How Do I FIND the Anastomosis??

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international bowel ULTRASOUND GROUP

iUSCAN Intestinal Ultrasound Group of the United States and Canada

FACULTY OF MEDICINE | UNIVERSITY OF CALGARY

Faculty Disclosures

Speaker: Janssen, Abbvie, Takeda, Pfizer

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

Research Support: Helmsley Trust, DOVA health, Janssen

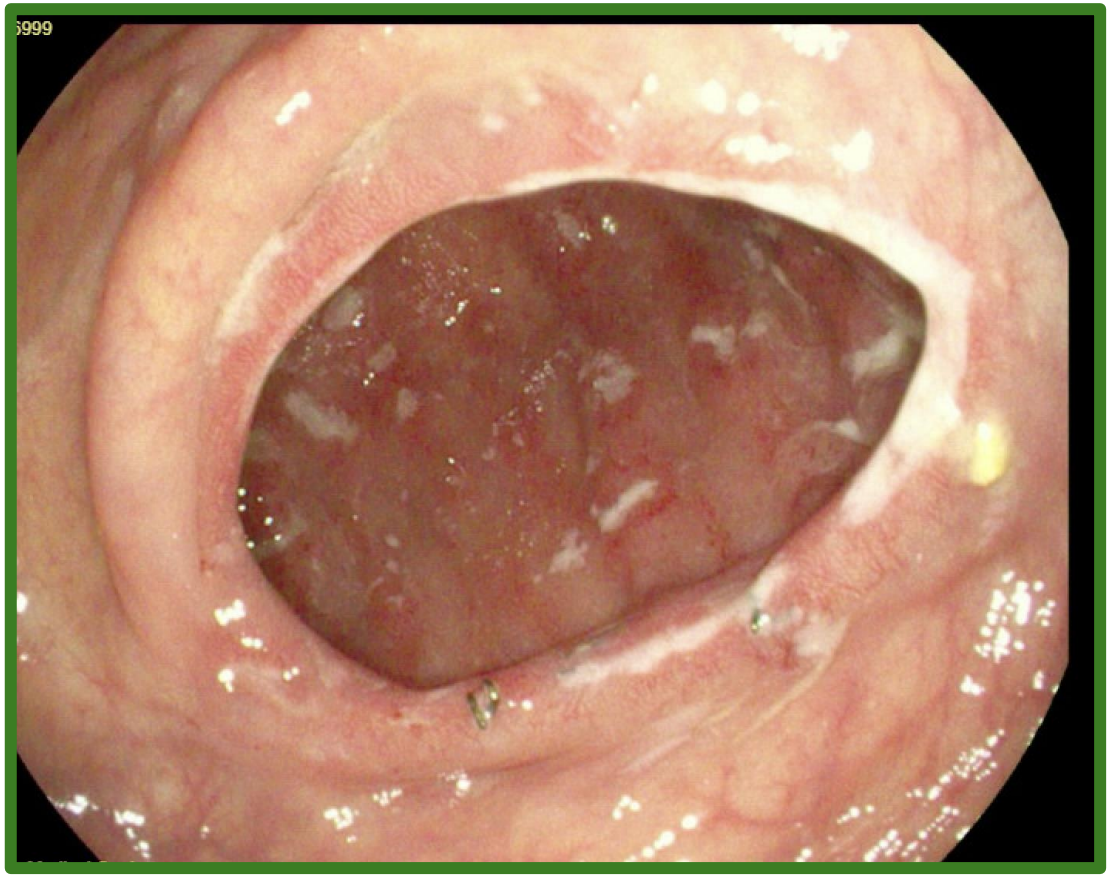
Learning Objectives

1. Locate, identify the anastomotic constituents of the postoperative anastomosis (including the anatomic configuration).

2. Understand and interpret the findings at the the post-operative anastomosis, to exclude/ identify complications, determine and grade recurrent inflammation at key anastomotic components.

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

- Up to 90% of patients exhibit endoscopic recurrence (Ri1) at 12mo w most exhibiting activity at **3 years**.
  - Clinical recurrence occurs much later[1]
- ~46% of CD patients require surgery within 10 yrs of Dx (range is 36-86% 37.7 % rate for kids[2,3] & ~50% repeat surgery w/in 20 years[4]
  - Lower rate of dvlping small bowel disease post colectomy but 20-40%
- Evidence for surgery first line in limited TI disease (LIRIC trial) may argue for more surgery[5]



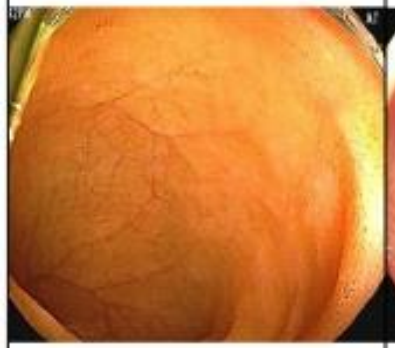
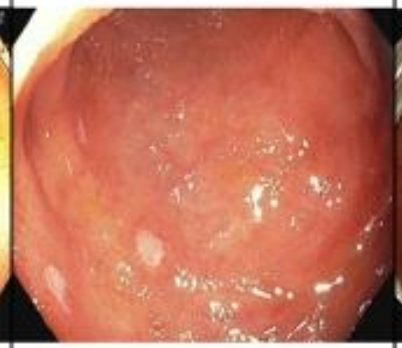
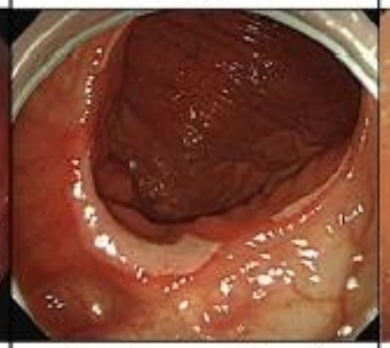
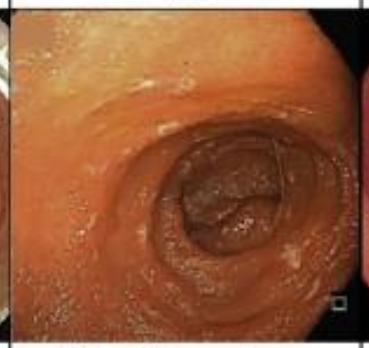
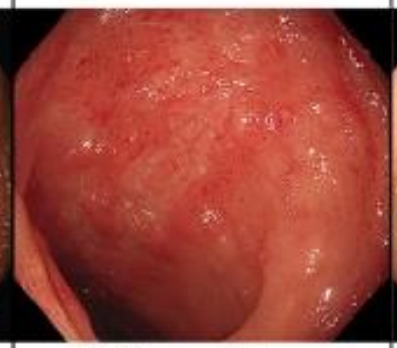
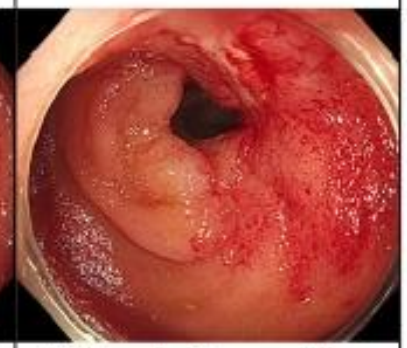
1.

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. Buisson et al. Aliment Pharmacol Ther, 2012. 35(6): p. 625–33
5. 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)

i0	i1	i2		i3	i4
		i2a	i2b		
					
No lesion in distal ileum	≤5 Aphthous lesions	Lesions confined to ileocolonic anastomosis	>5 Aphthous lesions with normal mucosa between the lesions	Diffuse aphthous ileitis with diffusely inflammmed mucosa	Diffuse inflammation with already large ulcers and/or narrowing

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

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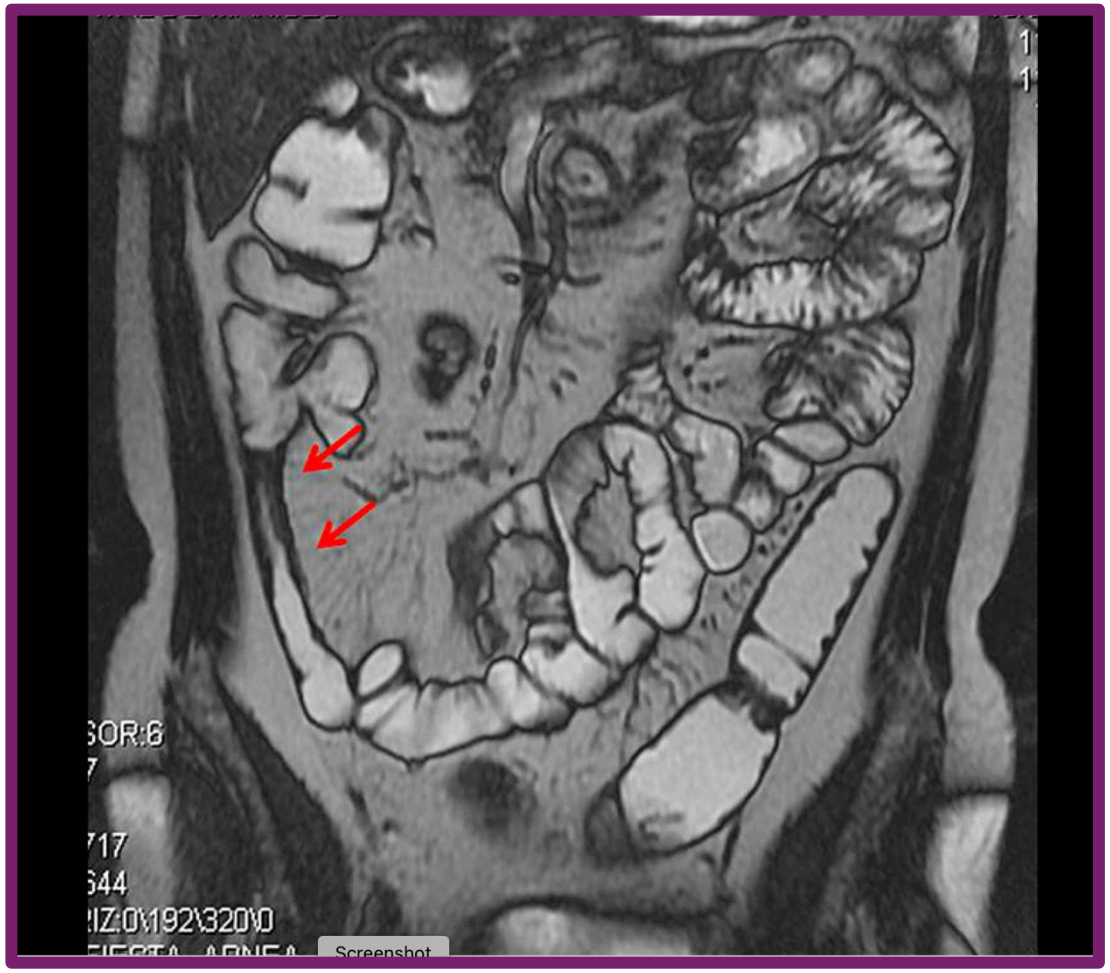
CT & MR – useful?

- 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.

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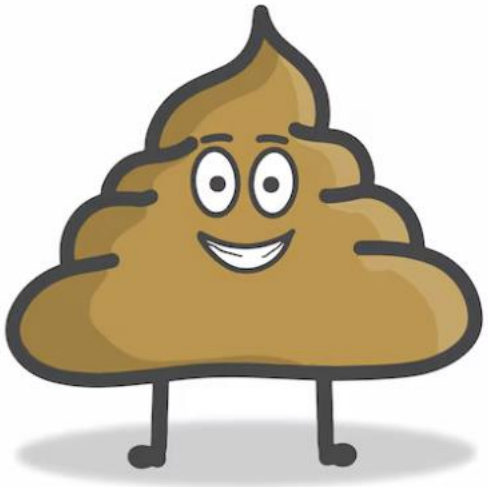
Biomarkers

- 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.

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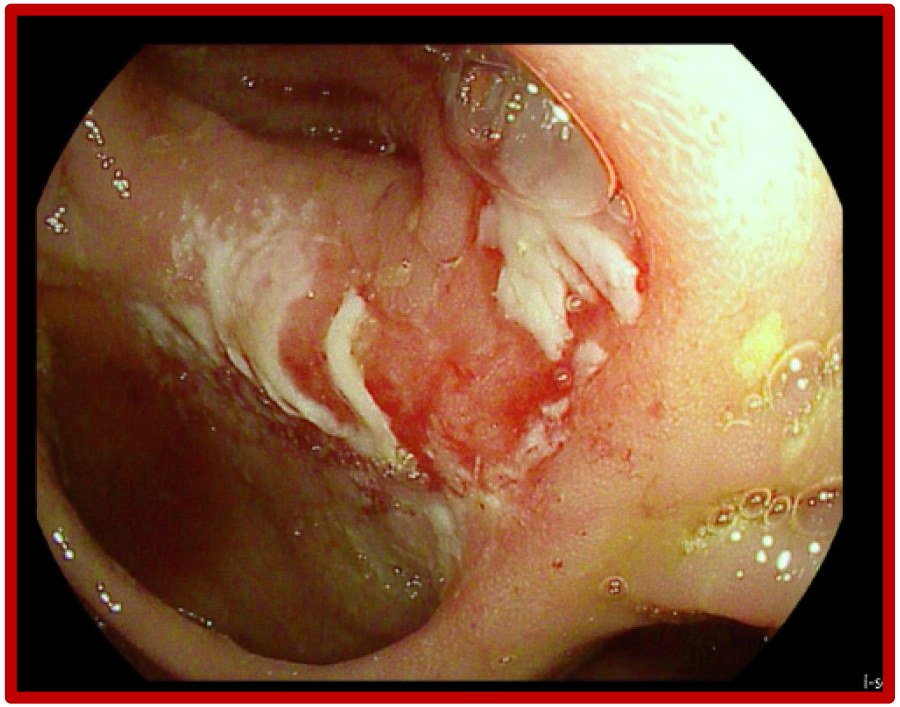
Success?

- 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.

IUS Accuracy

- **Pooled sensitivity of 0·89** [95% CI, 0·75-0·96] and **specificity of 0·76** [95% CI, 0·52-0·90]; using varying definitions of recurrence, sensitivity could be improved to 0·93 [95% CI, 0·80-0·98] and specificity to 0·85 [95% CI, 0·71-0·93][1]

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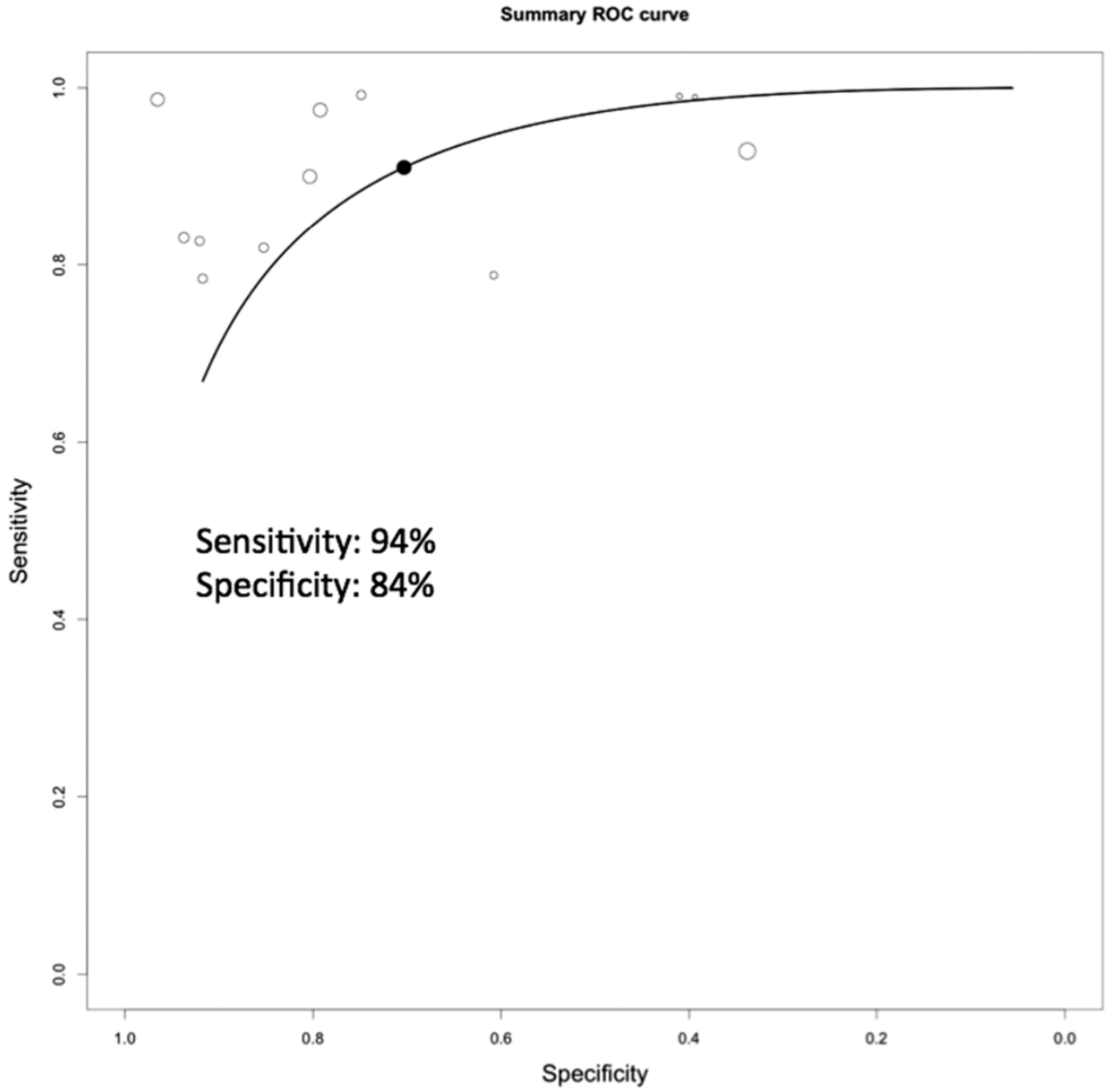


FIGURE 3. Summary receiver operating characteristic plot presenting test performance of US in detecting postsurgical recurrence.

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

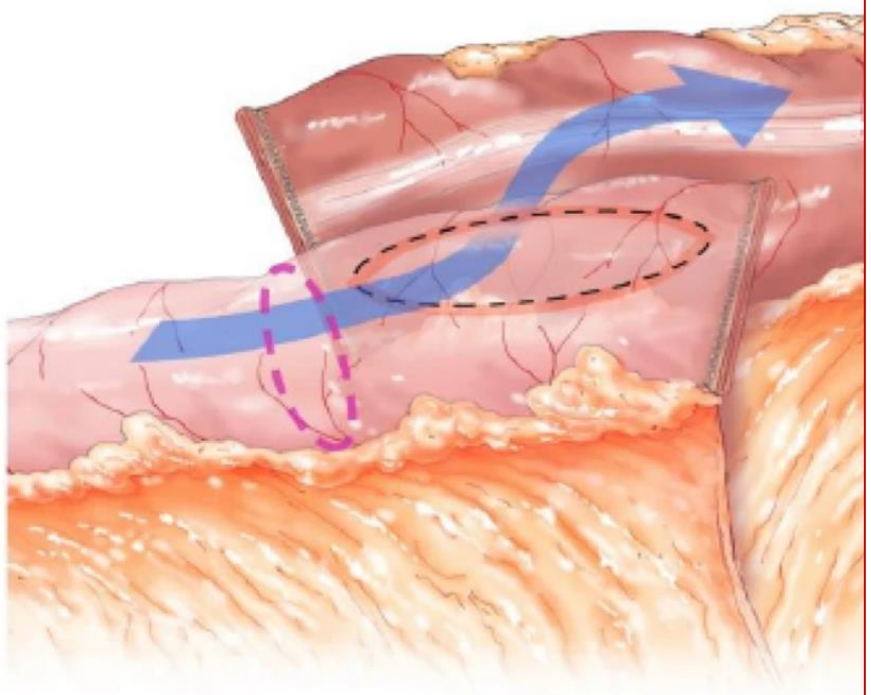
	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Accuracy, % (95% CI)	PPV, % (95% CI)	NPV, % (95% CI)
BWT ≥3 mm	77 (64–87)	65 (45–81)	73 (62–81)	81 (68–90)	59 (41–75)
FC ≥50 mcg/g	83 (70–91)	64 (44–81)	76 (65–85)	81 (68–90)	67 (46–83)
Presence of lymph nodes	35 (23–48)	97 (83–100)	56 (45–66)	95 (77–100)	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

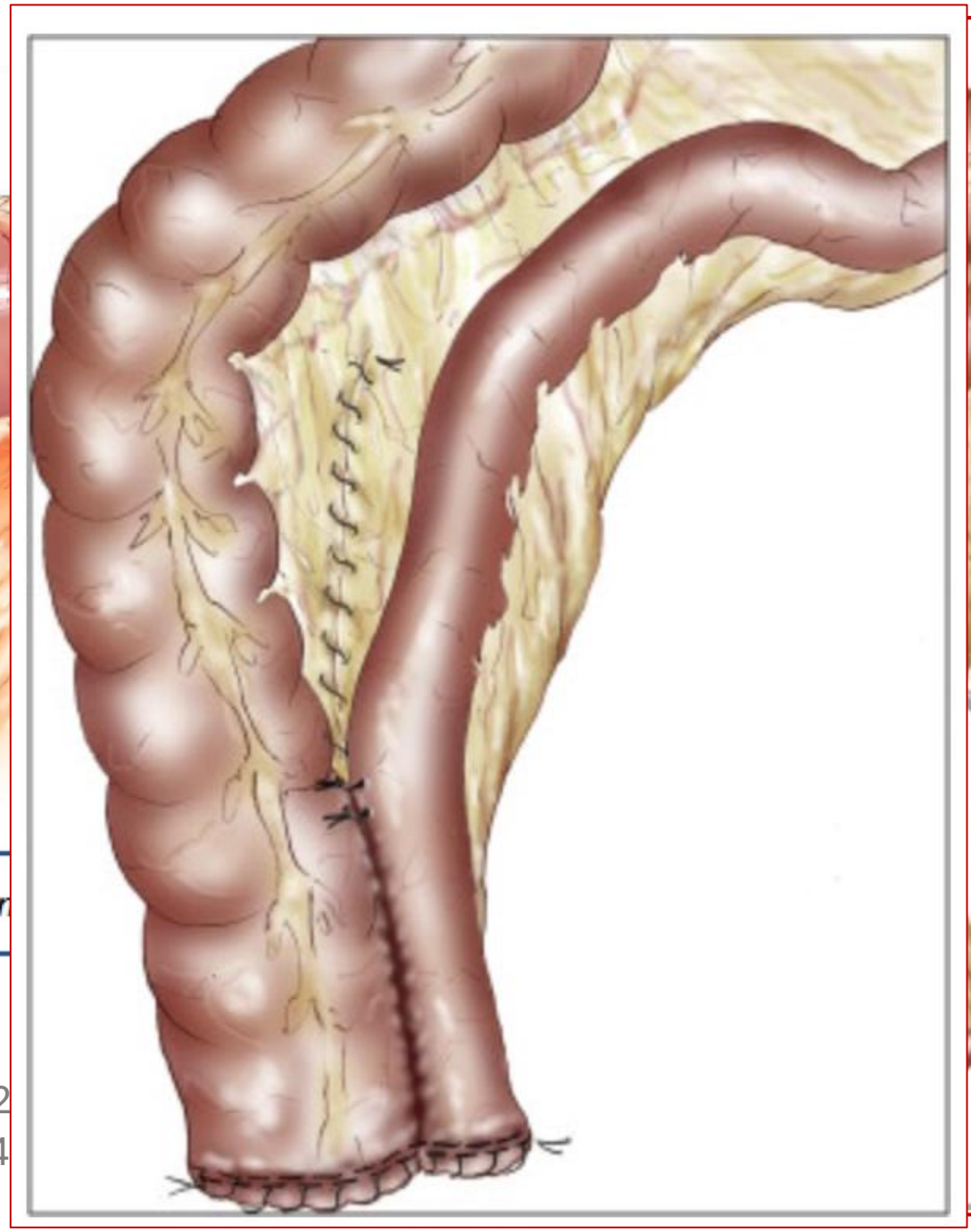
- Finding the anastomosis can be a treasure hunt – it doesn't need to be; nor should the disease distribution be a mystery. MOST common operation in CD is **an ILEOCECECTOMY**

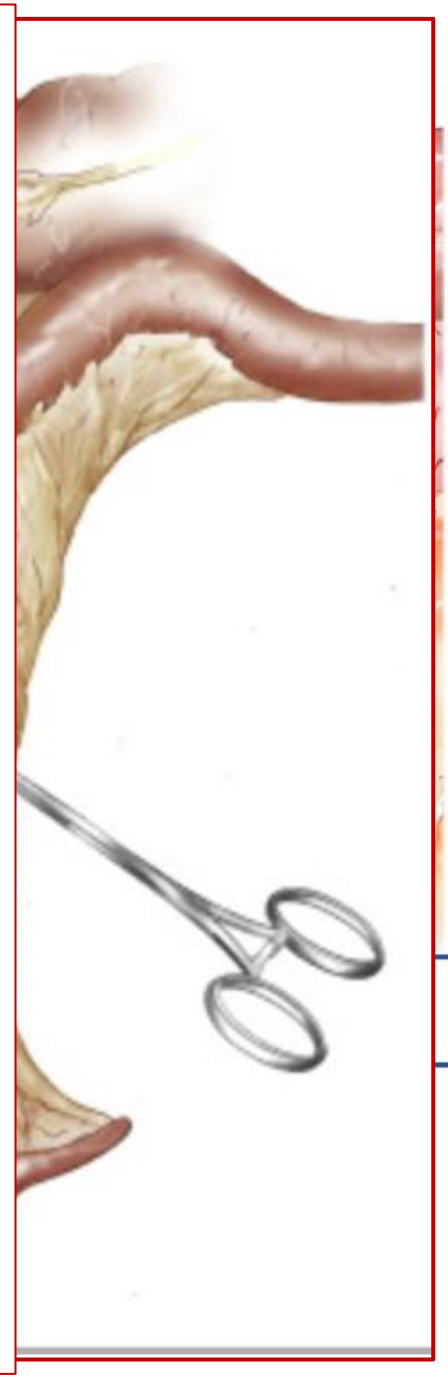
- REVIEW the operative report - caveat, no standards for operative reports currently exist
- REVIEW prior imaging

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

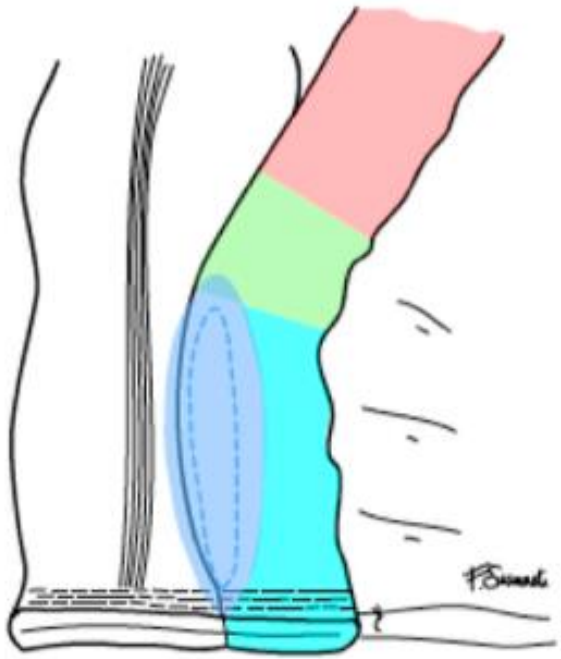


A. *Side-to-side Isoperistaltic ileocolic ar*

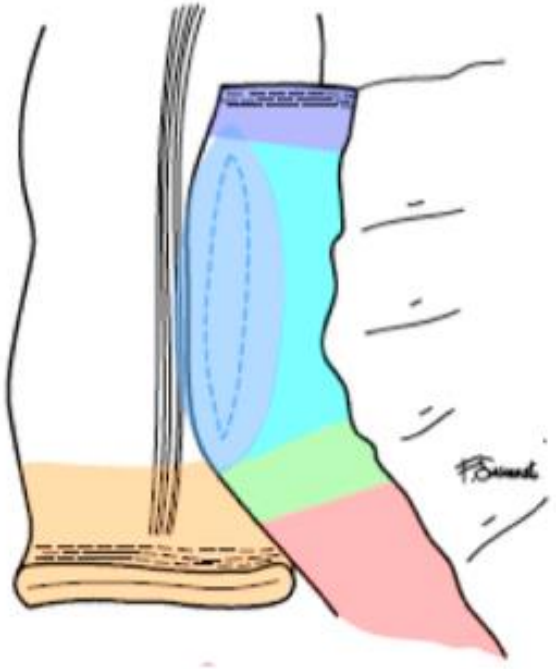




Beslenghi et al. Archives of Surgery 202
Debove et al. J of Visceral Surg 2012;14



Side-to-side antiperistaltic ileocolic anastomosis

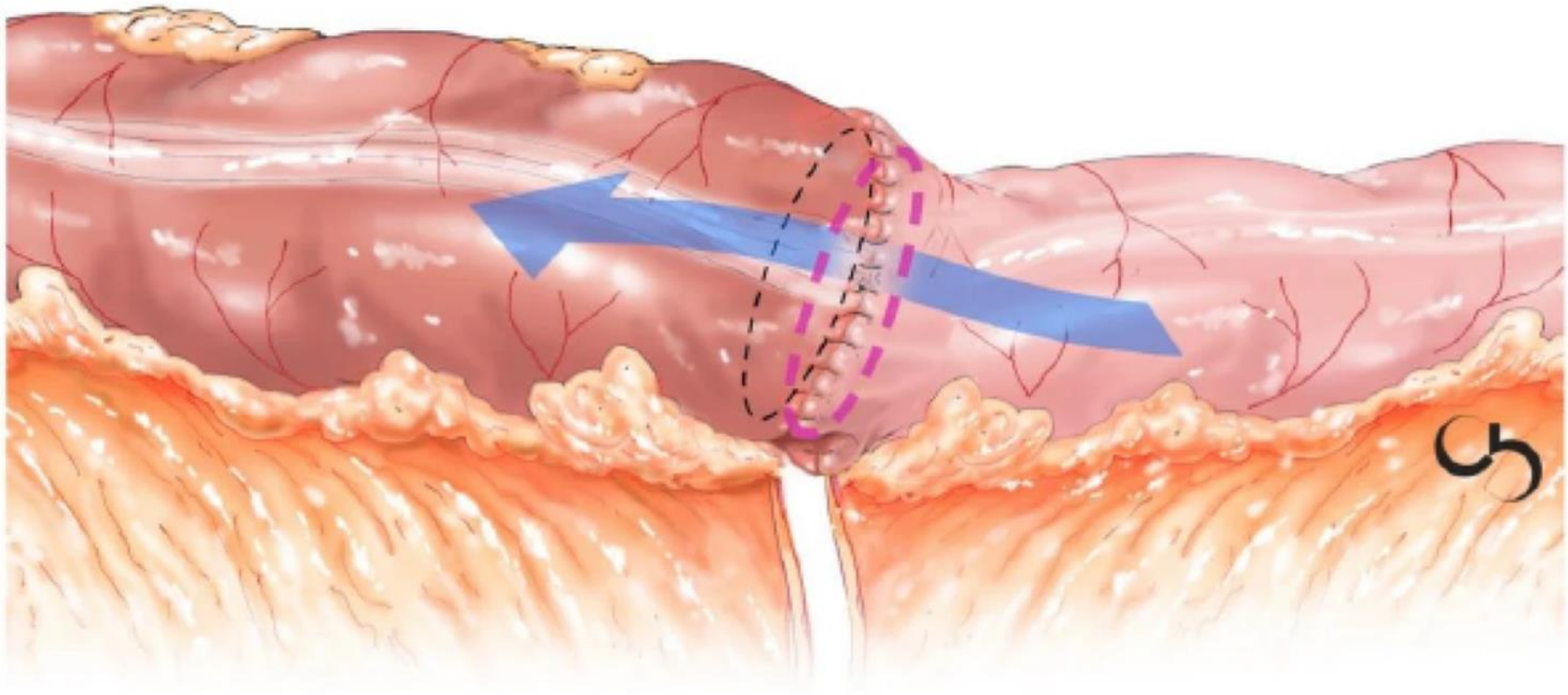


Side-to-side isoperistaltic ileocolic anastomosis

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

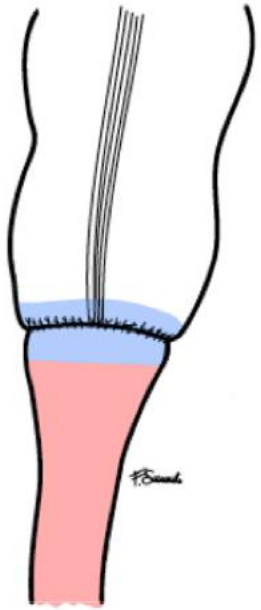
- Ileal body
- Neo-terminal ileum
- Anastomotic line
- Ileal inlet
- Colonic blind loop
- Ileal blind loop

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

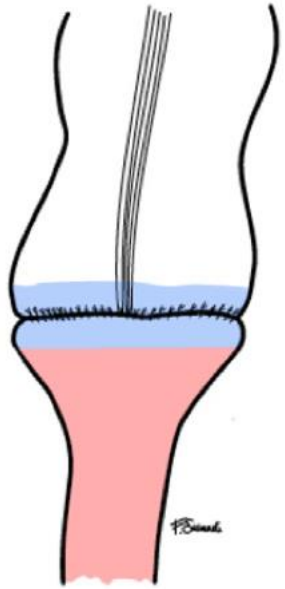


C. *End-to-end ileocolic anastomosis*

A



End-to-end ileocolic anastomosis

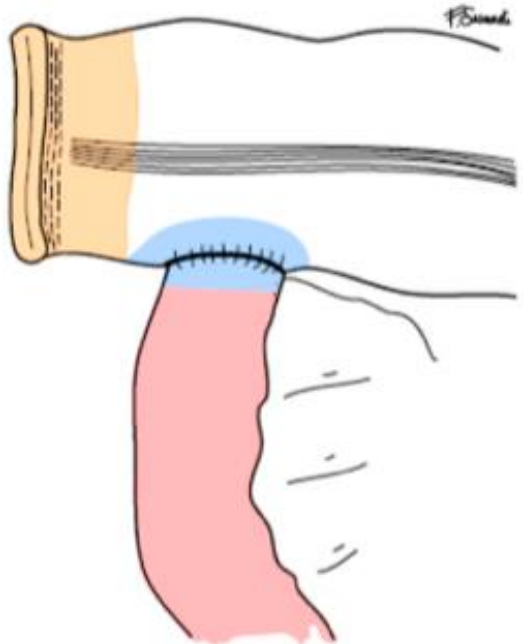


Kono-S ileocolic anastomosis

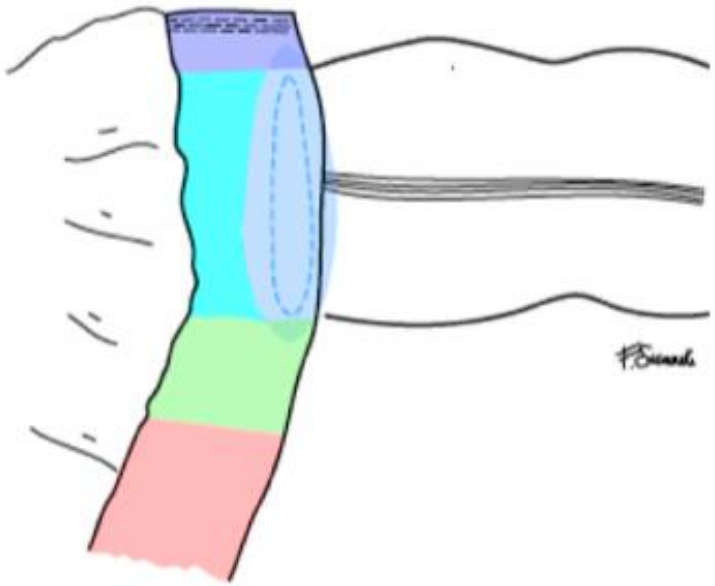
Areas of interest for endoscopic follow-up are reported in different colors.

- 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

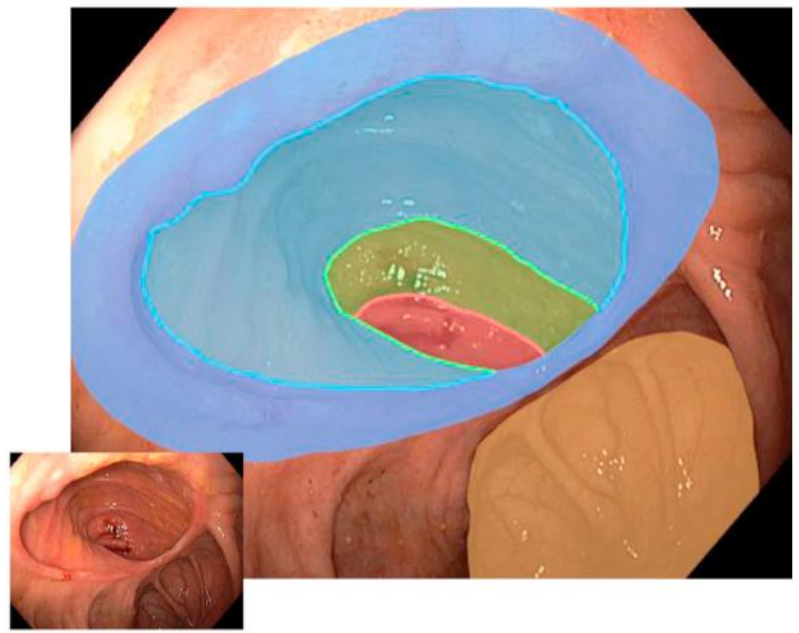


Side-to-end ileocolic anastomosis

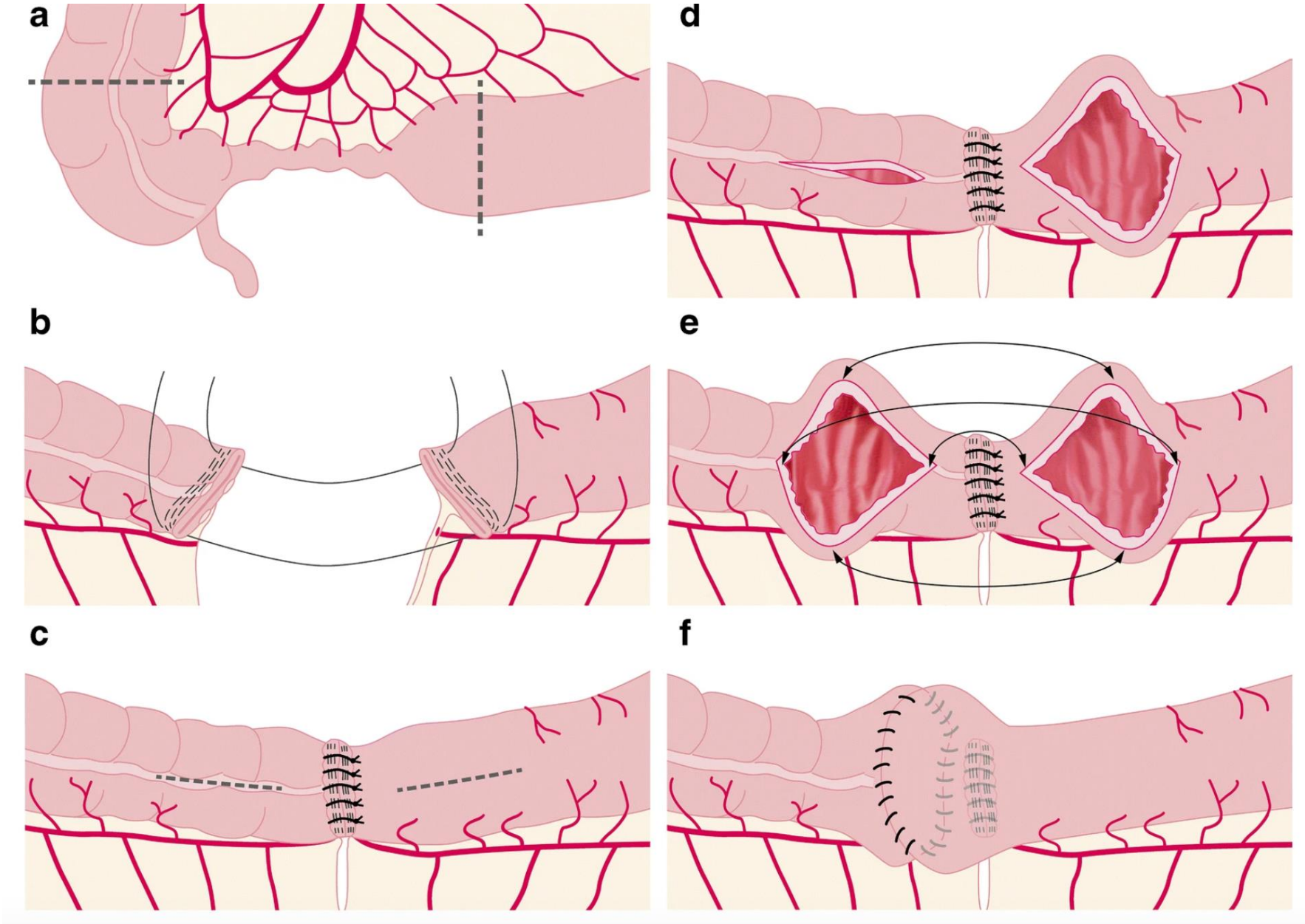
B

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



Horisberger et al. Lagenbeck's Archives of Surgery

Expert Consensus

- Modified RAND-University of California Los Angeles appropriateness method implemented using an international panel of 16 experts (rads, GI, surgeons)[1]

- **Detail** is important so use a high freq transducer where possible
- **No prep**; however, if pre-test probably of stricture HIGH can consider oral prep/ neg contrast (SICUS/ 500c Colyte).
- Documenting **whether or not the anastomosis was seen** is important - in addition to location, anatomic type

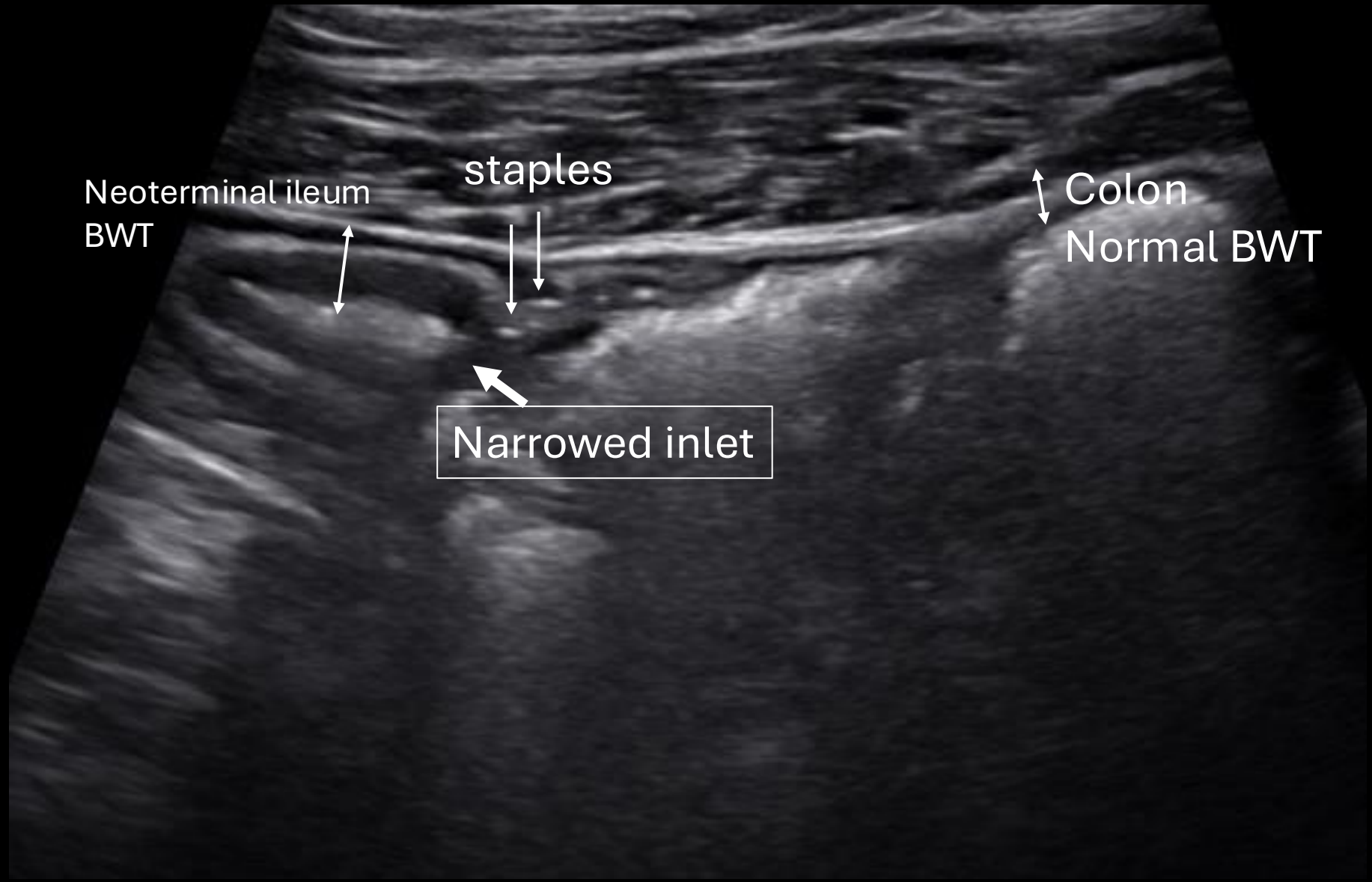
Ma.... Et al. Novak, 2026 submitted to Lancet Gastroenterol under review

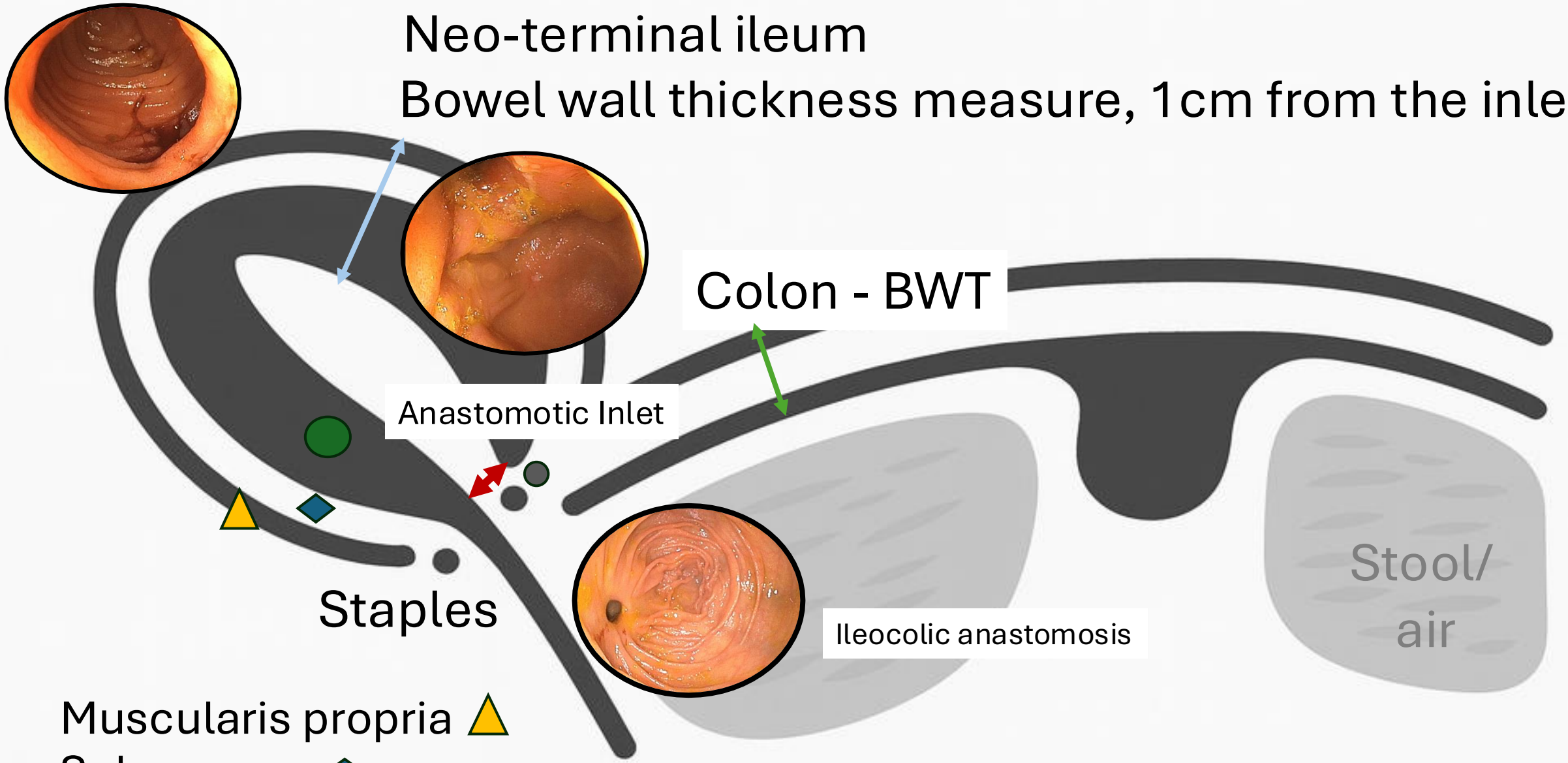
Expert Consensus

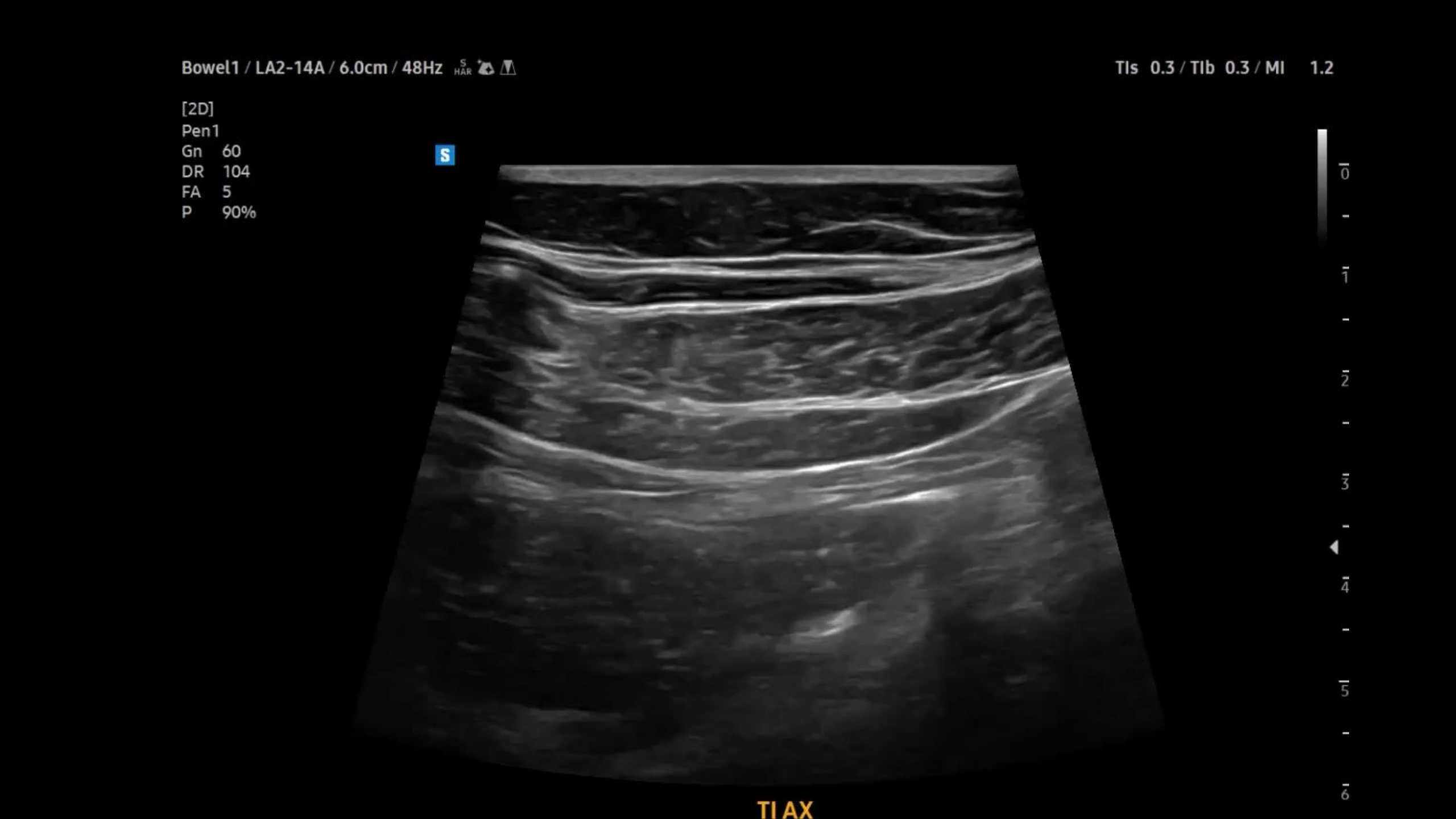
- ALL anatomic constituents of the ”anastomosis” that should be systematically evaluated include: the **neoterminal ileum (NTI),** neoterminal ileal **inlet**, colonic and ileal blind side of the anastomosis (the colonic segment immediately distal to the anastomosis).

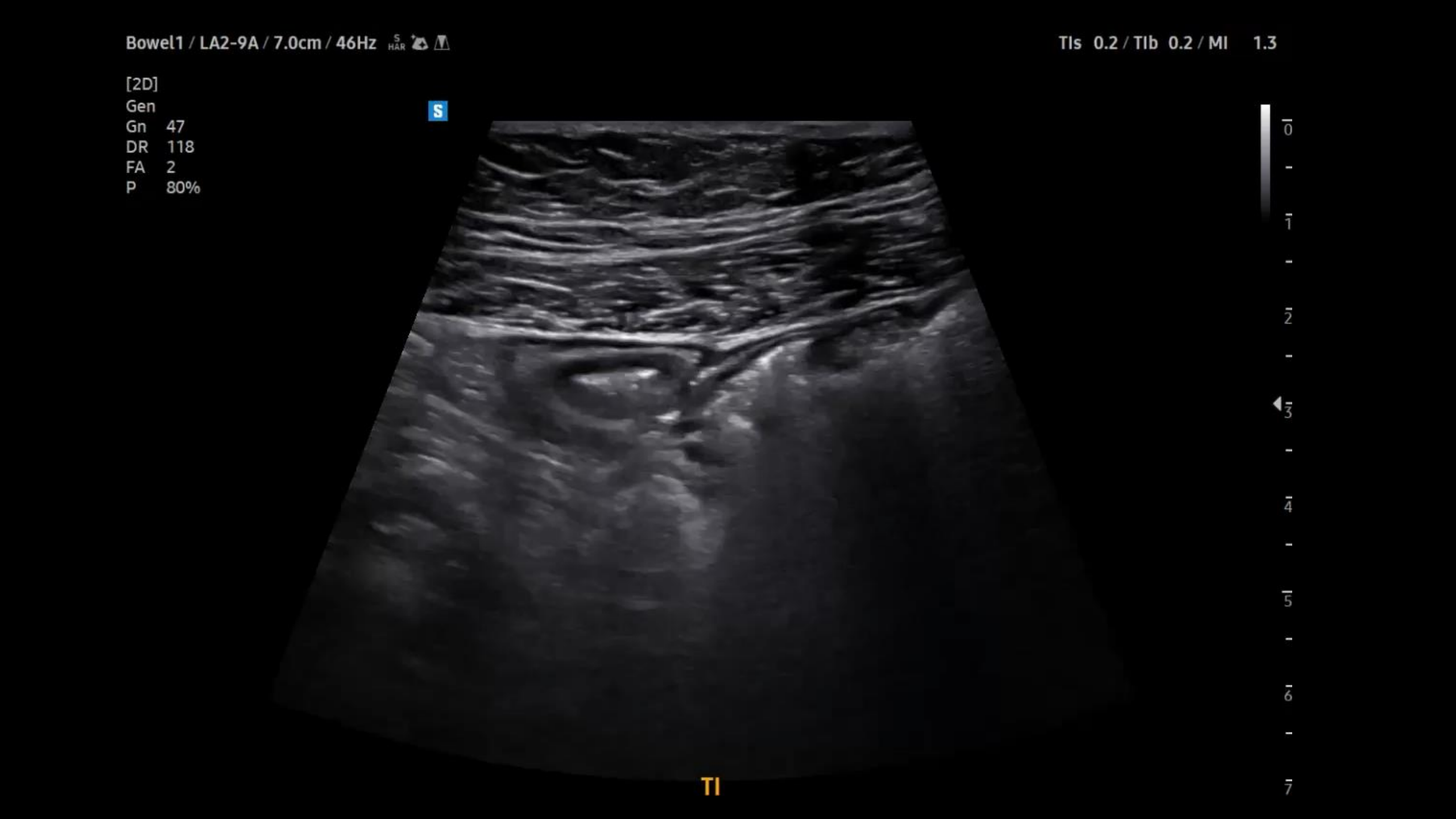
- The NTI BWT should be measured 1cm from the inlet to avoid estimations confounded by the surgical staple line.

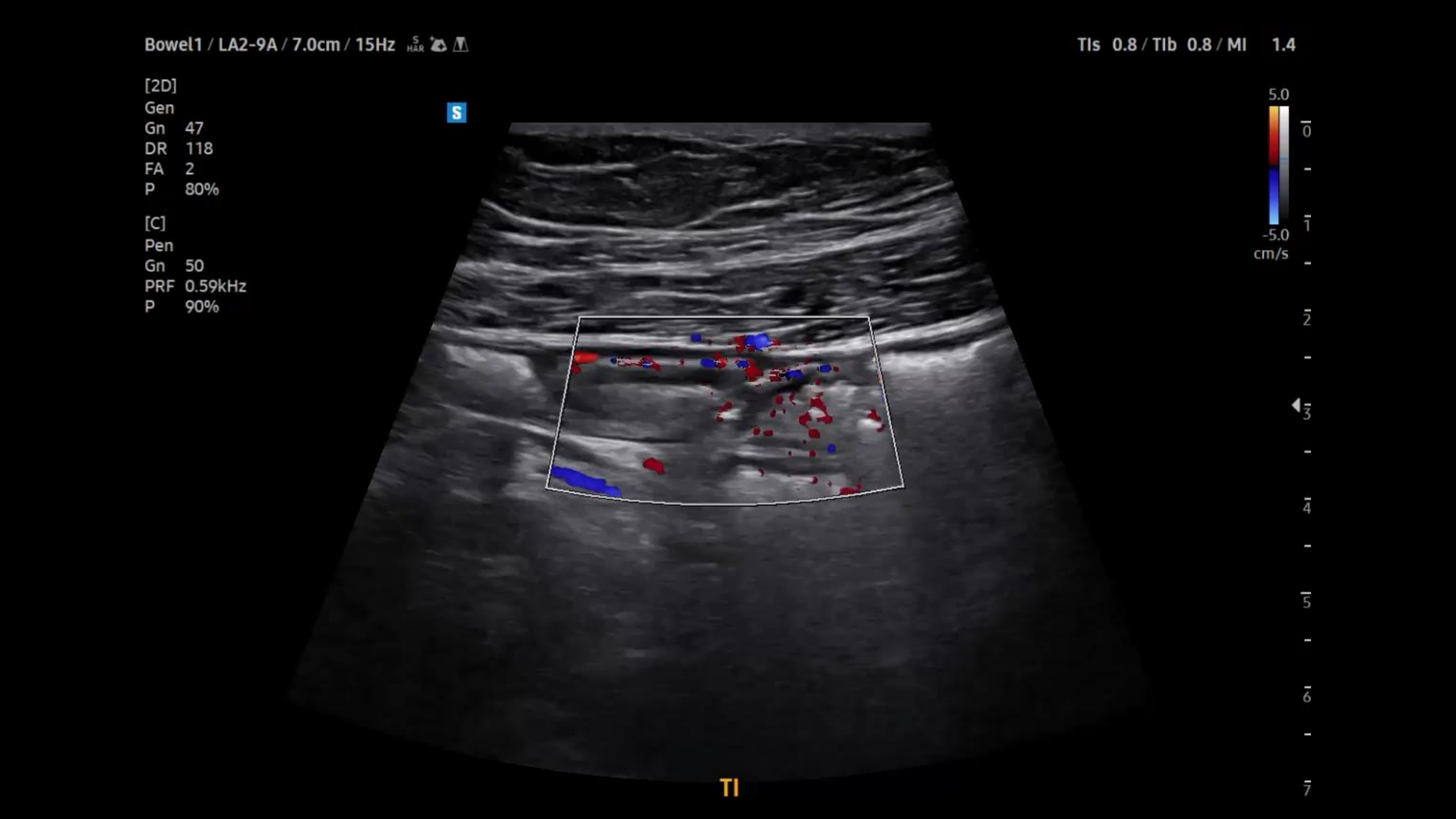
- Use of all standard parameters important (there is no currently validated postoperative activity score), including evaluation of complications (strictures using CONSTRICT guidelines).


Neoterminal ileum
BWT
staples
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


Bowel1 / LA2-9A / 7.0cm / 46Hz
TIs 0.2 / TIb 0.2 / MI 1.3
[2D]
Gen
Gn 47
DR 118
FA 2
P 80%
S
TI
0
1
2
3
4
5
6
7

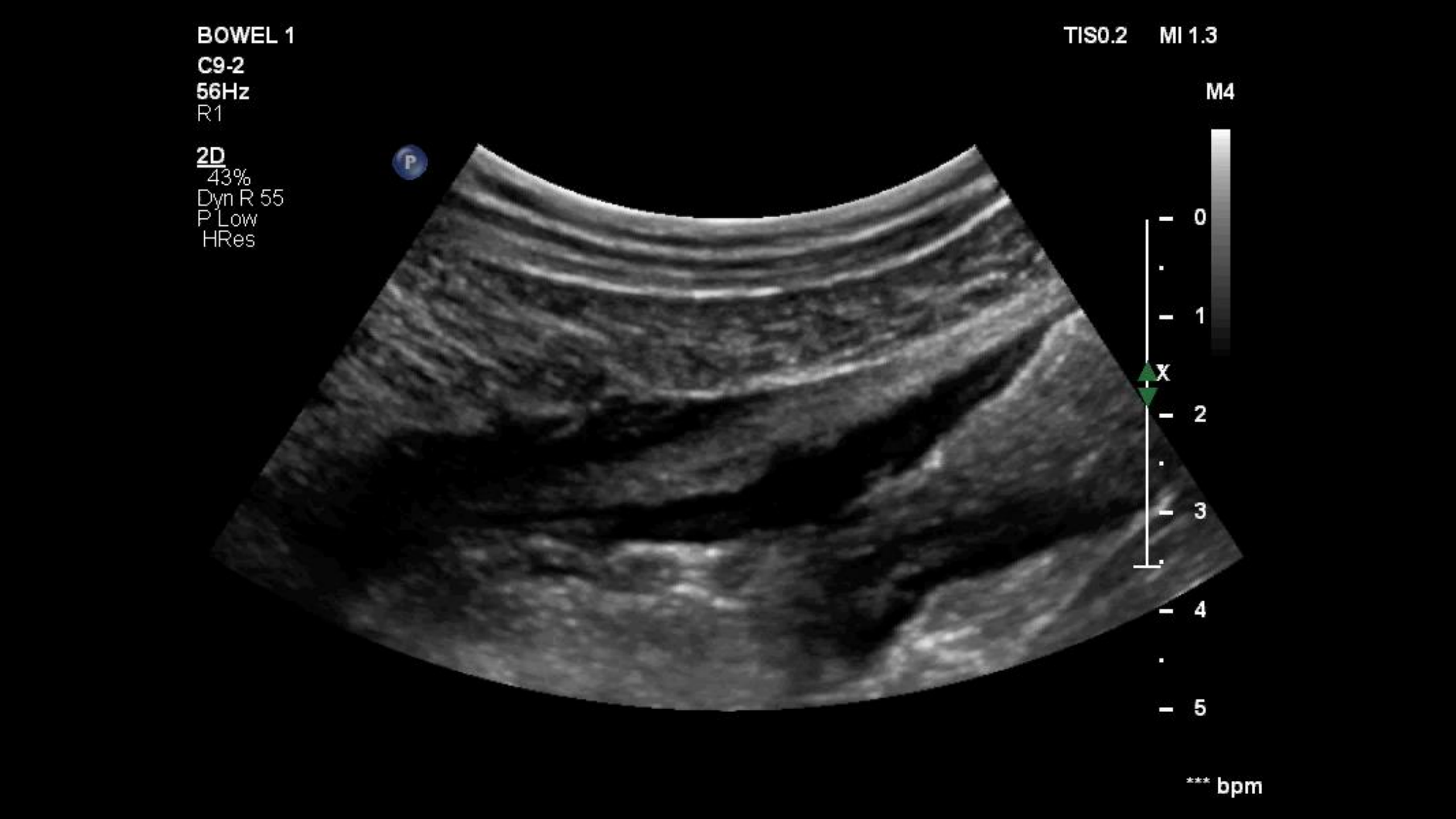

Bowel1 / LA2-9A / 7.0cm / 15Hz
TIs 0.8 / TIb 0.8 / MI 1.4
[2D]
Gen
Gn 47
DR 118
FA 2
P 80%
[C]
Pen
Gn 50
PRF 0.59kHz
P 90%
5.0
-5.0
cm/s
TI

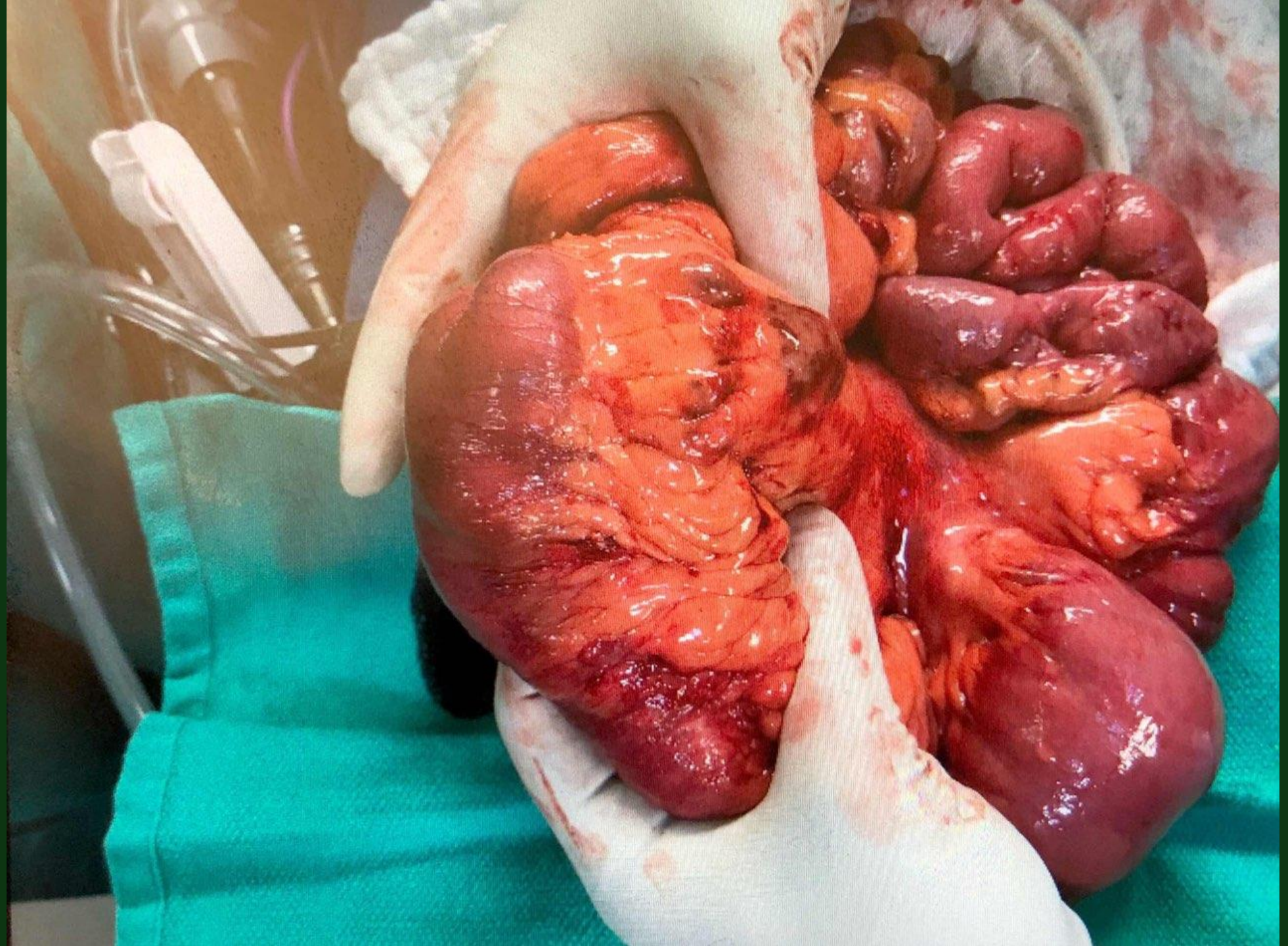
Case. MP

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)

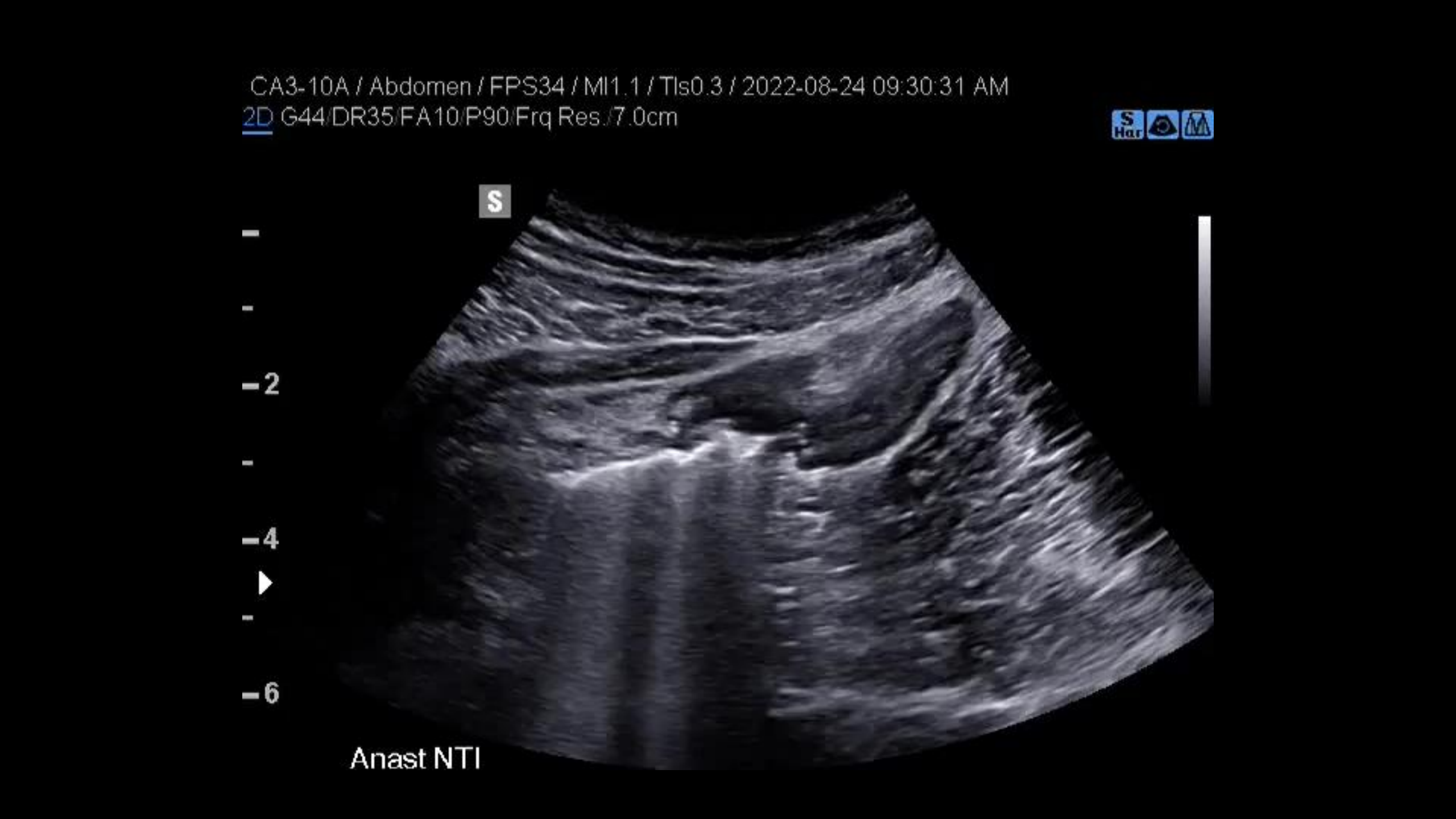
Follows up to discuss stopping IFX given recurrent viral infections

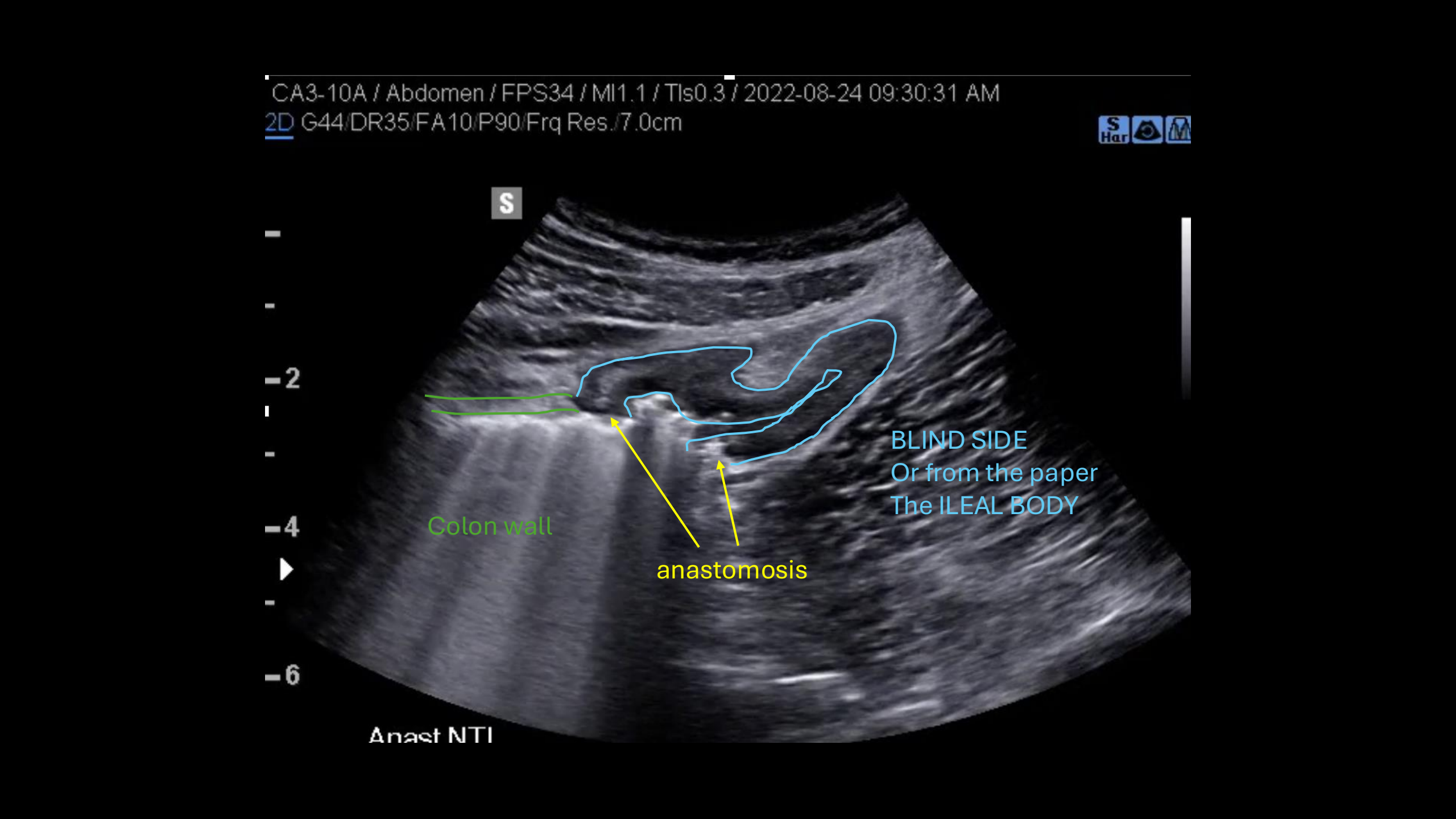
Blood work:

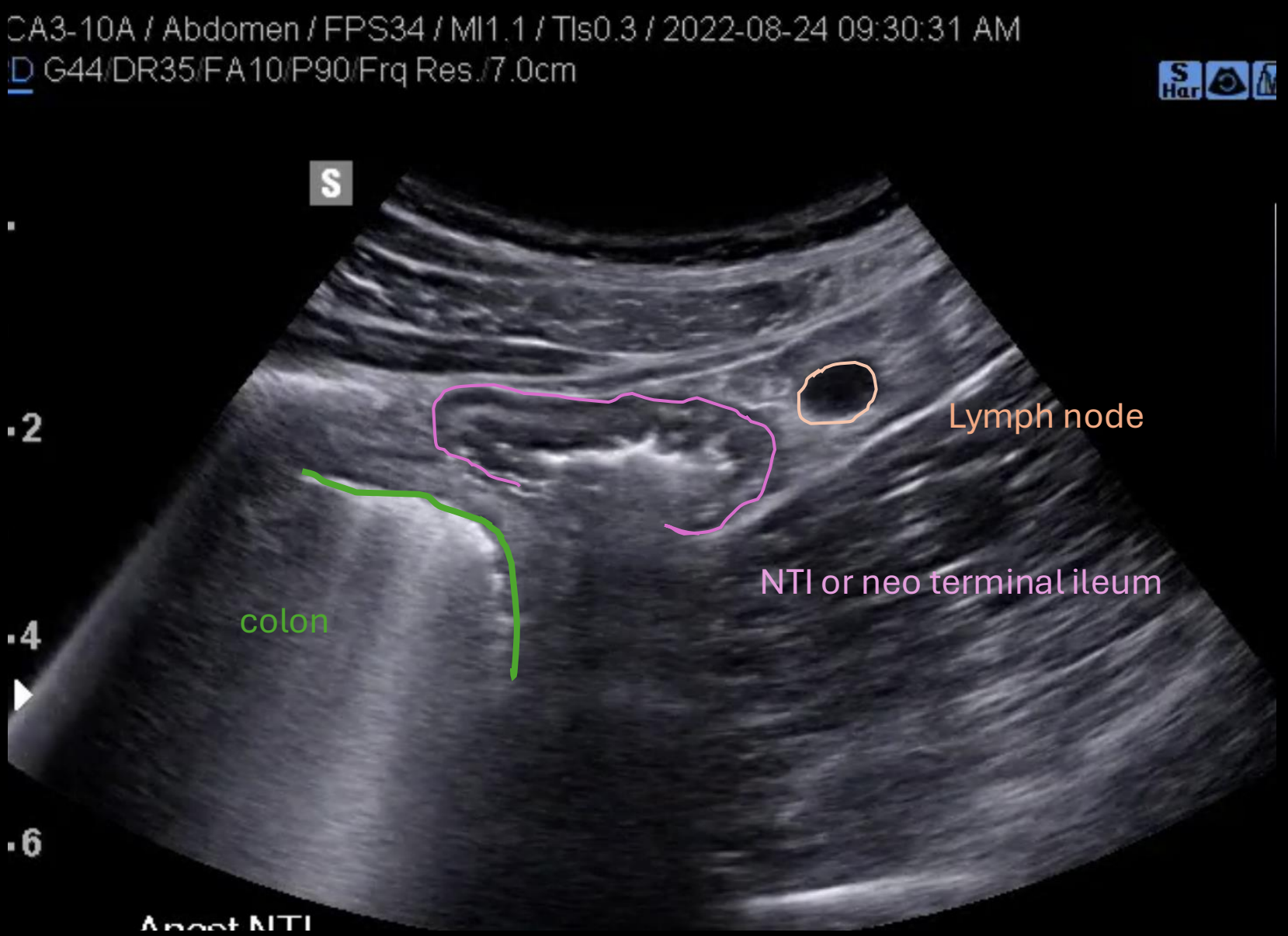
Ferritin is 18, Hb 142 MCV 85, plt 287, WBC 6.1

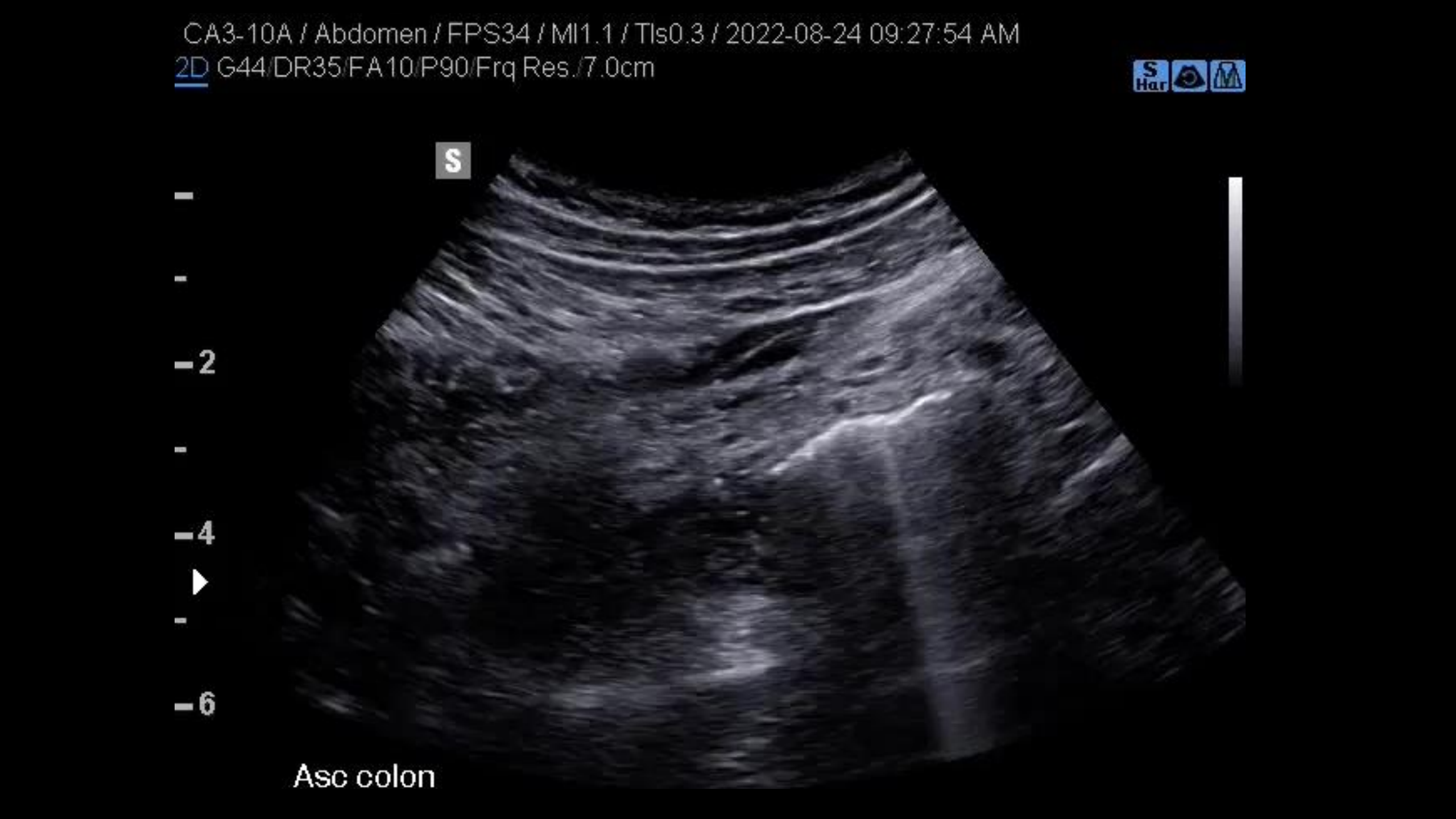
Cr, liver enzymes normal

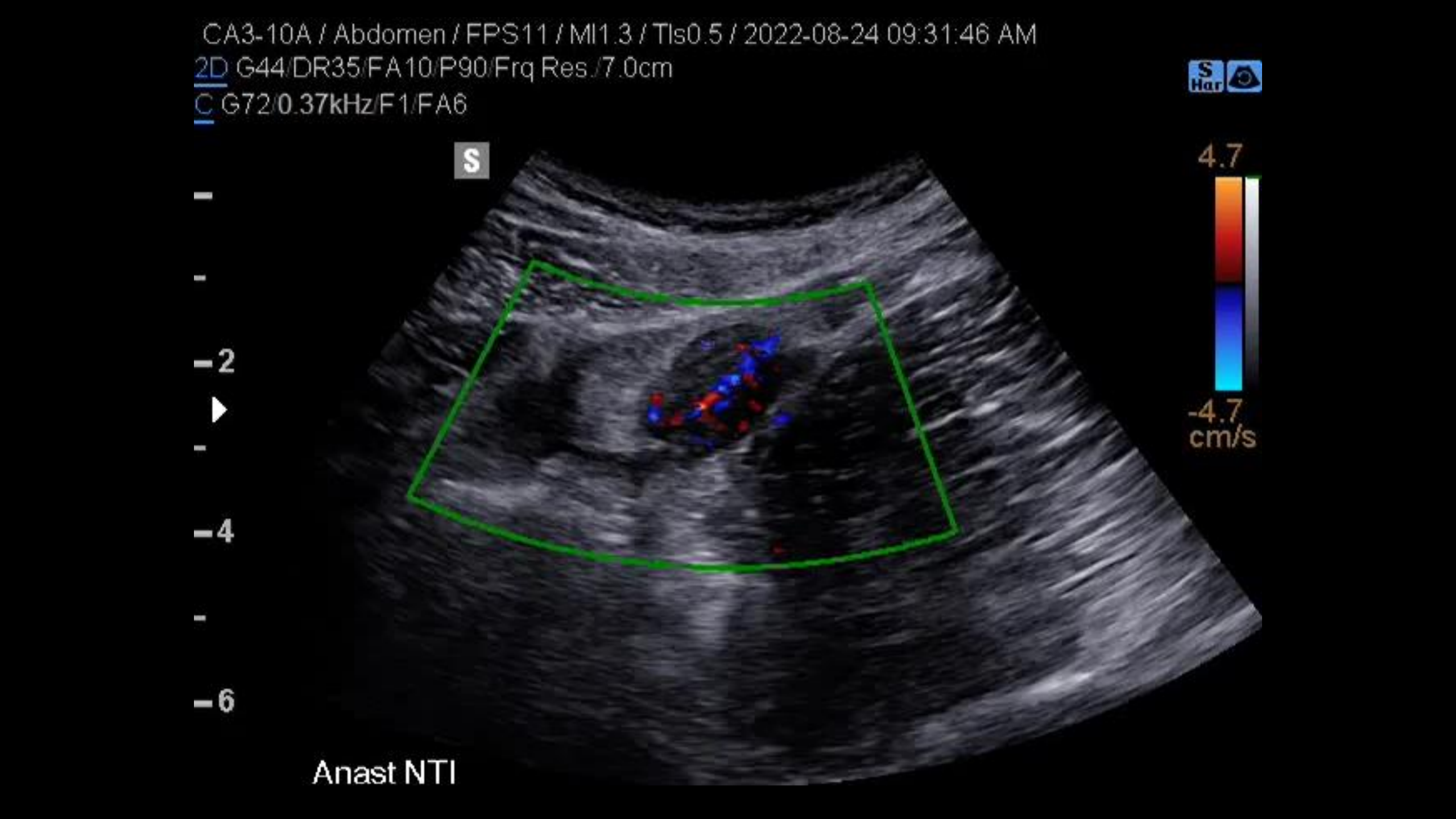
Fecal cal: pending

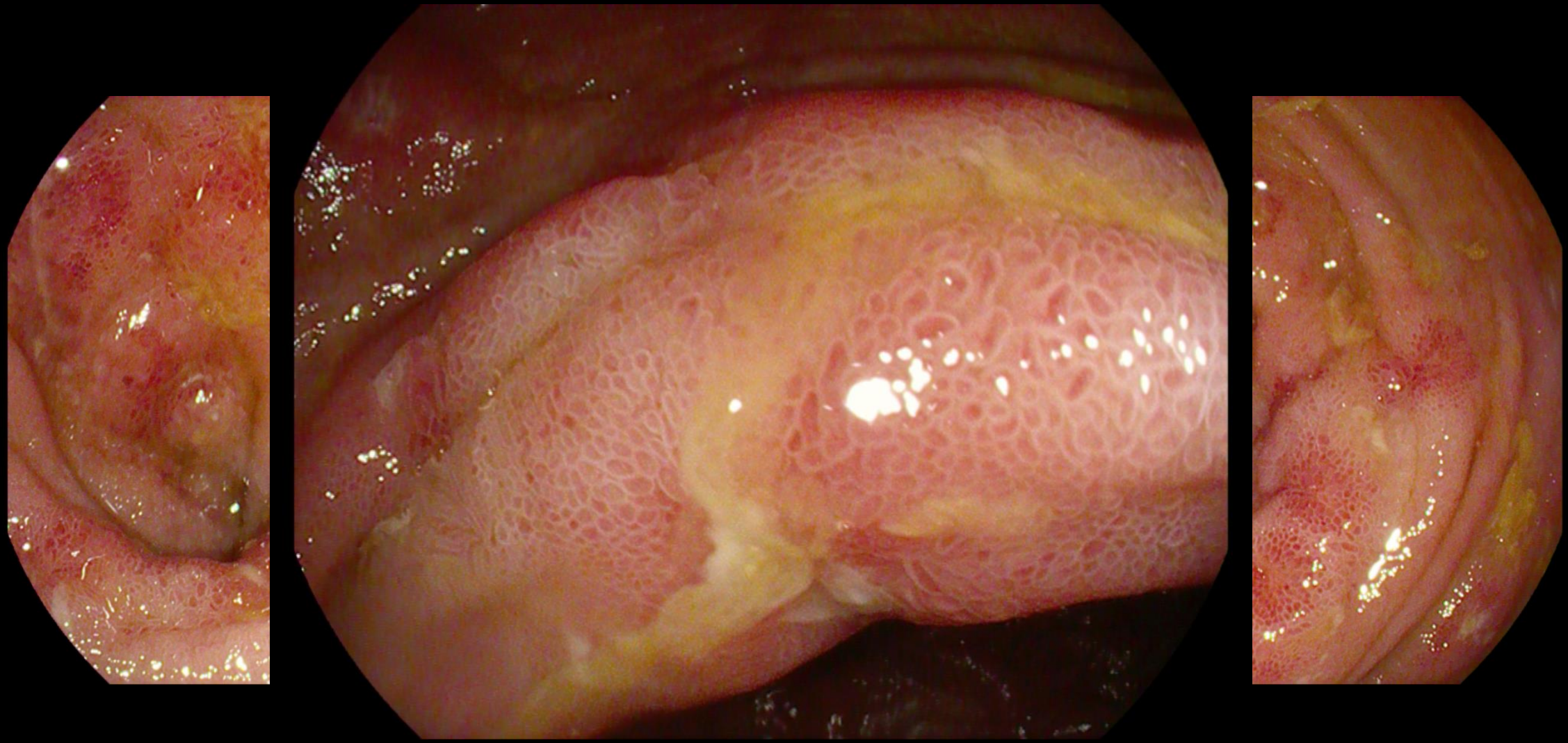

CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
2D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Anast NTI

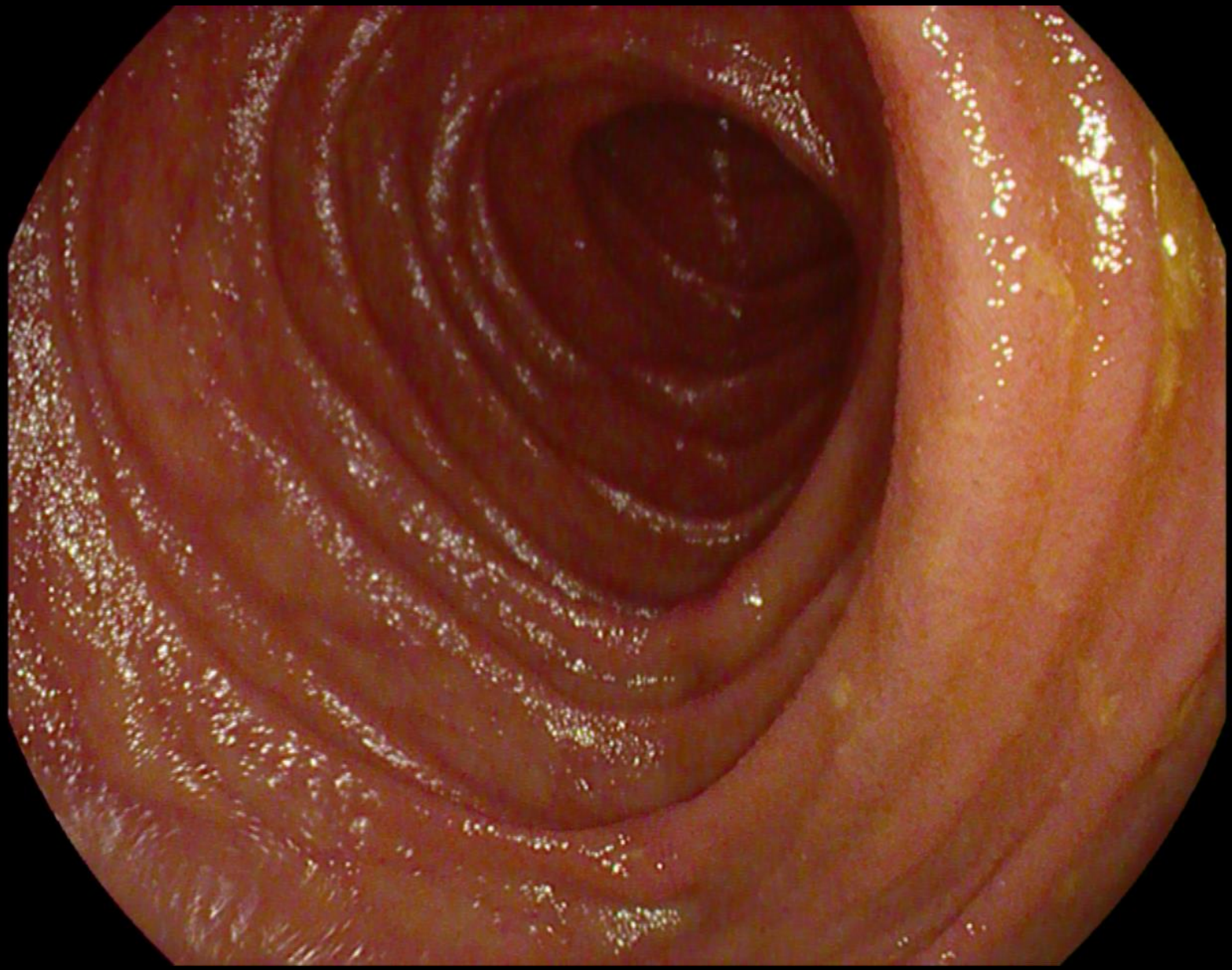

CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
2D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Colon wall
anastomosis
BLIND SIDE
Or from the paper
The ILEAL BODY
Anast NTI

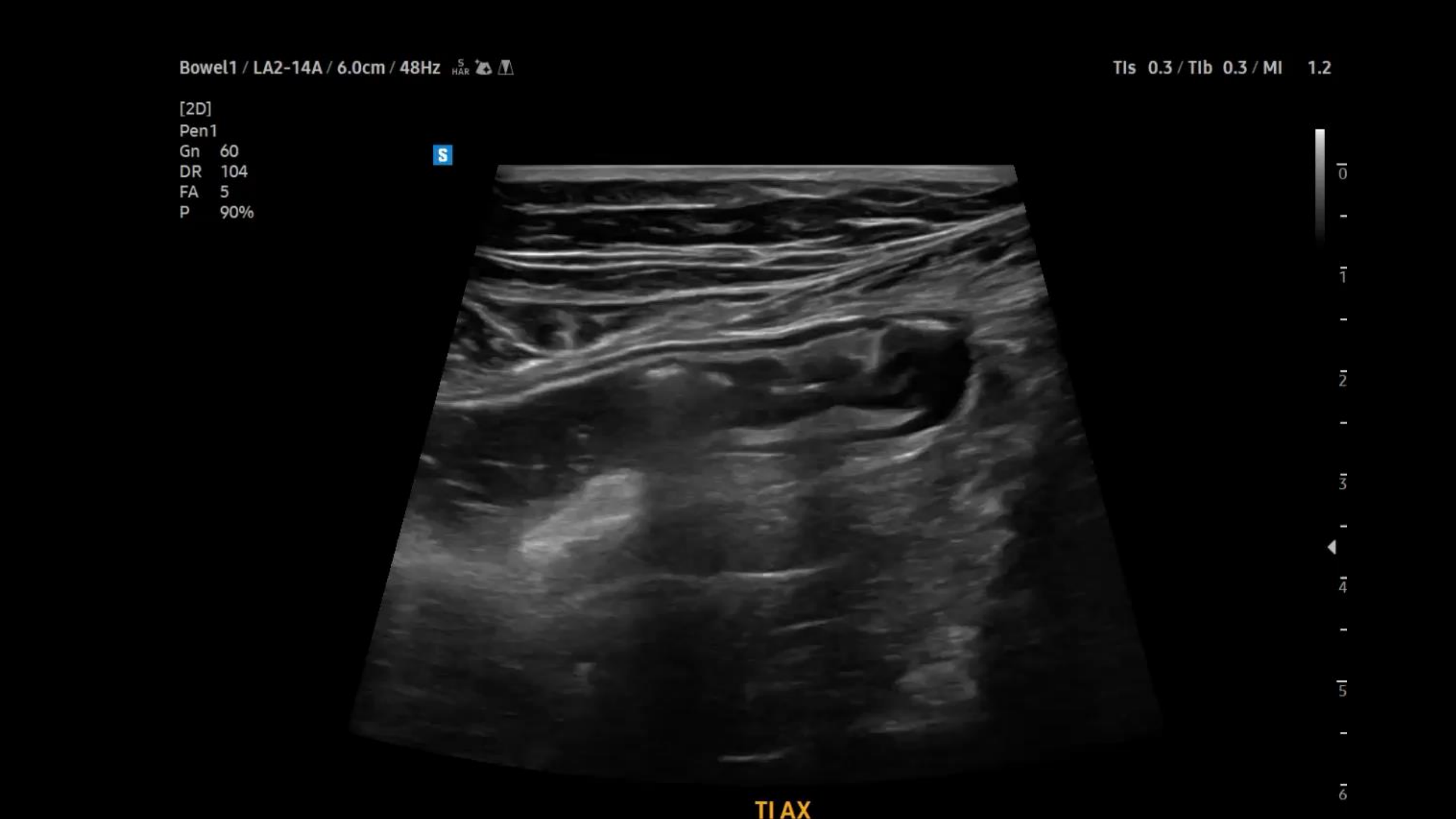

CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:30:31 AM
D G44/DR35/FA10/P90/Frq Res./7.0cm
S
2
4
6
Lymph node
NTI or neo terminal ileum
colon

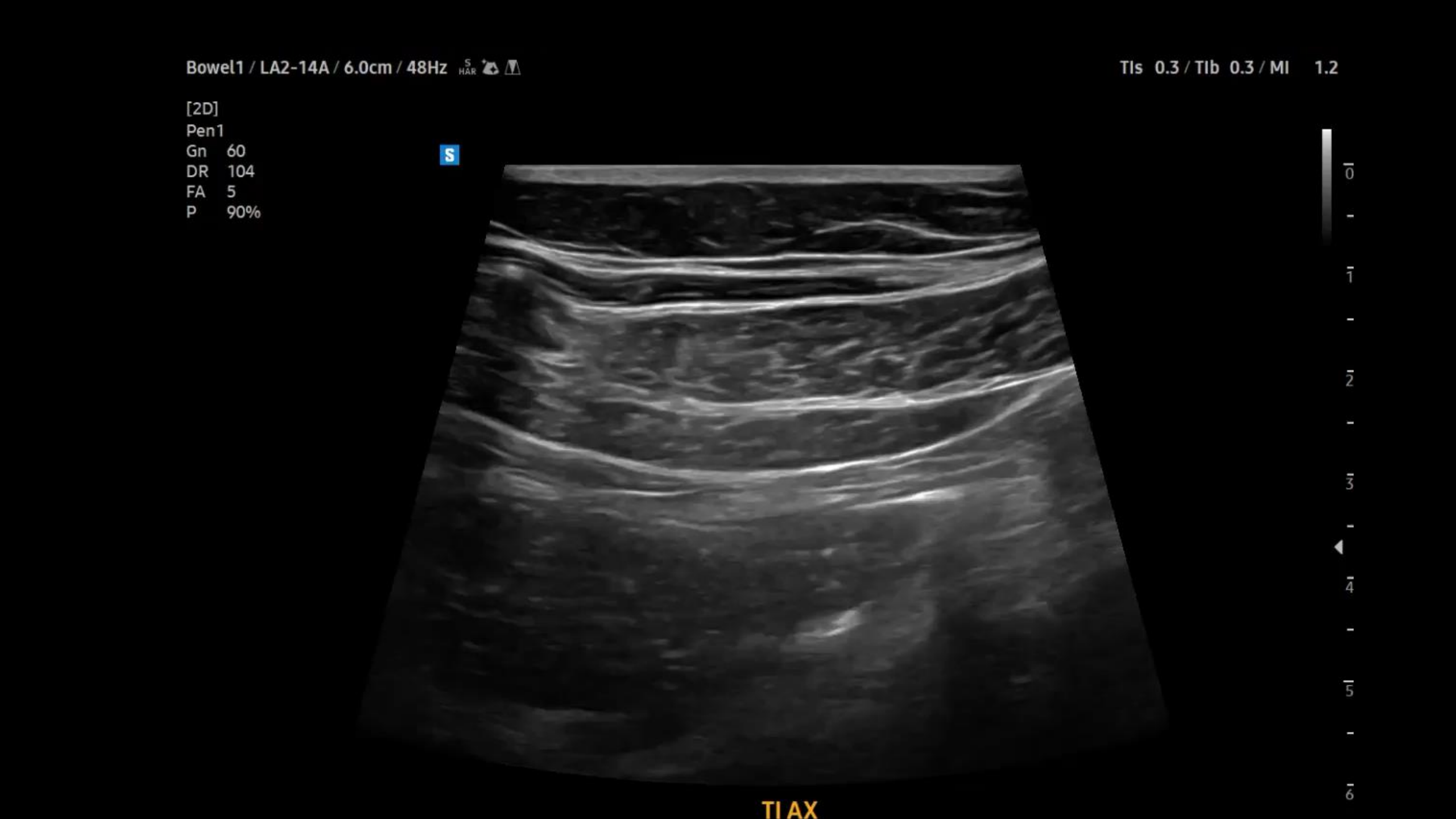

CA3-10A / Abdomen / FPS34 / MI1.1 / TIs0.3 / 2022-08-24 09:27:54 AM
2D G44/DR35/FA10/P90/Frq Res./7.0cm
S
Asc colon

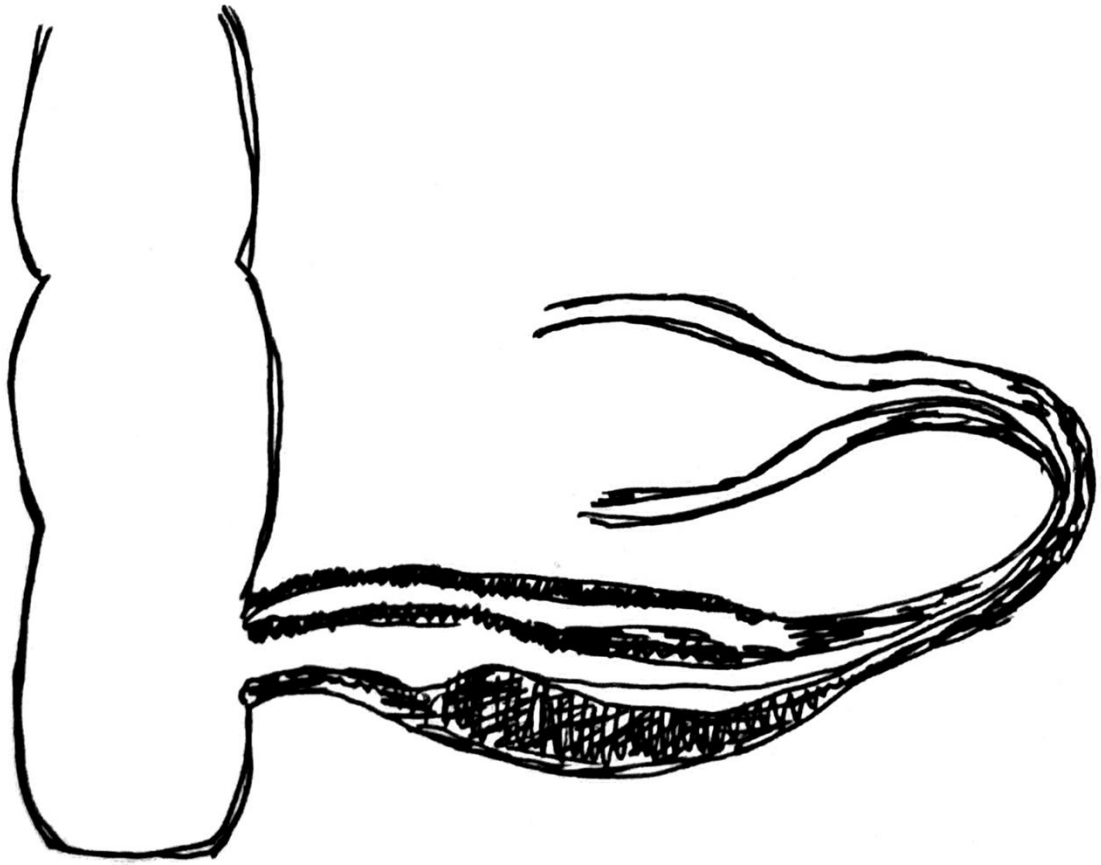

CA3-10A / Abdomen / FPS11 / MI1.3 / TIs0.5 / 2022-08-24 09:31:46 AM
2D G44/DR35/FA10/P90/Frq Res/7.0cm
C G72/0.37kHz/F1/FA6
S
4.7
-4.7
cm/s
2
4
6
Anast NTI



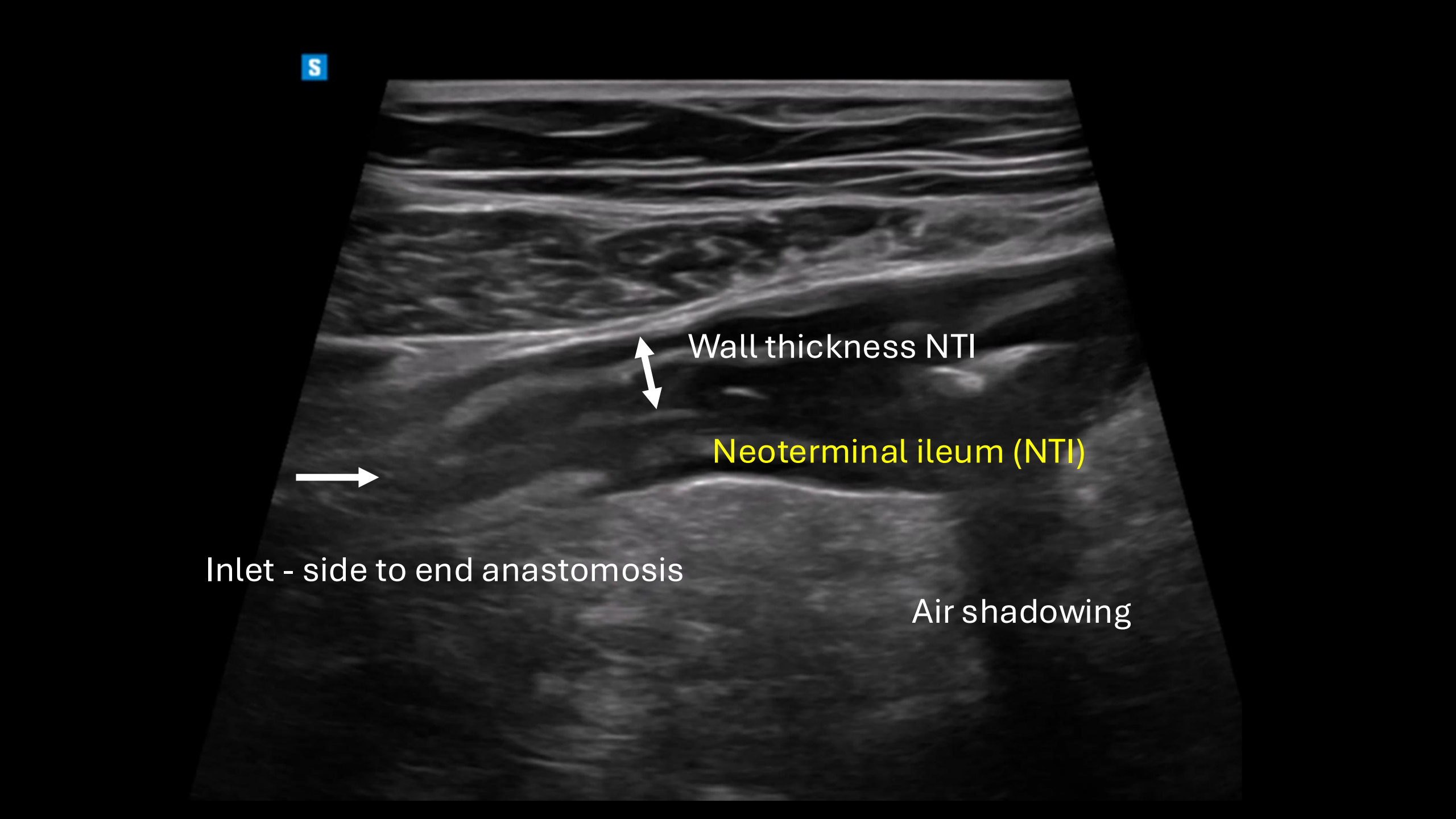


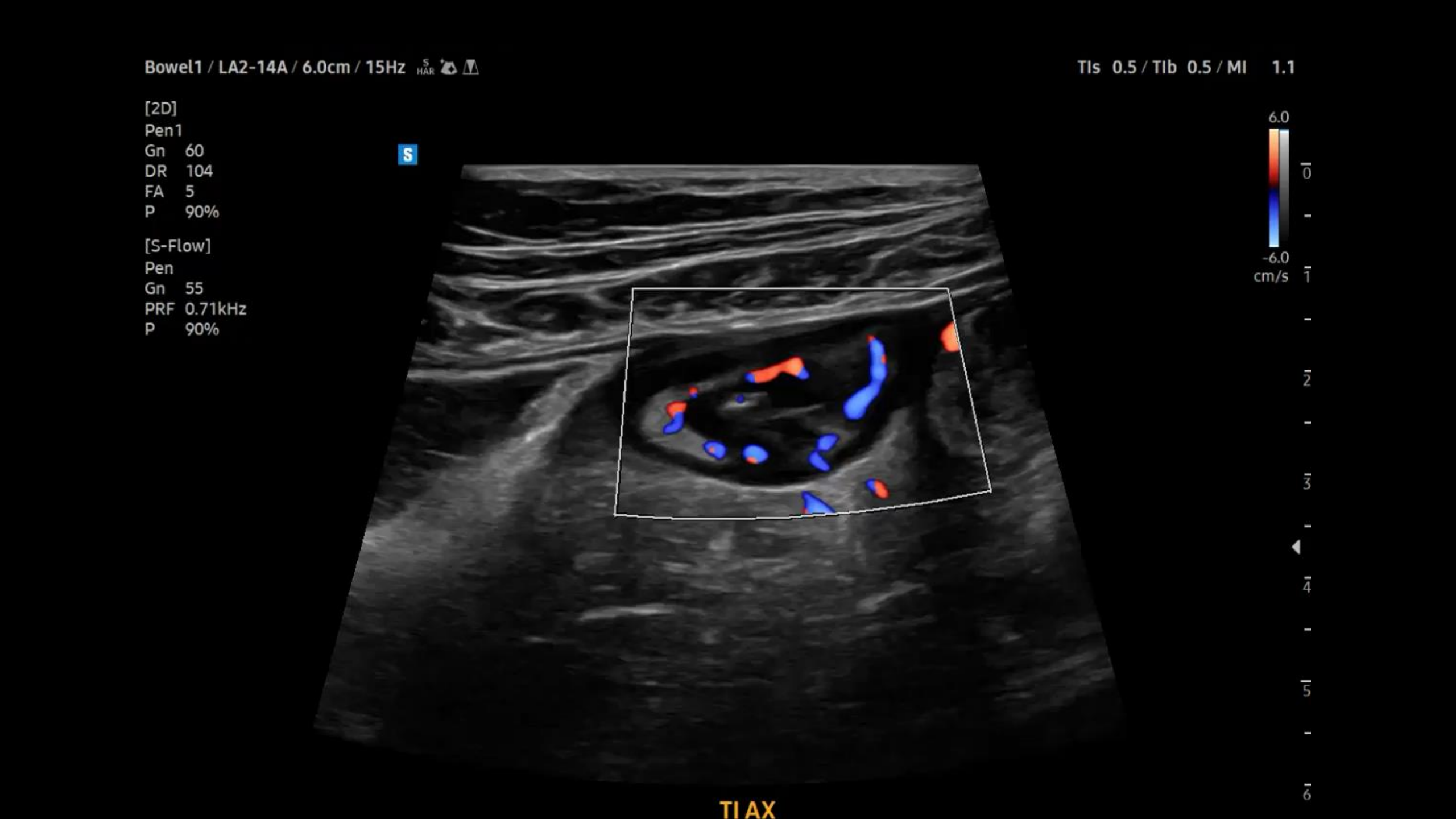

Bowel1 / LA2-14A / 6.0cm / 48Hz
TIs 0.3 / TIb 0.3 / MI 1.2
[2D]
Pen1
Gn 60
DR 104
FA 5
P 90%
TI AX

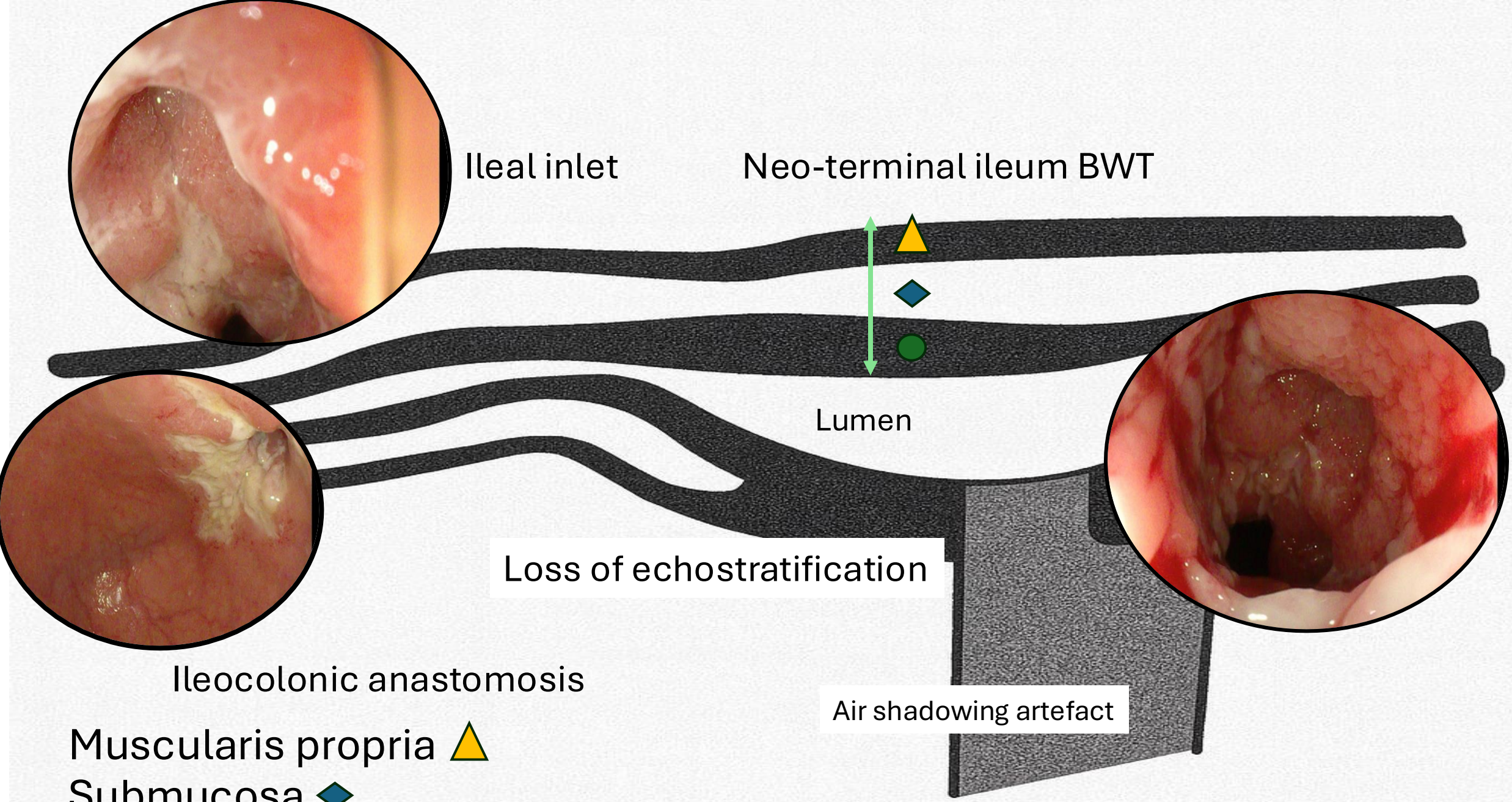

Bowel1 / LA2-14A / 6.0cm / 48Hz
TIs 0.3 / TIb 0.3 / MI 1.2
[2D]
Pen1
Gn 60
DR 104
FA 5
P 90%
TI AX



SIDE TO END anastomosis


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

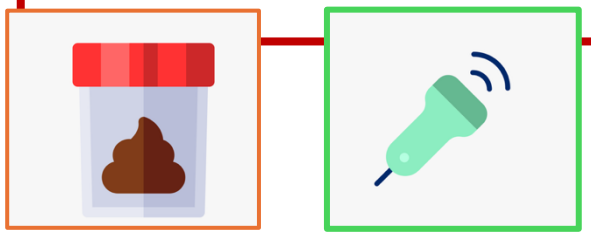

Bowel1 / LA2-14A / 6.0cm / 15Hz
TIs 0.5 / TIb 0.5 / MI 1.1
[2D]
Pen1
Gn 60
DR 104
FA 5
P 90%
[S-Flow]
Pen
Gn 55
PRF 0.71kHz
P 90%
6.0
-6.0
cm/s
TI AX


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

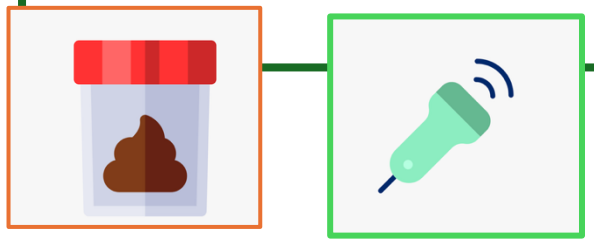

Team
Success
IDEA

Personalized Pre-operative RISK STRATIFICATION

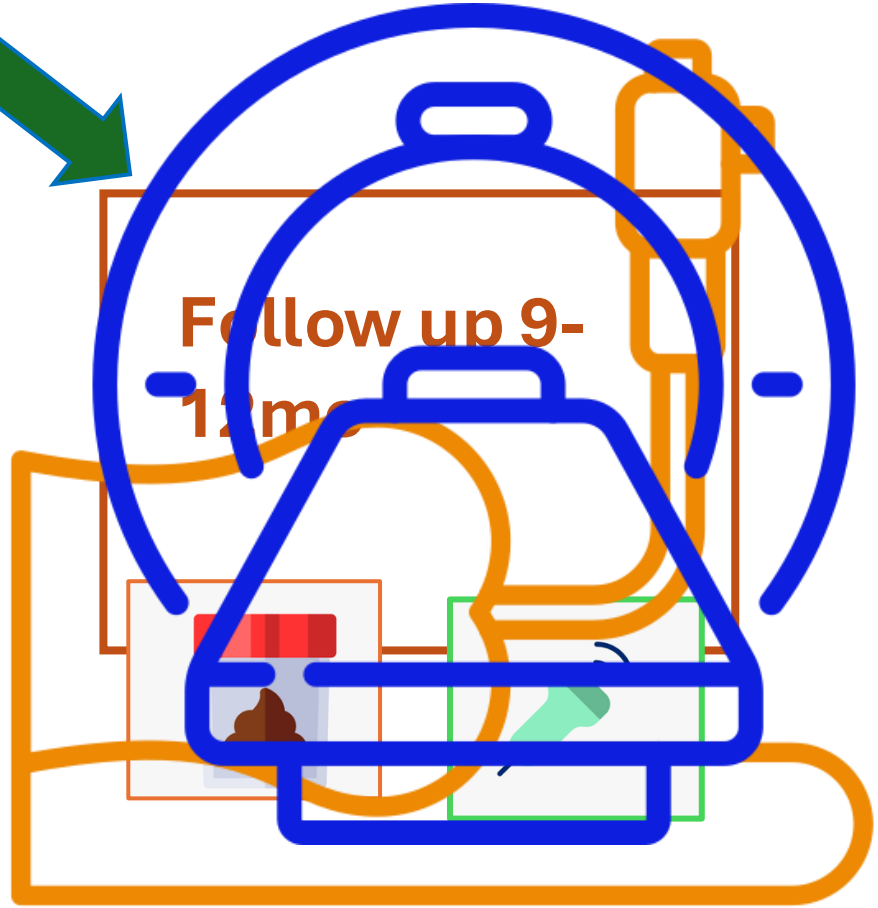
≤12wks
? Early Leak/ complications



12 weeks t0 6months
Risk stratified - EARLY if high risk



Follow up 9-12mo



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