

Review of Abnormal Findings/Complications in IUS

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University of Chicago
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Objectives

Understand

Primary indications for IUS in IBD

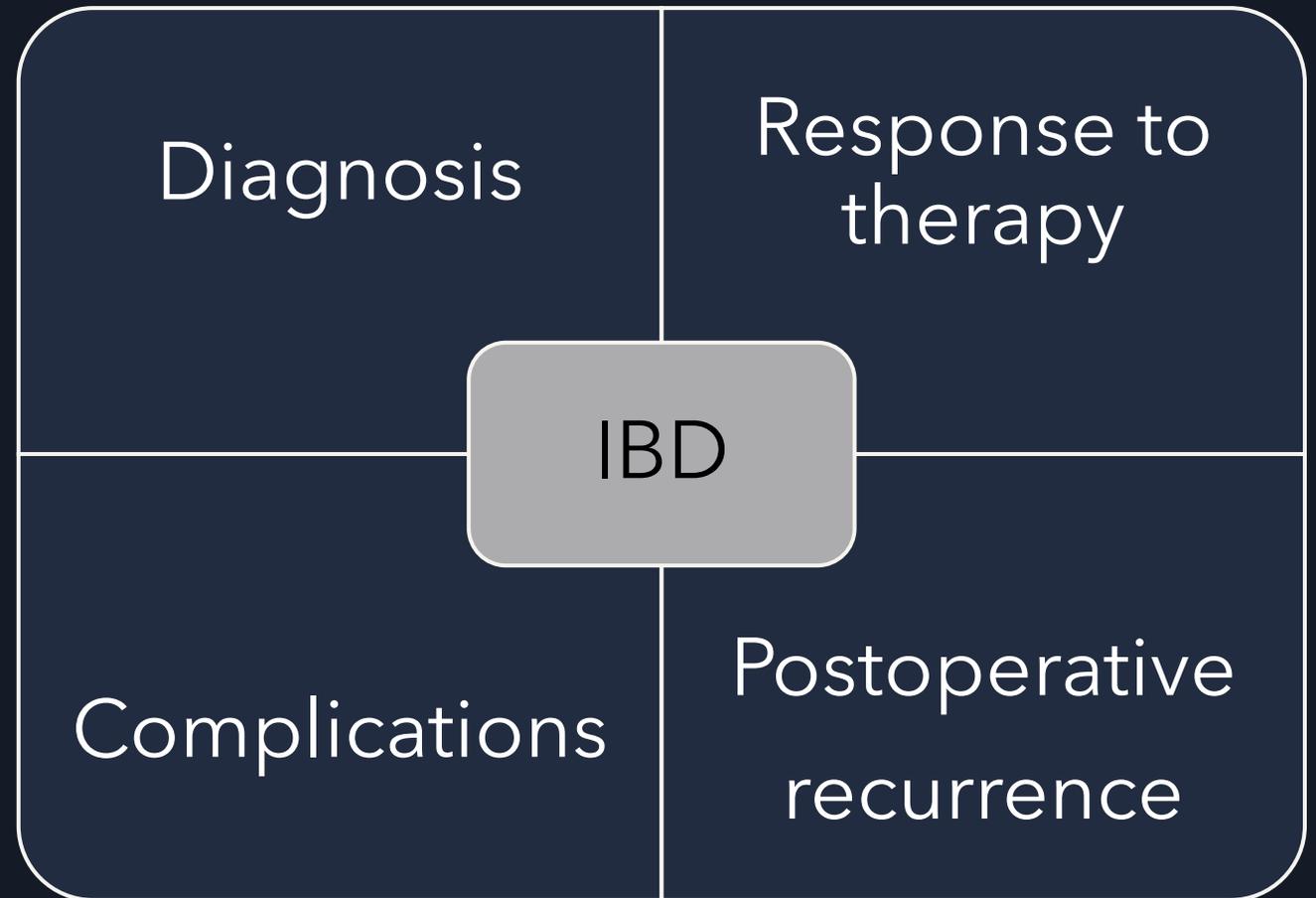
Recognize Intramural Findings

Bowel wall thickening (BWT)
Bowel wall vascularization
Bowel wall stratification
Loss of small bowel motility
Loss of large bowel haustrations

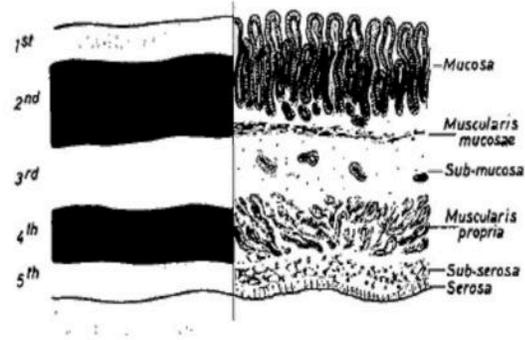
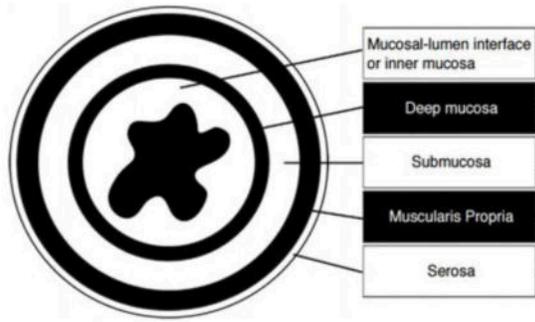
Recognize Extramural Findings

Mesenteric fat
Lymph nodes
Free fluid
Complications: Stricture, fistula and abscesses

Primary Indication for IUS in IBD



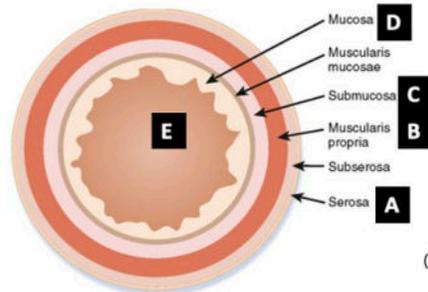
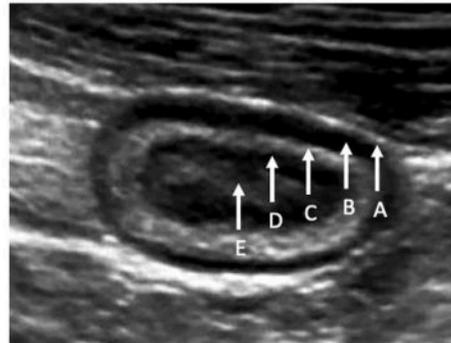
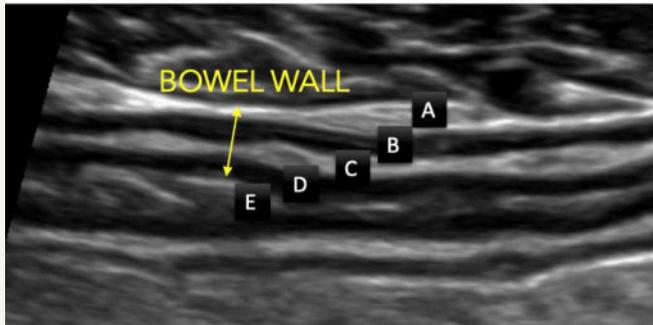
- 5 distinct sonographic layers



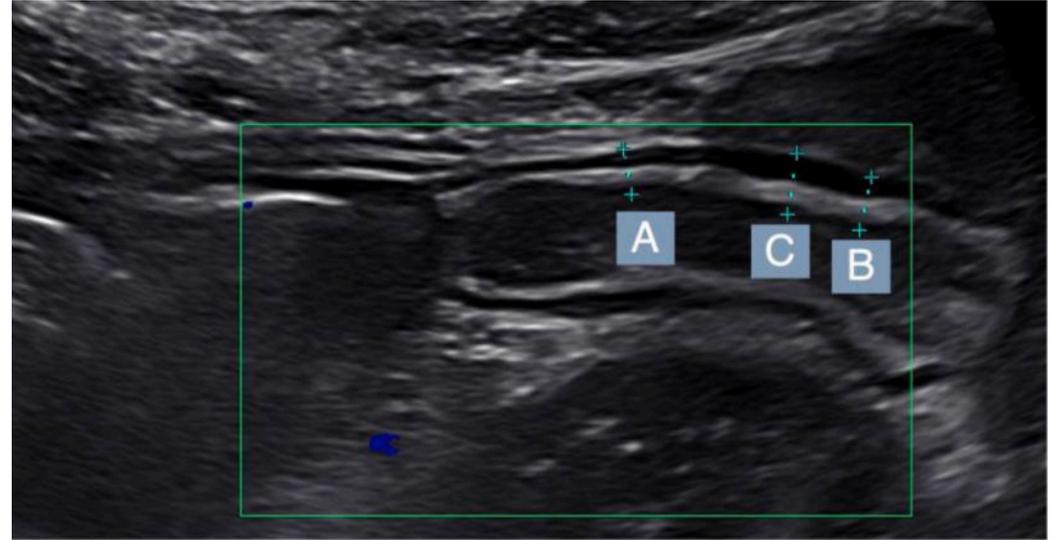
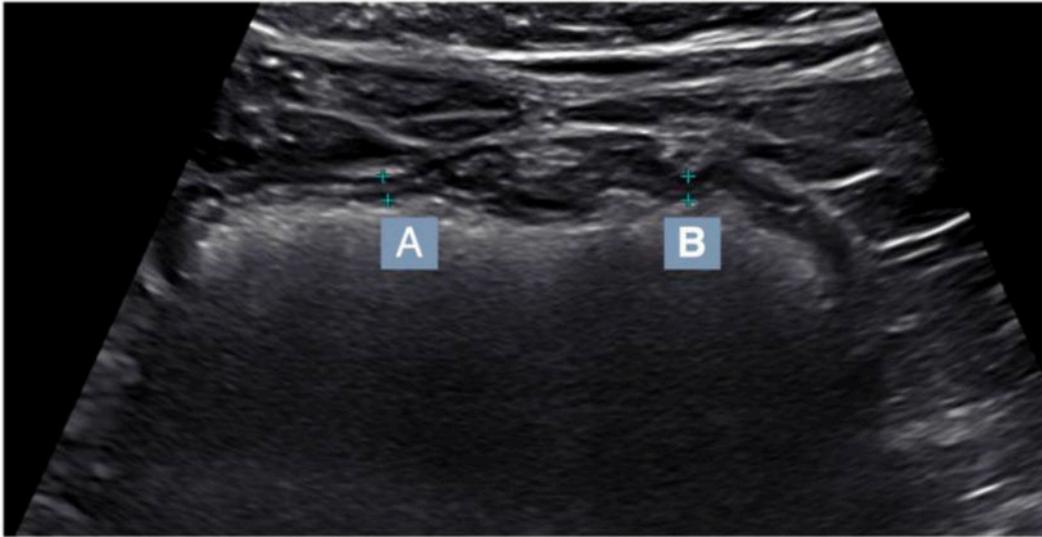
Courtesy of Dr. Carolina Palmela, Loures

Wilson SR et al. *Diagnostic Ultrasound*, Mosby 2010; Nylund et al. *Scand J Gastroenterol* 2008

Bowel Wall Thickness (BWT)



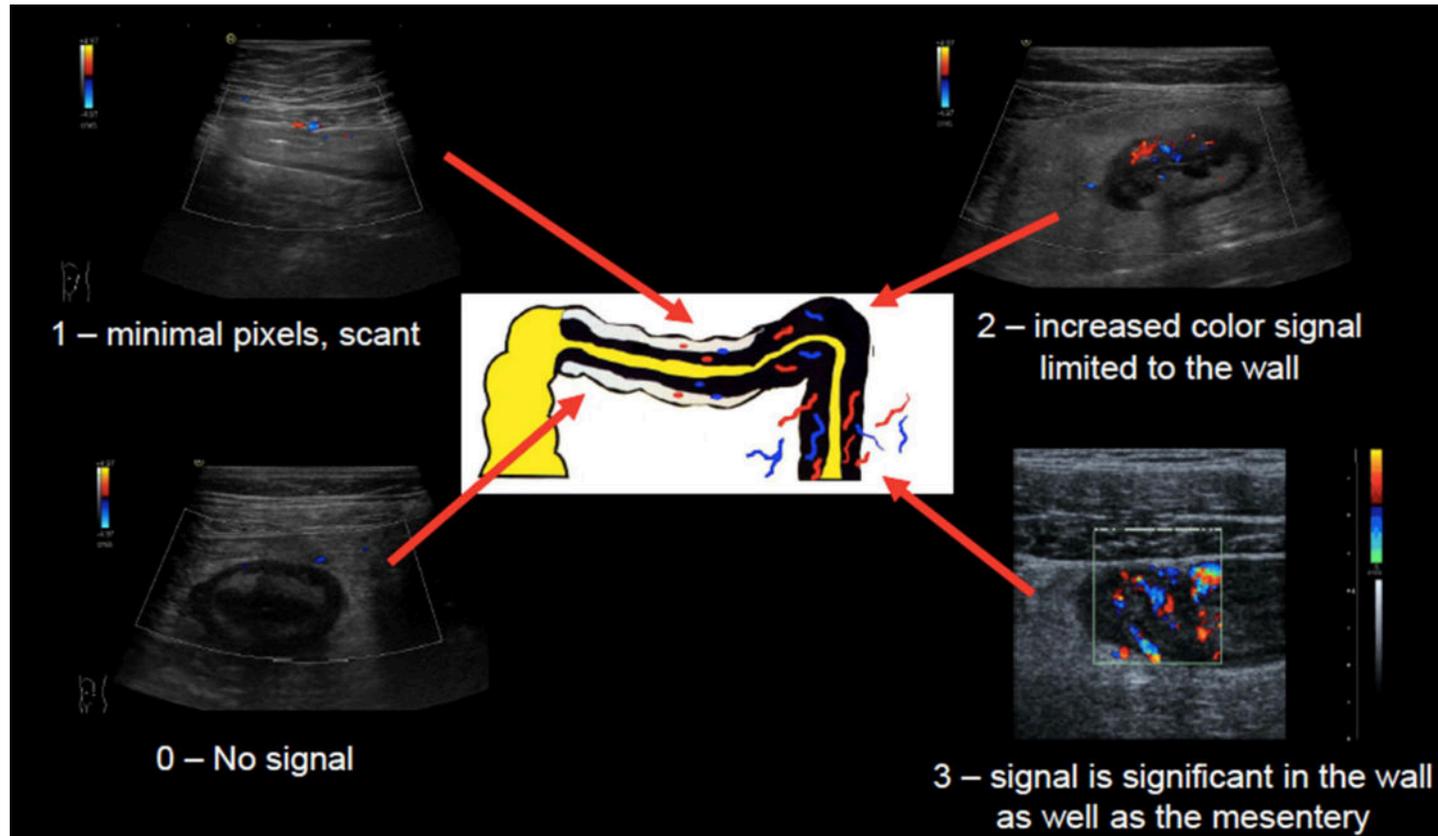
(Slide courtesy of Dr. Kenneth Ernest-Suarez)



*BWT:
Optimize the
image*

- Avoid gas artifacts & folds
- Measure perpendicular to the folds
- Thickness from luminal apposition to the muscularis-serosal interface

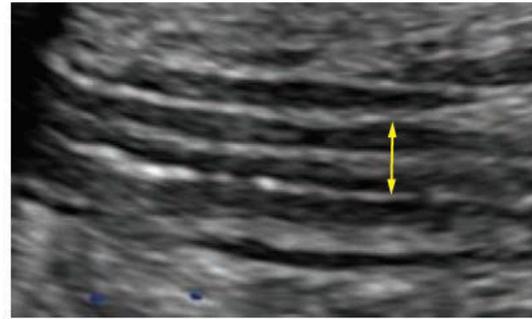
Bowel Wall Vascularization (Hyperemia)



- Detects small vessel blood flow central to inflammation
- Set 4-7cm/s
- Modified limberg score
- Affected by corticosteroid use

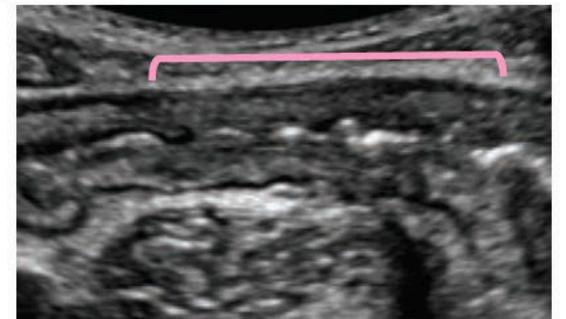
Bowel Wall Stratification (BWS)

A



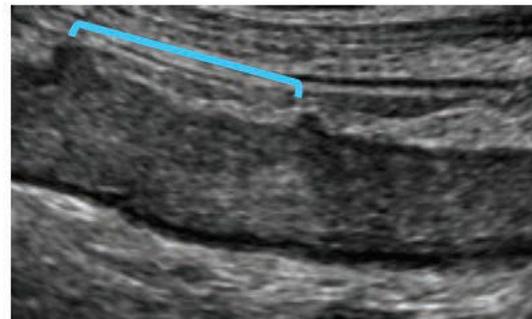
Stratification: normal
IBUS-SAS score 0

B



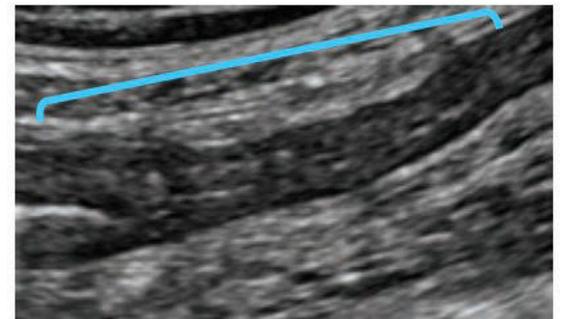
Stratification: uncertain
IBUS-SAS score 1

C



Loss of stratification
IBUS-SAS score 2 (focal)

D



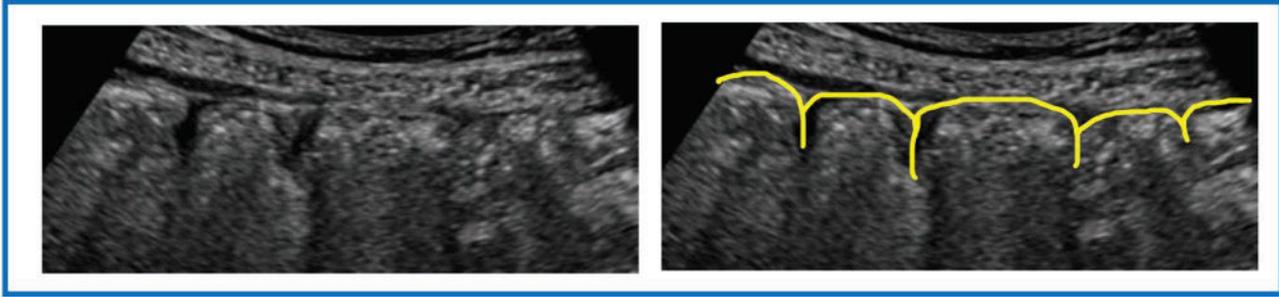
Loss of stratification
IBUS-SAS score 3 (extensive)

Small bowel motility

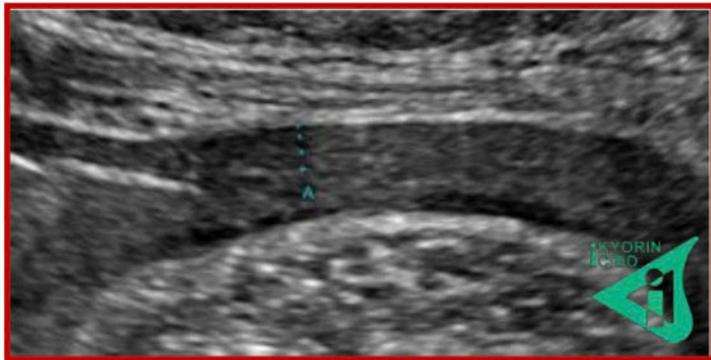
- Increased after meals
- Decreased in stricturing disease (both inflammatory and fibrotic)
- Can give miralax 375ml 30-40mins prior to scans to optimize assessment



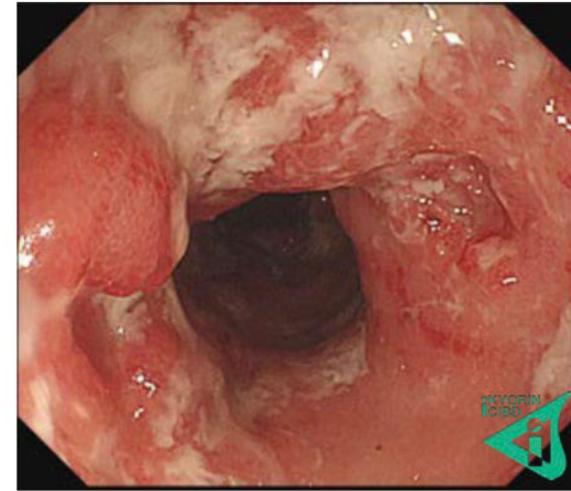
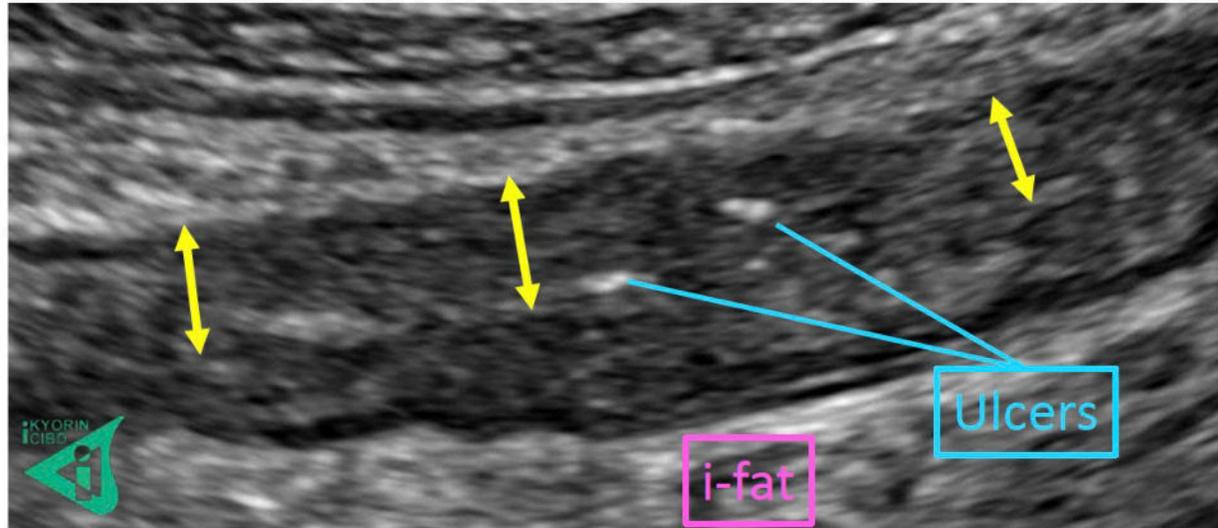
Normal



Active UC



Haustral Structure



Deep ulcers

- Thickened BW
- Loss of BWS
- Abnormal haustration in the colon

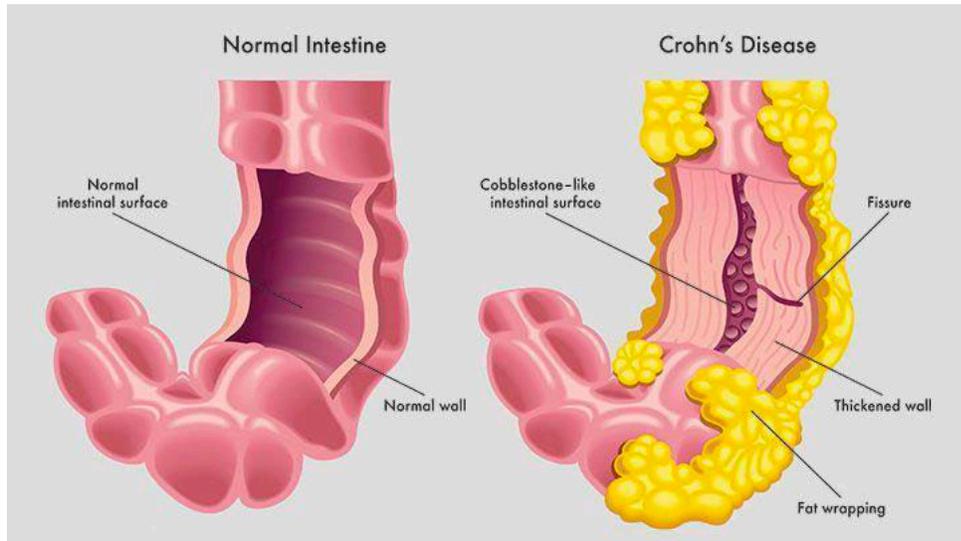
Extramural Findings

Mesenteric fat

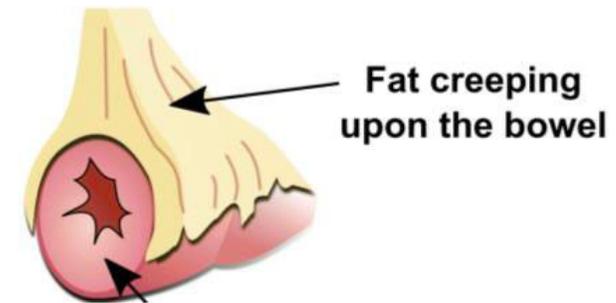
Lymph nodes

Free fluid

Complications:
Stricture, fistula,
abscesses



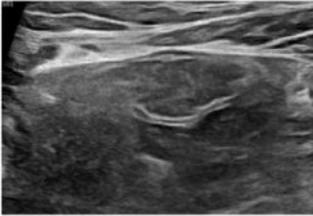
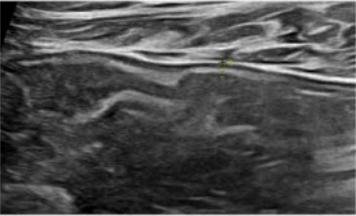
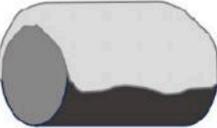
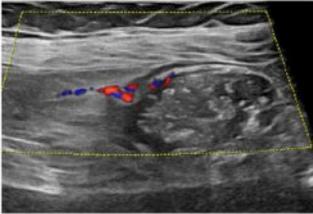
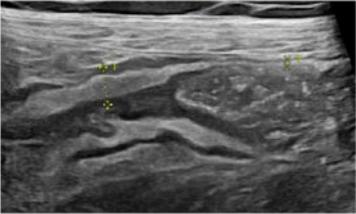
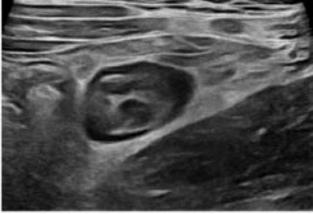
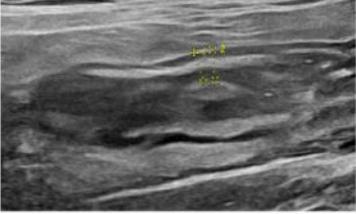
Creeping fat



Sualet al. JCC 2022;Sept 16: 472
Eder P et al. Cells 2019;8(6), 628

Mesenteric Fat

- Protective
- Metabolically active depot that drives systemic and intestinal inflammation via cytokine and adipokine signaling

Mesenteric fat wrapping	Schematic	Cross-sectional	Longitudinal
<p>None Absence or minimal (<25%) fat wrapping</p>			
<p>Incomplete Incomplete circumferential, with skipped areas along the TI</p>			
<p>Complete Circumferential wrapping, continuous along the TI</p>			

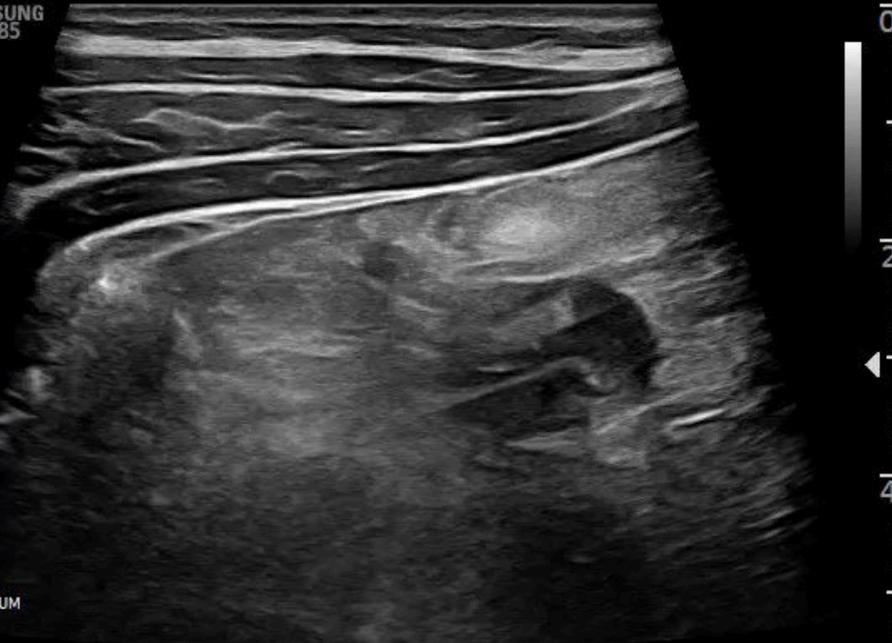
Mesenteric fat

Hyperechogenicity = i-fat

Musculoskeletal / SW Bowel / LA2-14A / FPS40 / 5.5cm / MI1.3 / TIs0.3 / 07-15-2024 08:46:06 AM
[2D] Frq Gen. / GN 61 / DR 45 / FA 10 / P100



SAMSUNG
RS85



TERMINAL ILEUM

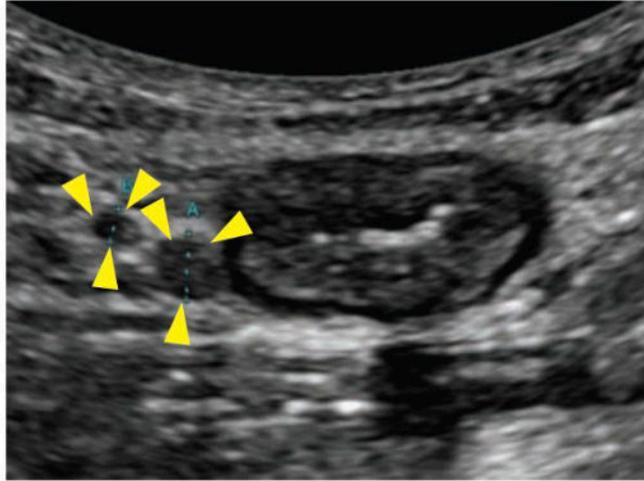
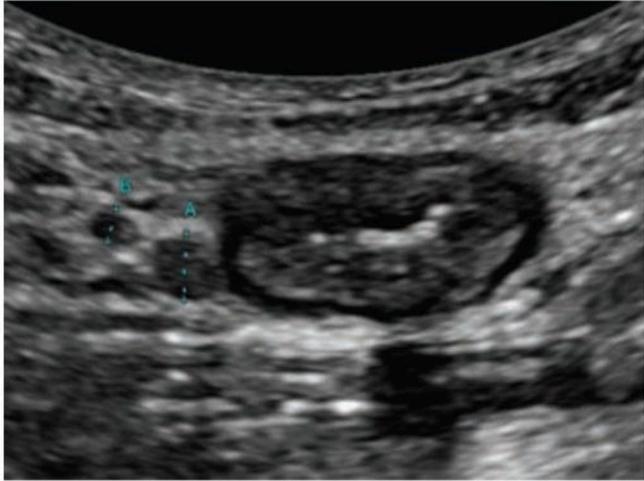
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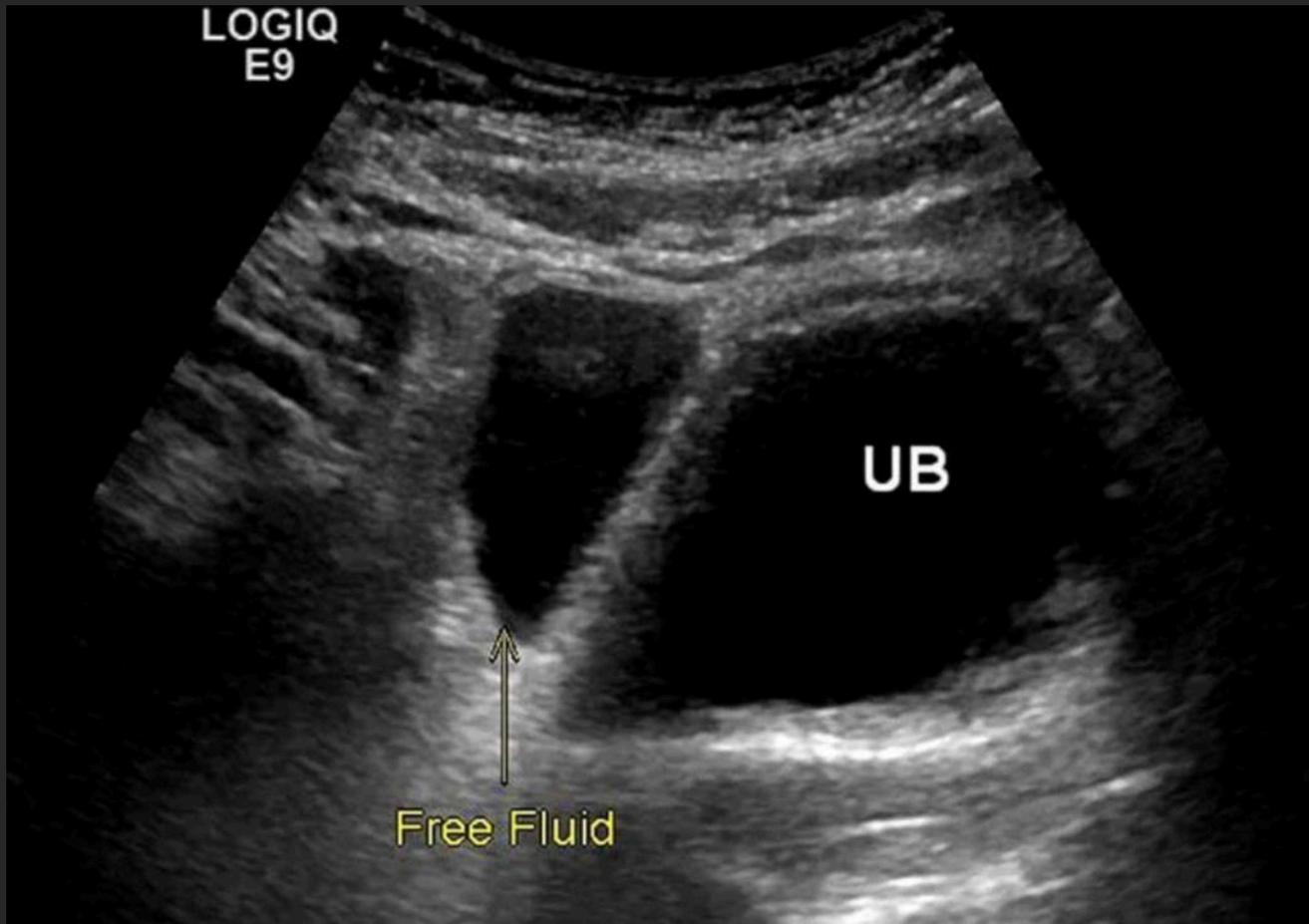
SAMSUNG
RS85



TERMINAL ILEUM



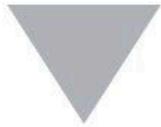
Pericolic lymph nodes



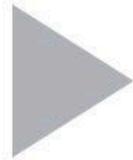
Free fluid

- Anechoic or hypoechoic fluid between bowel loops, paracolic gutters or pelvis
- Small physiological amounts can be normal
- Larger, echogenic or loculated=abnormal (evaluate for penetrating disease)

BWT (<3 mm)
(Rectum <4 mm)



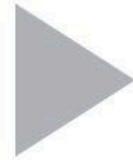
Echostratification
(+)



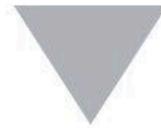
Inflammatory
Fat(-)



Doppler Color
(-)



Lymph Nodes (-)



Complications
(-)



Complications

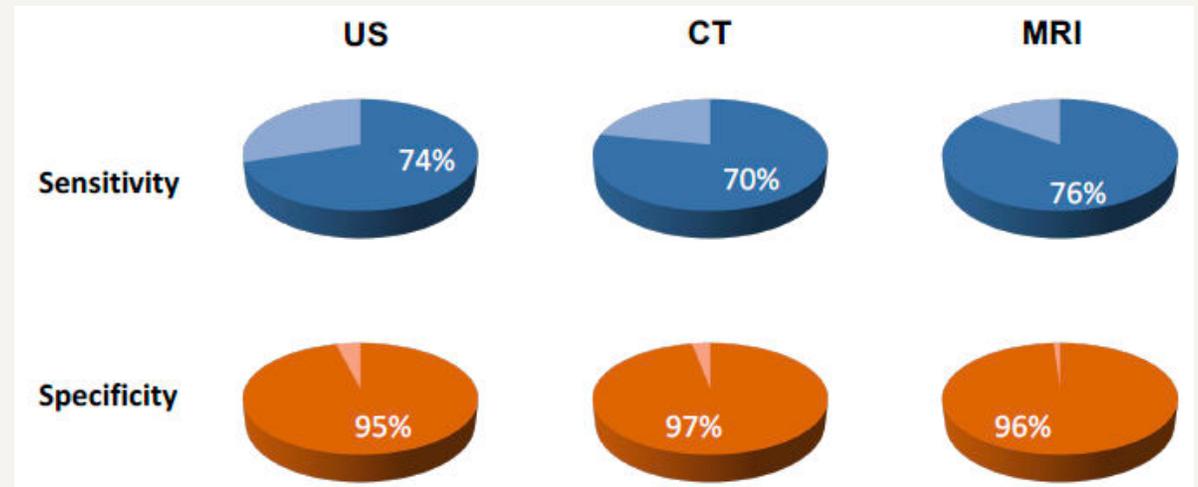
Stricture

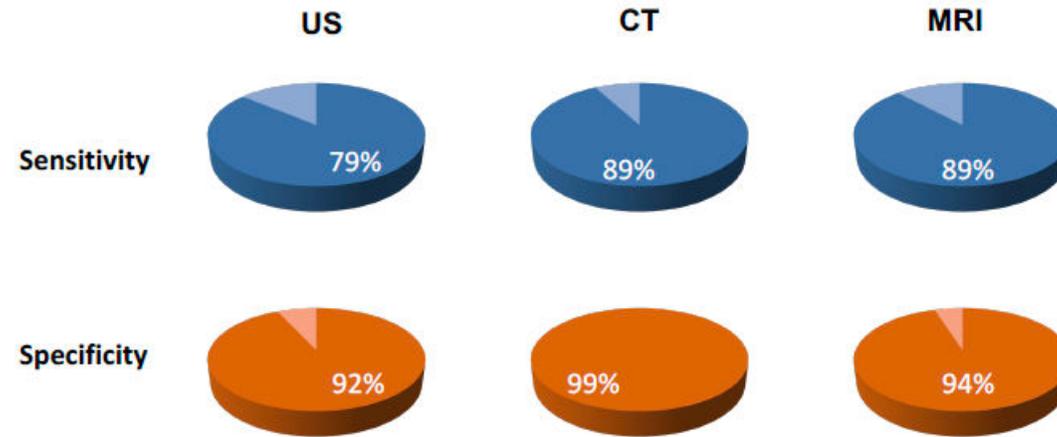
Fistula

Abscess

Accuracy of Diagnosing Fistula on IUS

CT, MRI and IUS had high accuracy for identification of fistula

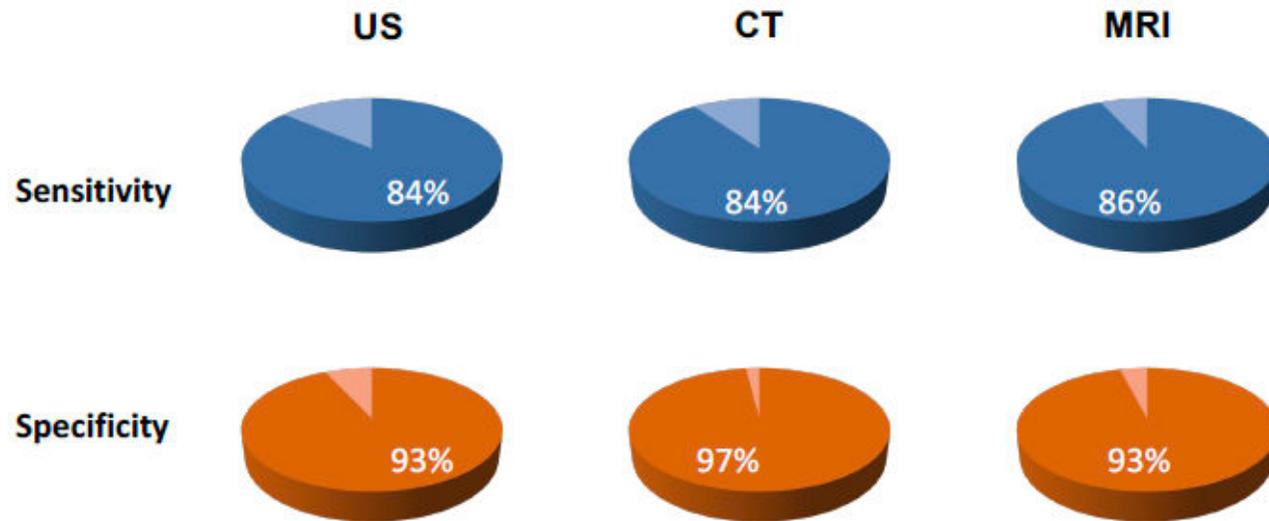




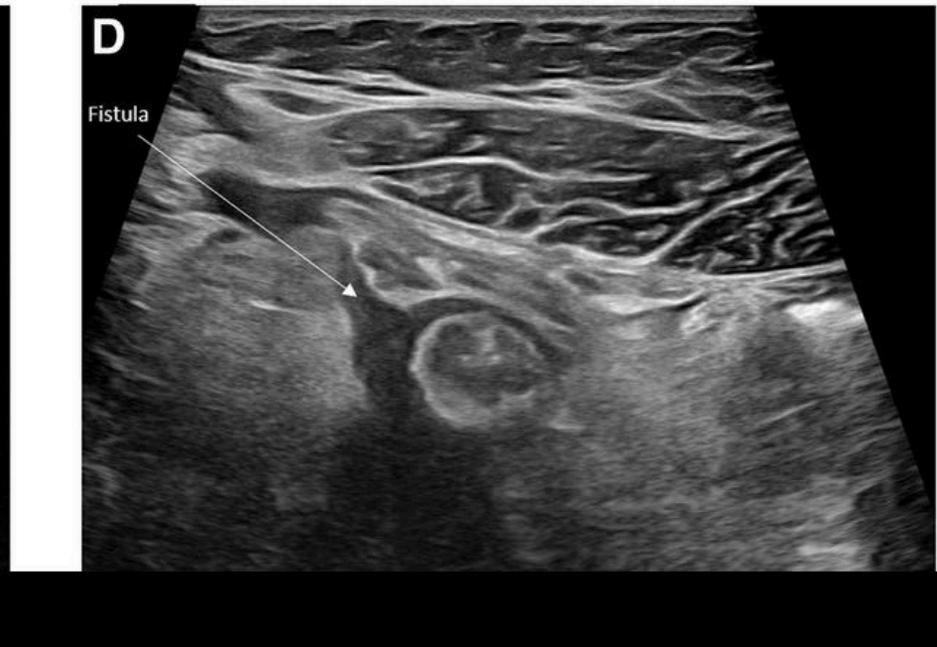
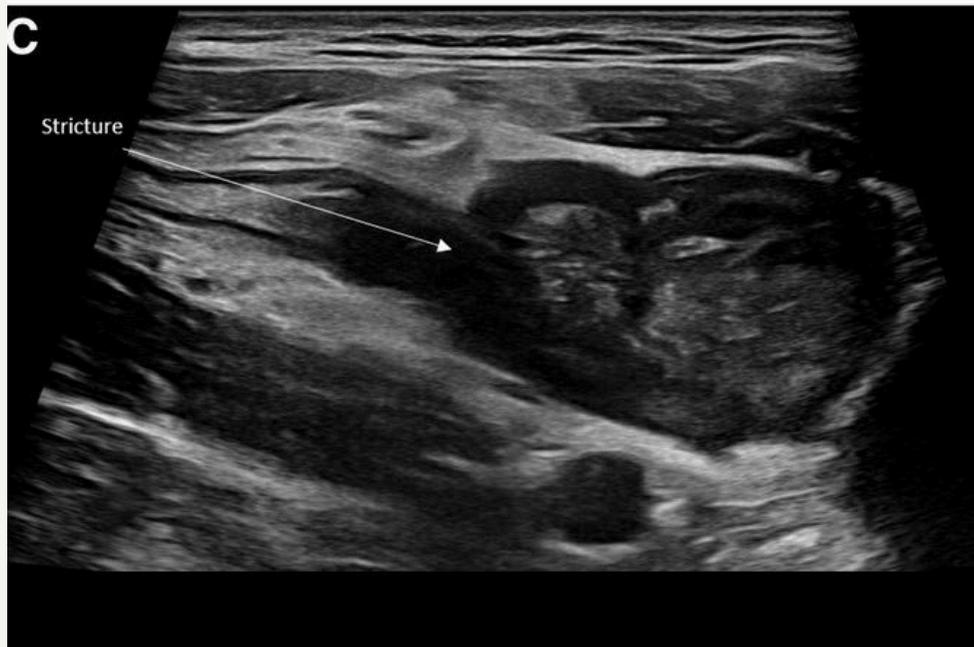
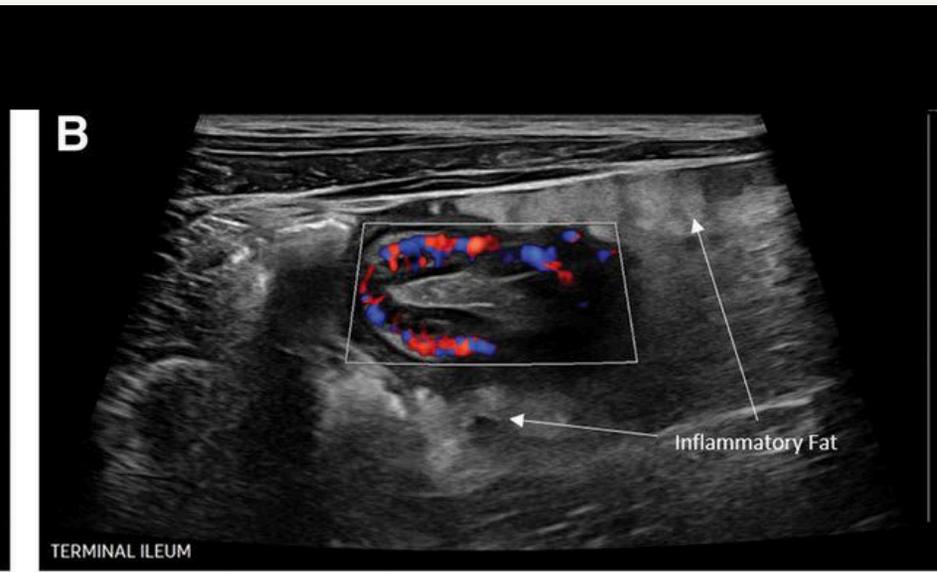
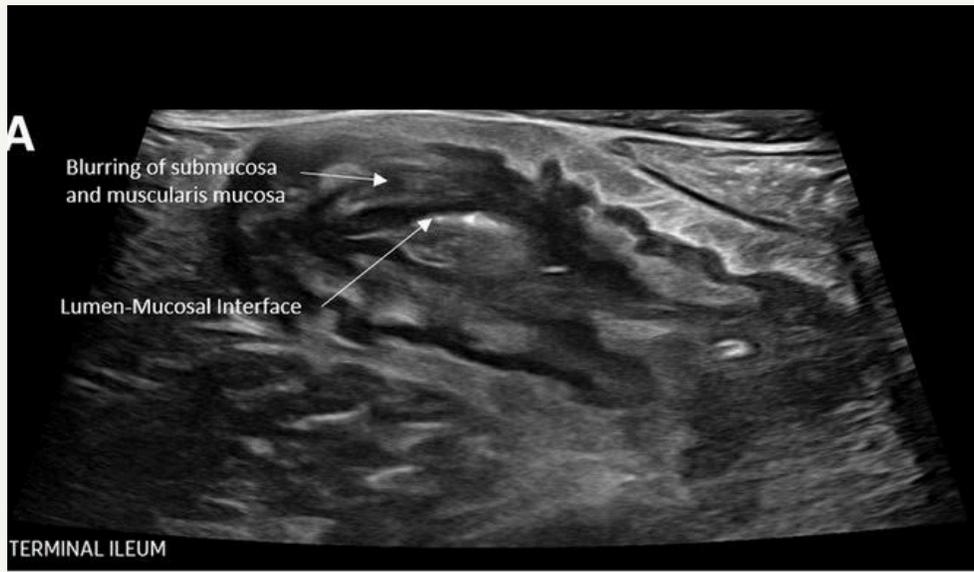
Accuracy in Diagnosing Stenosis

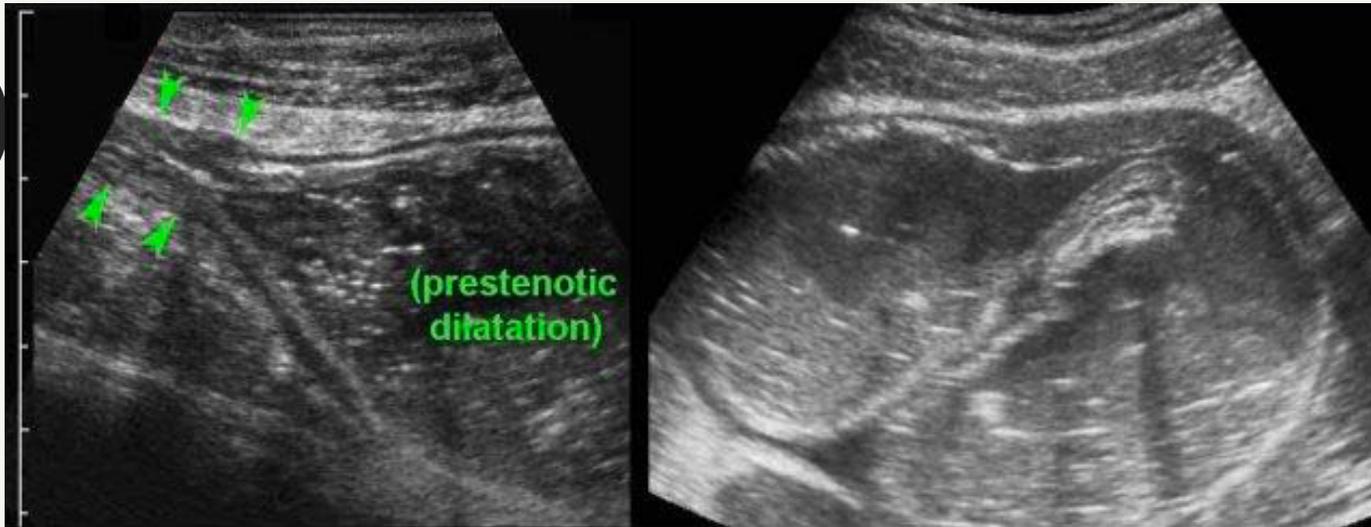
- US sensitivity of 79%, specificity of 92%
- CT 89%: 99%
- MRI 89%: 94%

Accuracy in Diagnosing Abscesses



Although IUS had higher false positives for abscesses





Stricture with pre-stenotic dilatation

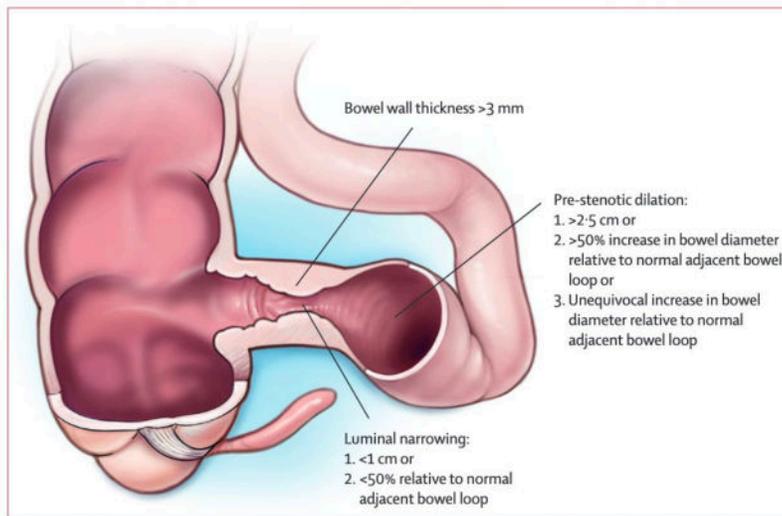
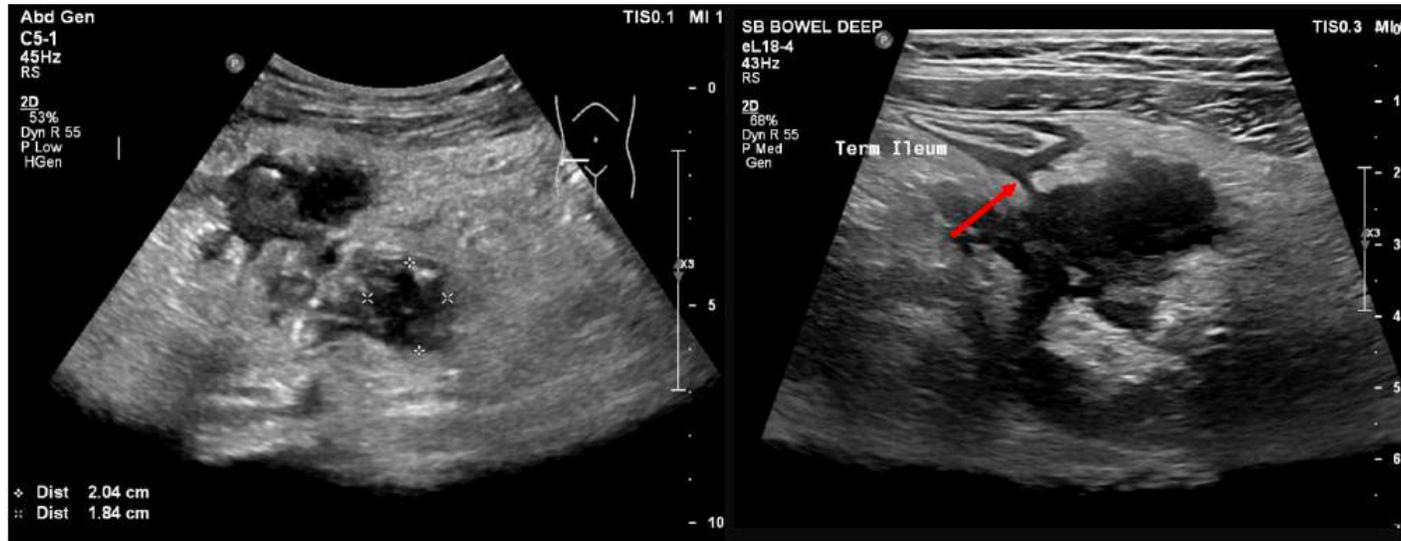


Figure 1: Anastomotic and naive small bowel Crohn's disease strictures on intestinal ultrasound defined by the combination of bowel wall, luminal narrowing, and pre-stenotic dilatation
Items defining motility abnormalities are described in the Results and the appendix (p 7).



Fistula and abscess

- Fistula: hypoechoic or echogenic tubular tract off inflamed bowel (linear, curvilinear, branching)
- Look for surrounding mesenteric fat highlighting tract
- Typically no doppler flow (distinguish from vessels)
- Air within the tract—bright echogenic foci with posterior shadowing or reverberation artifacts

Case 1

- 50 year old female

Asymptomatic

Ileal Ulcers on 1st routine screening colonoscopy

Chronic ileitis on histopathology

Case 1



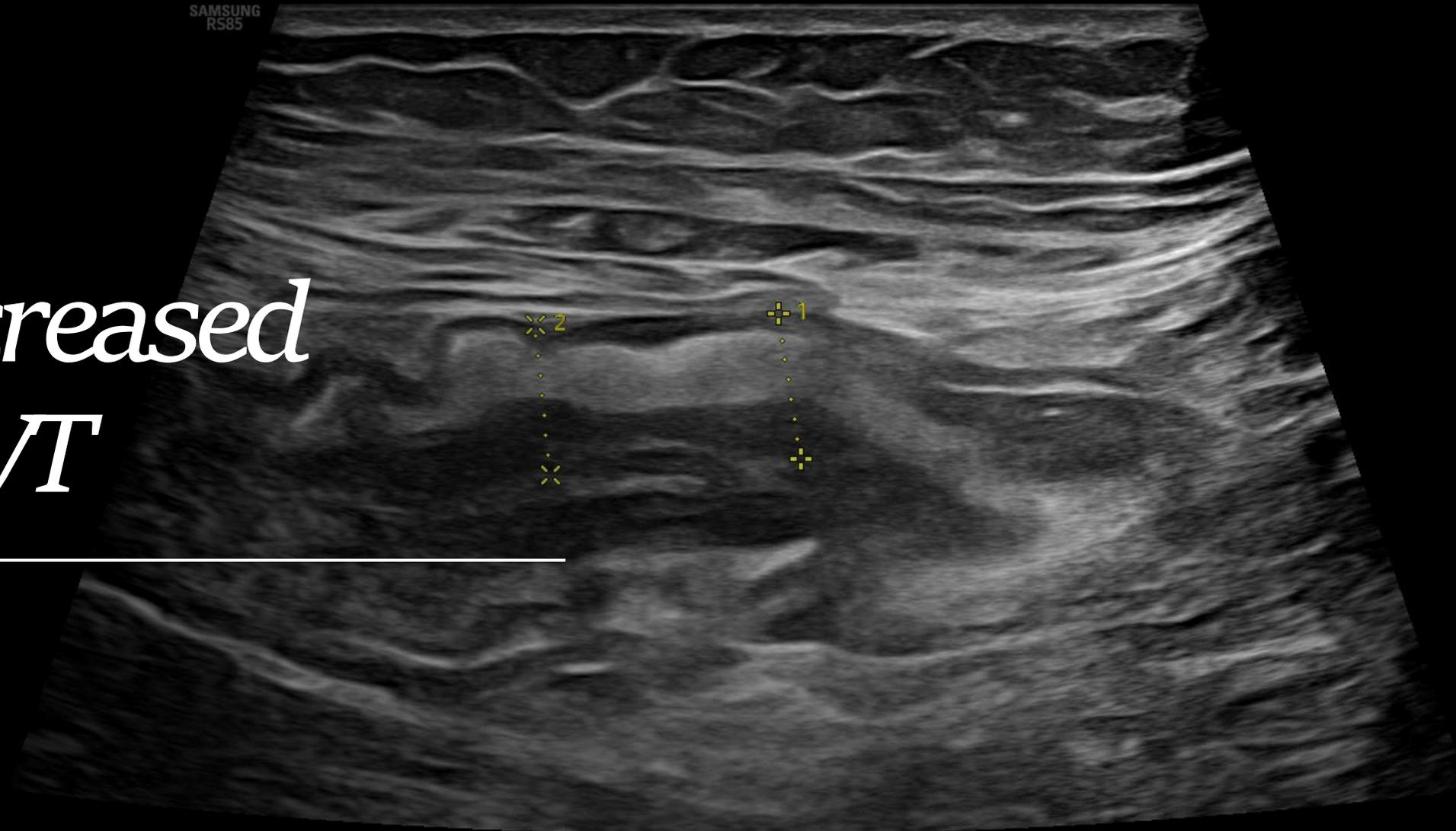
Case 1



Case 1

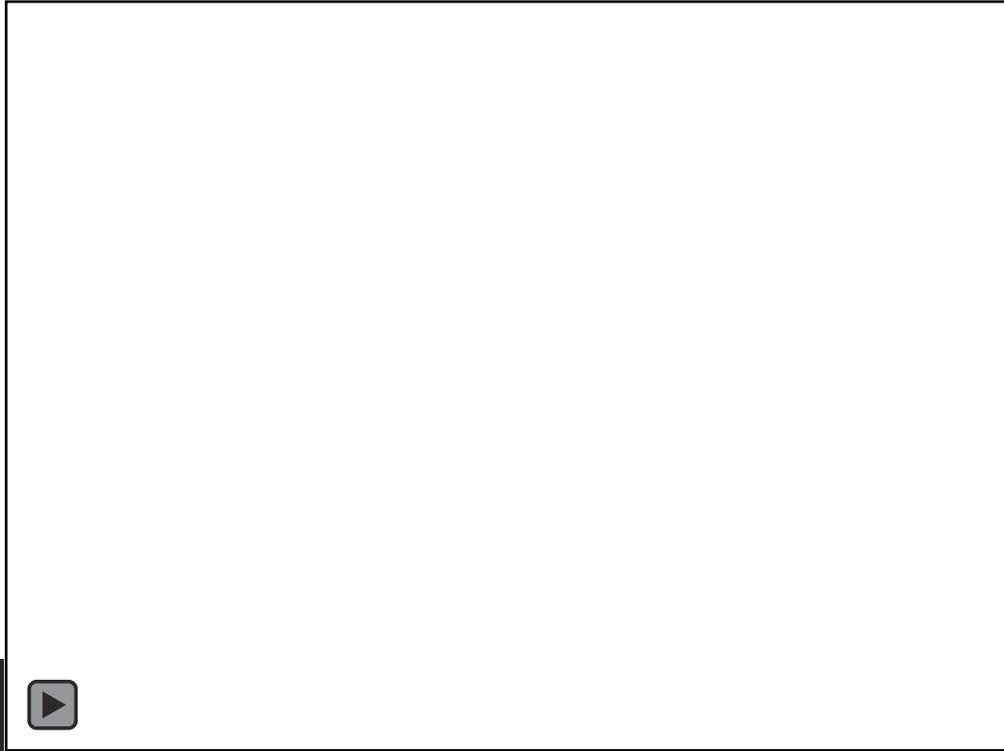


*Increased
BWT*



D1 0.80 cm
D2 0.82

TERMINAL ILEUM



*Bowel wall
hyperemia*



Case 1 Assessment

- **Increased Bowel Wall Thickness**

Maximum 8.1 mm

- **Presence of Bowel Wall Hyperemia**

Modified Limberg III at maximum distally, Limberg II proximally

- **Inflammatory Fat Presence**

Complete wrapping, but mild to moderate in intensity (subjective)

- **Small bowel segment length involved**

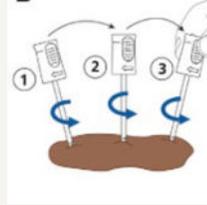
8 cm

- **Impression:** Moderate to severe inflammation distally with gradual improvement proximally over 8 cm in the distal terminal ileum including the ileocecal valve

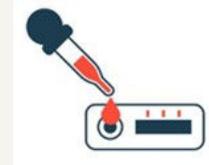
Case 2



- 8 bloody bowel movements daily
- 2 nocturnal bowel movements
- Cramping abdominal pain prior to bowel movements
 - Decreased appetite



FCP = Pending
GI PCR Panel
negative
C.Diff negative



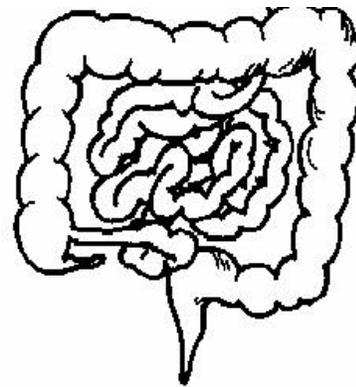
Pending

(case and slides courtesy of Dr. Dolinger)

37 y M with a history of left sided ulcerative colitis on 5-ASA for 3 years

*Most recent
colonoscopy
11 months
ago shows
left sided
colitis*

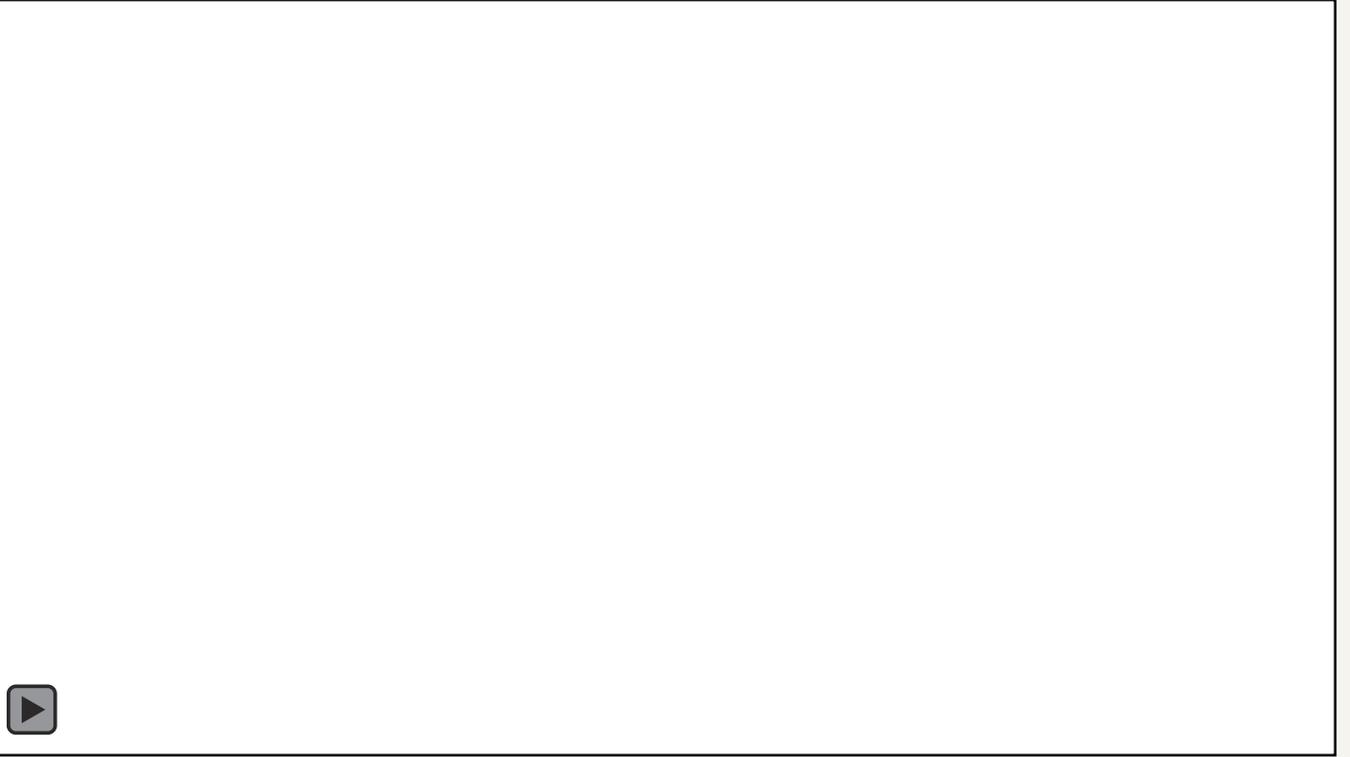
Mayo 2 to 30 cm in the
left colon



*What do you
see?*



*What do
you see?*



*What do
you see?*

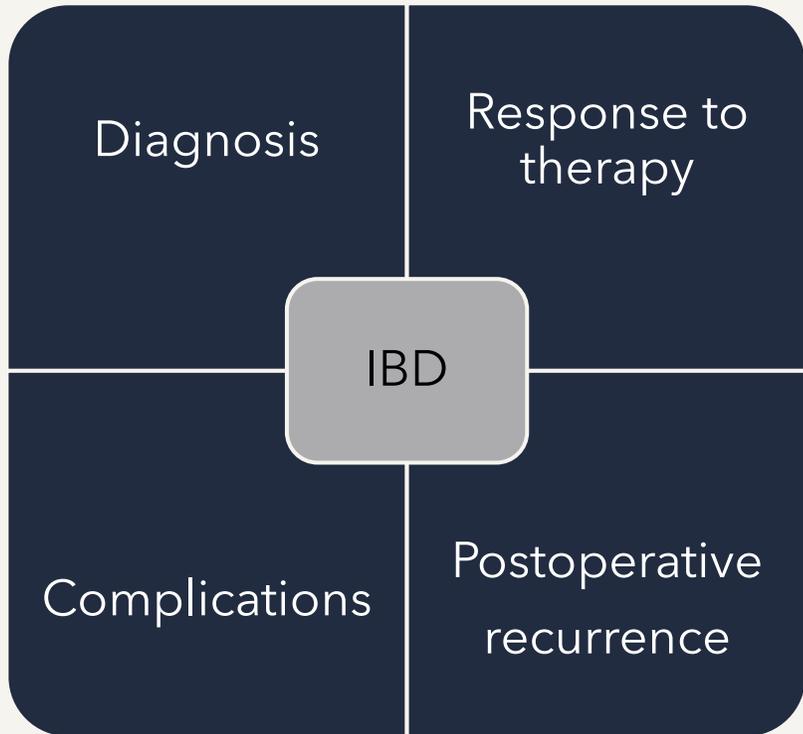


*New
assessment
based solely
on IUS*

- 37 y M with disease extension and moderate to severely active ulcerative colitis

Food for thought...
Would you repeat the colonoscopy?

Summary



- Intramural findings:
 - BWT*
 - Bowel wall vascularization*
 - Bowel wall echostratification*
 - Small bowel motility*
 - Large bowel haustration*
- Extramural findings:
 - Mesenteric fat*
 - Lymph nodes*
 - Free fluid*
- Complications