international bowel ULTRASOUND GROUP

KUWAIT GASTROENTEROLOGY ASSOCIATION
رابطة الجهاز الهضمي والكبد الكويتية

IUS in post surgical patients

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Intended Learning Outcomes

By the end of this session, the learner will be able to:

1. Evaluate post-operative anastomoses using appropriate imaging techniques (e.g., transabdominal ultrasound) and interpret findings to identify recurrence of inflammation at the anastomotic site.

2. Identify anatomical variations or abnormalities (e.g., altered surgical anatomy, skip lesions, adhesions, altered bowel loops position) that could modify the typical localization of bowel segments on IUS and impact the interpretation of findings in the post-operative setting.

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Faculty Disclosure

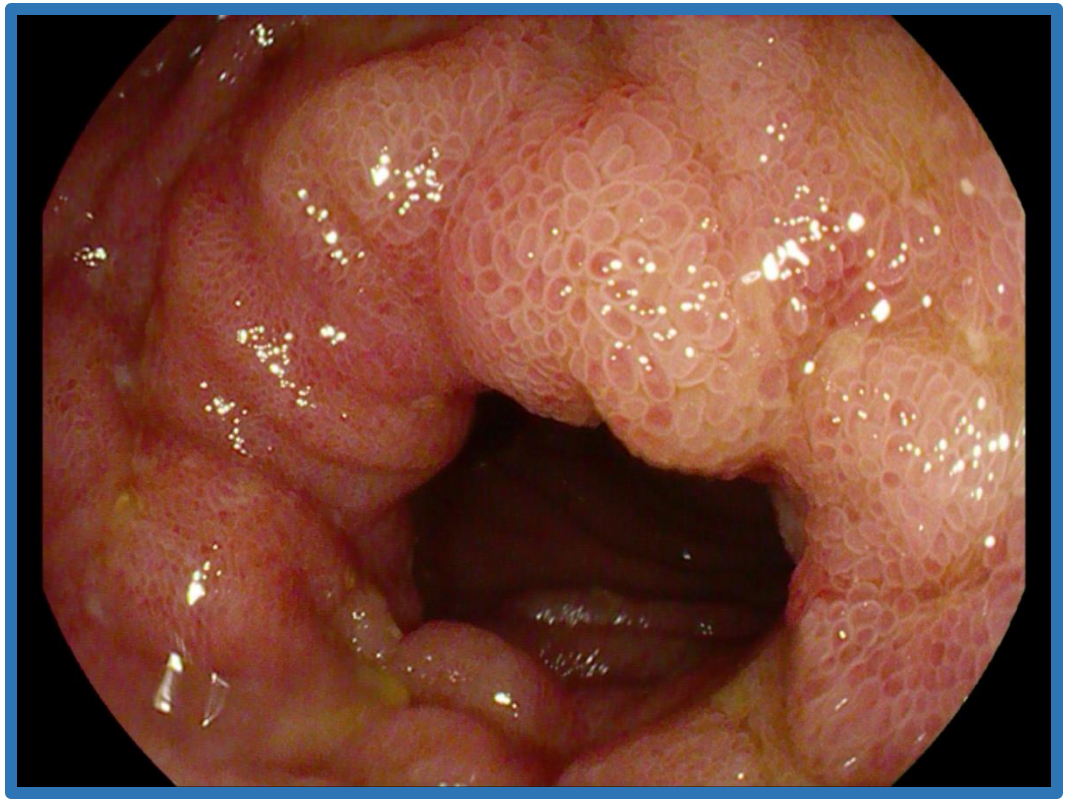
Speaker: Janssen, Abbvie, Takeda, Pfizer

Advisory boards: Janssen, Abbvie, Takeda, Eli Lilly, Pfizer, Ferring, Amgen, Fresenius Kabi, Celltrion, Bristol Myers Squibb

Research Support: Helmsley Trust, DOVA health, Janssen

Monitoring post operative Crohn's disease – does it matter?

- Up to 90% of patients exhibit endoscopic disease recurrence (Ri1) at 12mo with most exhibiting activity at 3 years.
  - Clinical recurrence occurs much later[1]
- ~46% of CD patients require surgery within 10 years of diagnosis (range is 36-86% 37.7 % rate for kids[2,3]
  - Lower rate of small bowel disease for colectomy but 20-40%
- Evidence for surgery first line in limited TI disease (LIRIC trial) may argue for more surgery[4]

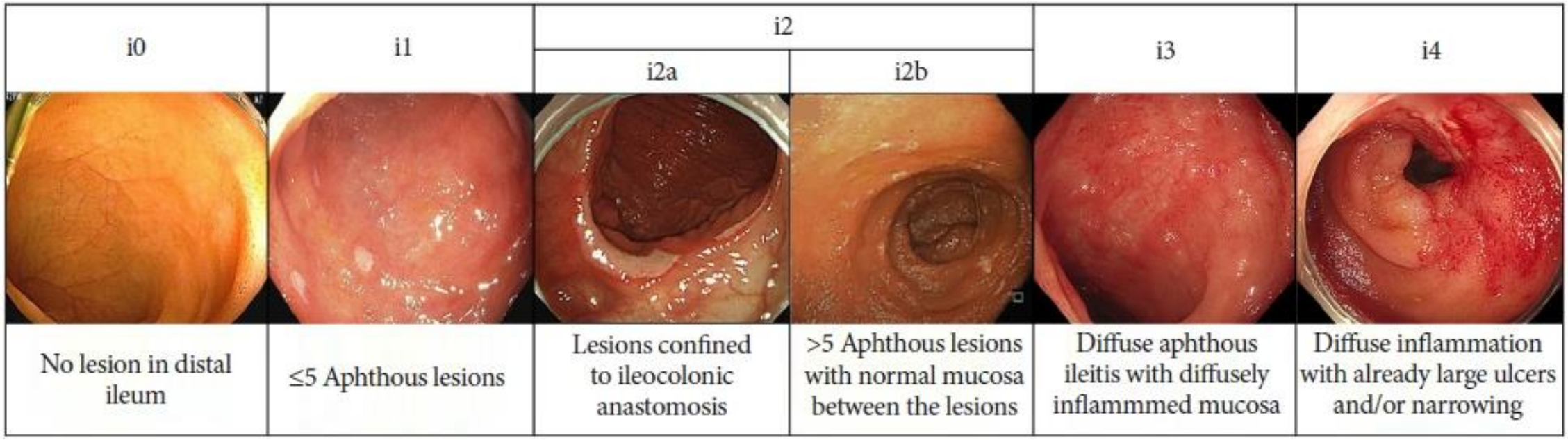


1. Hamilton AL et al. JCC 2022;16(12):1797
2. Yamaomo et al. Exp Review Gastro Hep 2015;9(1):55-66
3. Spinelli et al W J Gastro 2011;17(27):3213
4. Stevens TW et al. Lancet Gastroenterol Hep 2020;5(10):900-907


CHROME VANADIUM
13
15
17

Endoscopy: our gold standard

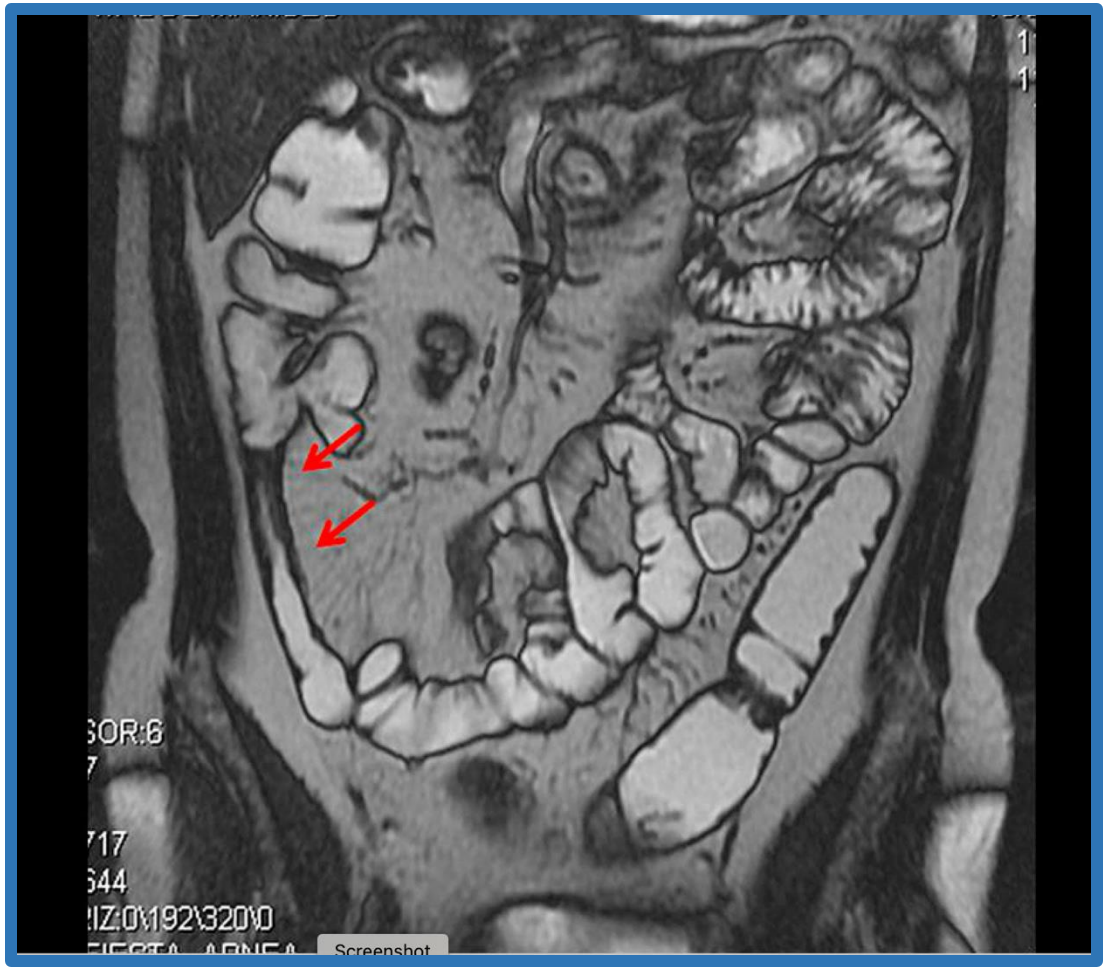
- Rutgeert's score developed in the 1990s – limited to disease proximal to the anastomotic inlet – designed for END to END anast (not side to side)



Clin Endoscop 2022: 55(4):480-488

CT & MR – useful?

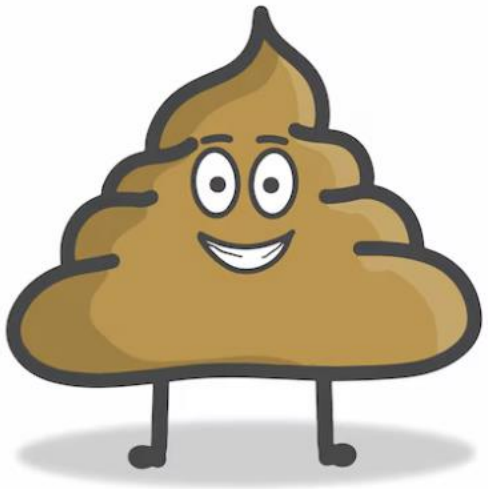
- 11 studies, 589 patients (4CTE, 7MRE)
- **MRE** pooled sens & spec were 90% (95%CI 0.78-0.96) and 78% (95%CI 0.57-0.90) respectively
- **CTE** pooled sens & spec were 93% (95%CI 0.87-0.96) and 67% (95%CI 0.35-0.90) respectively
- Most sens & spec parameters: **wall thickening**, penetrating lesions[1]
- **Colonic disease?** ***



Chavoshi et al. Abdom Radiol (NY). 2024; June3
doi: 10.1007/s00261-024-04394-6.

Biomarkers

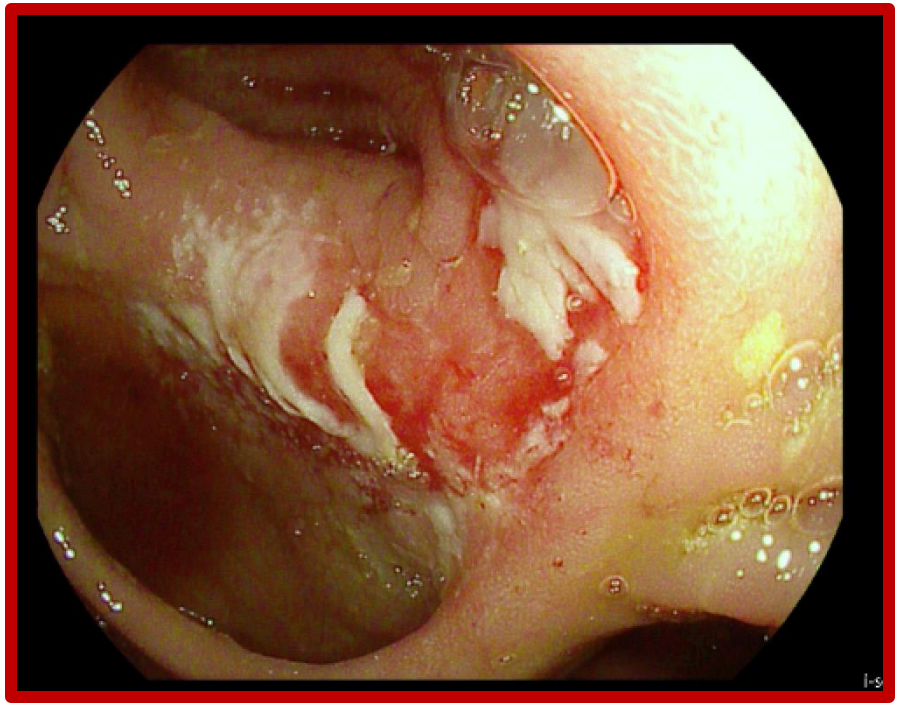
- CRP and ESR insensitive for detecting POR[1]
- FC levels are higher in those with endoscopic disease activity compared to those in remission with good correlation with the Rutgeert's score[2]
- ECCO guidelines recommend FC measure 3mo post op with endoscopy guided by the level[3]



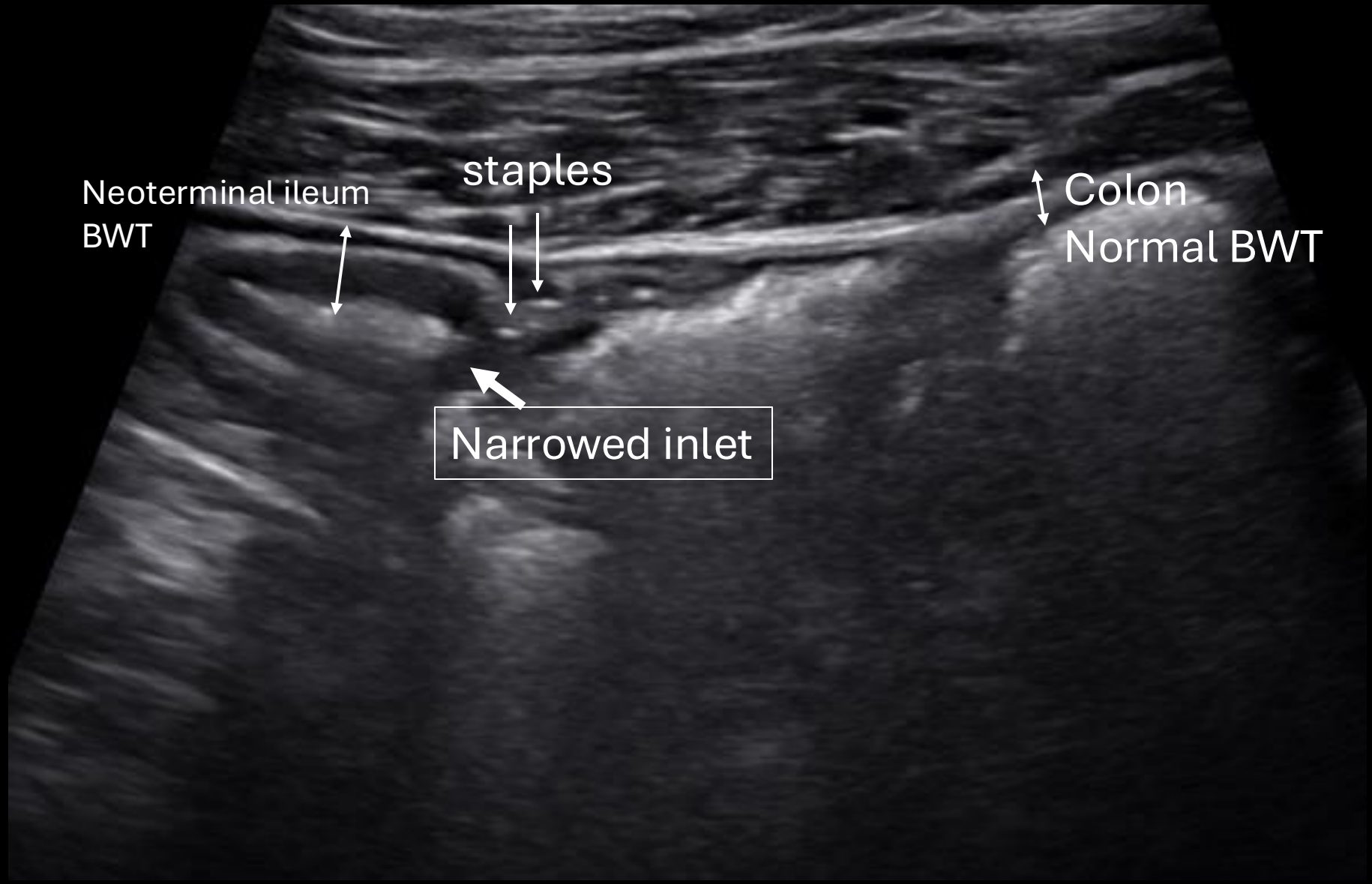
1. Yamaomo et al. Exp Review Gastro Hep 2015;9(1):55-66
2. Boschetti et al. Official J of College of Gastro, ACG. 2015;10(6):865-872.
3. Dragoni et al. JCC 2023;17(9):1373-1386.

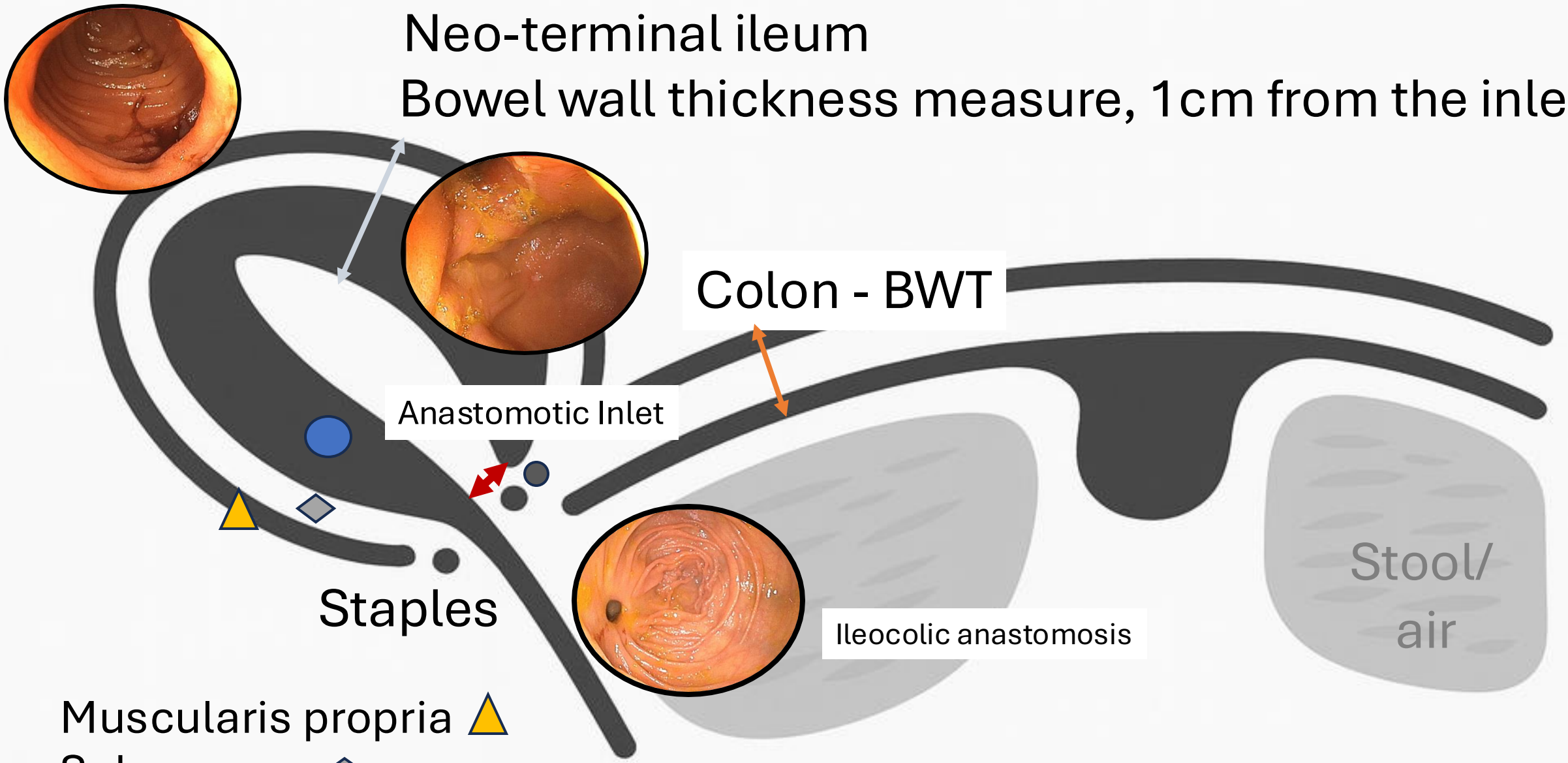
Success?

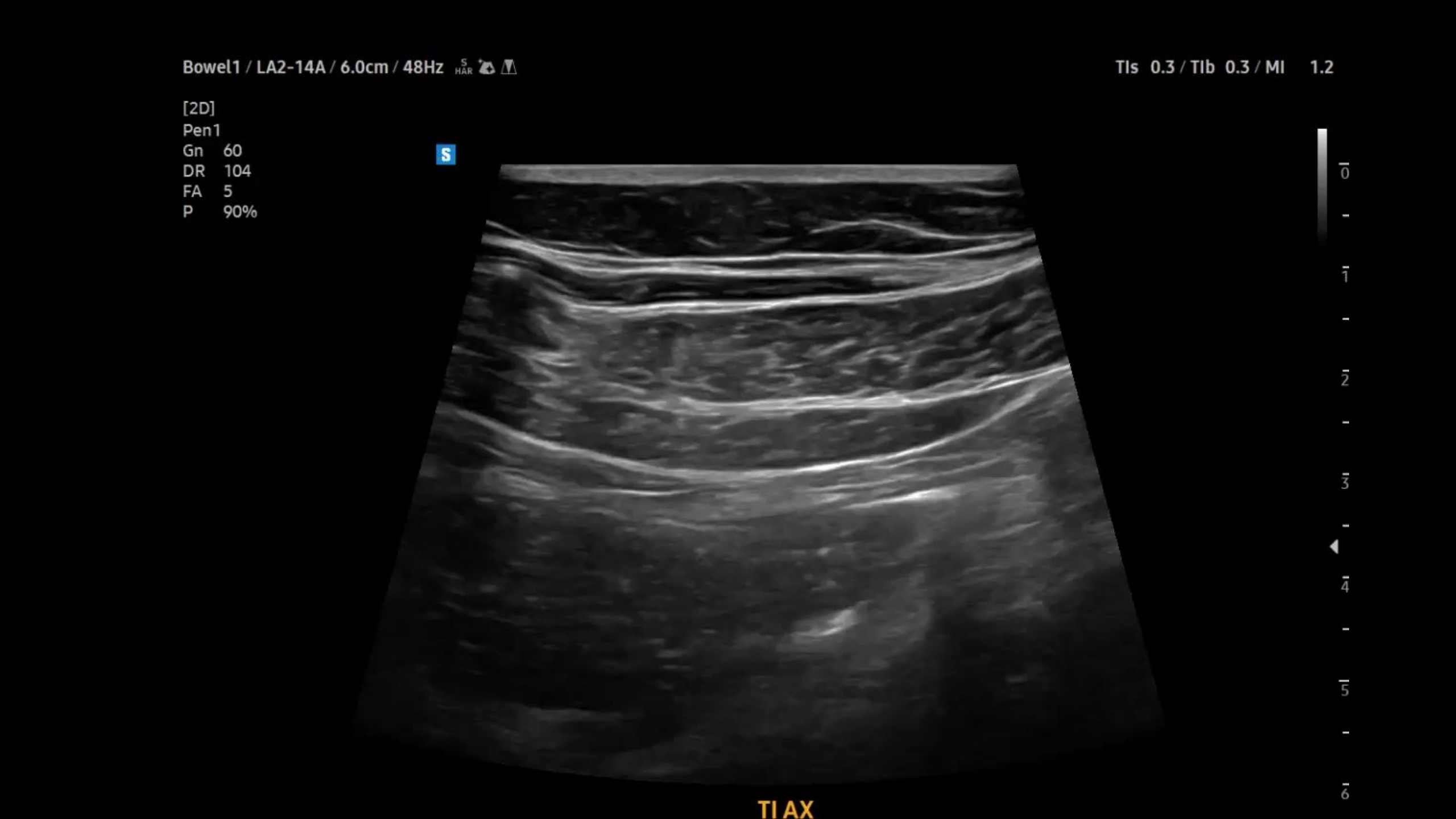
- Retrospective USA study, 901 post op CD patients, at least 1 yr after OR (2009-2019)[1]
  - Biomarkers (FC, CRP), imaging & IC (Rutgeert's ≥ 2b
- 78% considered high risk (HR), 28% 2 or more surgeries
- 38.1% of HR had monitoring w IC within 1yr

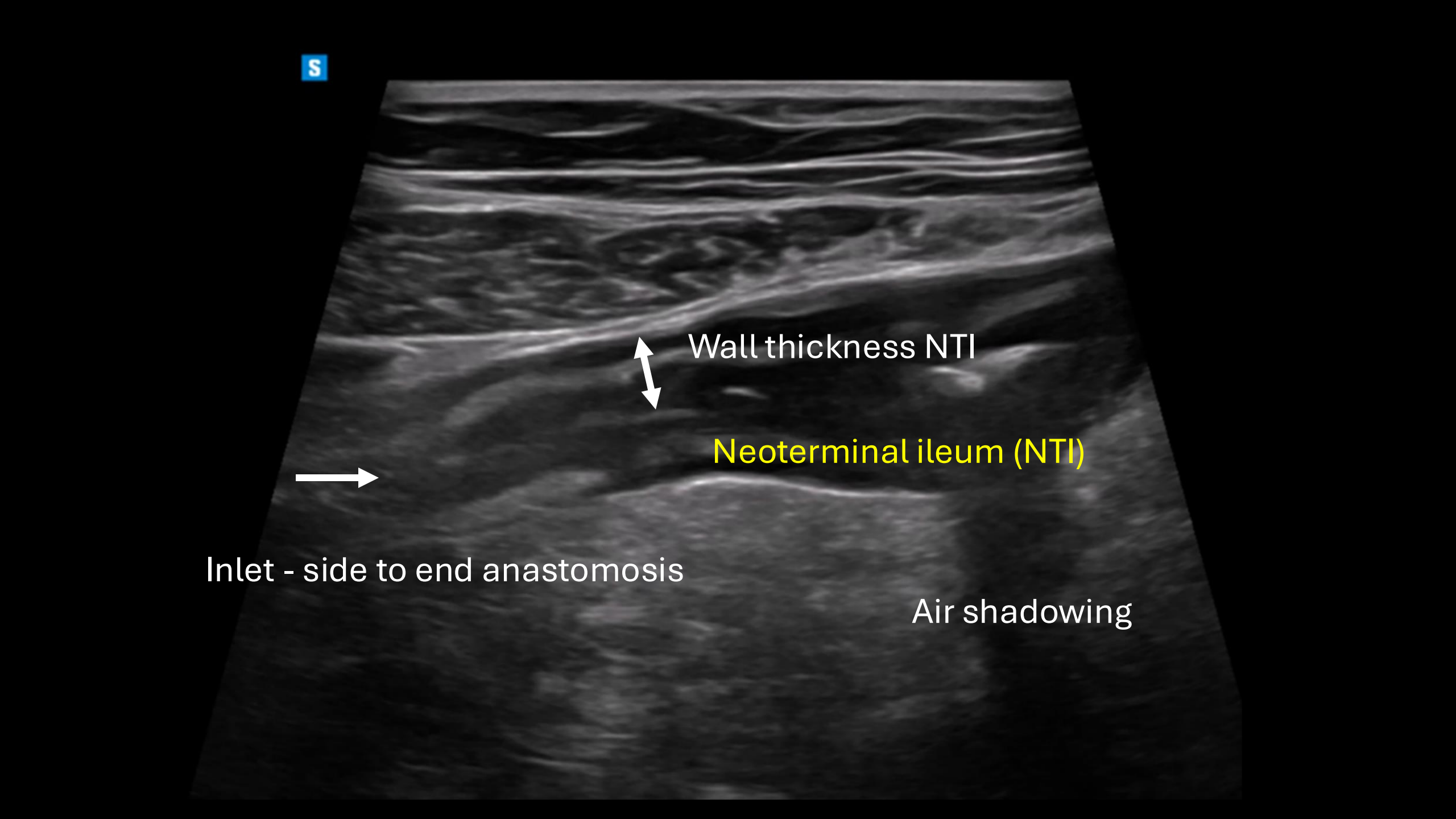


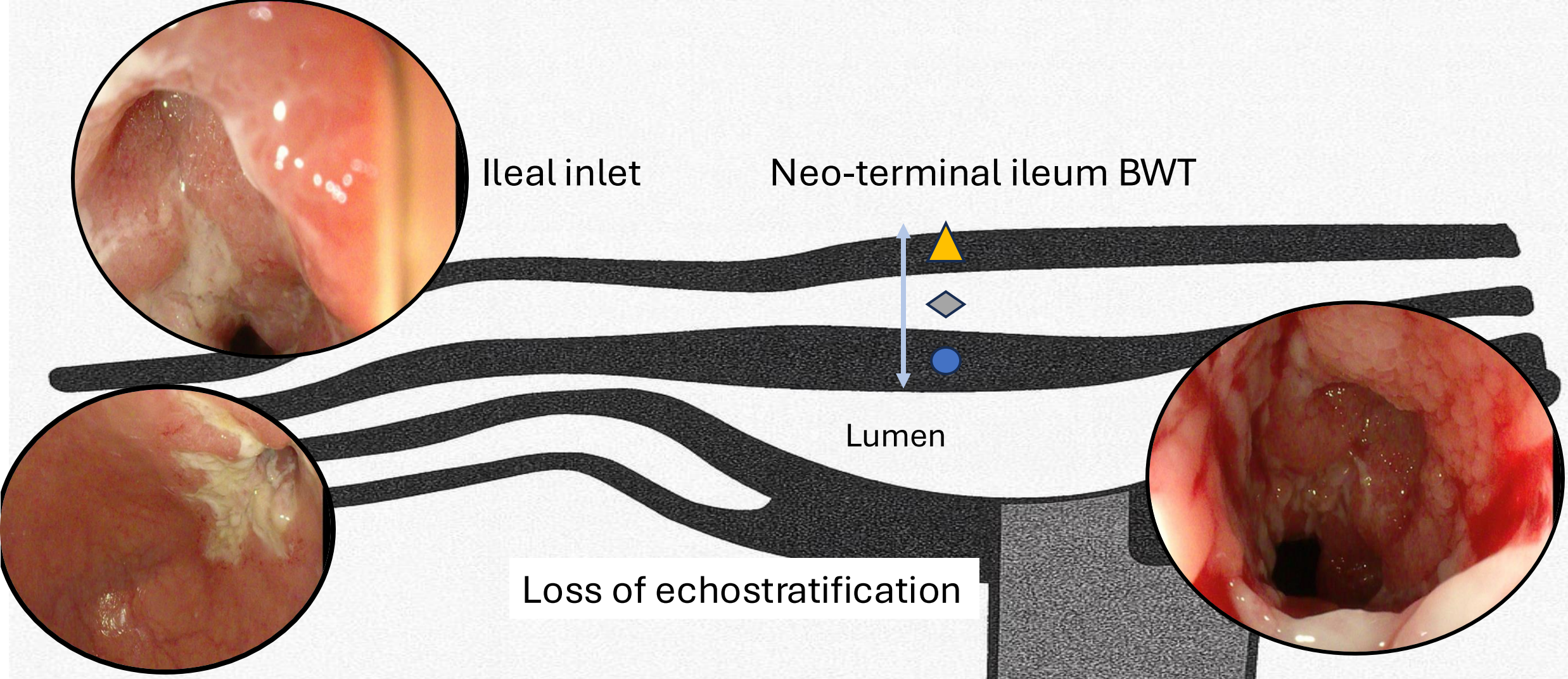
1. Li et al. Gid Dis Sci 2023;68:3596-3605.


staples
Neoterminal ileum
BWT
Colon
Normal BWT
Narrowed inlet


Neo-terminal ileum
Bowel wall thickness measure, 1cm from the inlet
Colon - BWT
Anastomotic Inlet
Staples
Ileocolic anastomosis
Stool/
air
Muscularis propria
Submucosa
Mucosa


Bowel1 / LA2-14A / 6.0cm / 48Hz
TIs 0.3 / TIb 0.3 / MI 1.2
[2D]
Pen1
Gn 60
DR 104
FA 5
P 90%
TI AX


Wall thickness NTI
Neoterminal ileum (NTI)
Inlet - side to end anastomosis
Air shadowing


Ileal inlet
Neo-terminal ileum BWT
Lumen
Loss of echostratification
Ileocolonic anastomosis
Air shadowing artefact
Muscularis propria
Submucosa
Mucosa

Ac

- S
  p
- F
  C

% CI

- C
  S

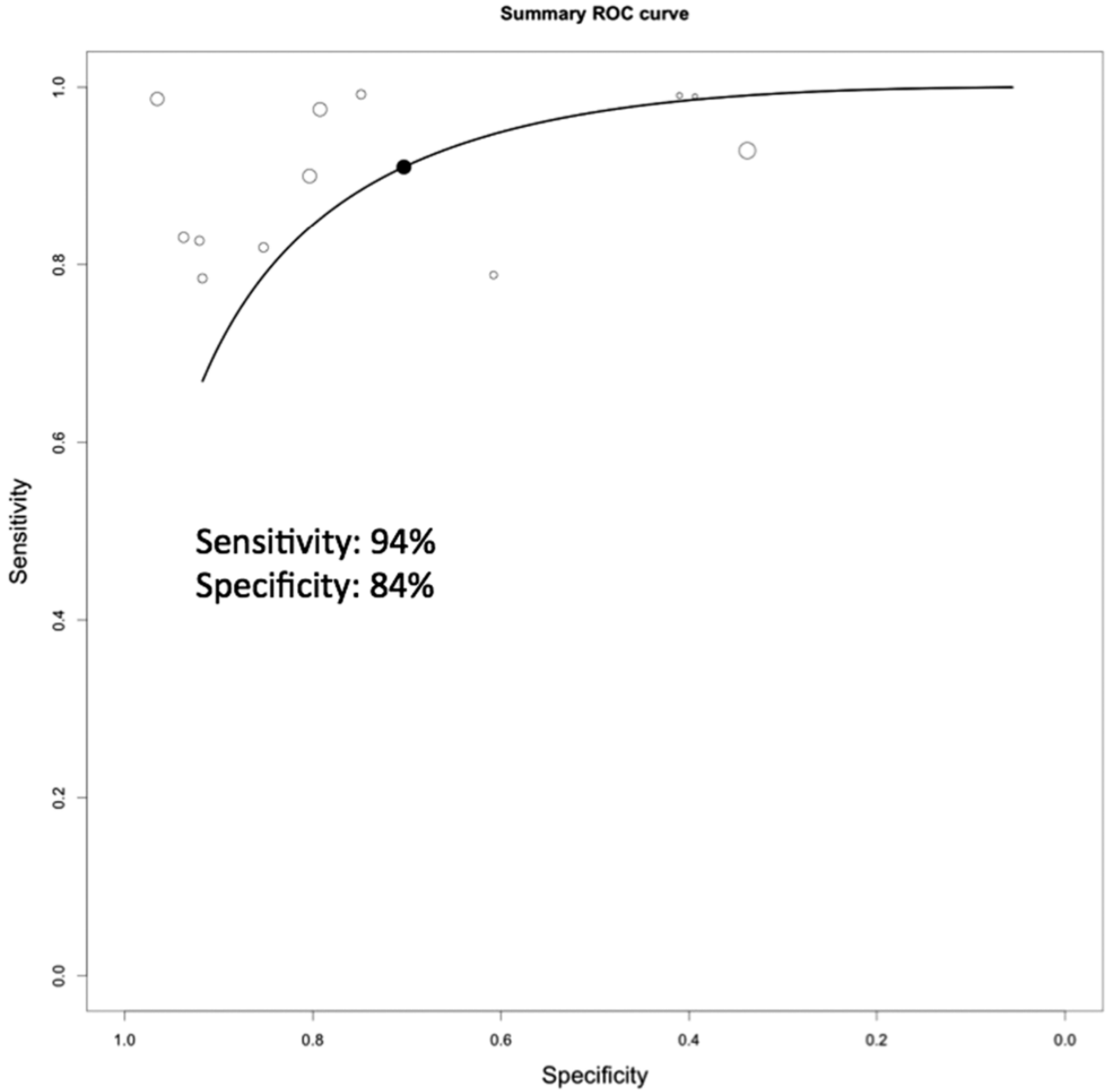


FIGURE 3. Summary receiver operating characteristic plot presenting test performance of US in detecting postsurgical recurrence.

Rispo et al. Inflamm Bowel Dis 2018;24(5):977

Table 3. Diagnostic Accuracy of Noninvasive Parameters Alone or in Combination in Detecting Endoscopic Recurrence (95% CI): Per-patient Analysis

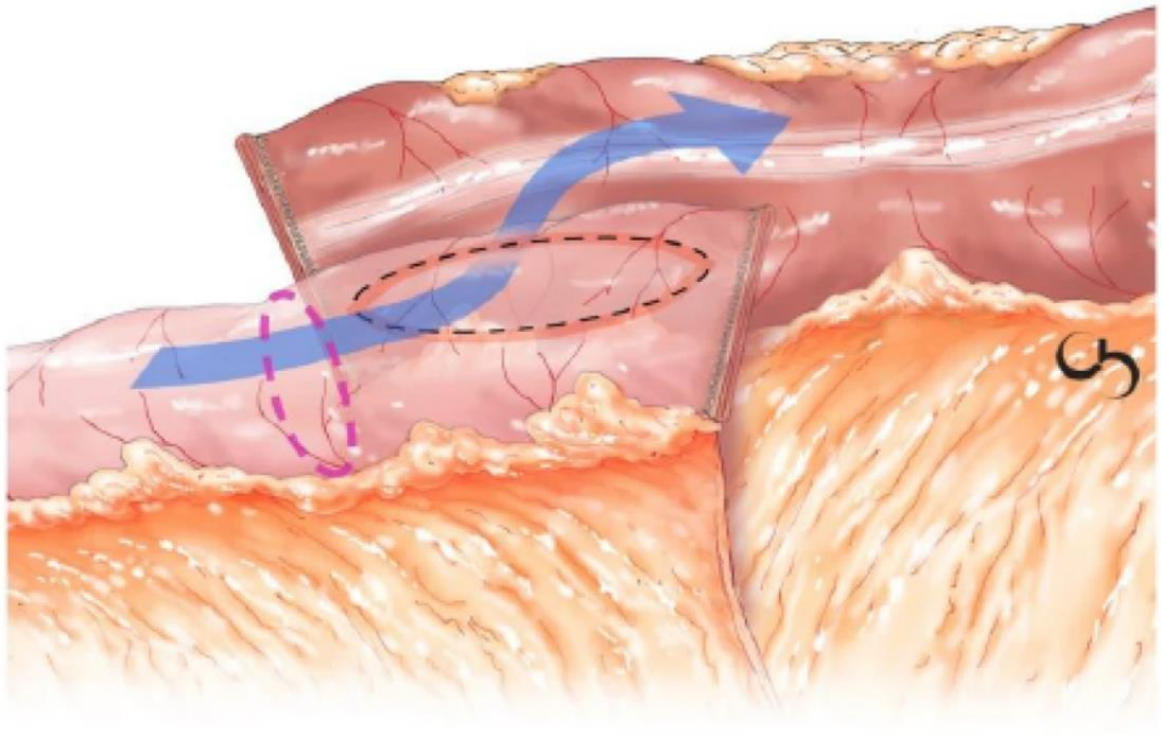
	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Accuracy, % (95% CI)	PPV, % (95% CI)	NPV, % (95% CI)
BWT ≥3 mm	77 (64–87)	65 (45–81)	73 (62–81)	81 (68–90)	59 (41–75)
FC ≥50 mcg/g	83 (70–91)	64 (44–81)	76 (65–85)	81 (68–90)	67 (46–83)
Presence of lymph nodes	35 (23–48)	97 (83–100)	56 (45–66)	95 (77–100)	43 (32–56)
BWT ≥3 mm and FC ≥50 mcg/g	65 (51–78)	93 (76–99)	75 (64–84)	94 (81–99)	59 (43–74)
BWT ≥3 mm and FC ≥50 mcg/g and lymph nodes	33 (20–48)	100	66 (55–75)	100	59 (47–70)
BWT ≥3 mm or FC ≥50 mcg/g	93 (83–98)	34 (18–54)	74 (63–83)	74 (63–84)	71 (42–92)
BWT ≥3 mm or FC ≥50 mcg/g or lymph nodes	97 (88–100)	34 (18–54)	76 (66–85)	75 (64–84)	83 (52–98)

Principles?

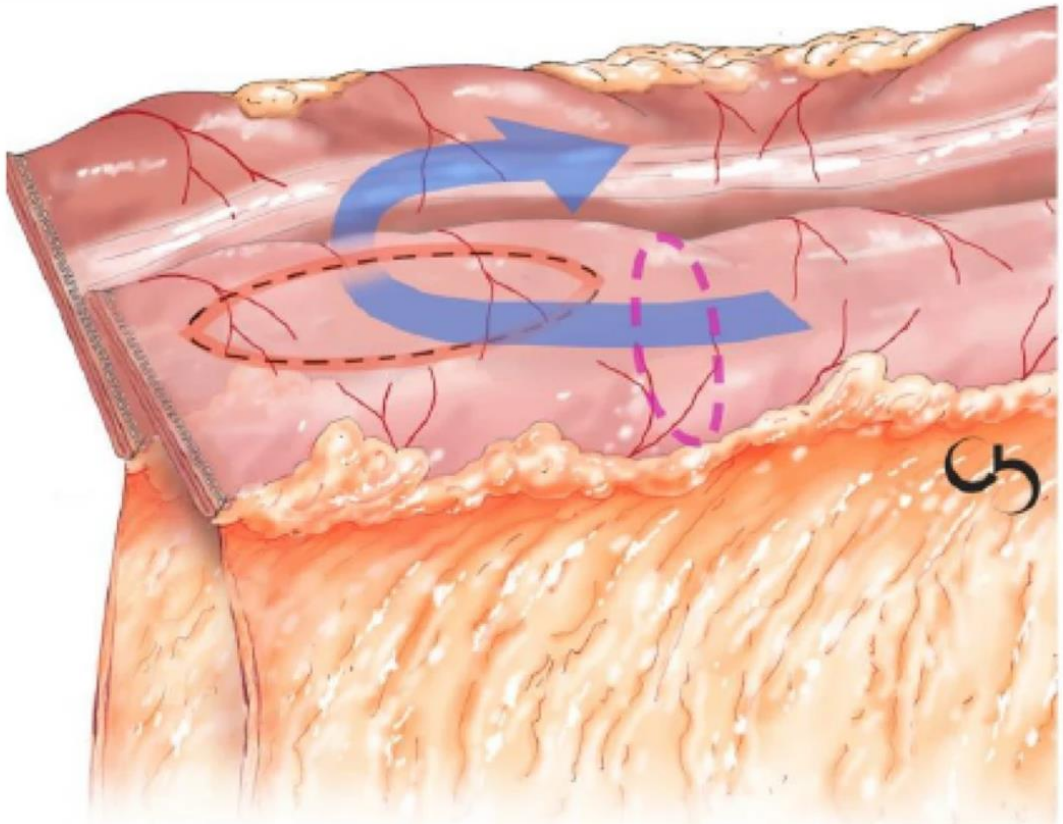
- Finding the anastomosis can be a treasure hunt – it doesn't need to be; nor should the disease distribution be a mystery.

- REVIEW the operative report
- REVIEW prior imaging

- R-hemi: anast will be HIGH in the RUQ; ileocecectomy – RLQ

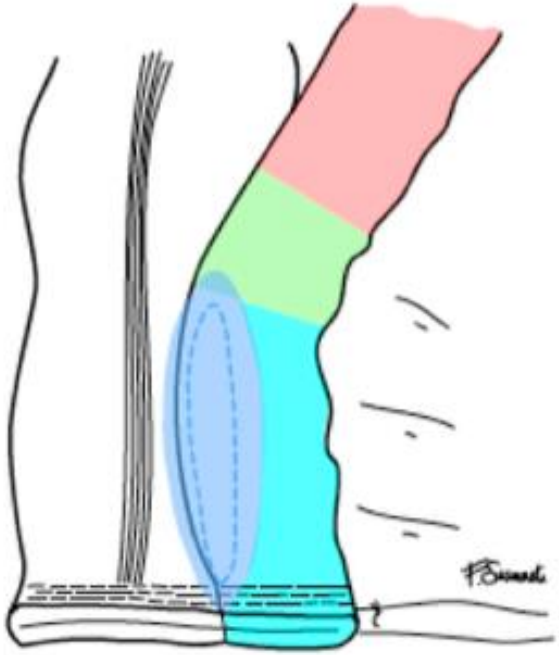


A. *Side-to-side Isoperistaltic ileocolic anastomosis*



B. *Side-to-side antiperistaltic ileocolic anastomosis*

Beslenghi et al. Archives of Surgery 2023;75:1607



Side-to-side antiperistaltic ileocolic anastomosis

Side-to-side isoperistaltic ileocolic anastomosis

Areas of interest for endoscopic follow-up are reported in different colors.

- Ileal body
- Neo-terminal ileum
- Anastomotic line
- Ileal inlet
- Colonic blind loop
- Ileal blind loop

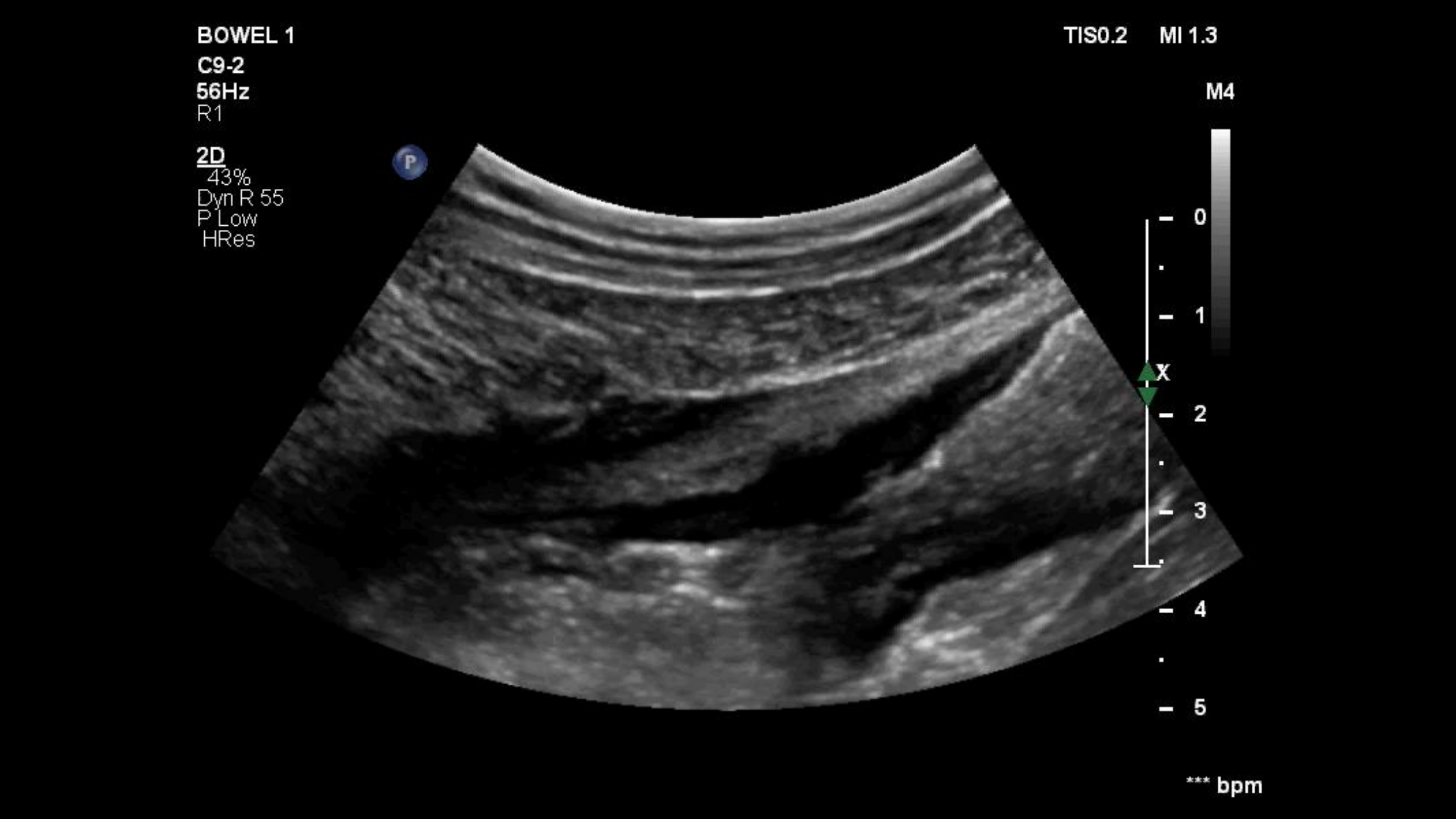
Riviere et al. Clin Gastro Hep 2022; 20(6):1201-1204

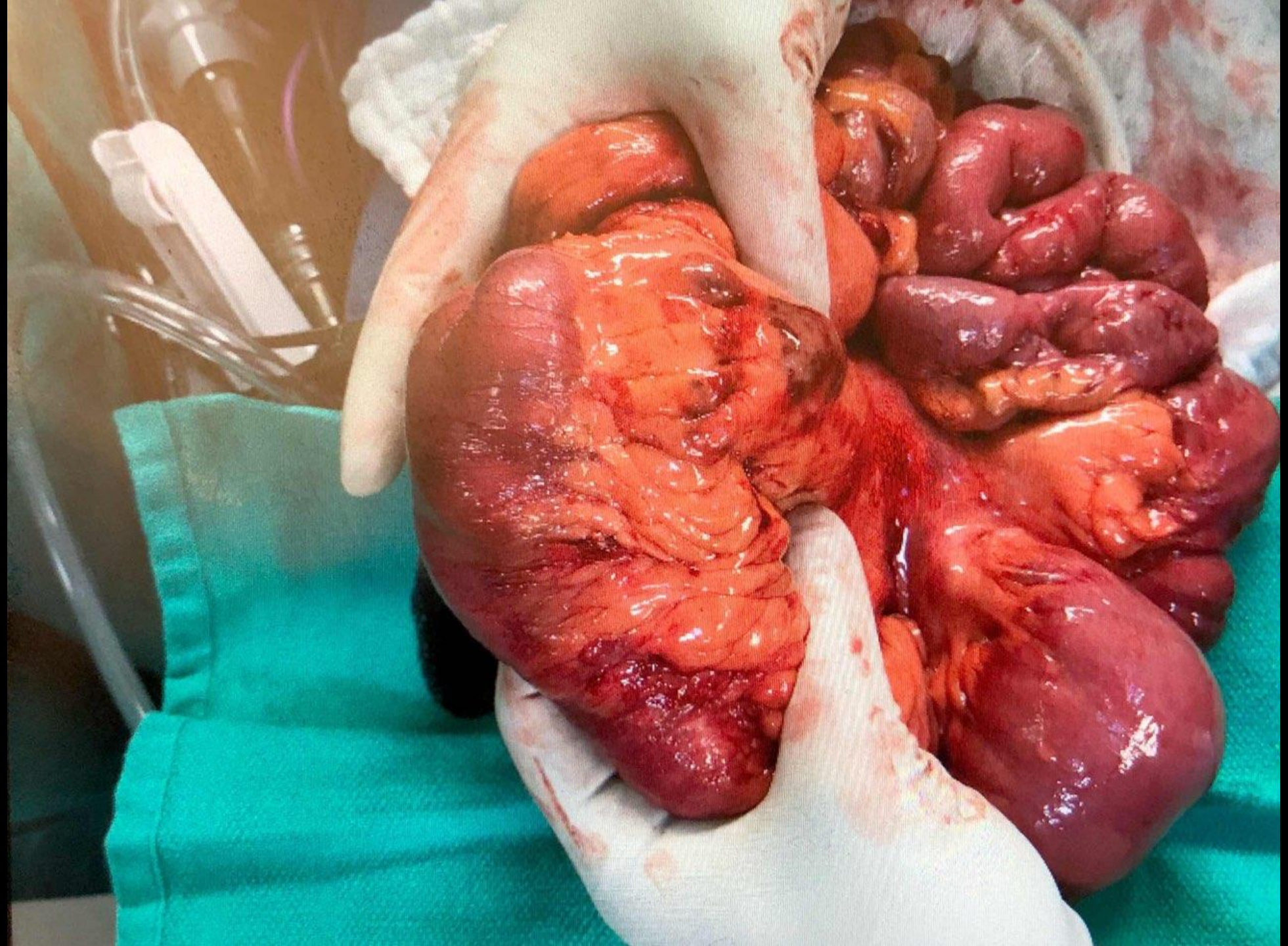
Case 1. MP

MP is a 28yo man with structuring ileal CD (Montreal classification A2 (diagnosed 18yrs), L1 (limited to the TI) and B3 (structuring in the absence of perianal disease

Non-smoker

Started on IFX monotherapy and treated with escalating doses to target optimal drug level.


BOWEL 1
C9-2
56Hz
R1
2D
43%
Dyn R 55
P Low
HRes
TIS0.2
MI 1.3
M4
0
1
2
3
4
5
*** bpm



Case 2. MP

Post-operatively we restarted IFX

Felt extremely well, is vigilant with his eating (eating “clean”), fit, active and as no symptoms (HBI = 0)

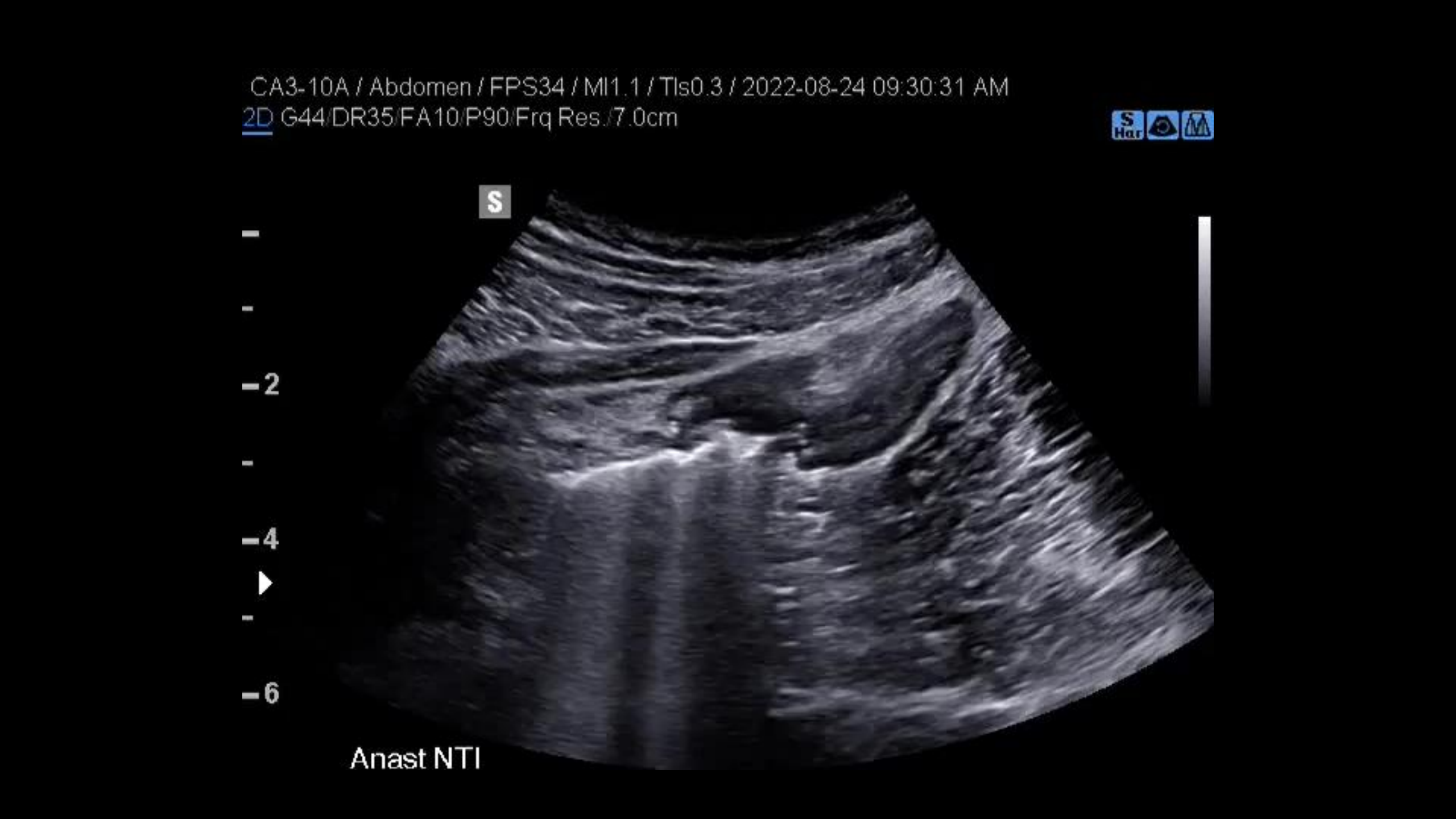
Follows up to discuss stopping IFX given recurrent viral infections

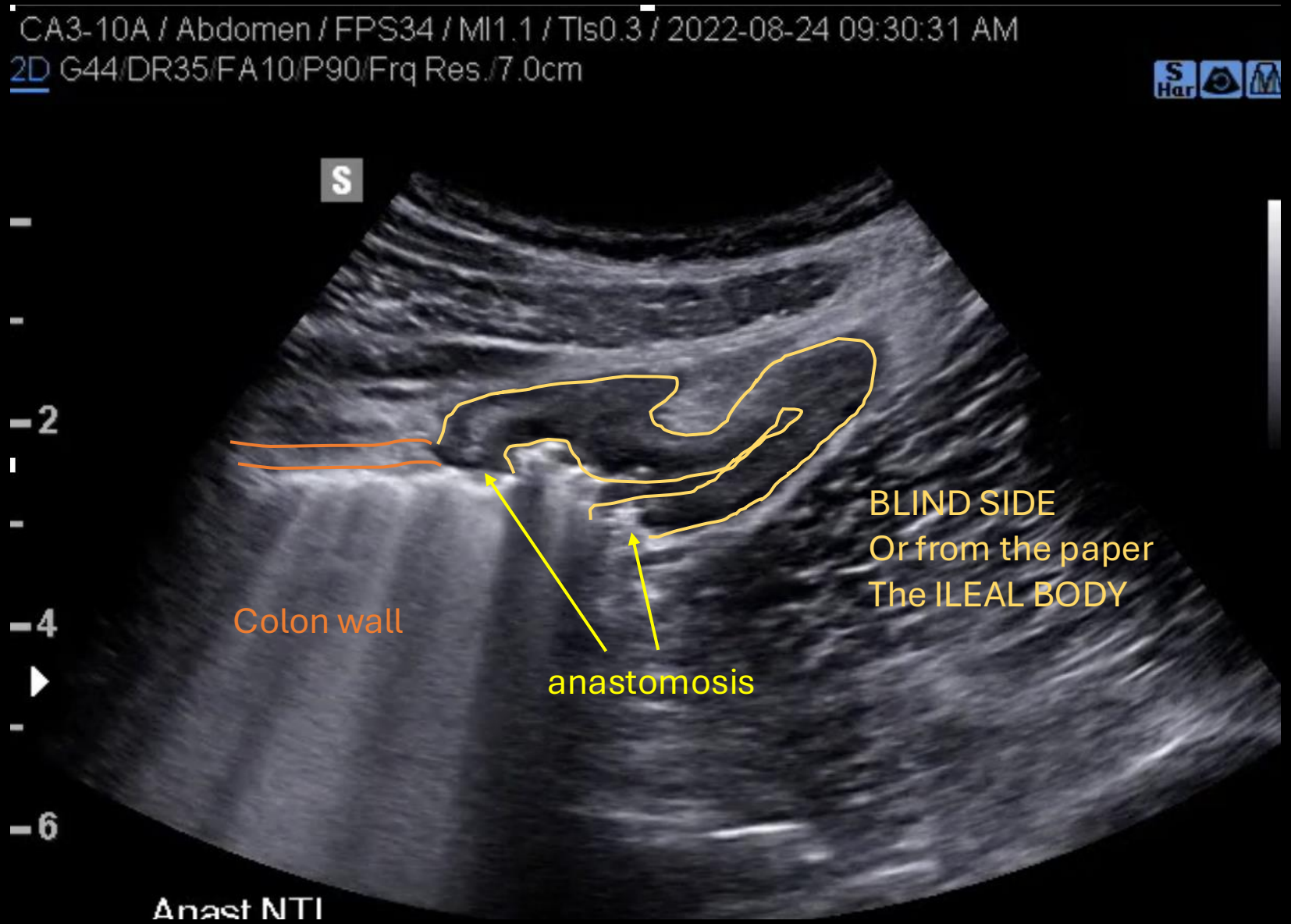
Blood work:

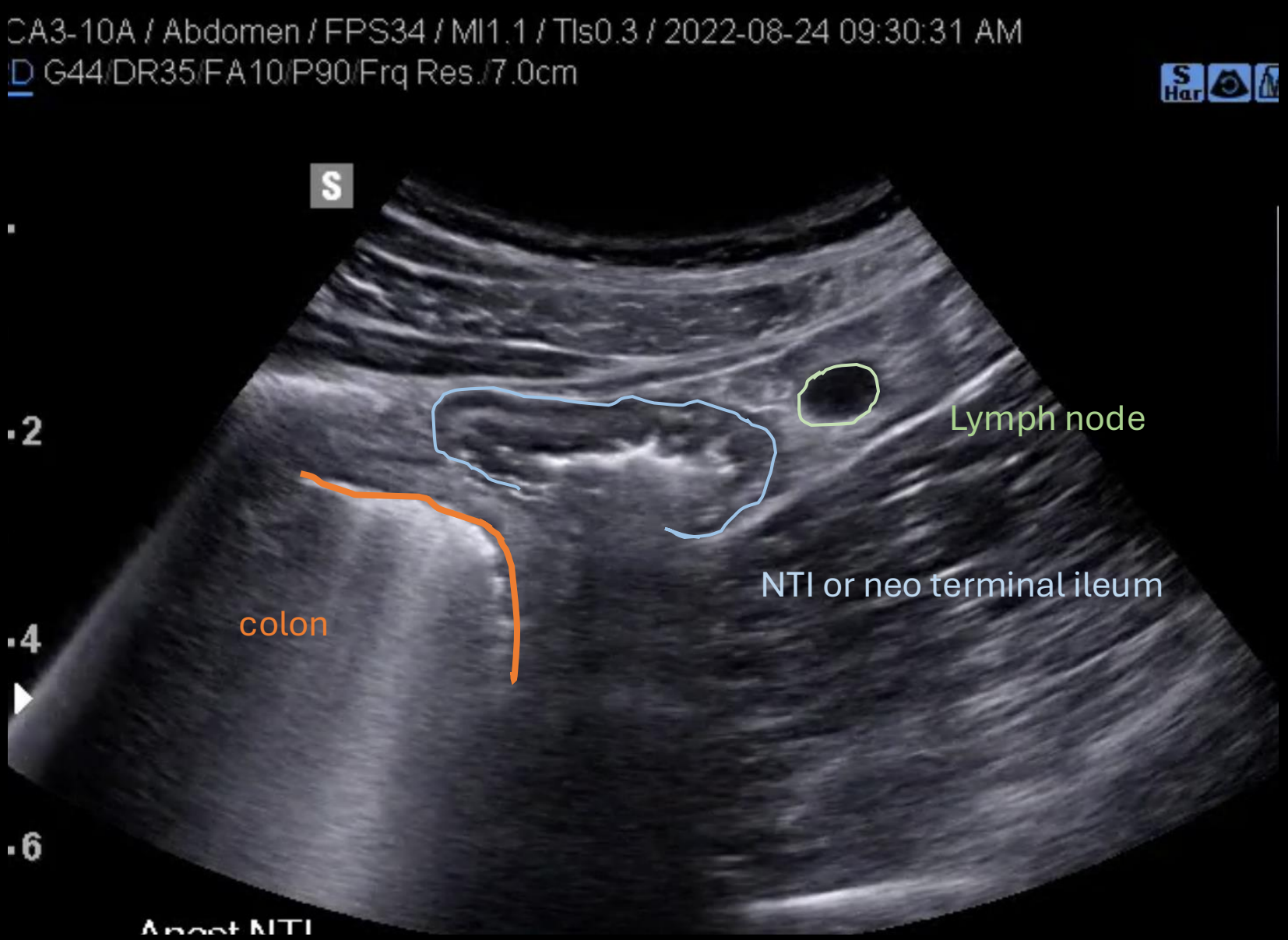
Ferritin is 18, Hb 142 MCV 85, plt 287, WBC 6.1

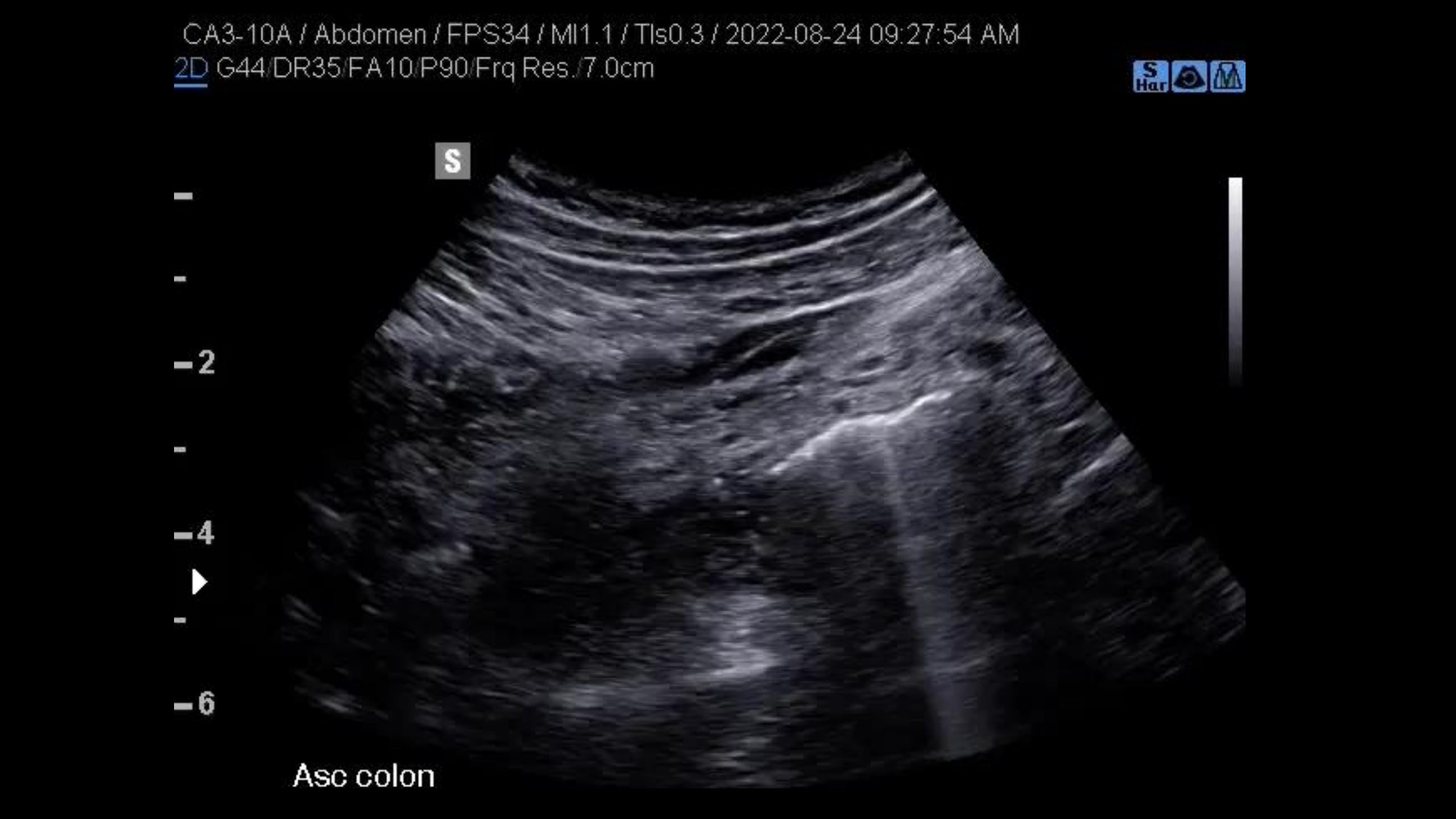
Cr, liver enzymes normal

Fecal cal: pending


CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
2D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Anast NTI


CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
2D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Colon wall
anastomosis
BLIND SIDE
Or from the paper
The ILEAL BODY
Anast NTI


CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Lymph node
NTI or neo terminal ileum
colon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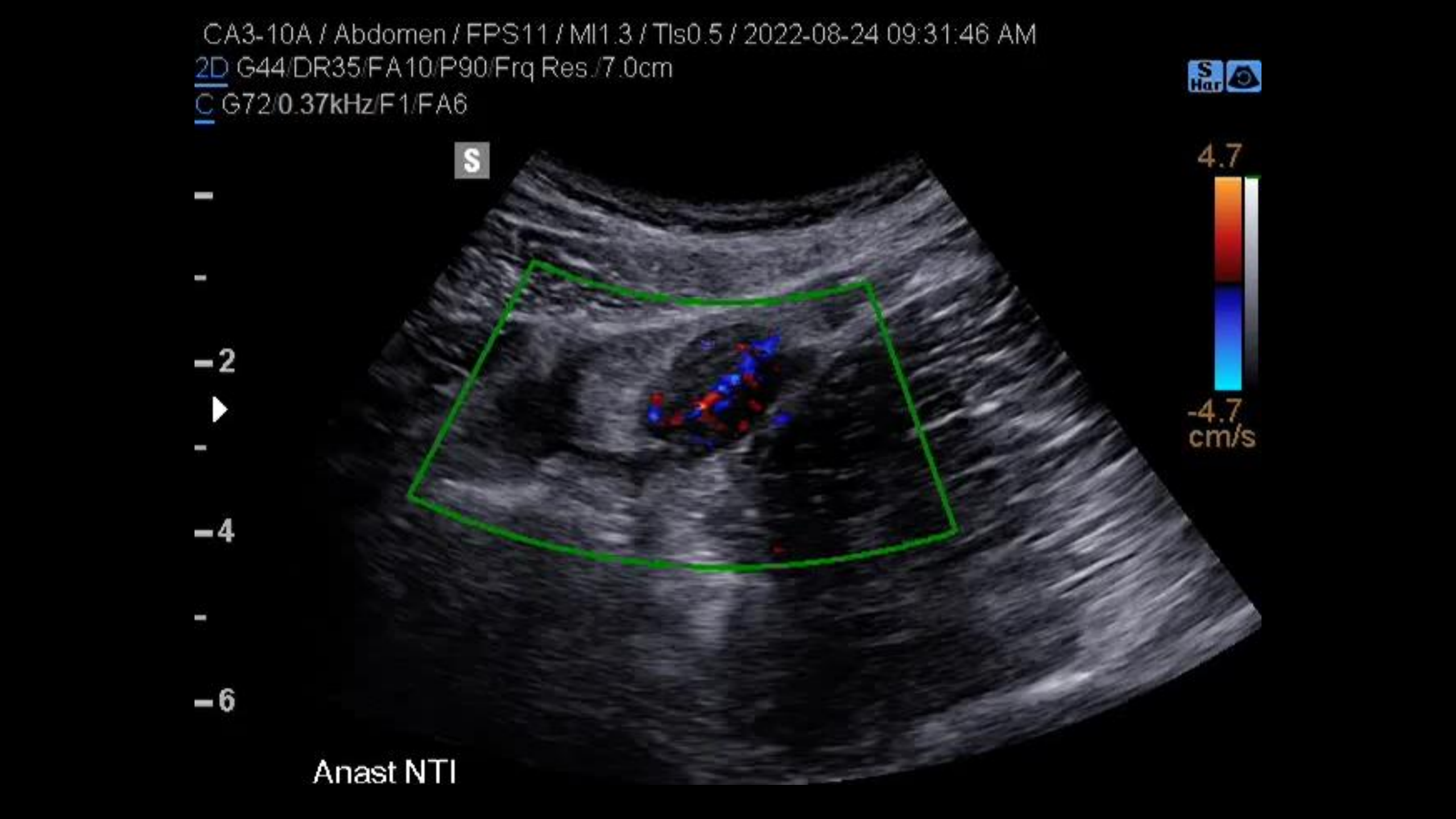
S
-2
-4
-6
Asc colon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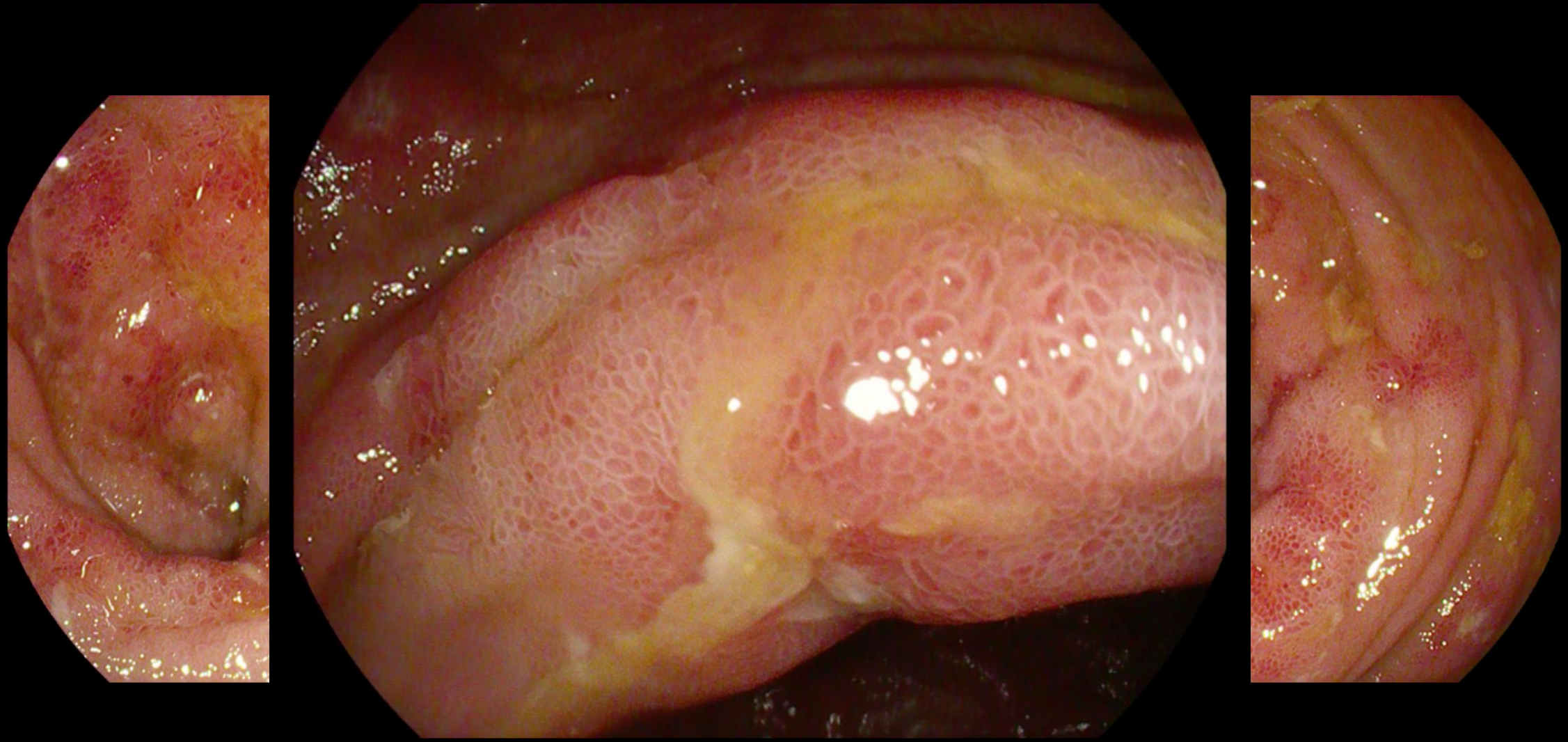
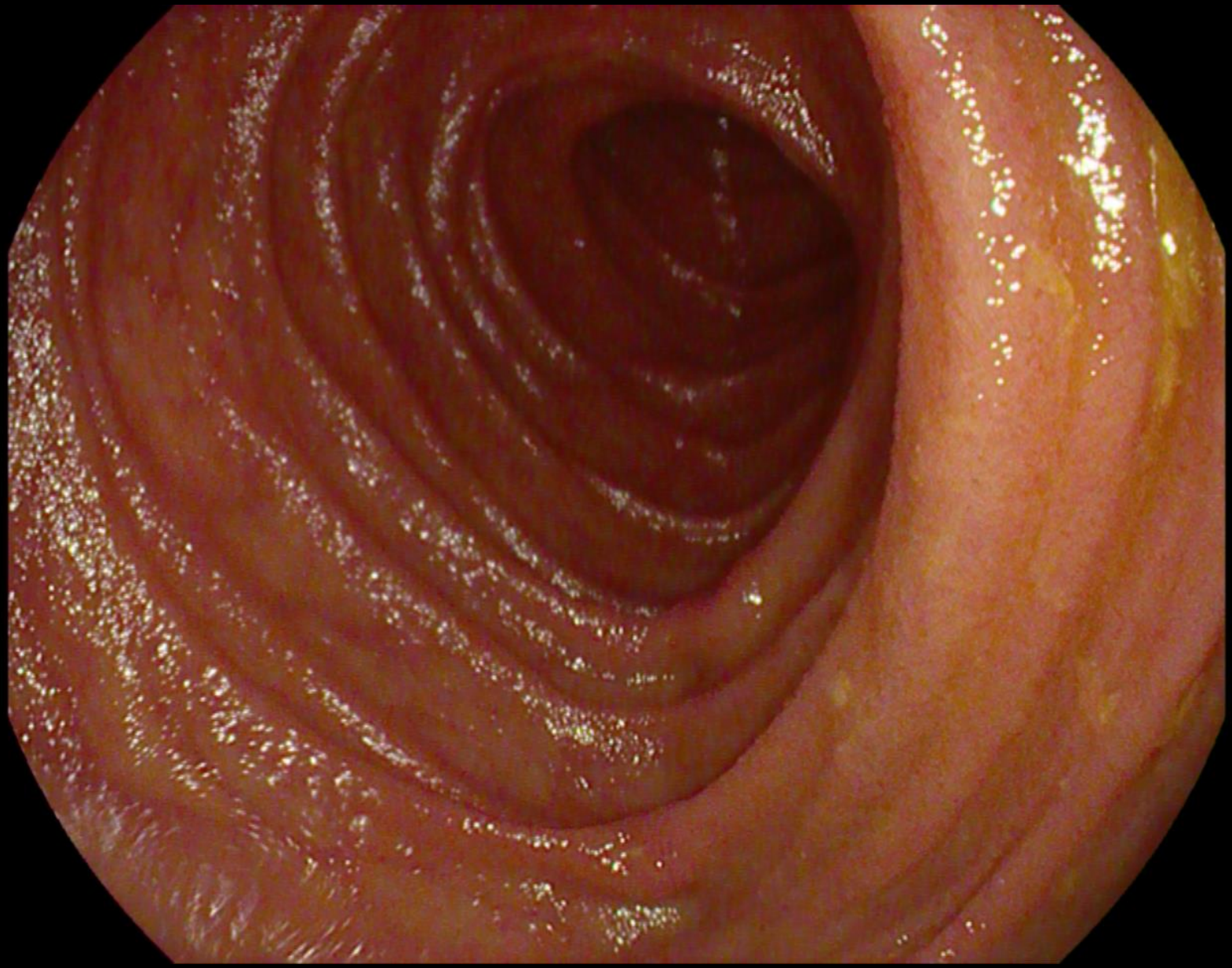
C G72/0.37kHz/F1/FA6
S
4.7
-4.7
cm/s
2
4
6
Anast NTI





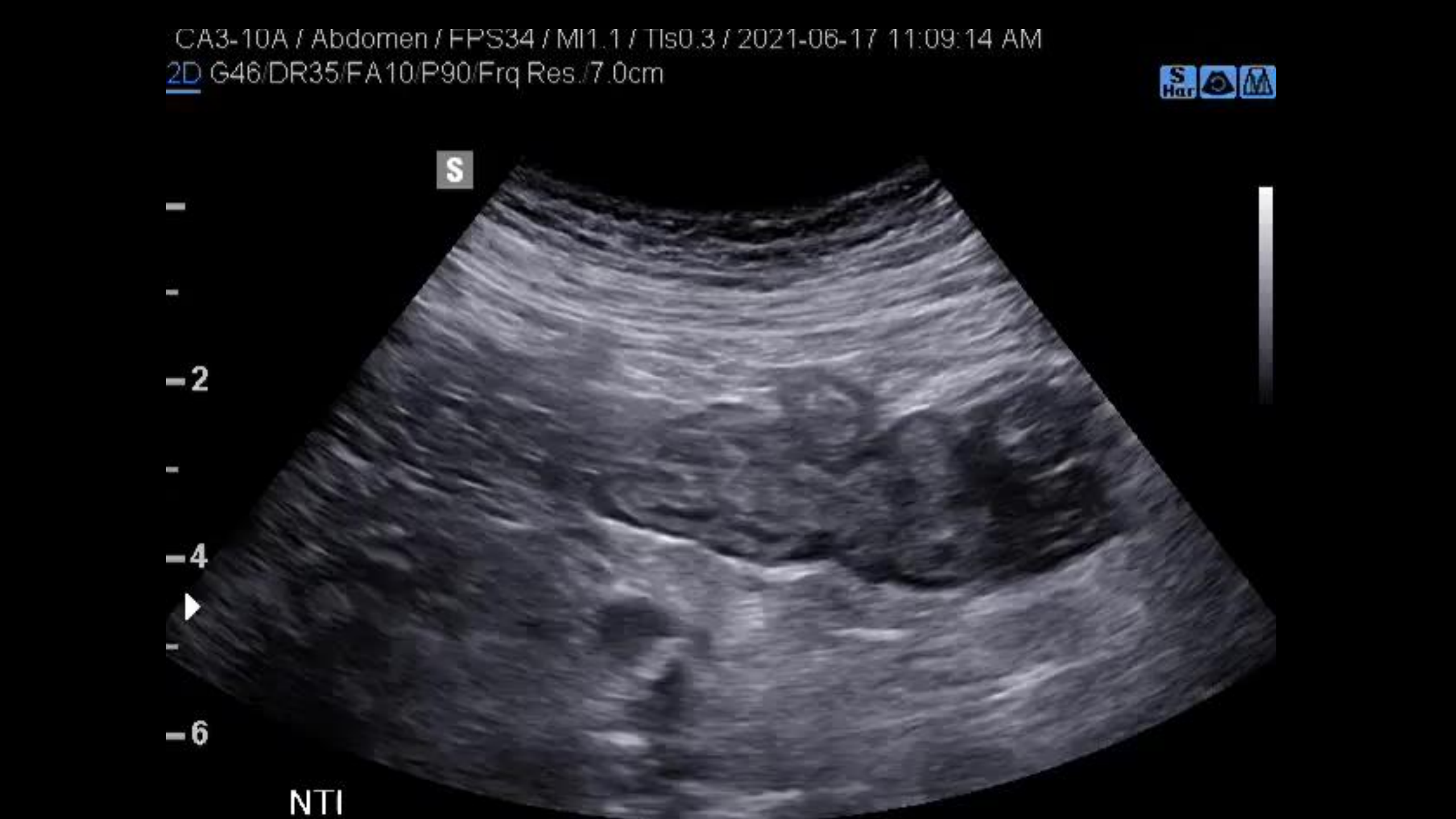
Case 2. SH

78yo woman, active smoker, longstanding terminal ileal CD - Montreal class A2 L1 B3, absence of perianal disease

Resection while on IFX (2015) given progressive TI structuring disease – rough course post-operatively with an ileus, no leak no return to OR

Post op failed IFX, tried ADA (joint pain, neuropathy D/C), UST – nonresponse and now on VDZ q4weekly

Pain is her main complaint – no obstructive Sx, is best on steroids which we negotiate!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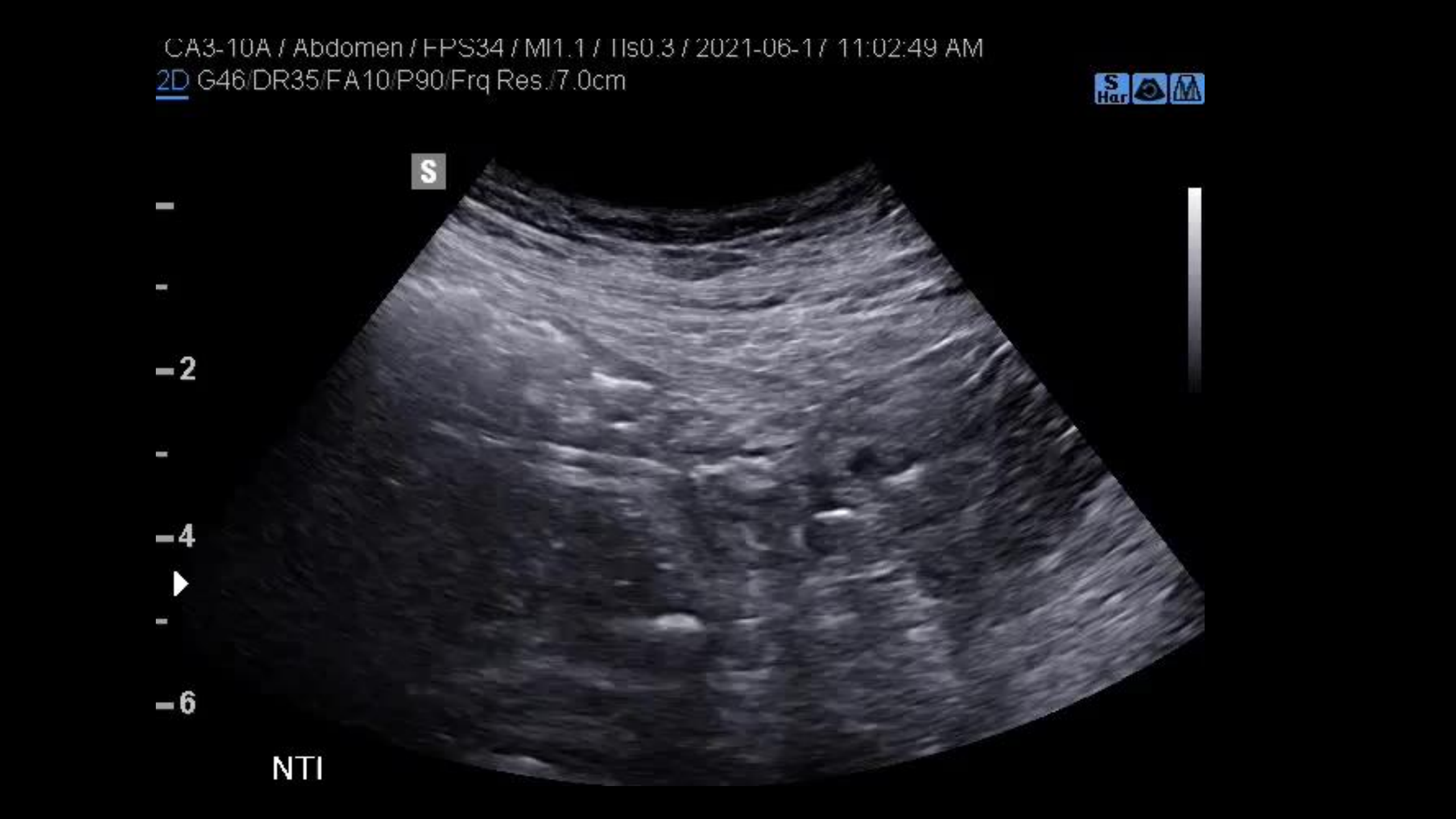
S
2
4
6
NTI


CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2021-06-17 11:02:49 AM
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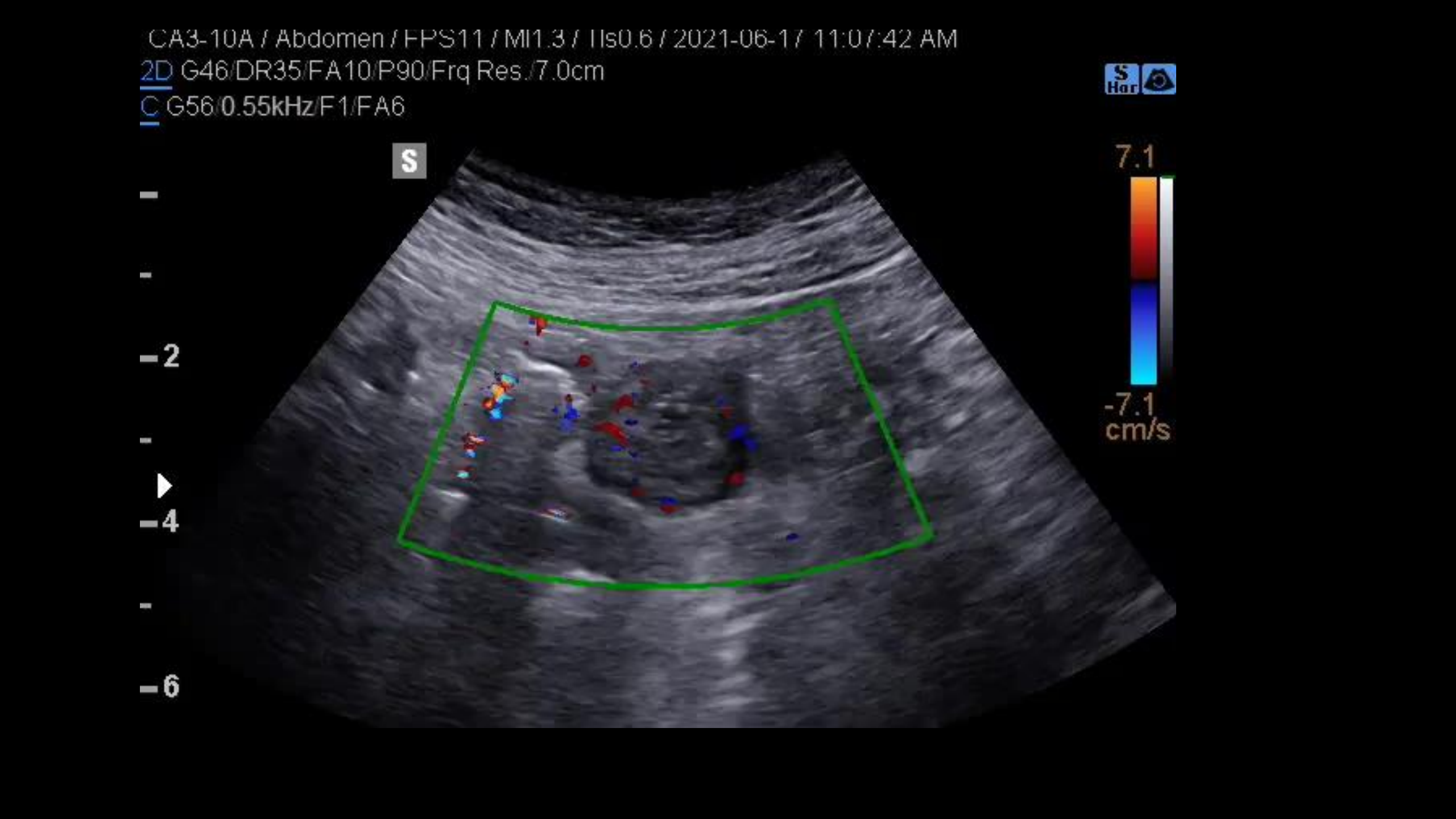
S
2
4
6
NTI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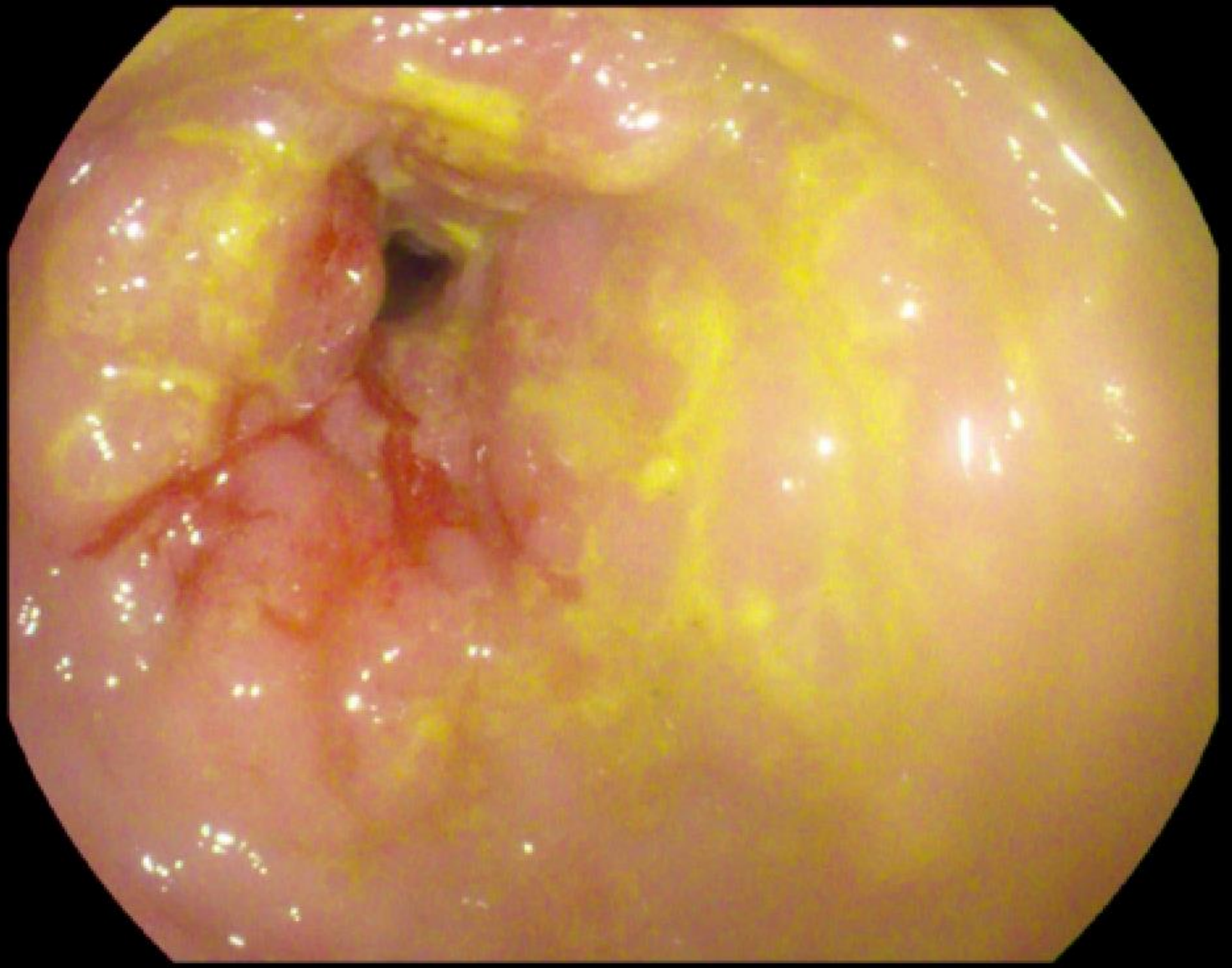
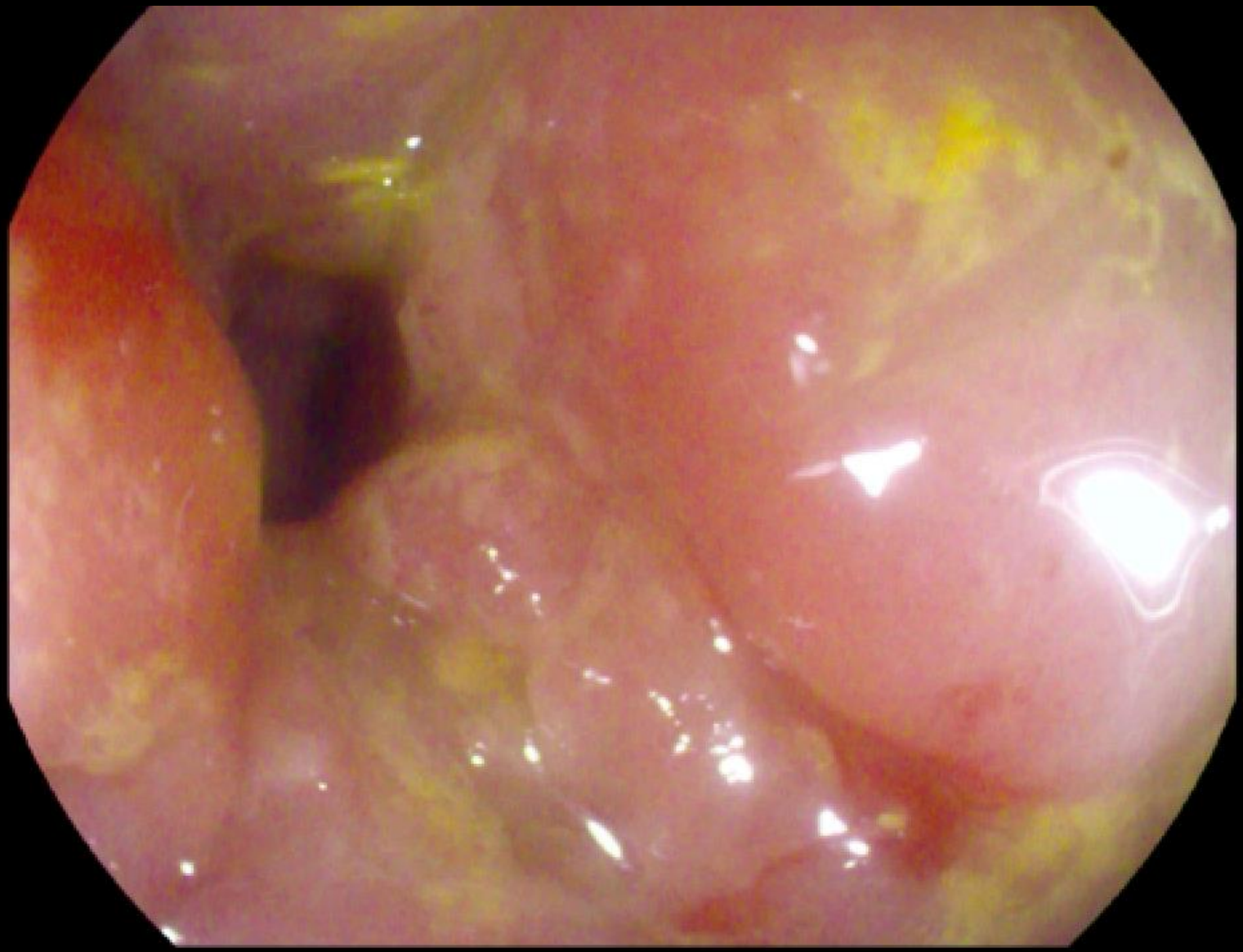
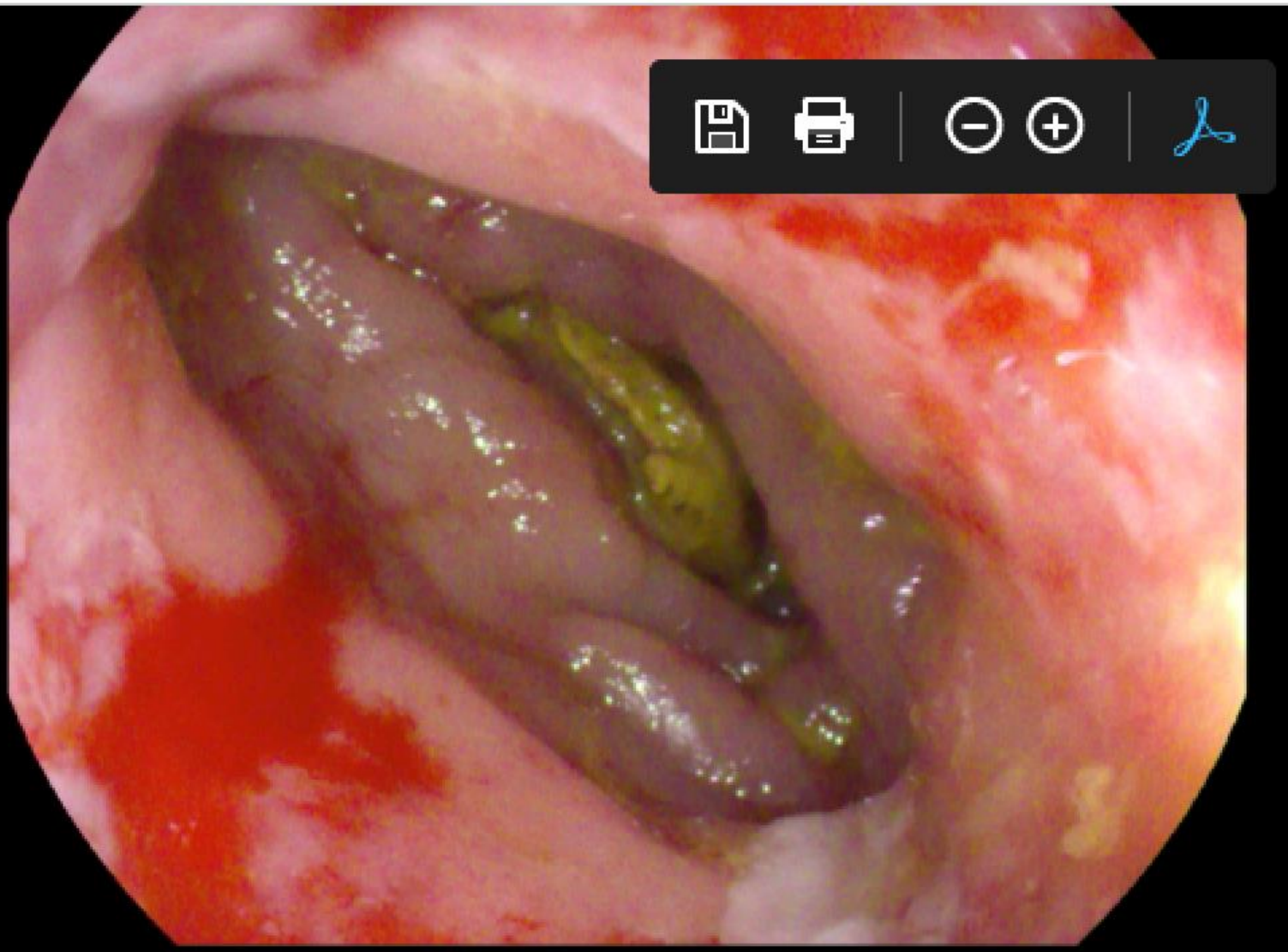
C G56/0.55kHz/F1/FA6
S
7.1
-7.1
cm/s
2
4
6

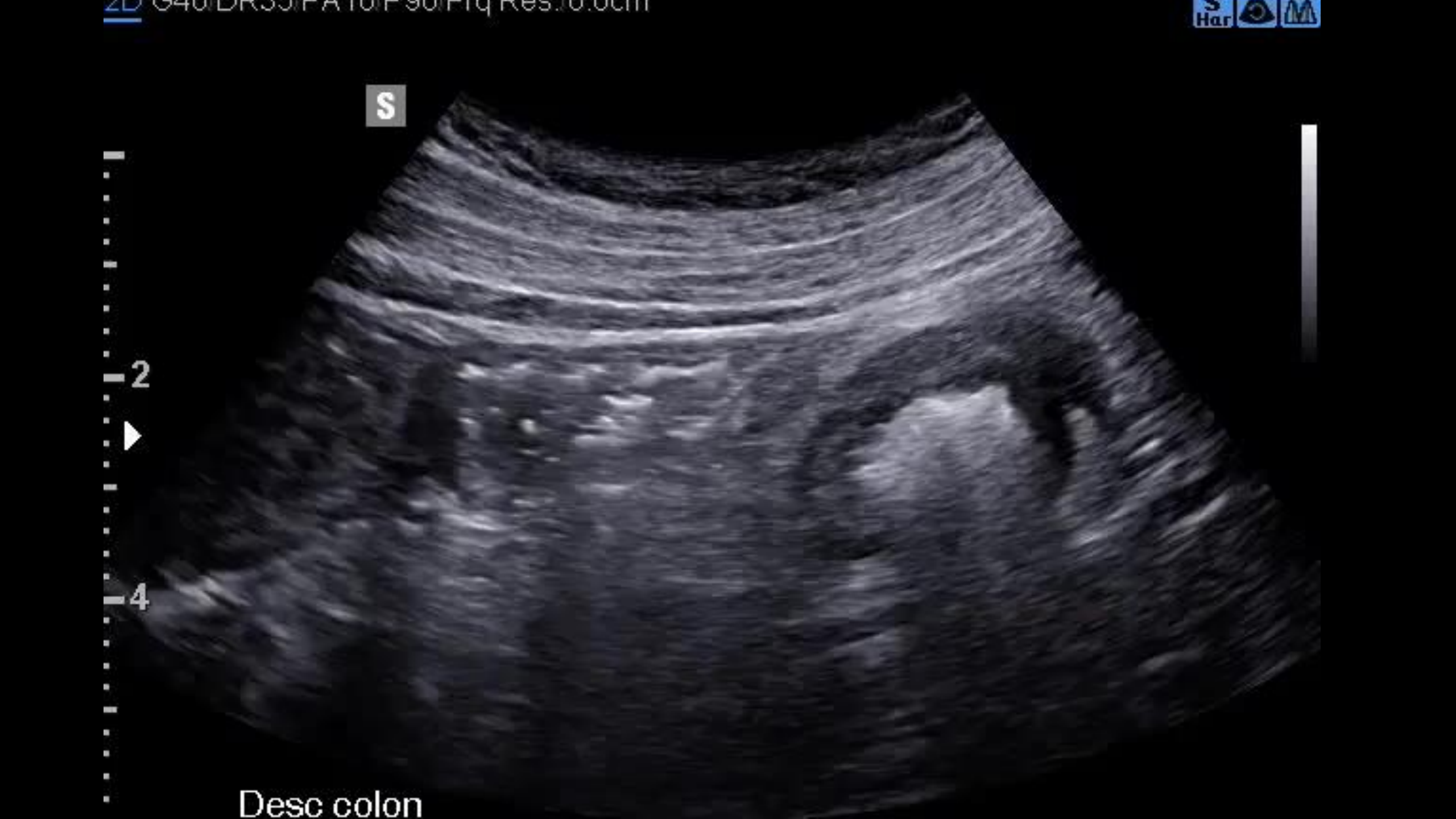
Case 3.

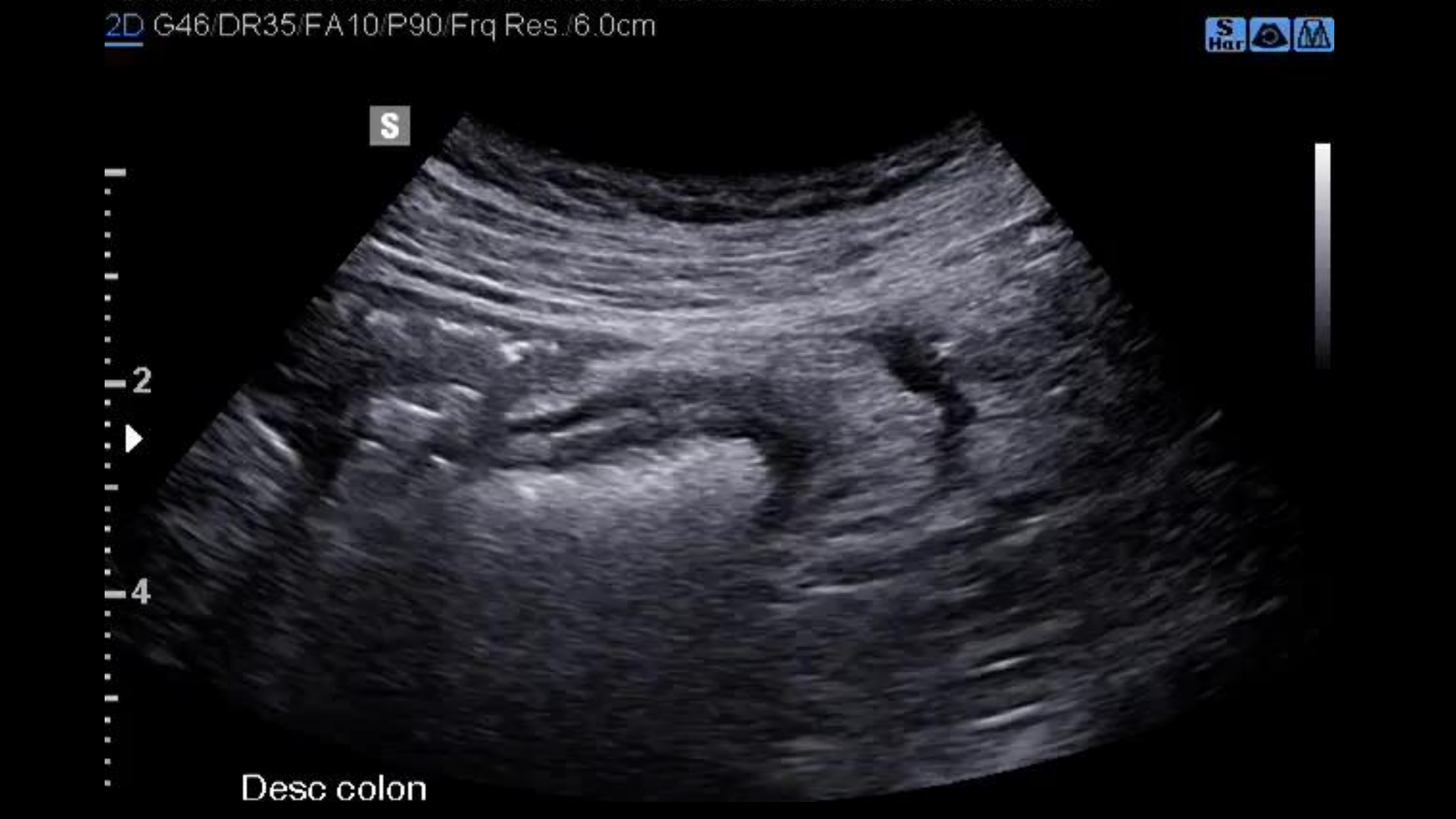
- 28yo male to female transgendered woman, very complex, Dx w ileocolonic disease at 11 w severe perianal involvement. Prior ilecectomy more than 8 years ago.
- Multiple hospital admissions to address severe perianal disease ultimately with diversion (left sided colostomy).
- Prior exposure to IFX, ADA, now on UST dosed q4 weekly
- “frozen abdomen” after last OR – had multiple challenges with small bowel obstruction post op (“hostile”).
- Scheduled for repeat colon, given poor prep, restage/ grade disease post op.

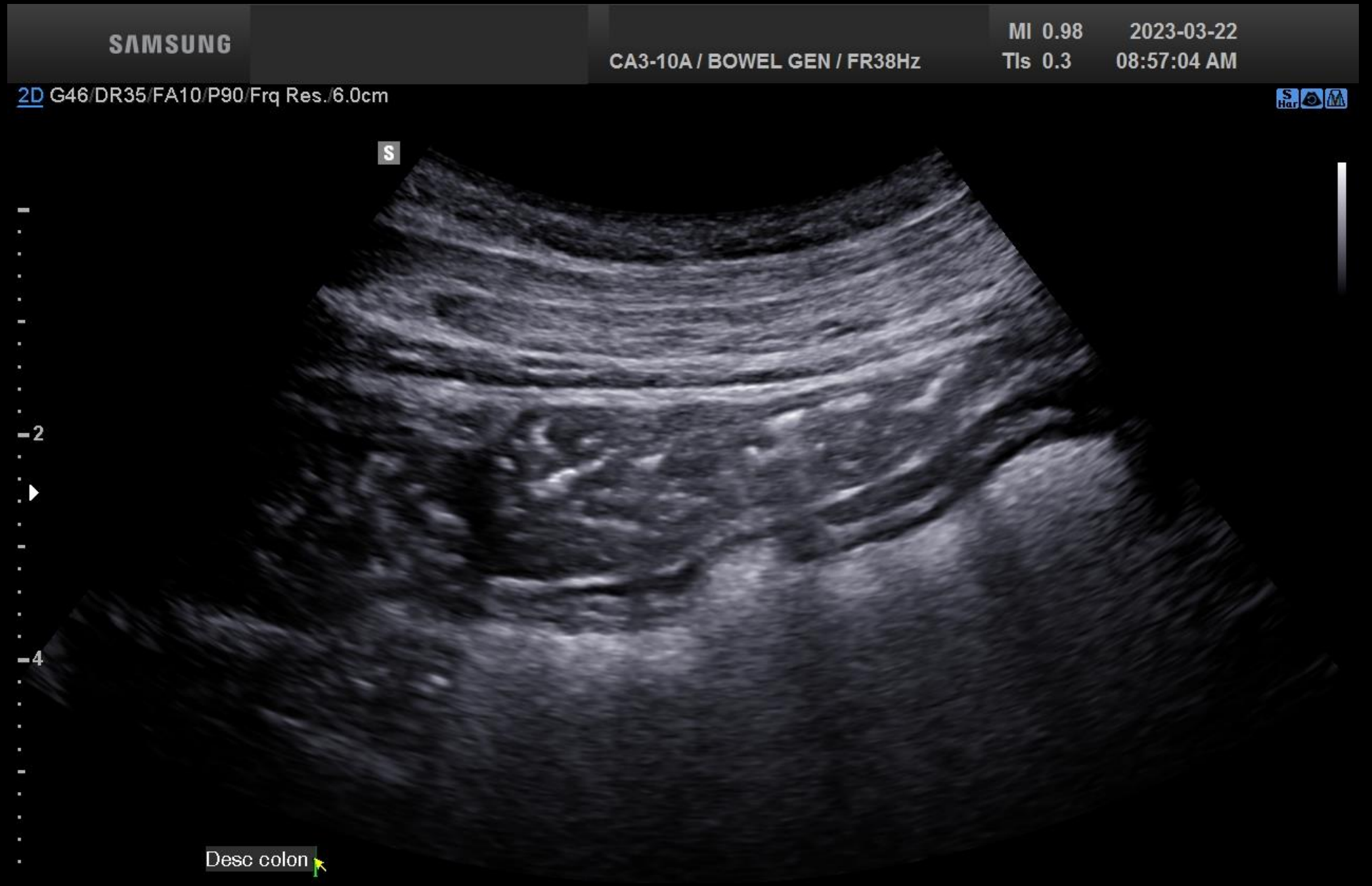


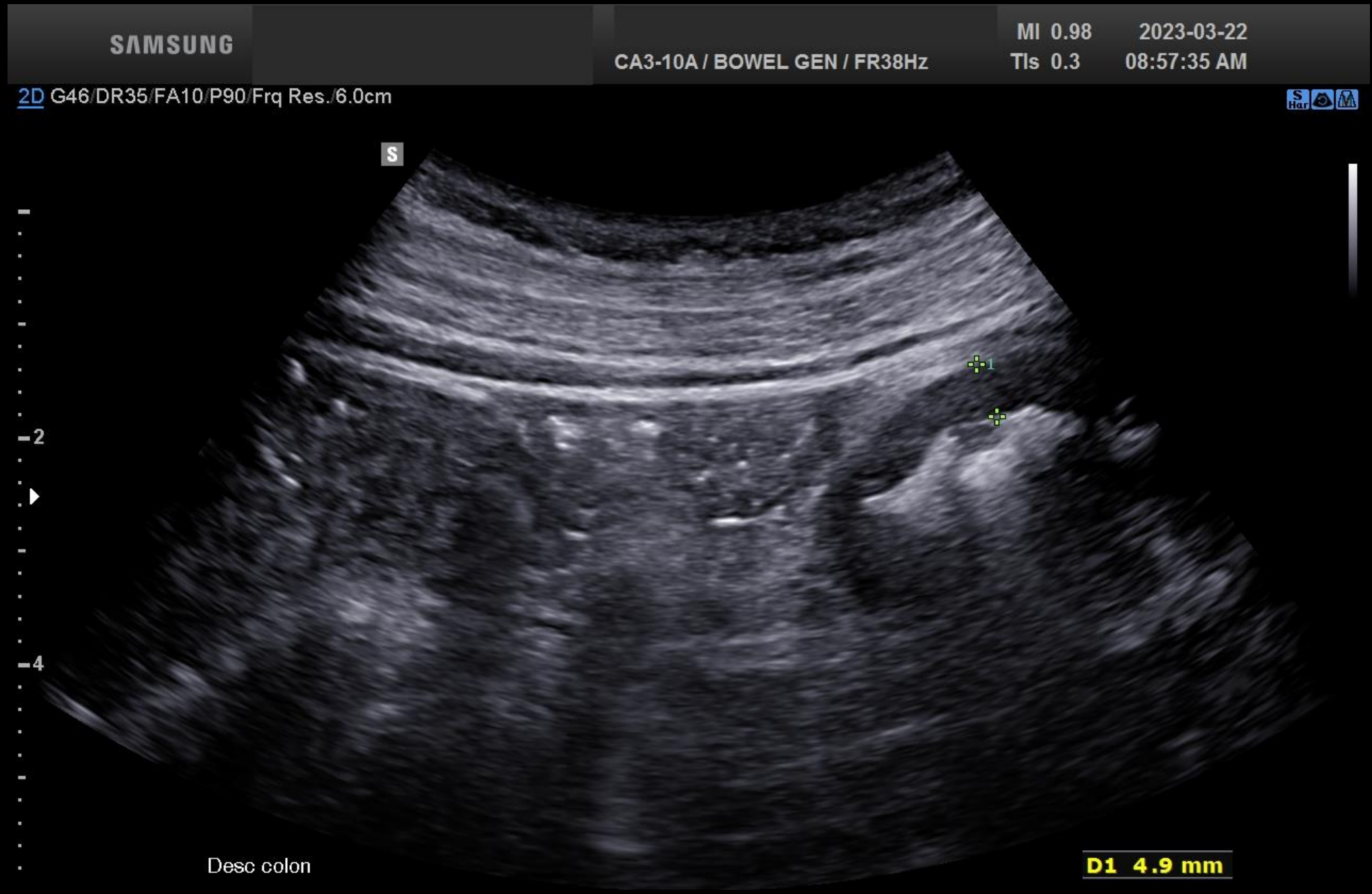


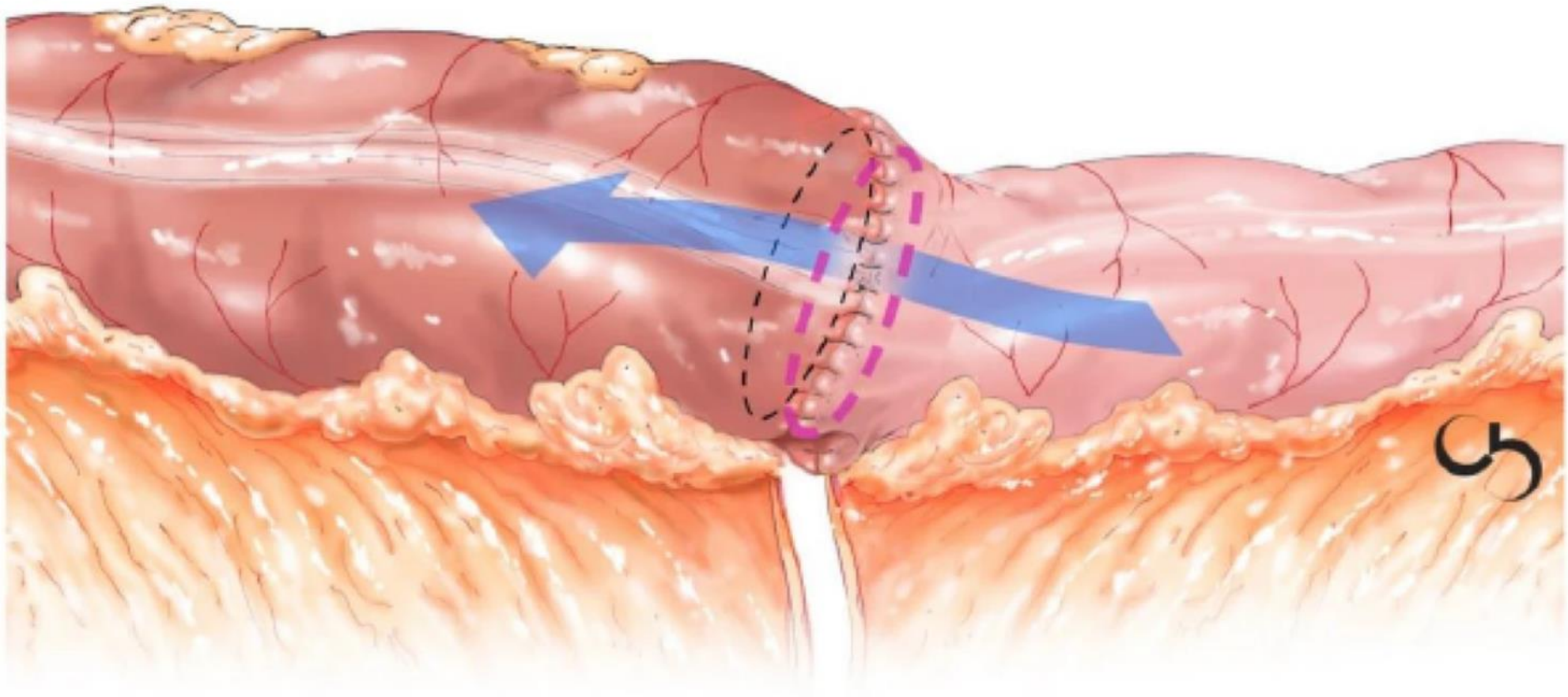



S
2
4
Desc colon

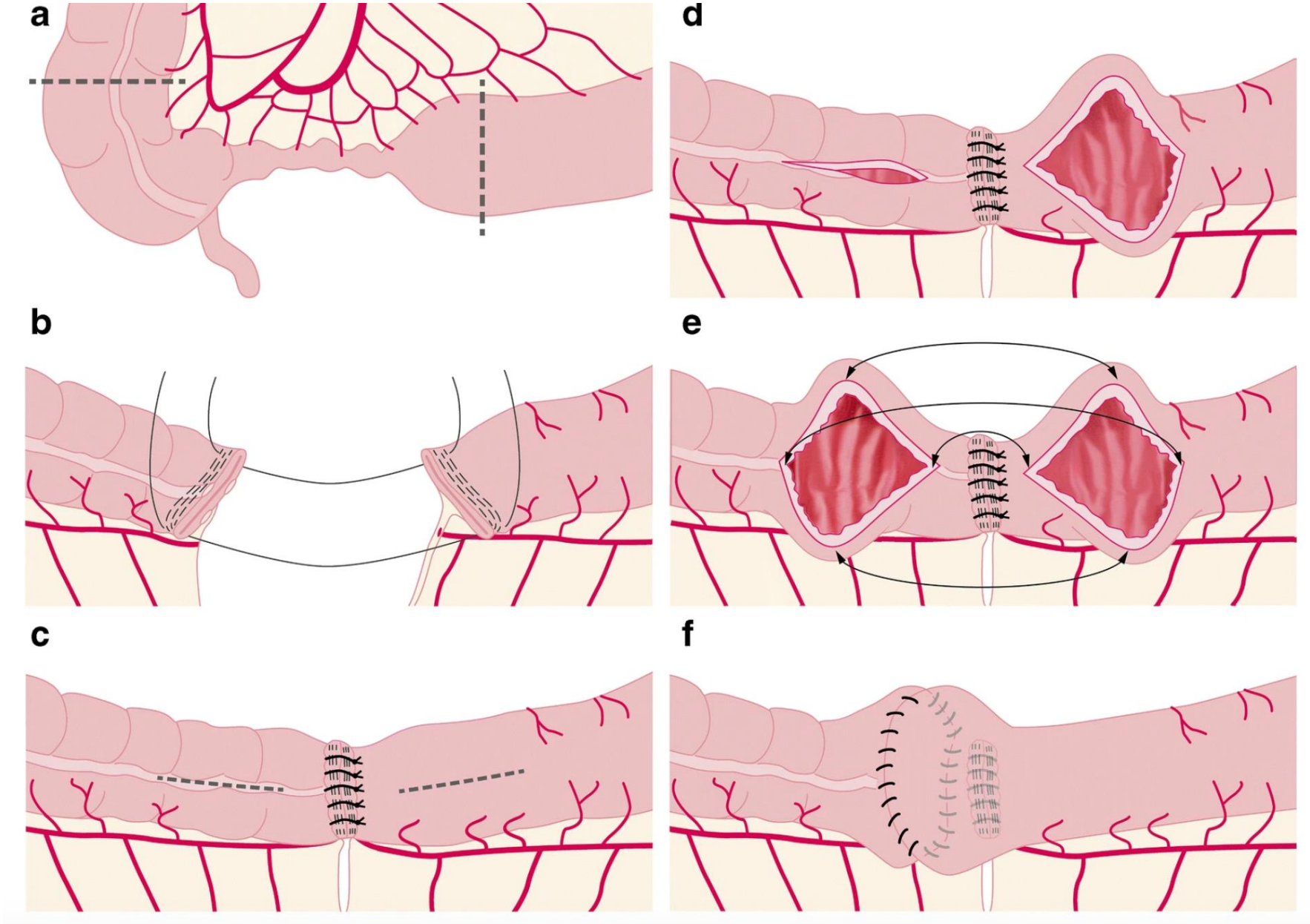

2D G46/DR35/FA10/P90/Frq Res./6.0cm
S
2
4
Desc colon


SAMSUNG
CA3-10A / BOWEL GEN / FR38Hz
MI 0.98
TIs 0.3
2023-03-22
08:57:04 AM
2D G46/DR35/FA10/P90/Frq Res./6.0cm
S
2
4
Desc colon


SAMSUNG
CA3-10A / BOWEL GEN / FR38Hz
MI 0.98
TIs 0.3
2023-03-22
08:57:35 AM
2D G46/DR35/FA10/P90/Frq Res./6.0cm
S
1
2
4
Desc colon
D1 4.9 mm

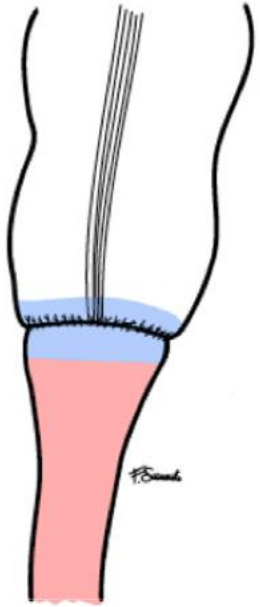


C. *End-to-end ileocolic anastomosis*

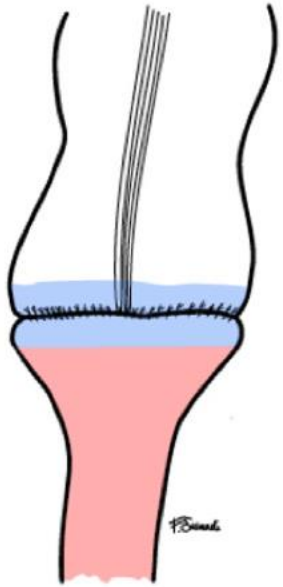


Horisberger et al. Lagenbeck's Archives of Surgery

A



End-to-end ileocolic anastomosis

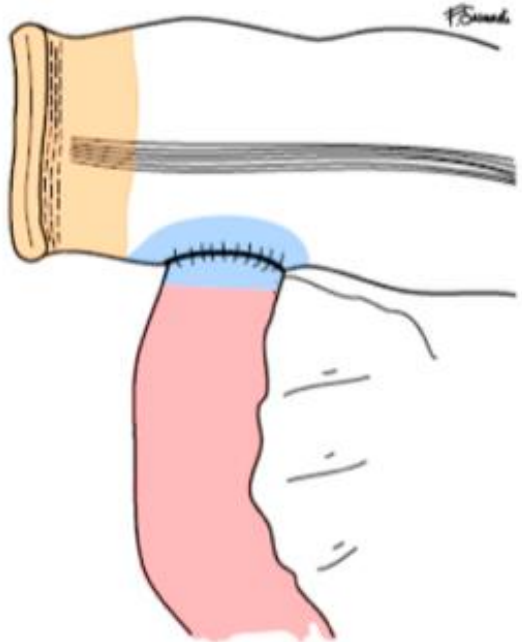


Kono-S ileocolic anastomosis

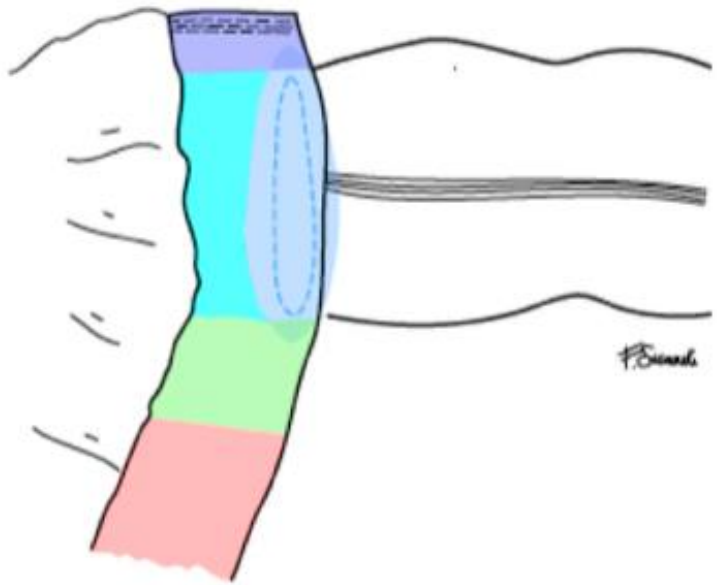
Areas of interest for endoscopic follow-up are reported in different colors.

- Ileal body
- Neo-terminal ileum
- Anastomotic line
- Ileal inlet
- Colonic blind loop
- Ileal blind loop

Riviere et al. Clin Gastro Hep 2022; 20(6):1201-1204



End-to-side ileocolic anastomosis

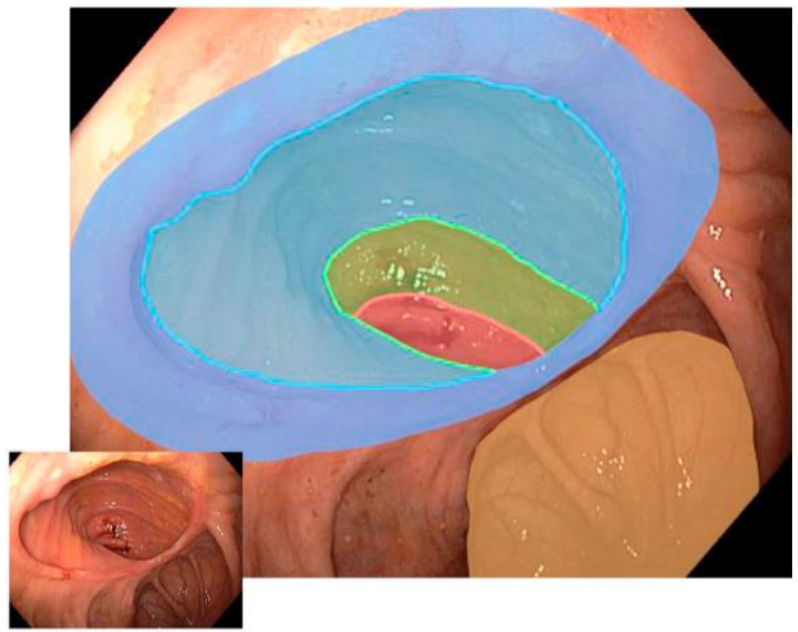


Side-to-end ileocolic anastomosis

B

Areas of interest for endoscopic follow-up are reported in different colors.

- Ileal body
- Neo-terminal ileum
- Anastomotic line
- Ileal inlet
- Colonic blind loop
- Ileal blind loop



Riviere et al. Clin Gastro Hep 2022; 20(6):1201-1204

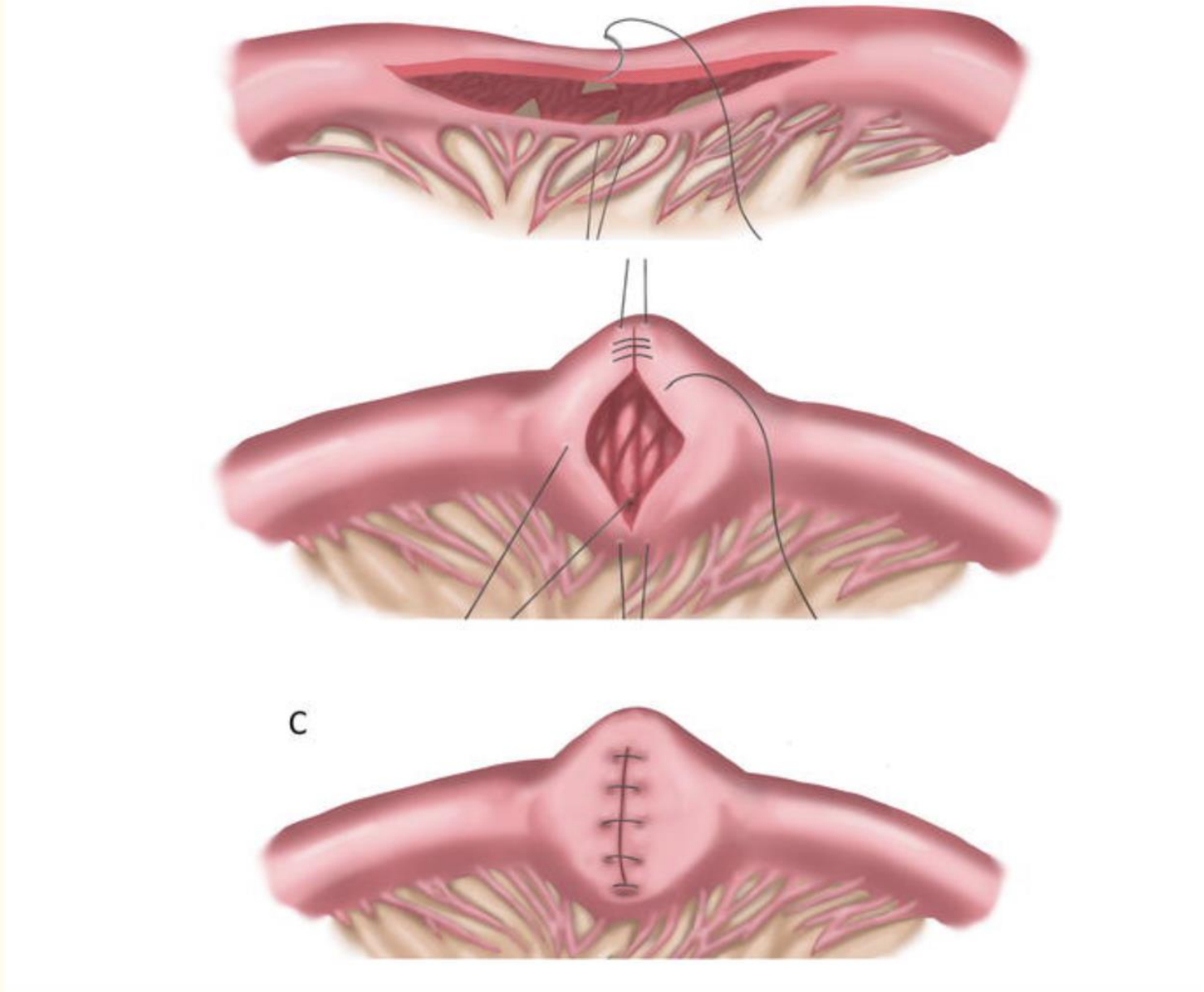
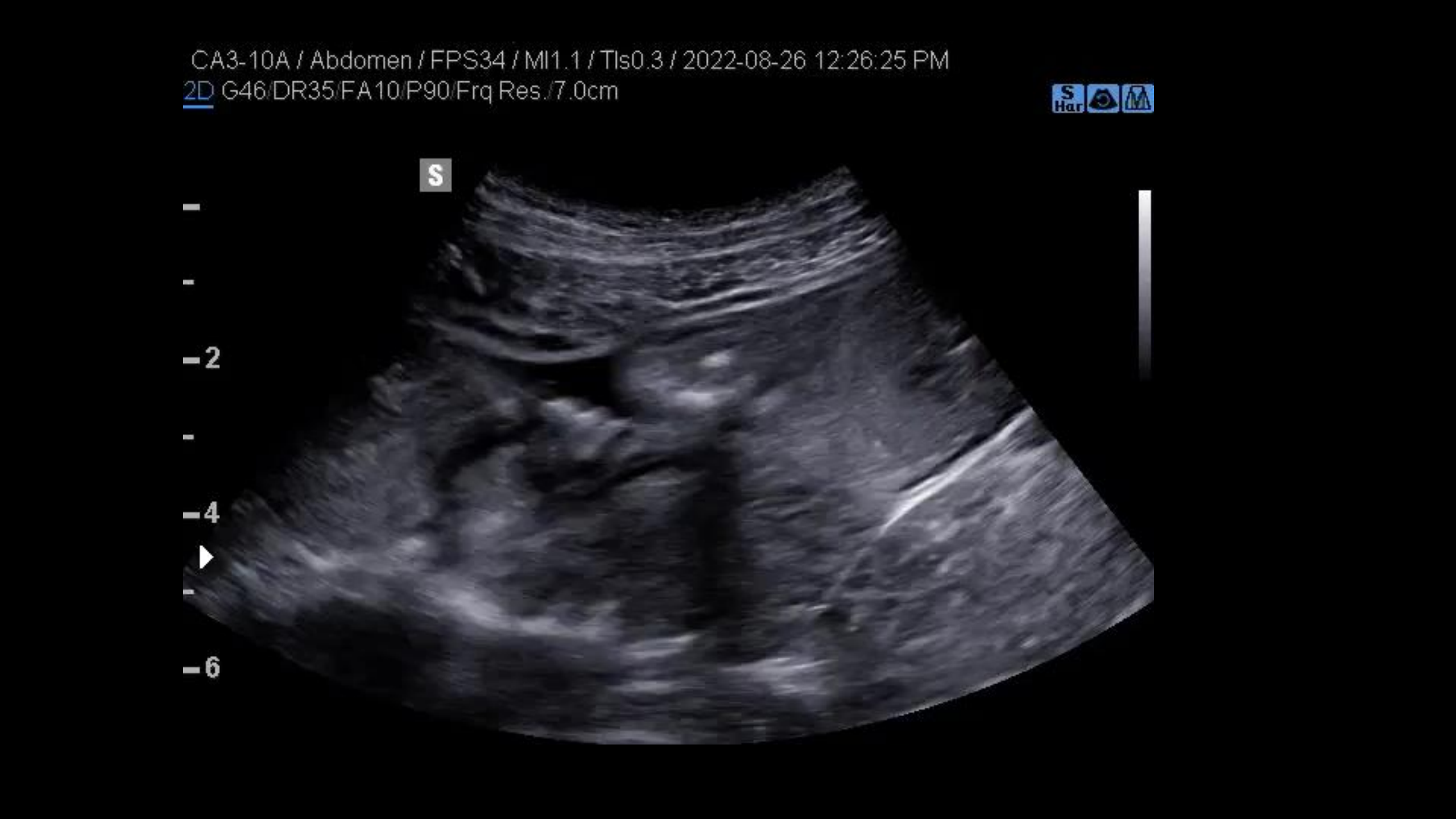


Figure 8.
The Heineke-Mikulicz technique. A - Longitudinal incision; B - transverse suture; C - final aspect.

Chaves Oliverira E, Open Access Peer Reviewed Chapter

Current Elective Surgical Treatment Of IBD

Oct 2021

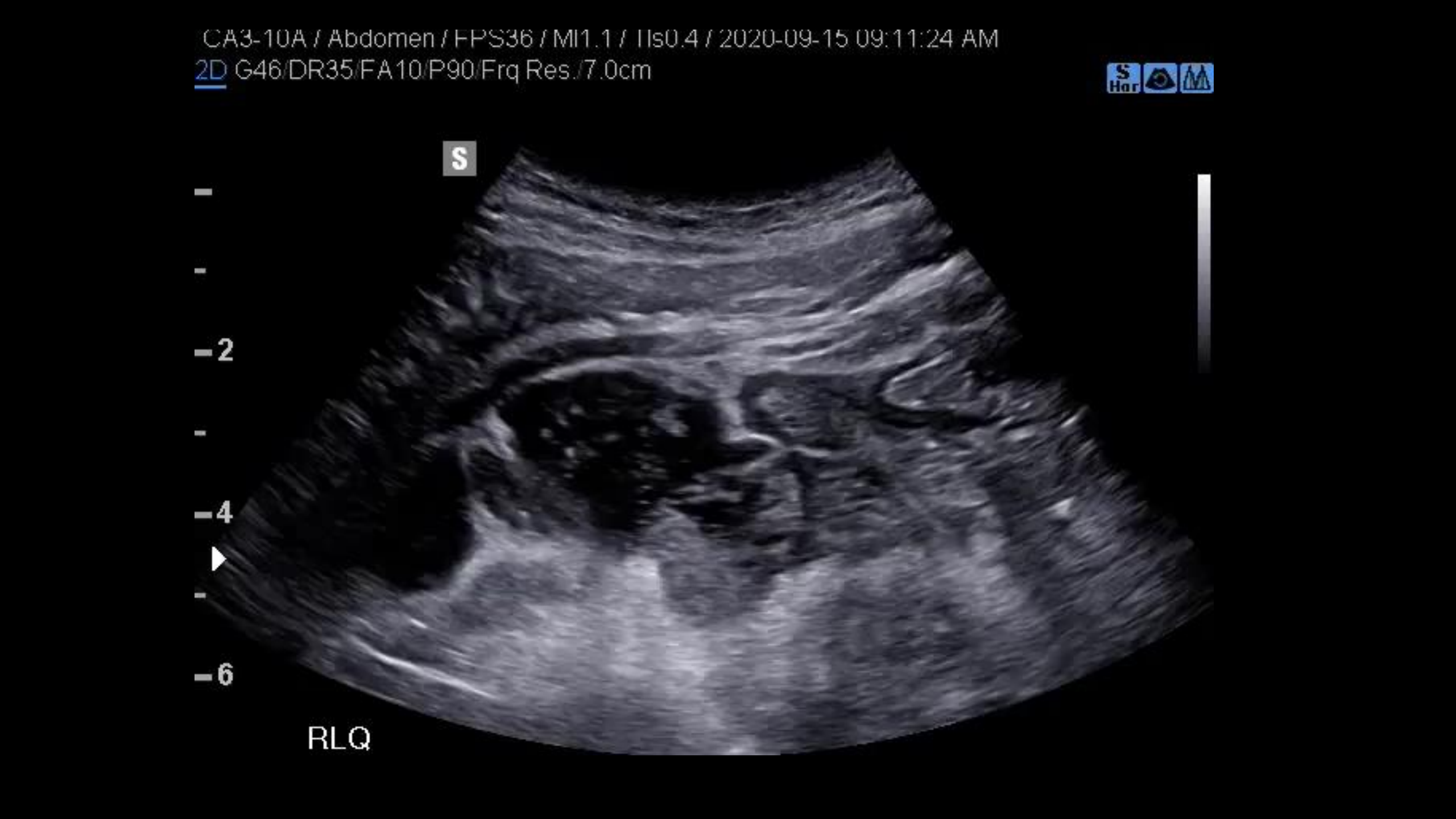

CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-26 12:26:25 PM
2D G46/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6

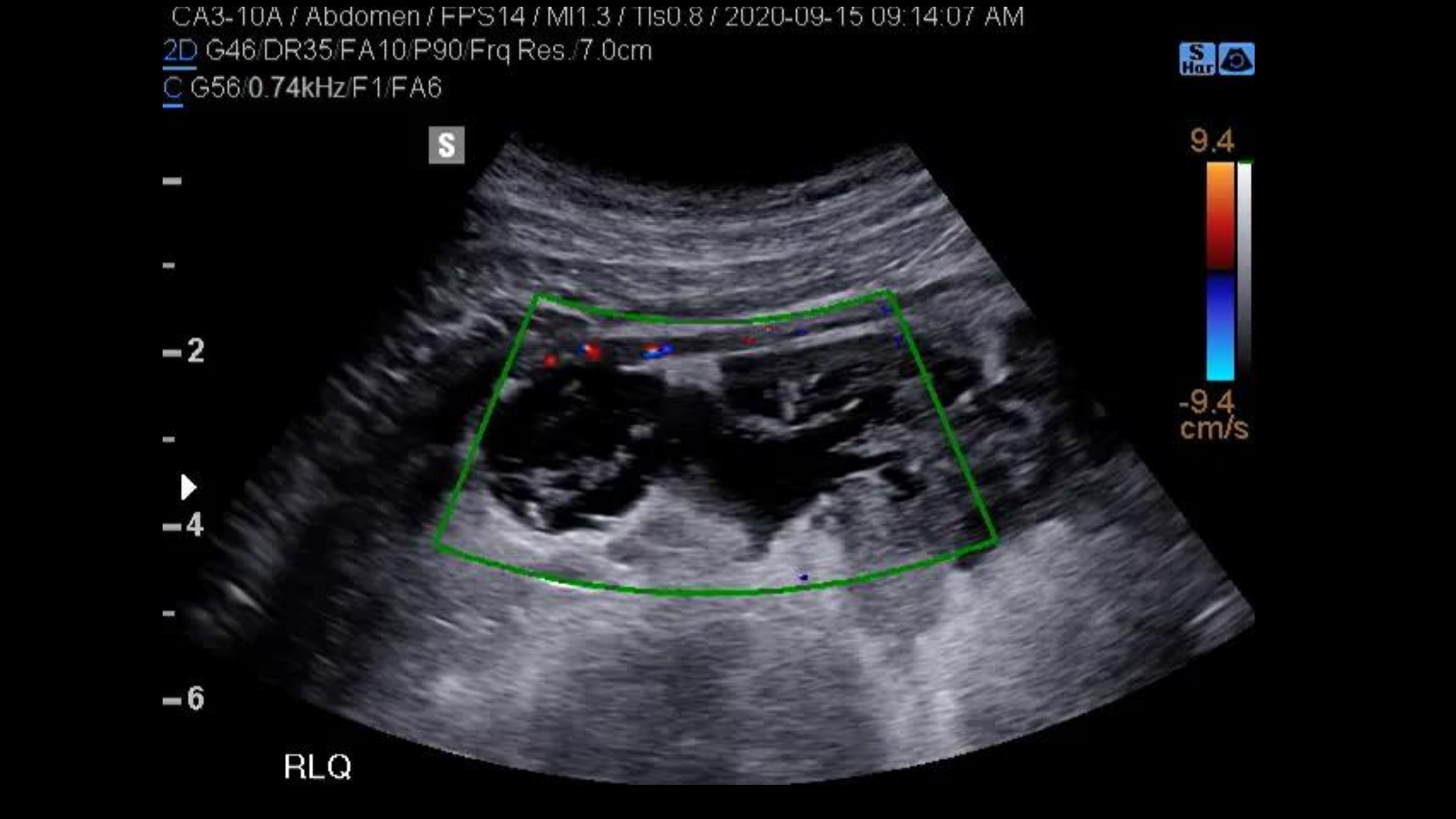
Case 4. JR

54 yo Norweigen Canadian man with longstanding ileal CD, surgery for a progressive, symptomatic stricture approximately 9d ago.

Presents to 'flare clinic' at the UofC during COVID

Can not stand up straight, abdominal pain, distention – waking him from sleep, no blood work available since OR/ admission.


CA3-10A / Abdomen / FPS36 / MI1.1 / TIs0.4 / 2020-09-15 09:11:24 AM
2D G46/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
RLQ

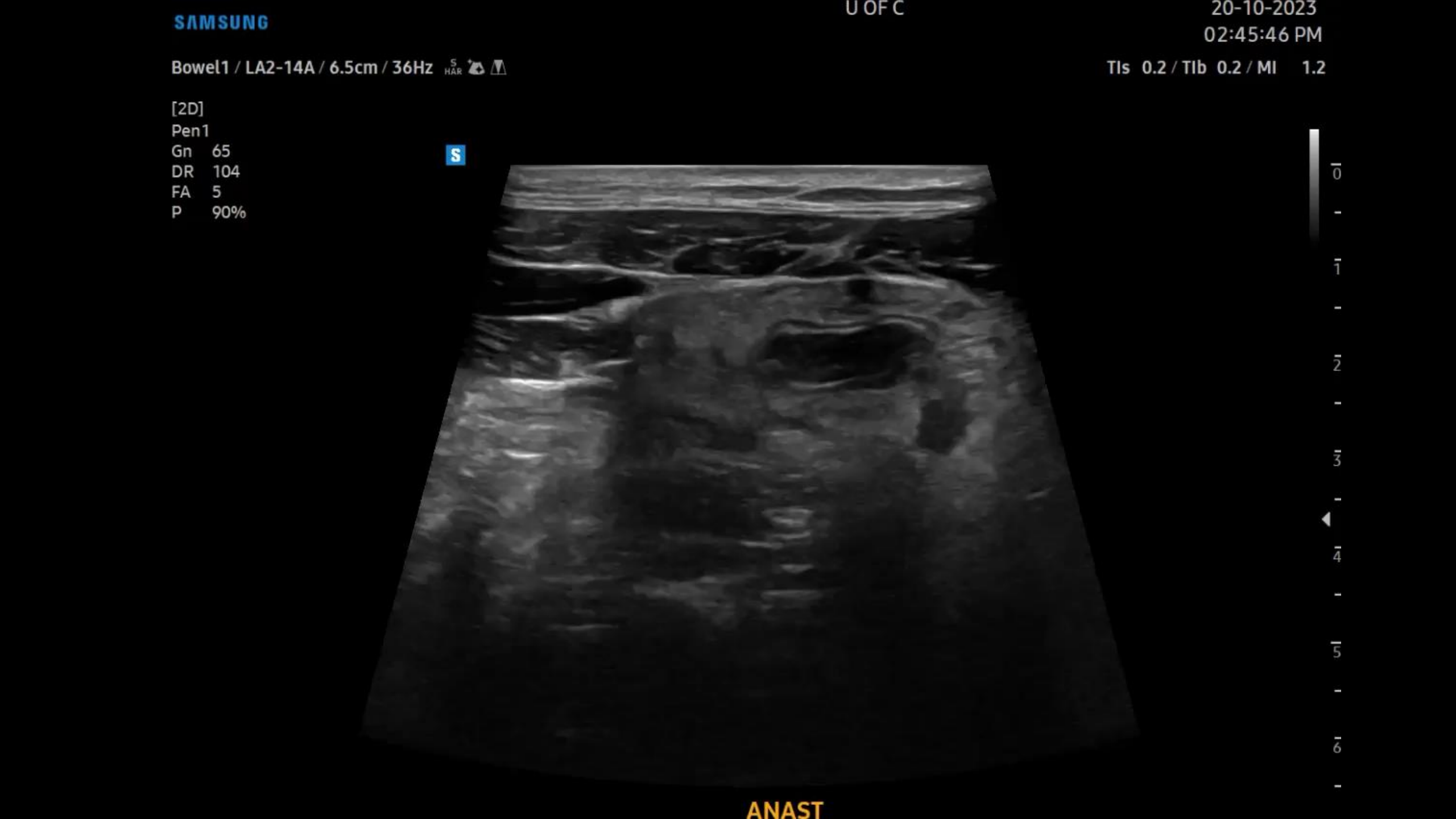

CA3-10A / Abdomen / FPS14 / MI1.3 / TIs0.8 / 2020-09-15 09:14:07 AM
2D G46/DR35/FA10/P90/Frq Res./7.0cm
C G56/0.74kHz/F1/FA6
S
9.4
-9.4
cm/s
2
4
6
RLQ

Case 6. AC

34 yo Engineer, longstanding, stricturing terminal ileal CD, no Luminal penetrating complications, no perianal disease, non-smoker.

Long segment of TI affected, continues to have pain in the RLQ post operatively, significant diarrhea with some improvement with bile-acid sequestration.

OR was complicated by a intra-operative


SAMSUNG
U OF C
20-10-2023
02:45:46 PM
Bowel1 / LA2-14A / 6.5cm / 36Hz
TIs 0.2 / TIb 0.2 / MI 1.2
[2D]
Pen1
Gn 65
DR 104
FA 5
P 90%
ANAST

Case 7. GH

38yo father of 4, 12 years of complex penetrating ileal CD

Resection July 2016 – 6 weeks post-op very sudden (within 24hr) onset severe bloating/ fullness, loss of appetite and intermittent severe peri-umbilical belly pain

Sough pain relief from GP – now needing opiates

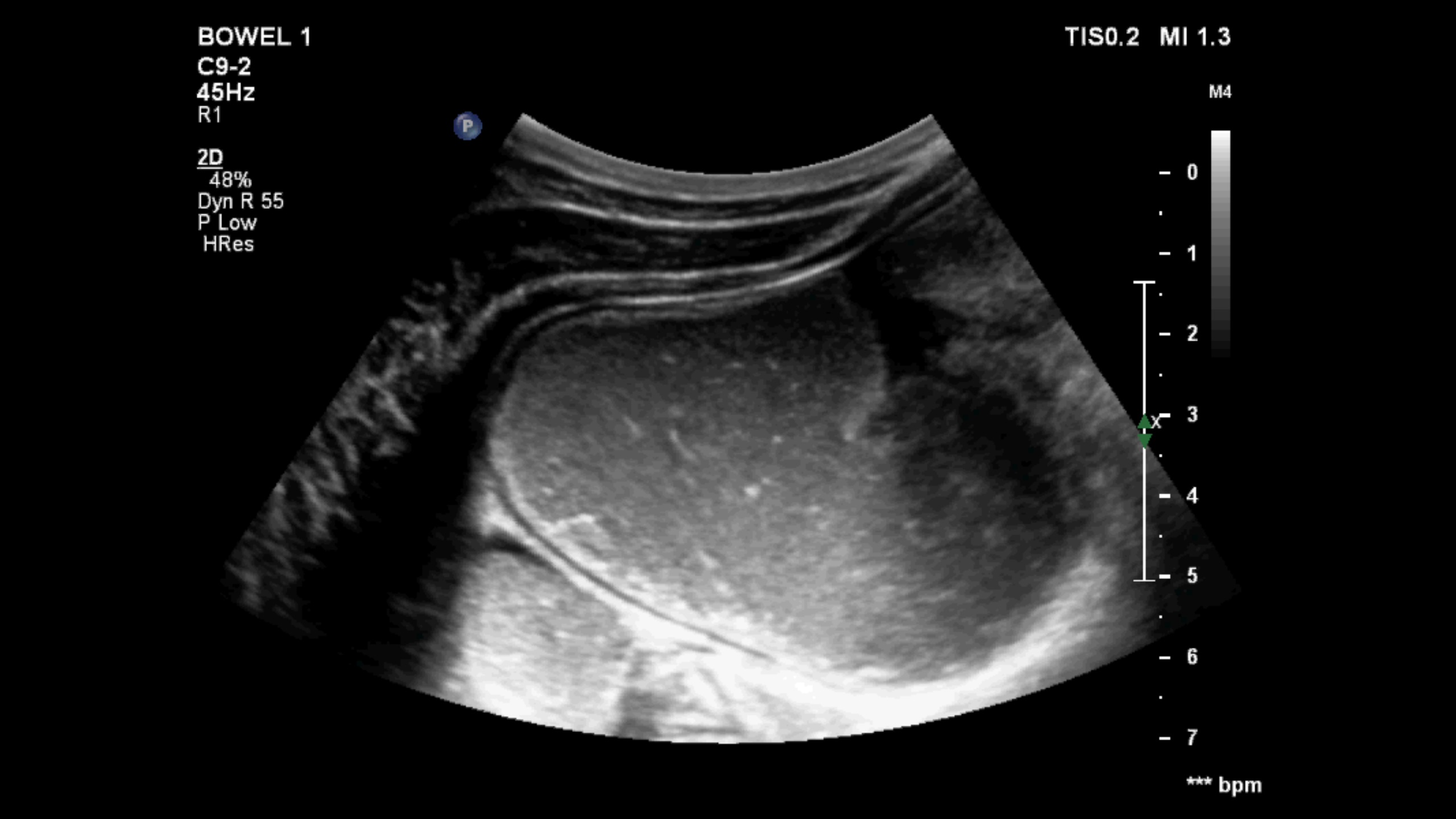
Non-smoker

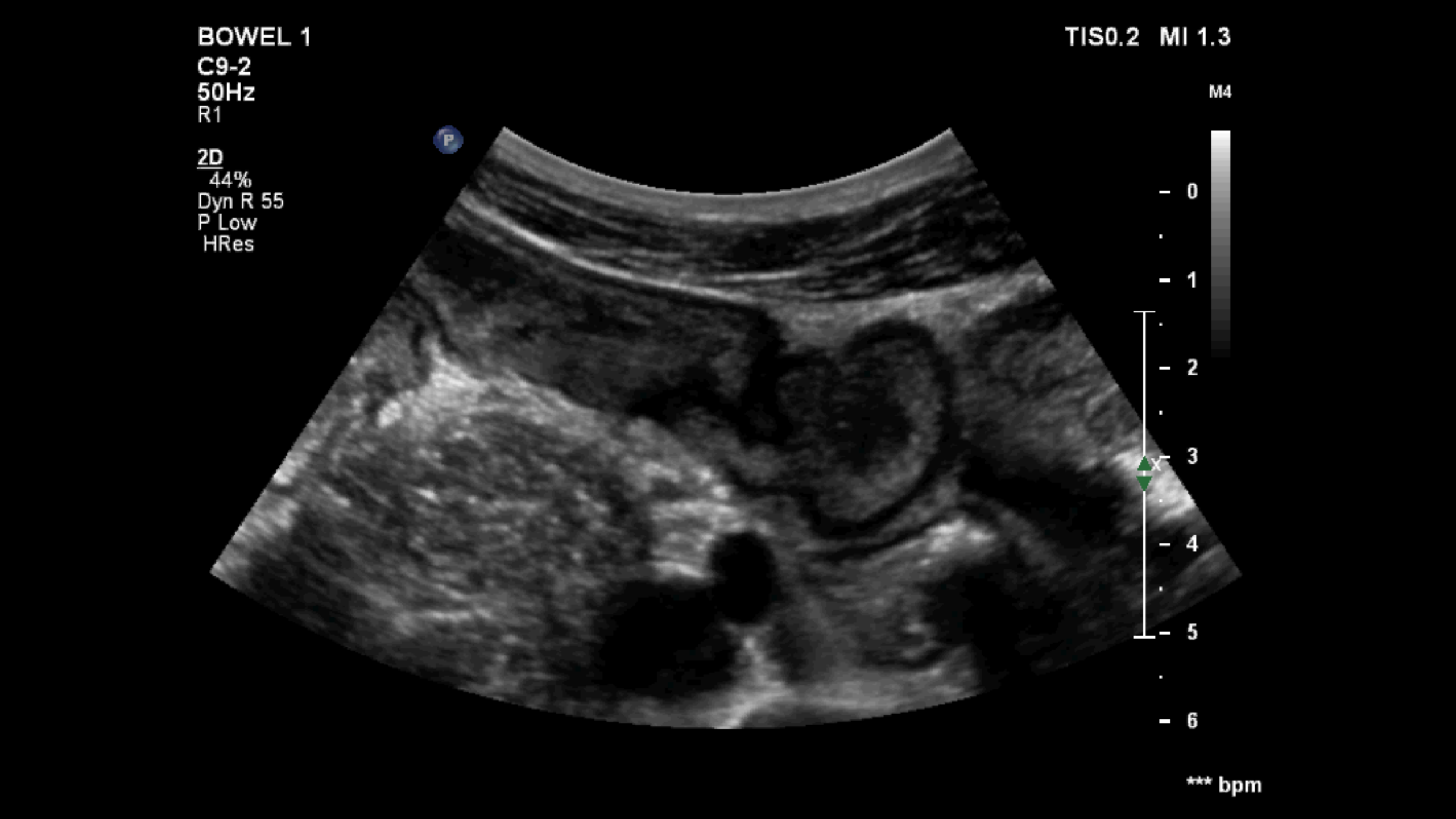
Case 7. GH

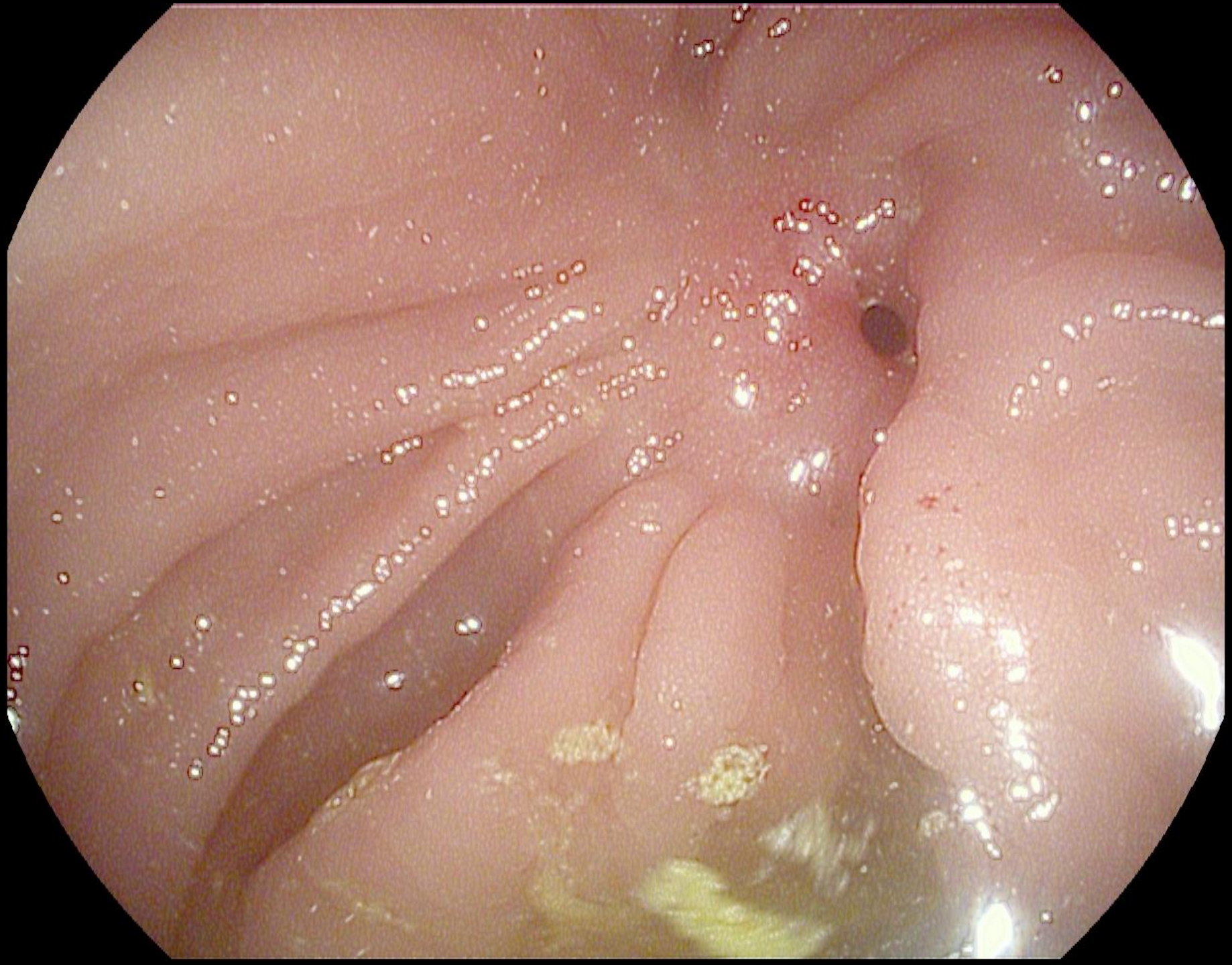
Blood work completed post operatively demonstrated anemia, Hb 118 with MCV 92

CRP 2.1

No fecal calprotectin available


BOWEL 1
C9-2
45Hz
R1
2D
48%
Dyn R 55
P Low
HRes
TIS0.2 MI 1.3
M4
0
1
2
3
4
5
6
7
*** bpm


BOWEL 1
C9-2
50Hz
R1
2D
44%
Dyn R 55
P Low
HRes
TIS0.2 MI 1.3
M4
0
1
2
3
4
5
6
*** bpm

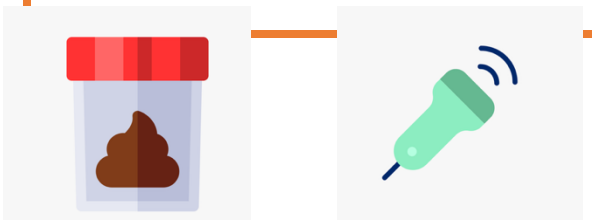



Team
Success
IDEA
Target
Reduction
Plan

Personalized Pre-operative RISK STRATIFICATION

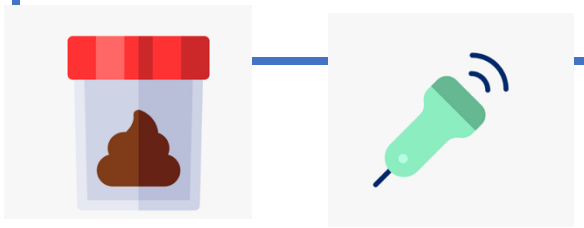
≤12wks

? Early Leak/ complic

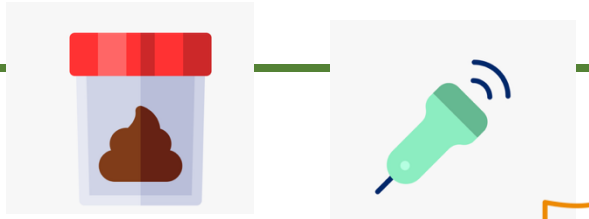


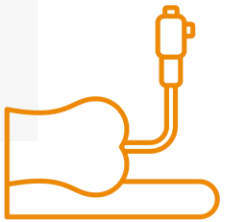
12 weeks

Higher risk



Follow up 6,9 12mo





Thank you

knovak@ucalgary.ca