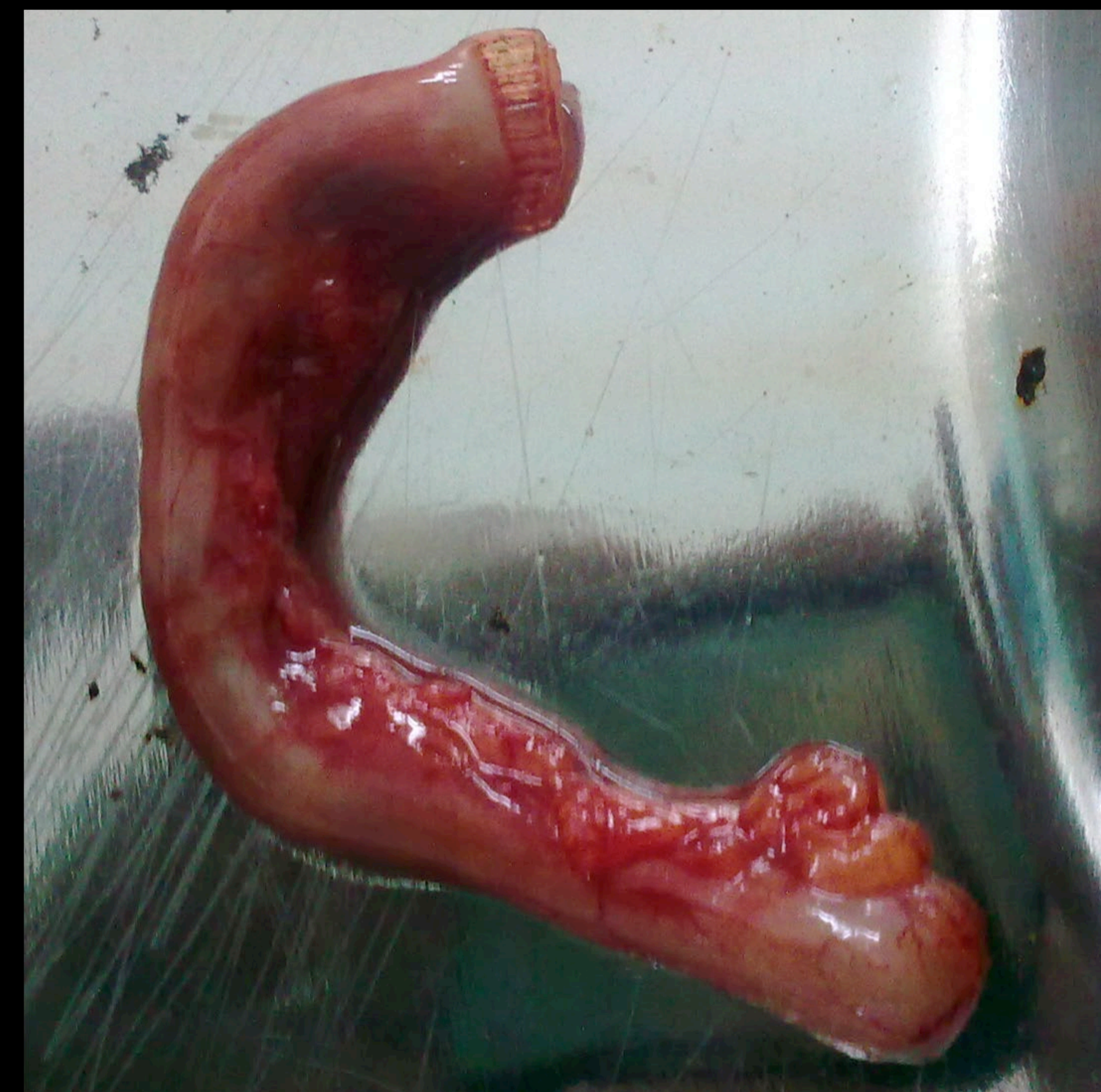
- Arrived 6h20 am with RLQ
- T: 36.8, P:68,
- +Rovsings
- + Rebound
- WBC:12, Neutro: 8.8
- PAS = 8/10

LOGIQ

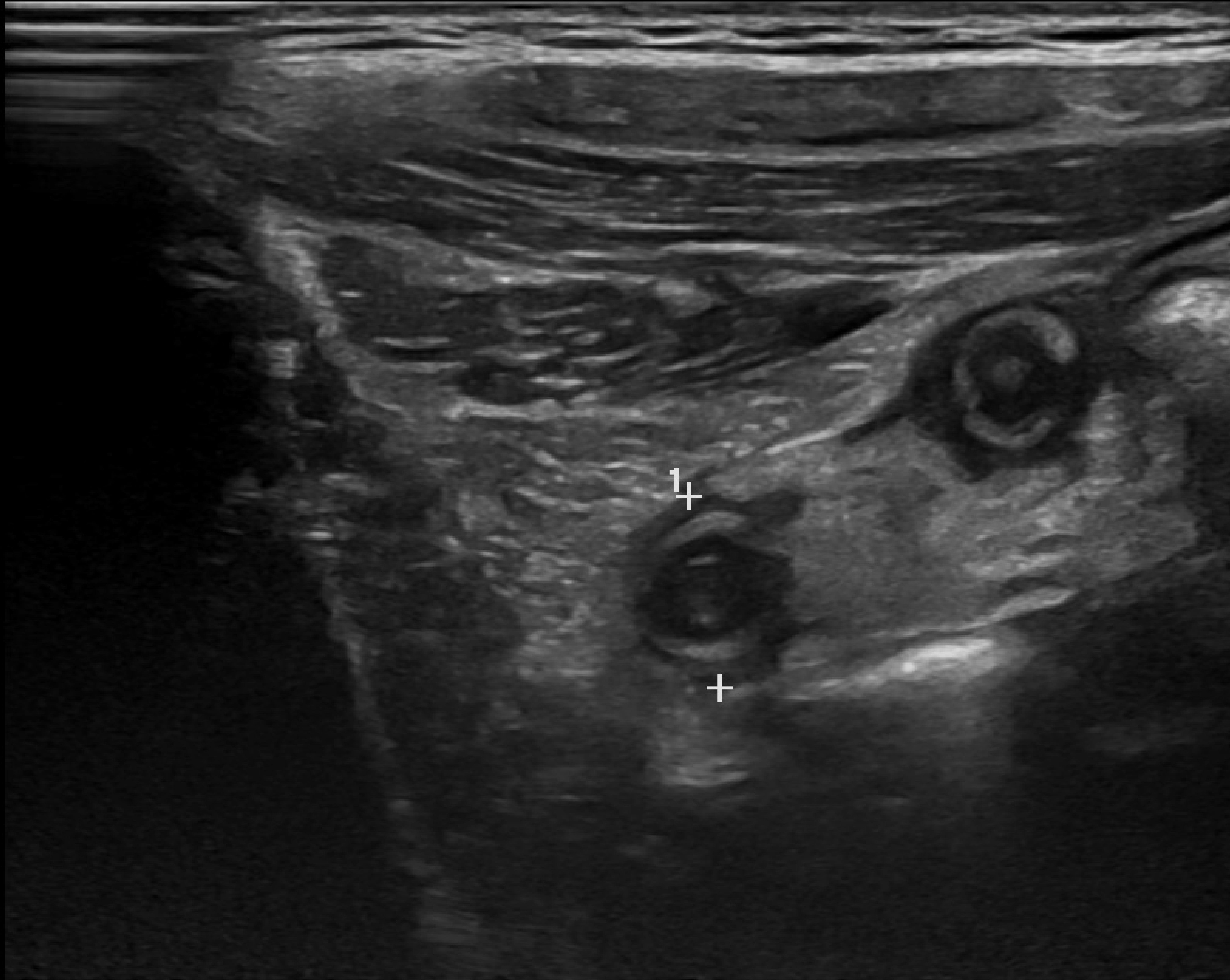
1 L 0.59 cm

FR	33
CHI	X
Frq	14.0
Gn	60
S/A	7/3
Map	B/2
D	4.0
Zm	0
DR	63
AO%	100

0 1 2 3 4



LONG RLQ APP


LOGIQ
1 L 0.79 cm
FR 33
CHI X
Frq 14.0
Gn 60
S/A 7/3
Map B/2
D 4.0
Zm 0
DR 63
AO% 100
0
1
2
3
4
TRANS RLQ APP

02/11/23 08:51:02AM KH

MSK Gen

FR 33

LOGIQ

CHI	X
Frq	14.0
Gn	60
S/A	7/3
Map	B/2
D	4.0
Zm	0
DR	63
AO%	100

0 1 2 3 4

LONG RLQ END

02/11/23 08:50:23AM KH

MSK Gen

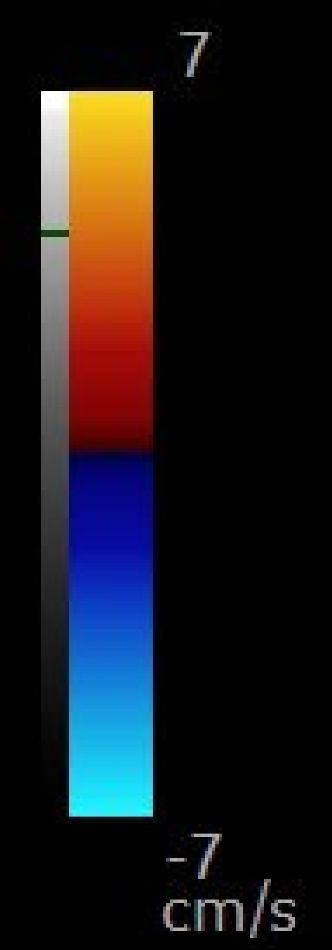
FR 10

LOGIQ

CHI X
Frq 14.0
Gn 60
D 4.0
AO% 100

CF
Frq 6.1
Gn 20.0
L/A 3/6
PRF 1.2
WF 95
S/P 3/16
AO% 100

0
1
2
3
4



TRANS RLQ APP

POLL QUESTION: WHAT IS THE LONGEST KNOWN APPENDIX?

1. 10cm
2. 1 ft
3. 15cm
4. 26 cm

CASE #3: 8 YO BOY WITH MILD RLQ PAIN (COURTESY ANDREW O'FARRELL)

CASE #4: 19 YO MALE WITH RLQ PAIN X 2 DAYS

- Afebrile
- P: 120
- RLQ tenderness
- WBC: normal. Neutrophis: 5.6
- Alvarado Score: 7/10, no fever, no WBC, no neutrophilia

LOGIQ

FR 25

CHI X
Frq 10.0
Gn 60
S/A 3/3
Map F/2
D 6.0
Zm 2
DR 63
AO% 100

2
4

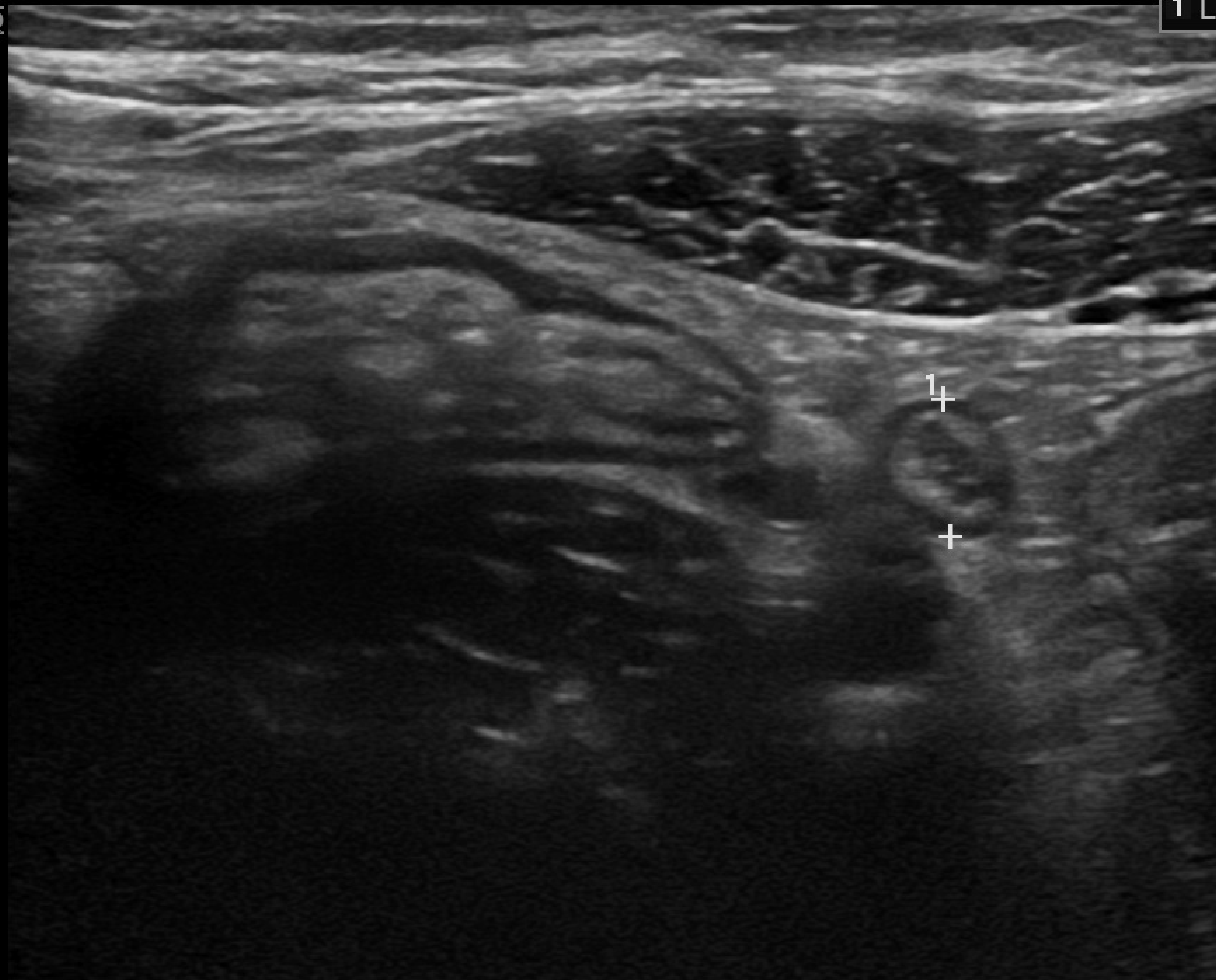
RLQ LONG APP

LOGIQ

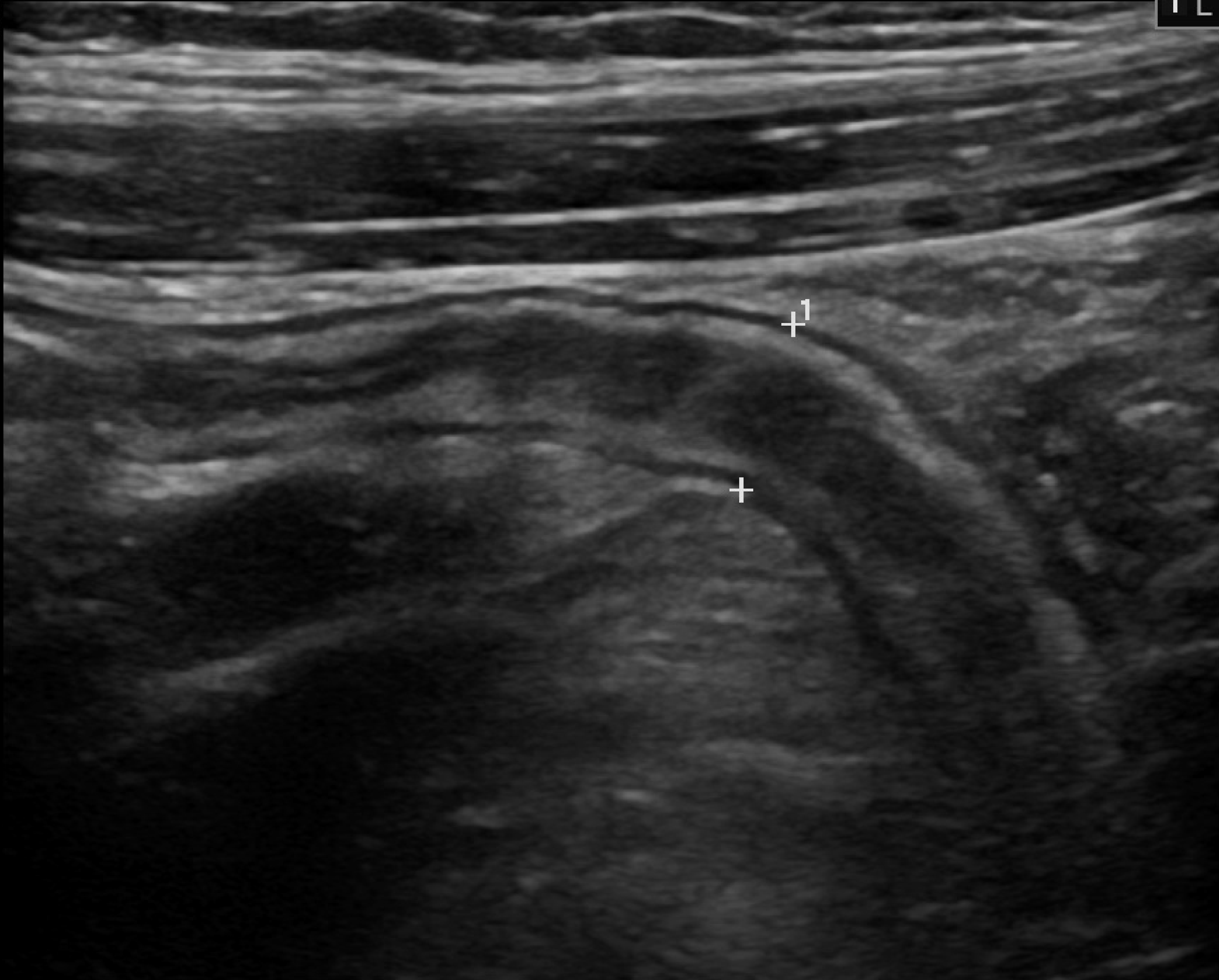
1 L 0.57 cm

FR 30

CHI	X
Frq	15.0
Gn	60
S/A	3/3
Map	F/2
D	4.5
Zm	2
DR	63
AO%	100



RLQ TRANS



LOGIQ
1 L 0.72 cm
FR 30
CHI X
Frq 10.0
Gn 60
S/A 3/3
Map F/2
D 4.5
Zm 2
DR 63
AO% 100
1
2
3
4
RLQ LONG APP

CASE #5: 19 YO FEMALE WITH 4 HRS OF RLQ PAIN

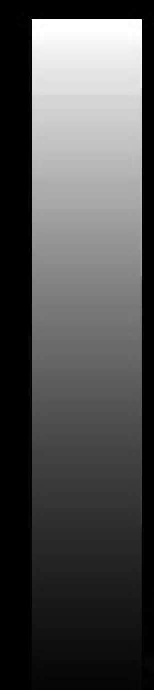
- Afebrile
- + Nausea/Anorexia
- No rebound, No Rovsings, No obturator
- WBC: 15
- Alvarado Score: 6 (75% sensitive for ruling out appendicitis <7)

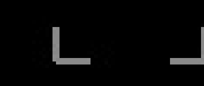
LOGIQ

FR 25

CHI X
Frq 15.0
Gn 60
S/A 3/3
Map F/2
D 5.0
Zm 0
DR 63
AO% 100

0
2
4





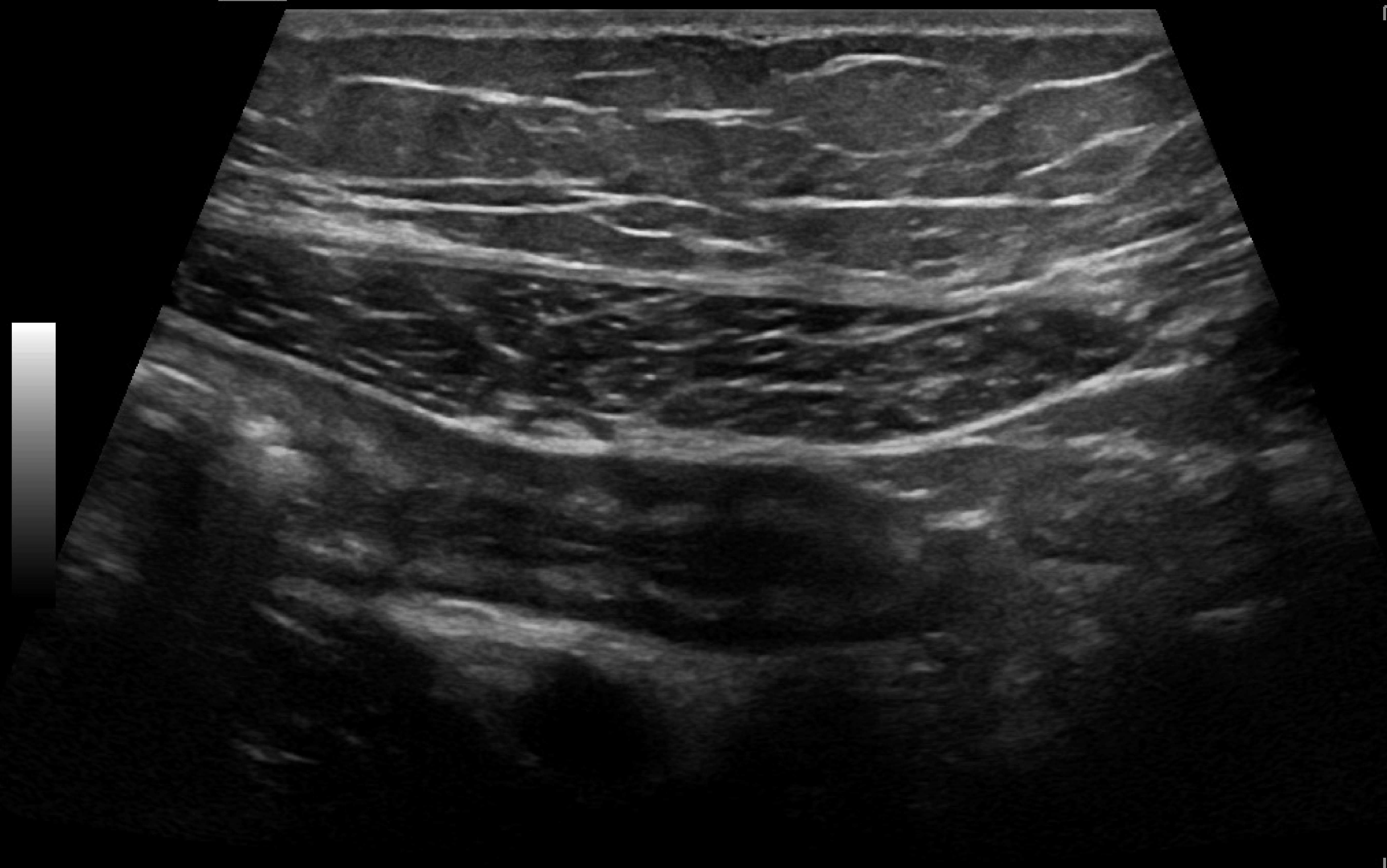
LONG RLQ

Elk Valley Hospital US1
05/10/23 08:33:31AM KH

NOT FOR DIAGNOSIS
Bowel

FR 25

LOGIQ



0
2
4

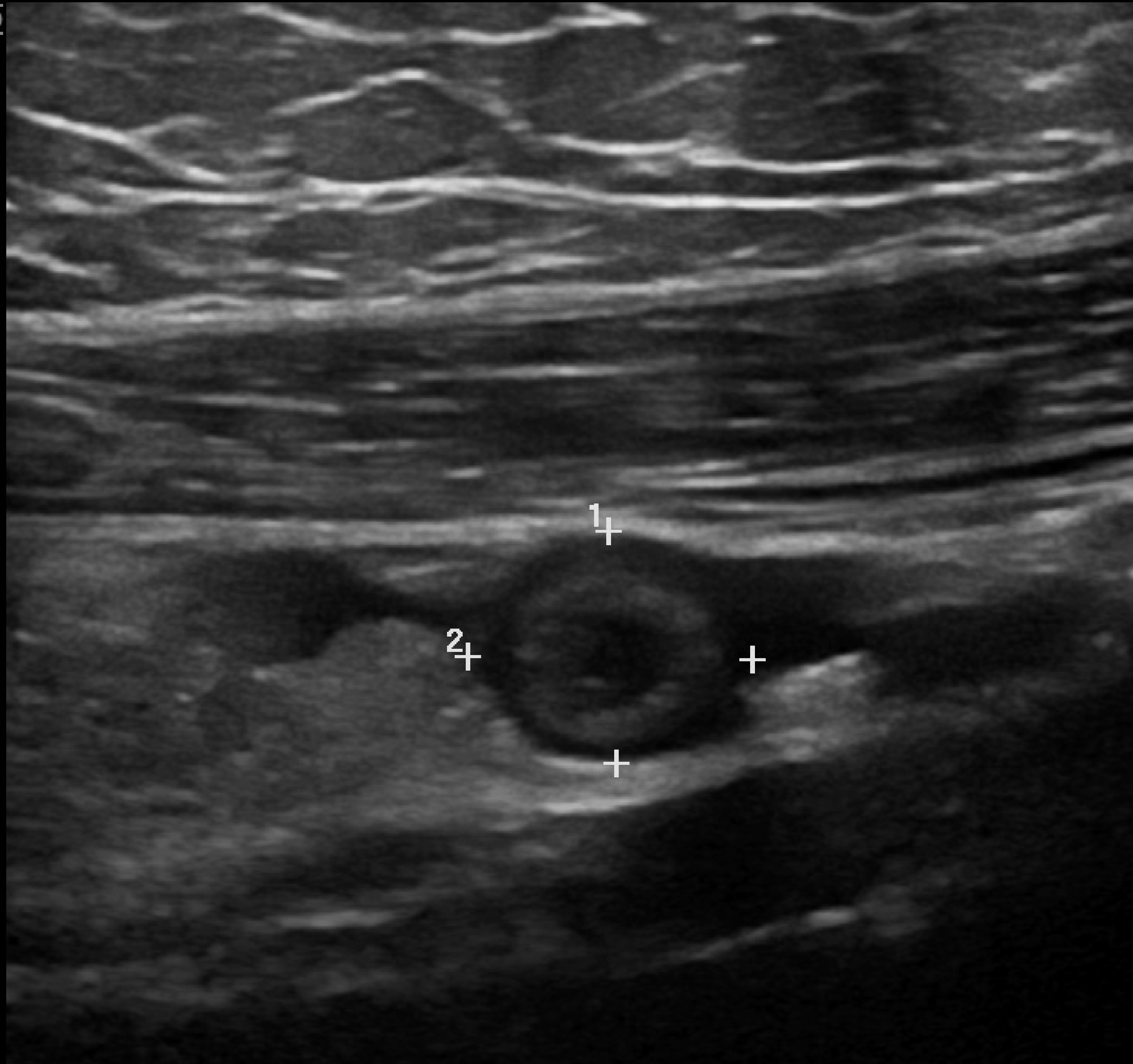
CHI X
Frq 15.0
Gn 60
S/A 3/3
Map F/2
D 5.0
Zm 0
DR 63
AO% 100

LONG RLQ APP

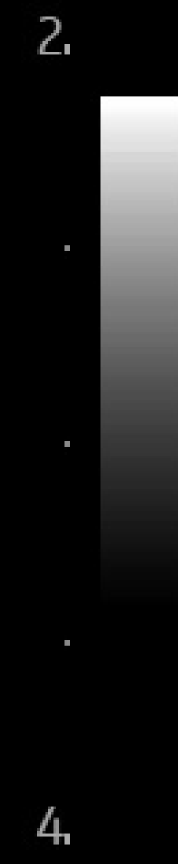
Valley Hospital US1
.0/23 08:34:07AM KH

NOT FOR DIAG
Bowe

1 L 1.03 cm
2 L 1.27 cm



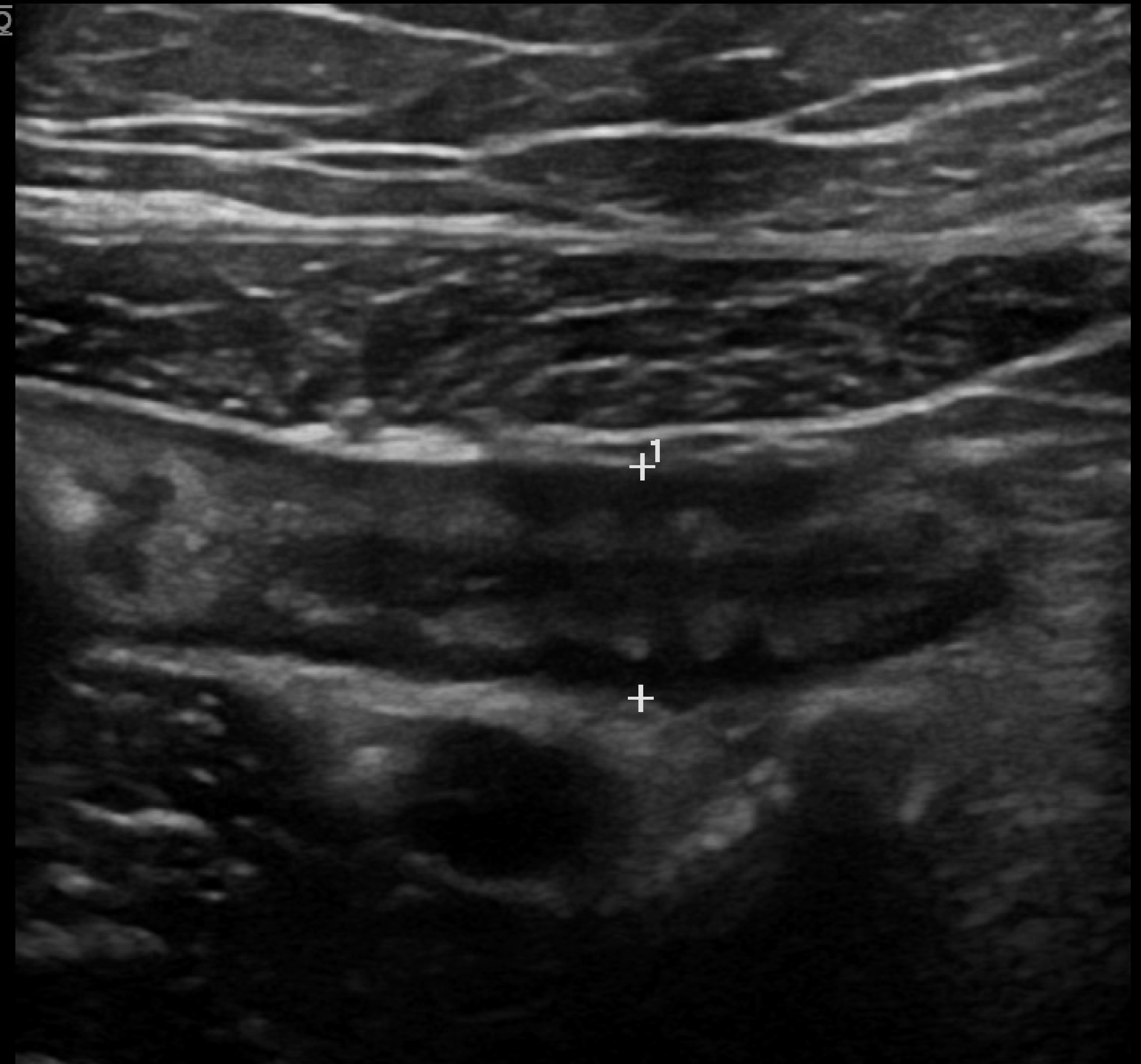
LQ APP



Elk Valley Hospital US1
05/10/23 08:34:46AM KH

NOT FOR DI

1 L 1.05



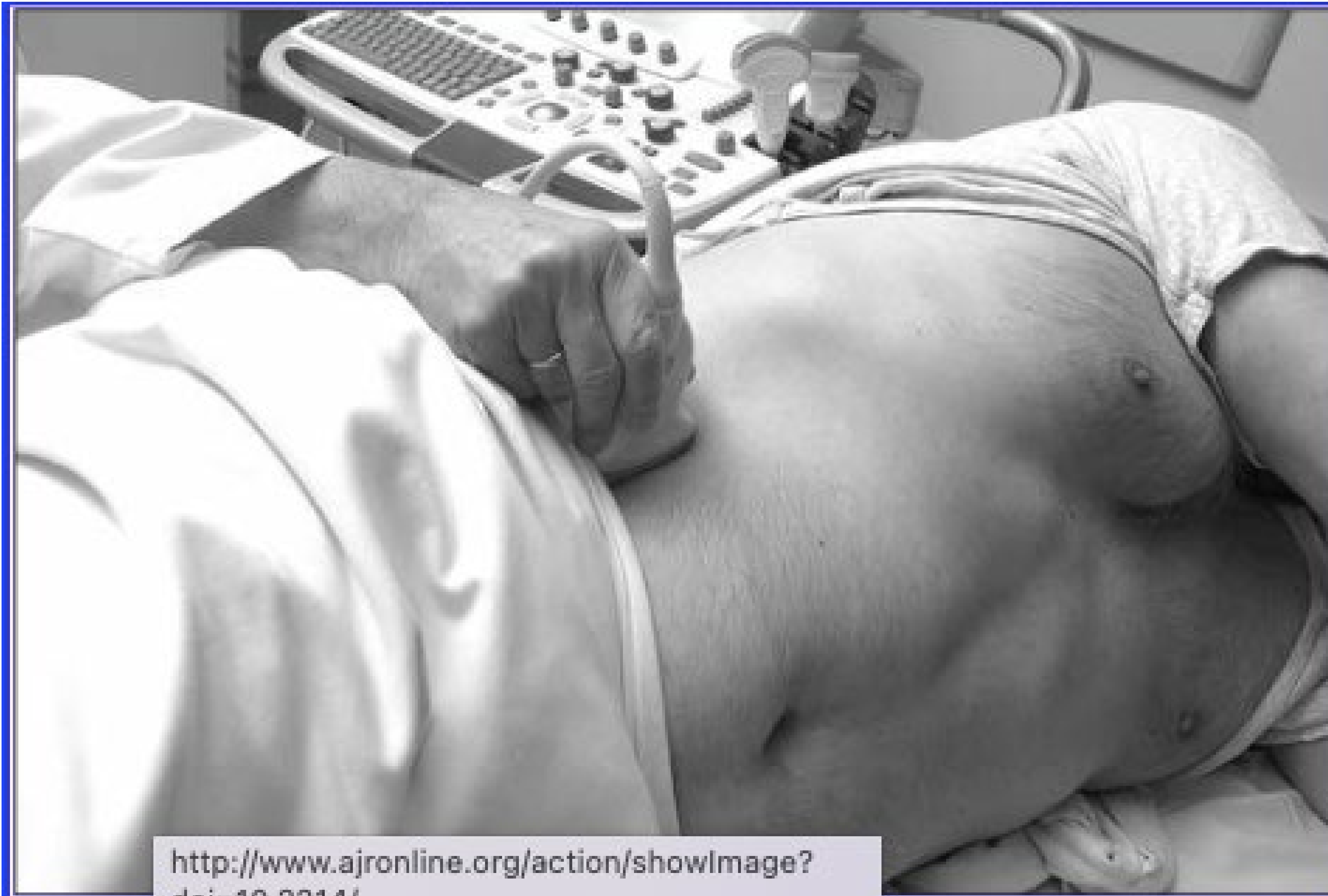
LONG RLQ APP

TIPS & TRICKS

- Move slowly
- Conscience of probe pressure: Graded pressure.
- Try the 3 point exam

Three-Step Sequential Positioning Algorithm During Sonographic Evaluation for Appendicitis Increases Appendiceal Visualization Rate and Reduces CT Use

Stephanie T. Chang[1]
R. Brooke Jeffrey[1]
Eric W. Olcott[1,2]



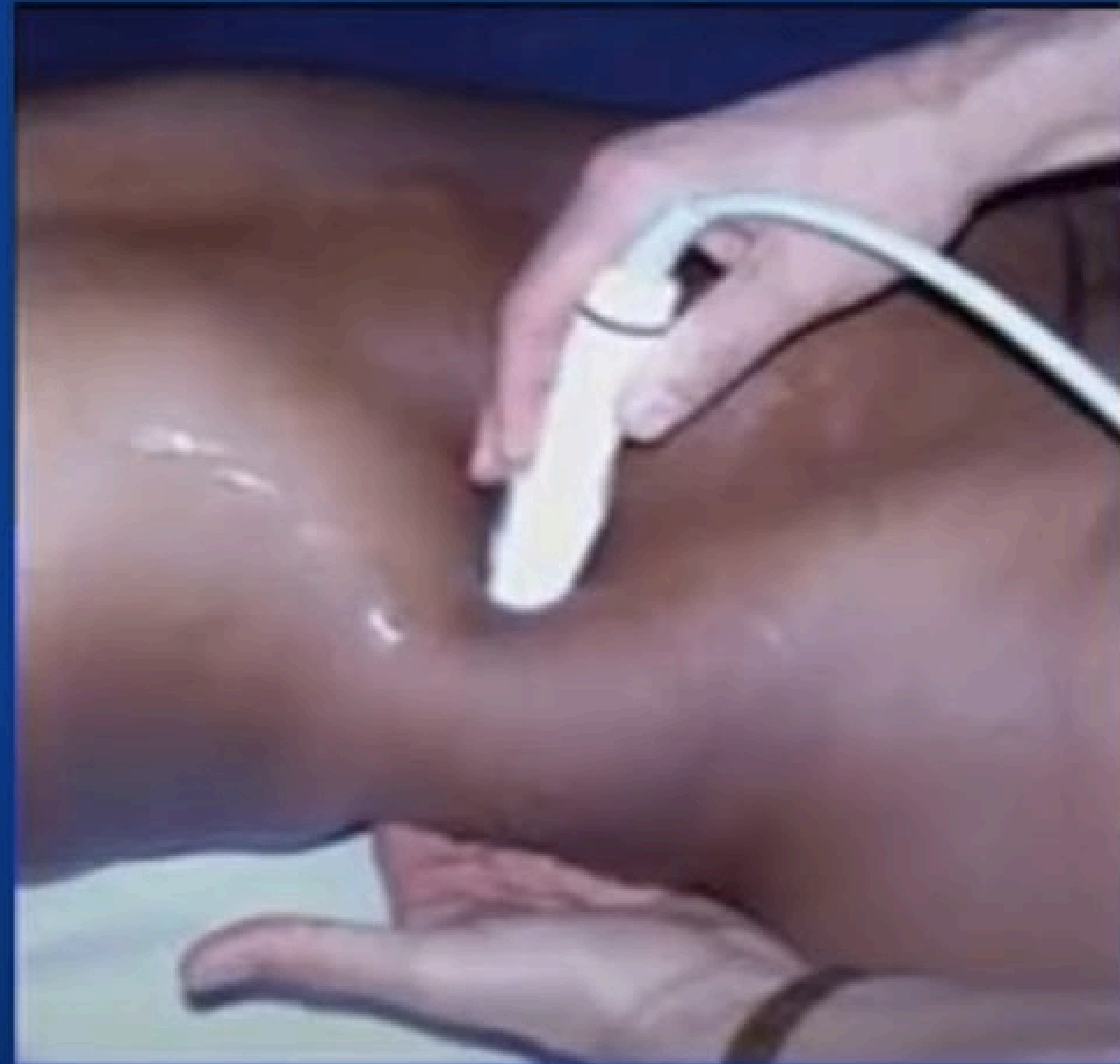
C

A

P

B

- Can be difficult to visualize if the ascending colon and distal small bowel contain large amounts of air.
- Move the probe to the flank and look behind the cecum.
- Try to push the appendix towards the probe.



TIPS & TRICKS

- Move slowly
- Conscience of probe pressure
- Try the 3 point exam
- Befriend your local ultrasound tech

TREATMENT: TO OPERATE OR NOT?

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 NOVEMBER 12, 2020 VOL. 383 NO. 20

A Randomized Trial Comparing Antibiotics with Appendectomy for Appendicitis

The CODA Collaborative*

ABSTRACT

> JAMA Surg. 2023 Oct 1;158(10):1105-1106. doi: 10.1001/jamasurg.2023.2756.

Long-Term Outcome of Nonoperative Treatment of Appendicitis

Barbora Pátková [1,2], Anna Svenningsson [1,3], Markus Almström [1,3], Jan F Svensson [1,3], Staffan Eriksson [4,5], Tomas Wester [1,3], Simon Eaton [6]

Affiliations + expand

PMID: 37556160 PMCID: PMC10413207 (available on 2024-08-09)
DOI: 10.1001/jamasurg.2023.2756

FEB 2024 RURAL POCUS ROUNDS

POCUS OF THE APPENDIX