Two views of Crohn's: a pictorial review of video capsule endoscopy, correlated with MR enterography

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Background

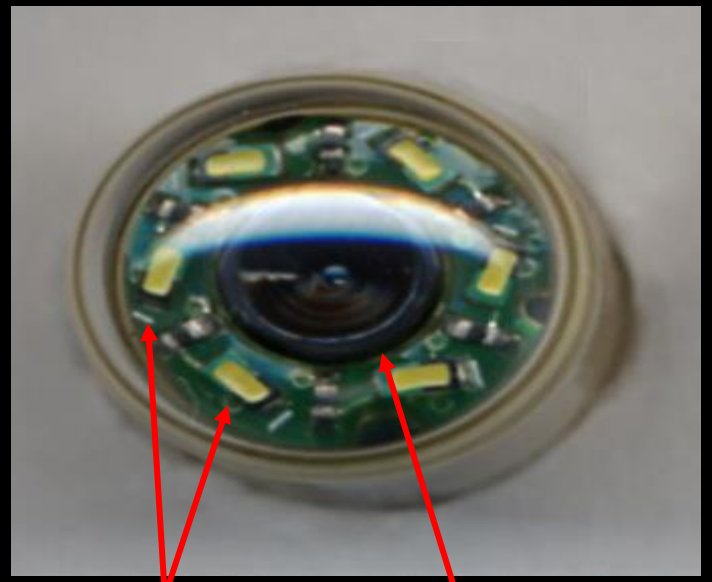
- Crohn's is a major subtype of inflammatory bowel disease, and can affect any part of the gastrointestinal tract, leading to inflammation, stricturing, and penetrating complications.
- Assessment of the small bowel (involved in 75% of patients) is challenging, as only the proximal/distal 10 cm are visible at standard endoscopy.
- MR enterography (MRE) is the primary modality for assessment of the small bowel, but video capsule endoscopy (VCE) is an alternative established technique.
- We present a pictorial review of VCE for the gastrointestinal radiologist, focusing on the assessment of small bowel Crohn's, correlated with MRE, highlighting strengths and weaknesses of each modality, as well as potential complications of VCE.

Video capsule endoscopy system

The video capsule endoscopy (~ 2.5 x 1 cm) captures images that are transmitted to a body-worn belt for later analysis.

Optical dome and lens system

Capsule body containing transmission system



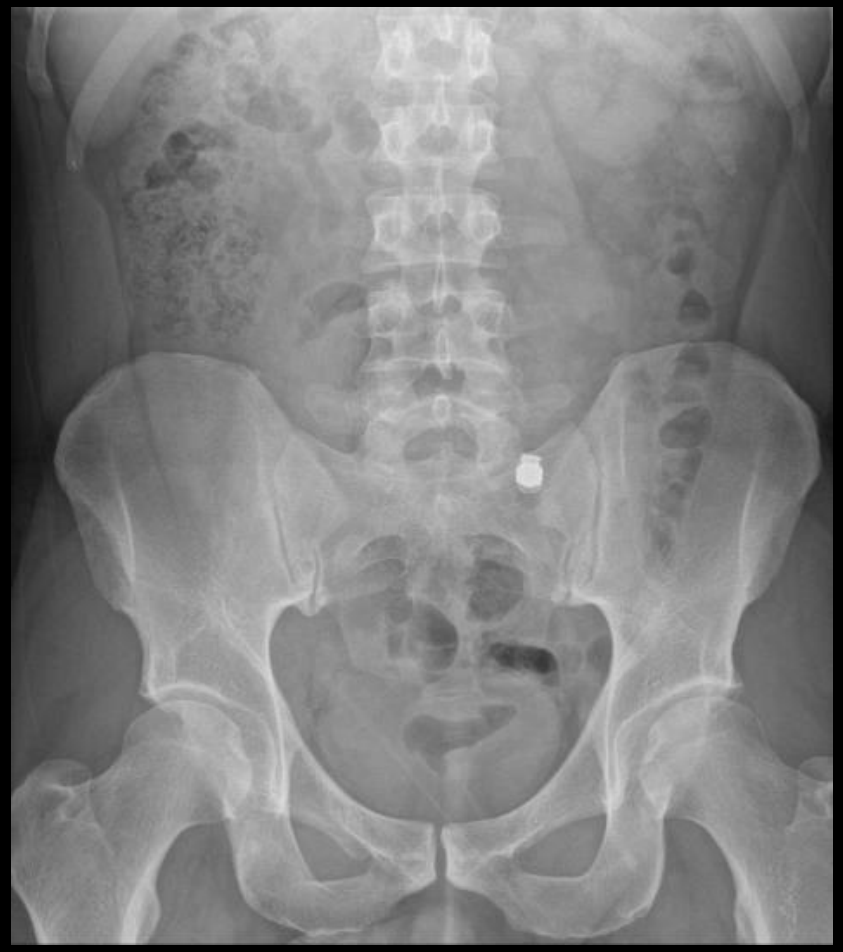
LED lights

Camera

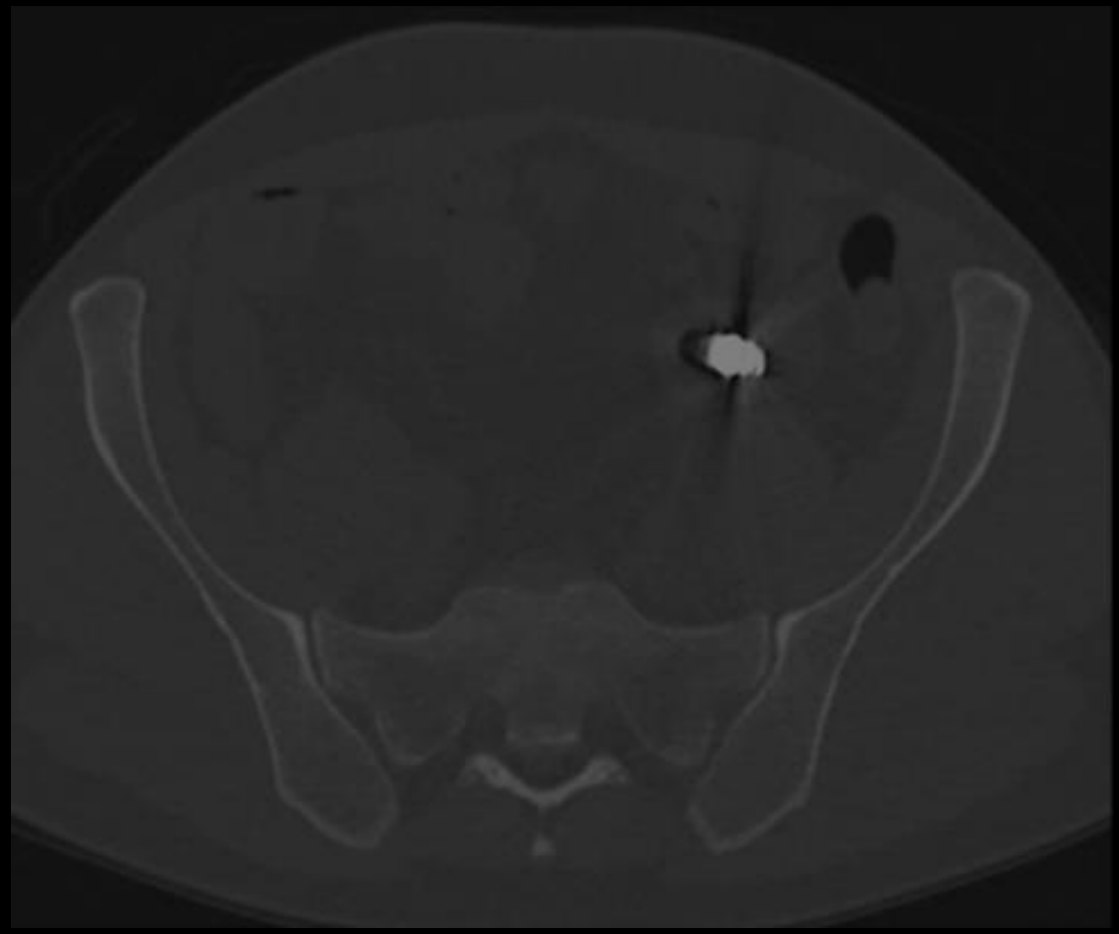
Video capsule endoscopy in profile and en face

Body-worn receiver belt

Video capsules on imaging



Radiograph shows video capsule endoscopy within small bowel



Axial CT shows video capsule endoscopy within small bowel

Patency capsule

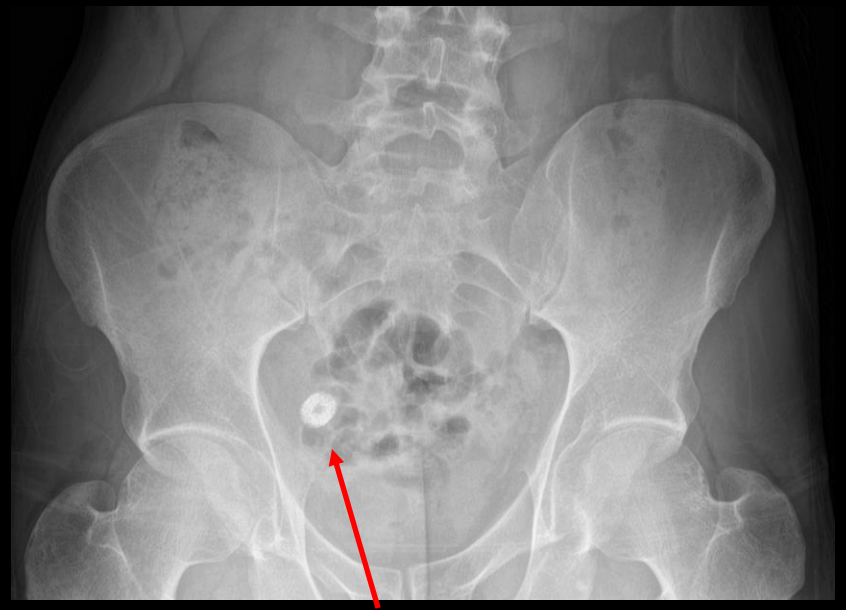
If there is symptomatic or radiological concern for strictures, a 'patency' capsule can be given before VCE to assess if the capsule will be able to pass through the small bowel.

The patency capsule is the same size as the VCE. It is made of lactose, which dissolves after approximately 30 hours, and 10% barium, so can be visualised on radiographs and CT.

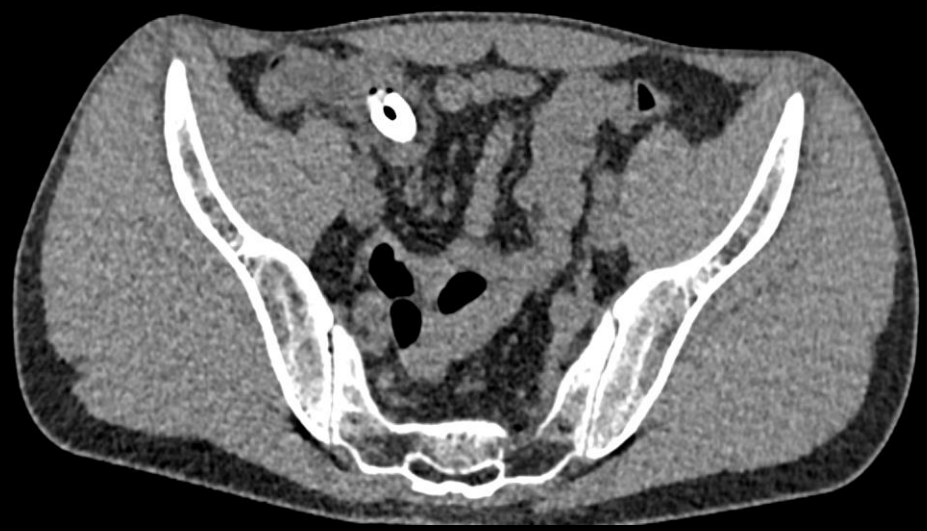
If a radiograph the day after patency capsule administration does not demonstrate the capsule, or it is confidently seen within the large bowel, the video capsule can be given.

If a radiograph shows the capsule is in small bowel, or an equivocal location, this can be clarified with a non-contrast CT.

Patency capsule

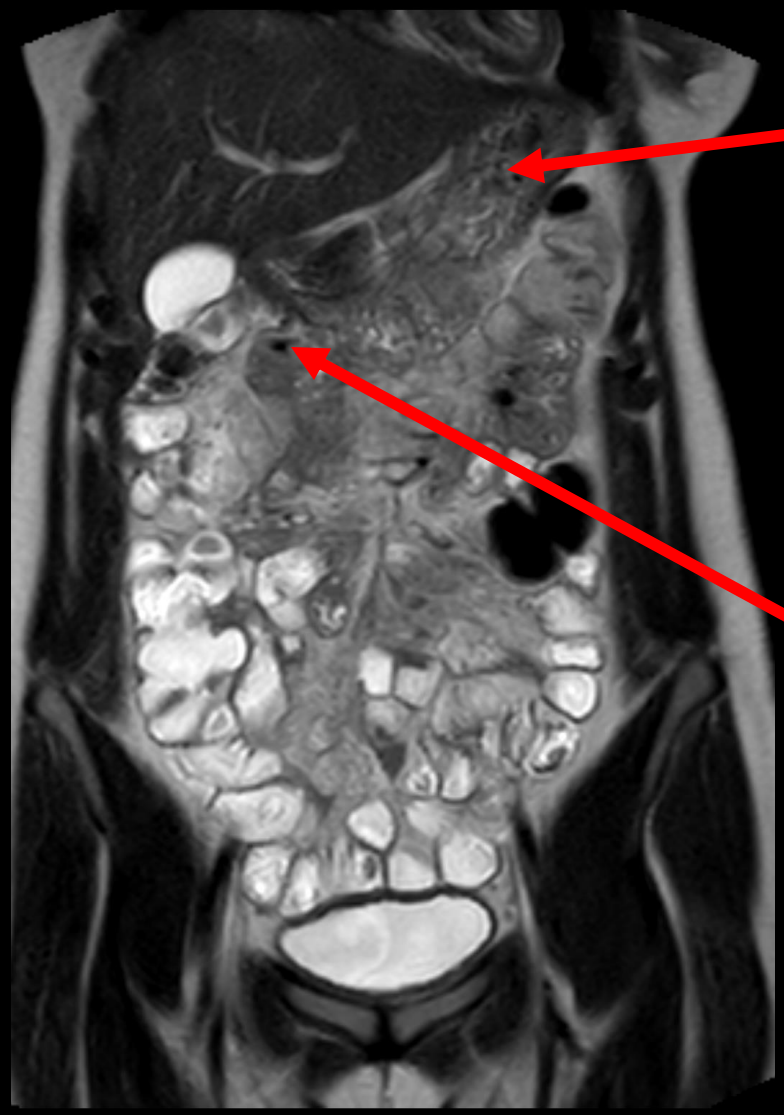


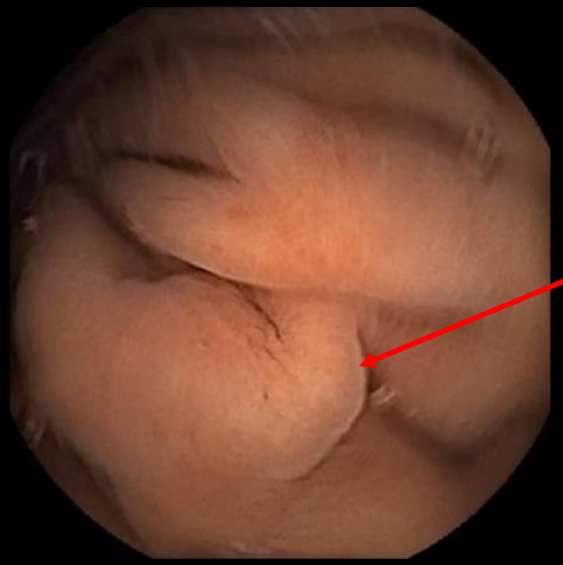
Radiograph shows patency capsule within bowel loops in the pelvis



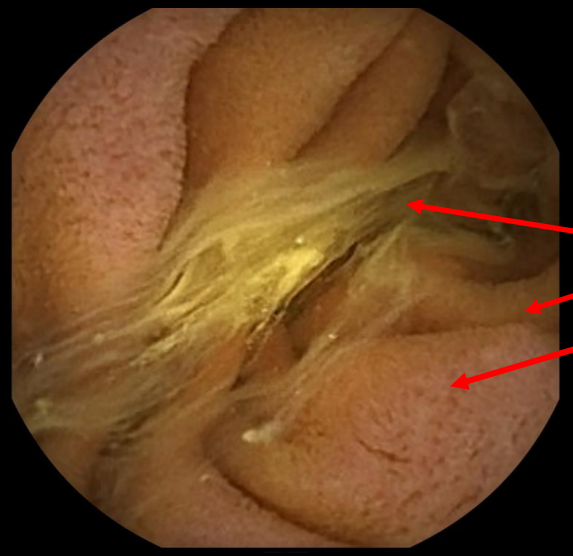
Subsequent CT confirms patency capsule in the terminal ileum

Normal video capsule endoscopy



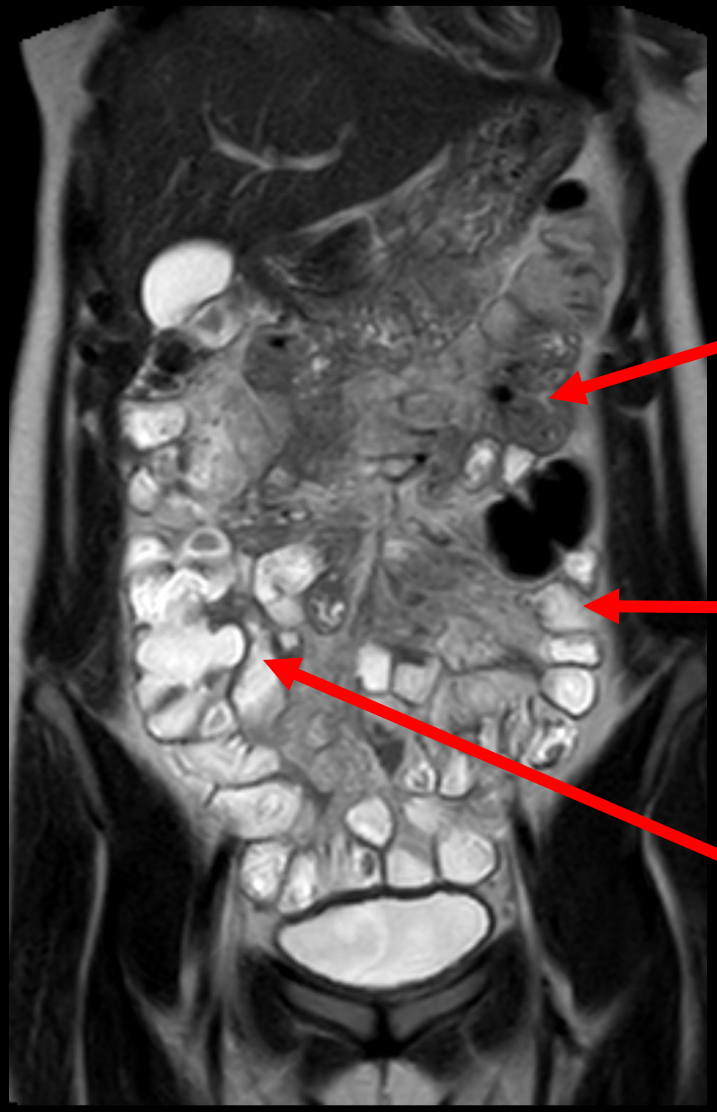


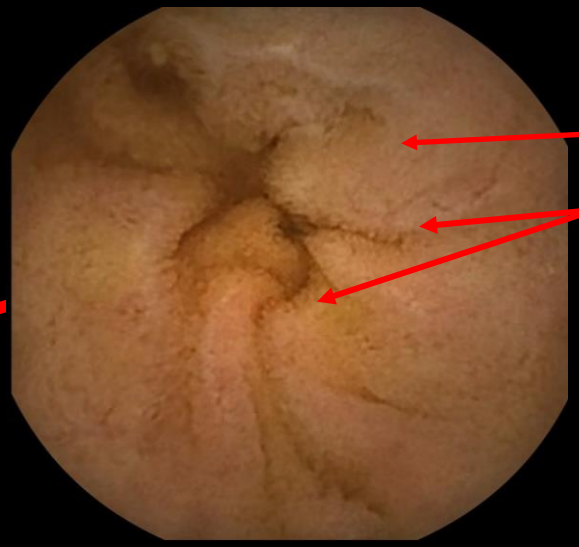
<u>Stomach</u>
Normal gastric rugae



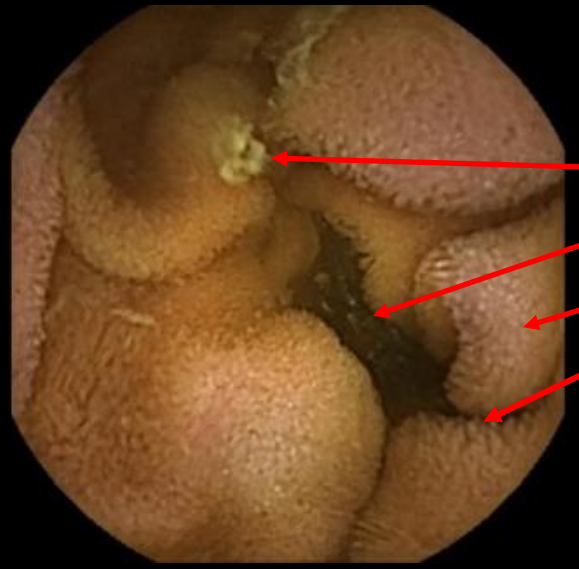
<u>Duodenum</u>
Luminal bile
Normal folds
Normal villi

Normal video capsule endoscopy

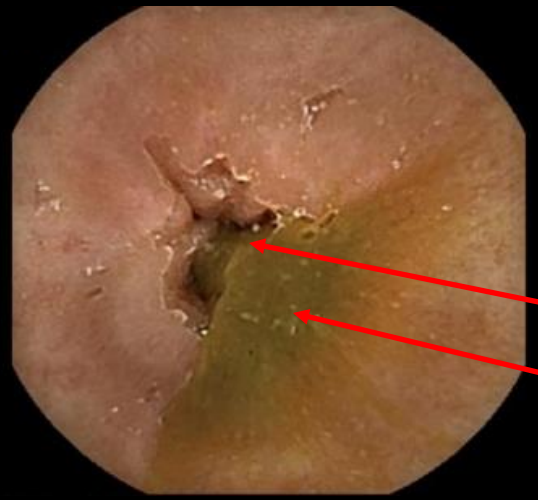




<u>Jejunum</u>
Normal fold
Normal villi – more numerous than in ileum



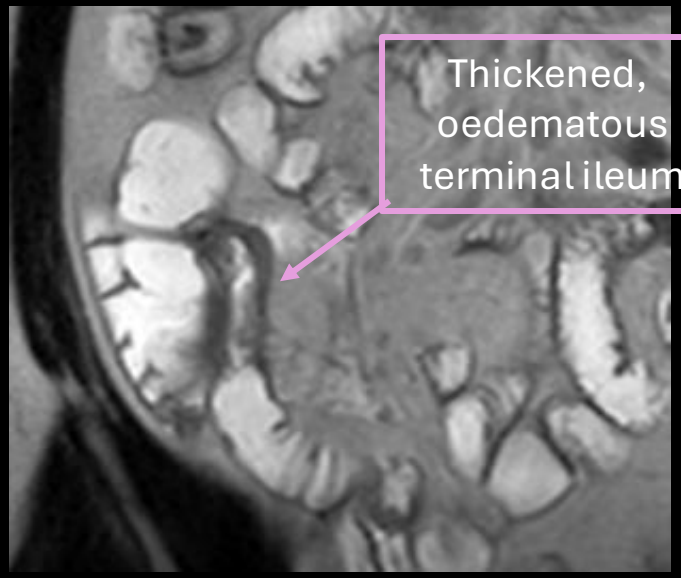
<u>Ileum</u>
Food residue
Lumen
Normal fold
Normal villi

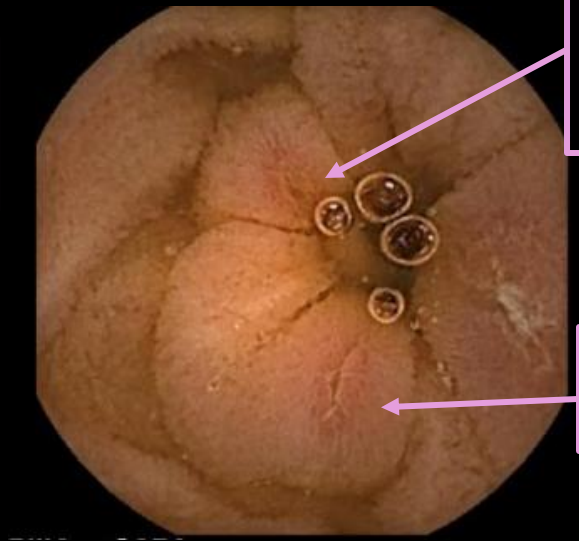


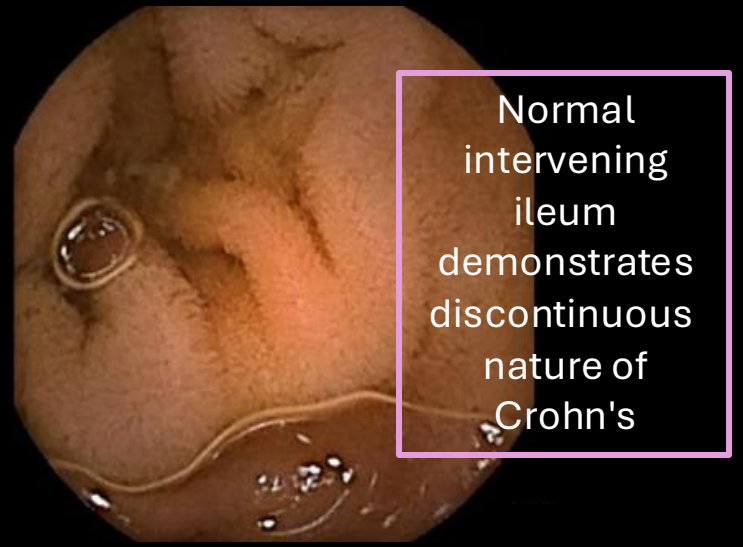
<u>Terminal ileum</u>
Ileocaecal valve
Refluxing colonic contents

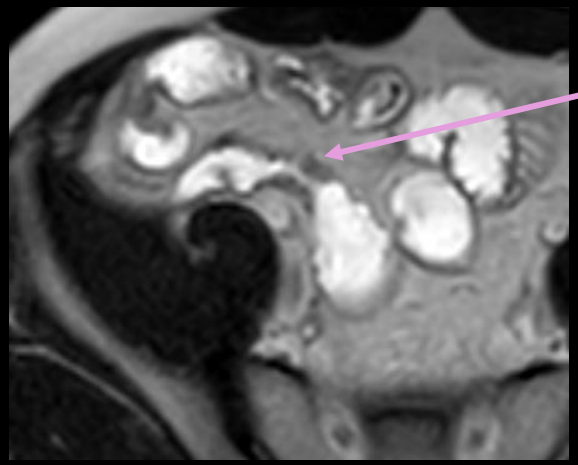
Ulcerating Crohn's disease

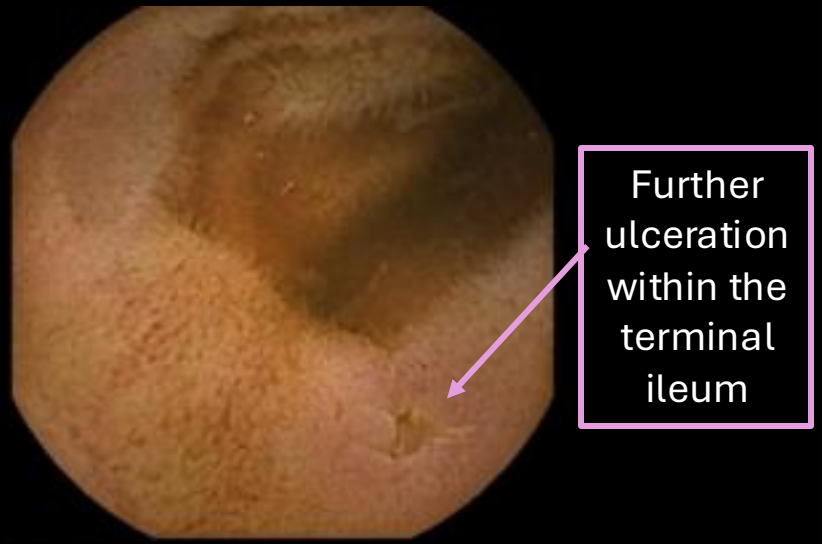
30M with 1 aphthous ulcer at colonoscopy.





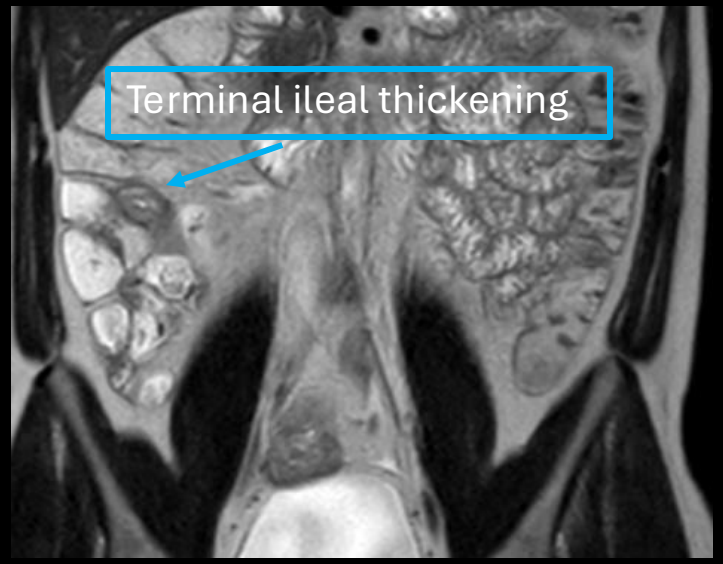


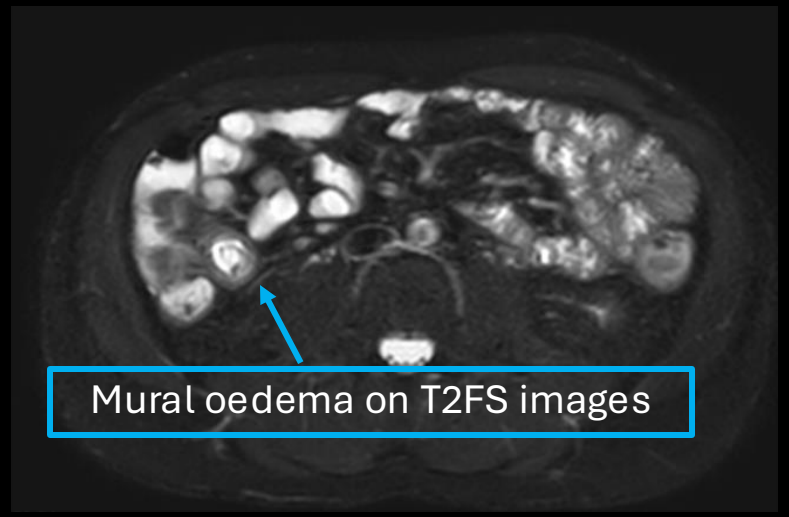


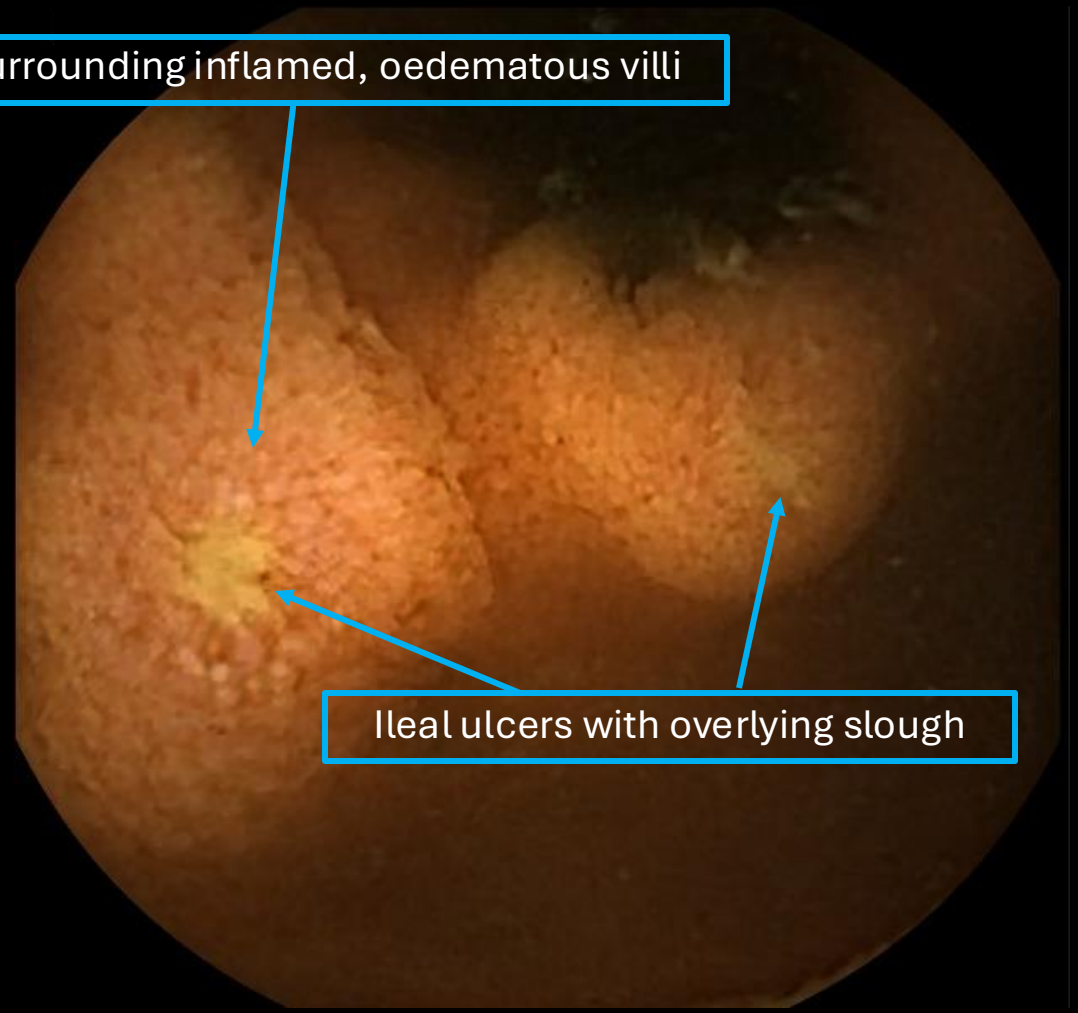


Ulcerating Crohn's disease

40M with mildly raised faecal calprotectin (FCP).

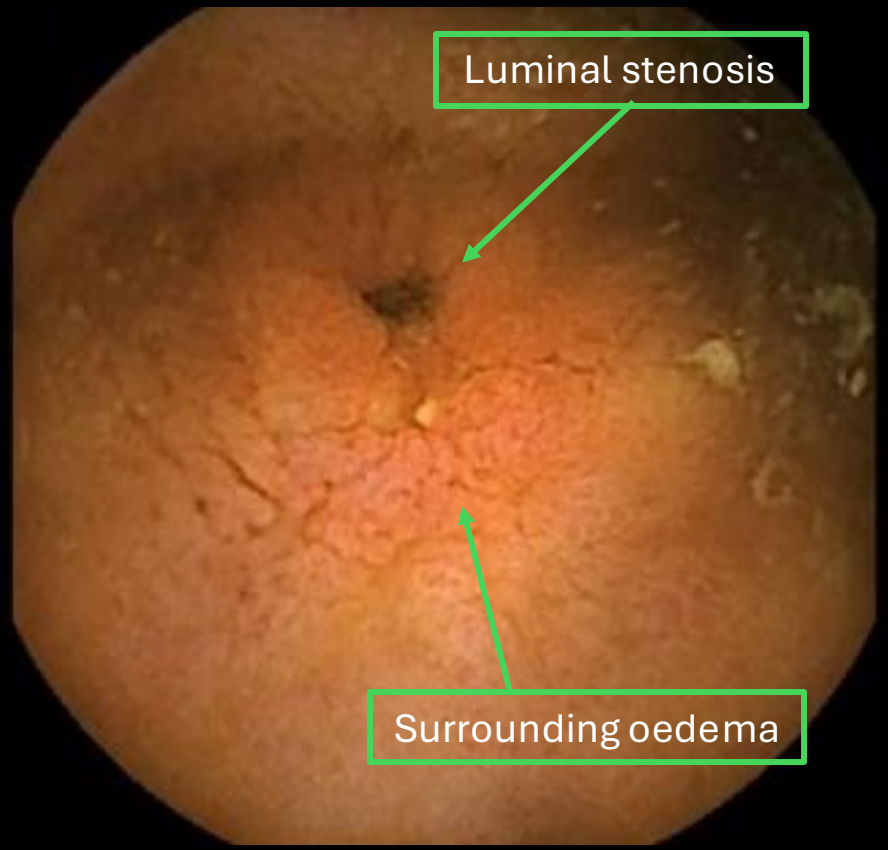




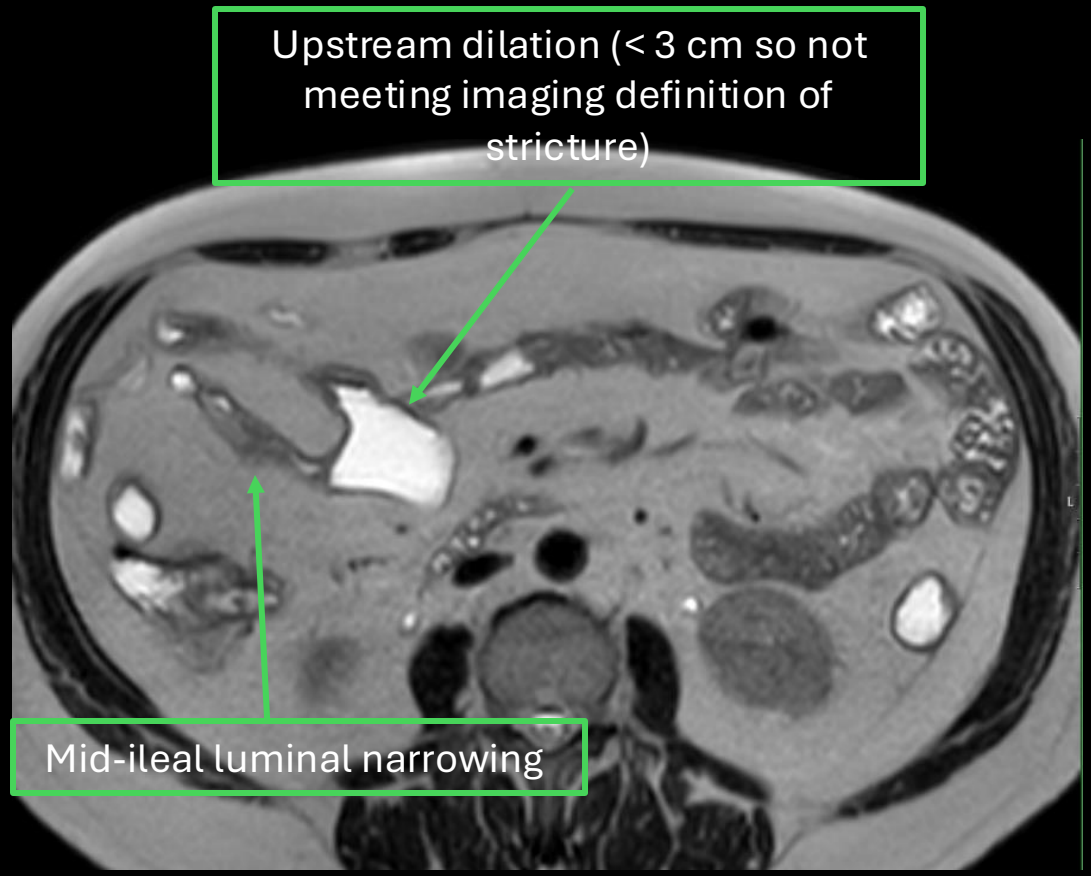


Stricturing Crohn's disease

70M with known stricturing Crohn's on biologics; ongoing nonspecific symptoms, raised FCP. Patency capsule passed prior.



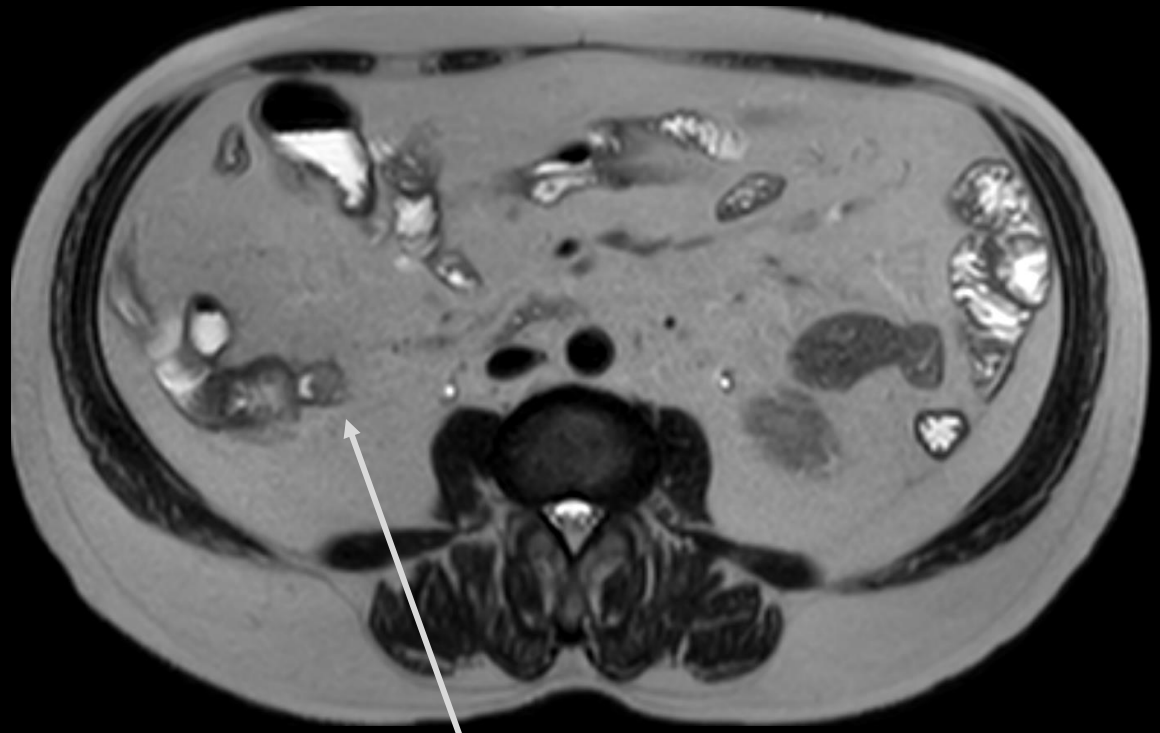
This stenosis was functionally obstructing – capsule held up for 2h – but eventually passed



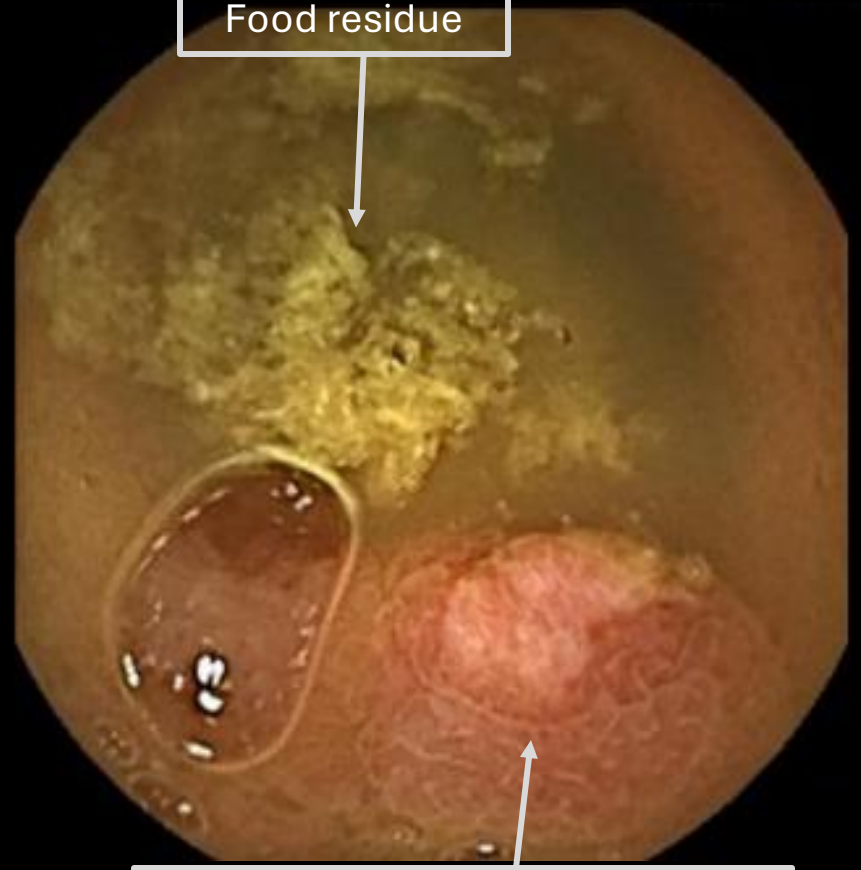
Subsequent MRE

Inflammatory Crohn's polyp

60M with known Crohn's, VCE for disease reassessment.



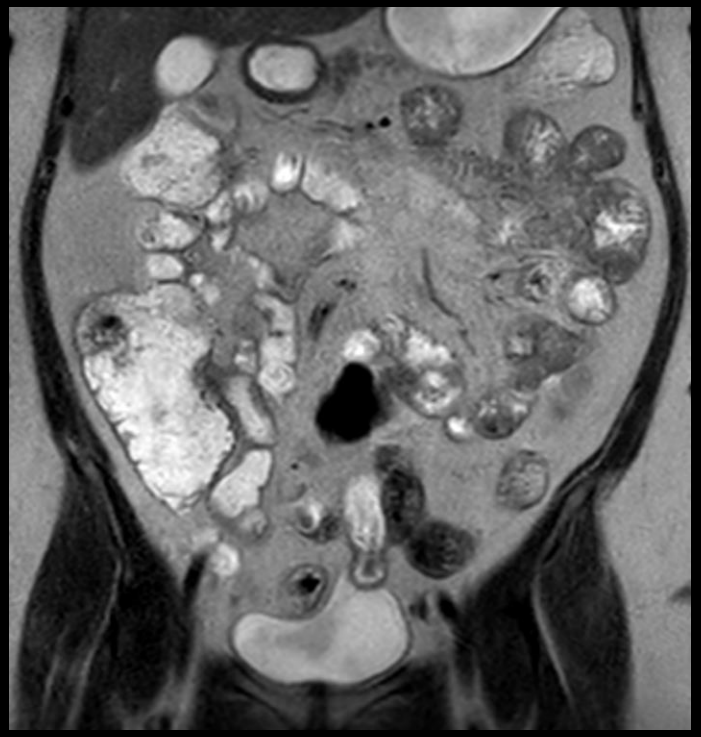
MRE shows intraluminal filling defect within the terminal ileum



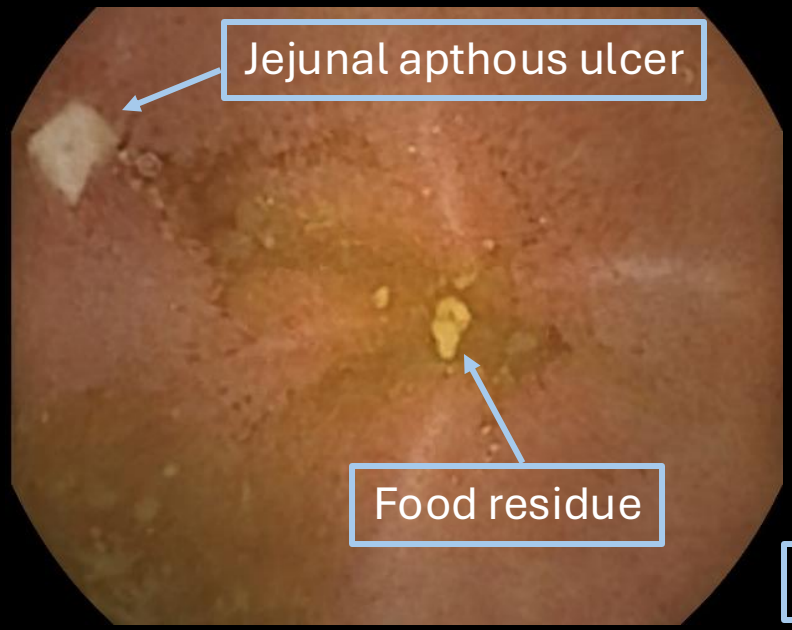
Terminal ileal inflammatory polyp

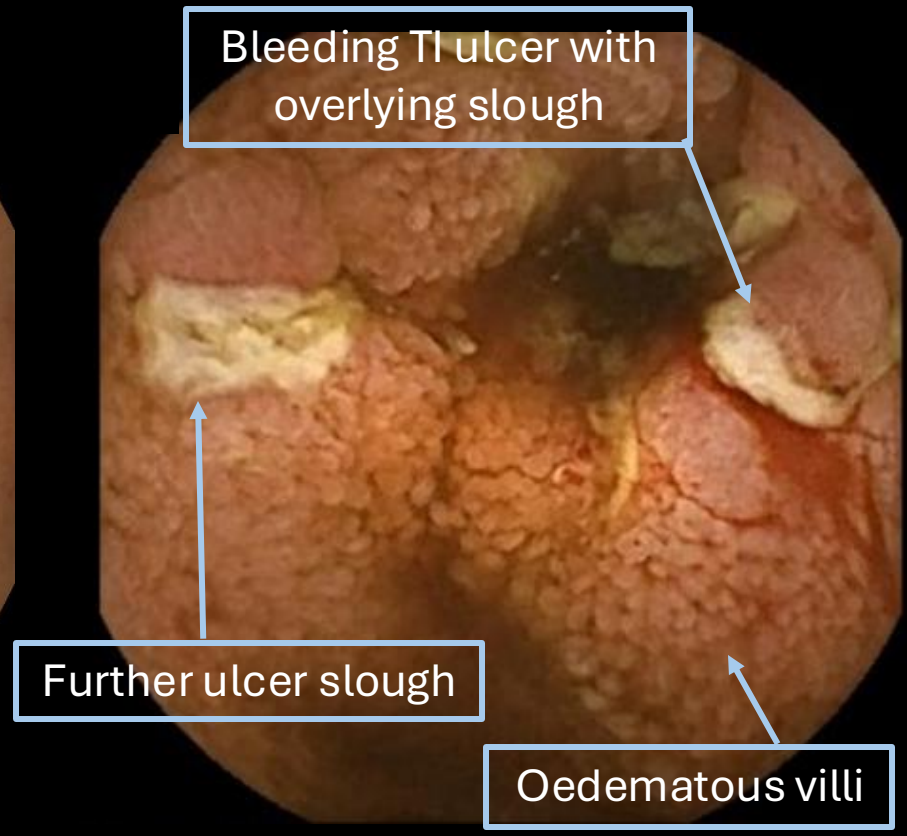
Jejunal disease revealed on VCE

40F, microcytic anaemia, raised FCP, normal OGD and colonoscopy.



MRE shows mild TI thickening and normal jejunum

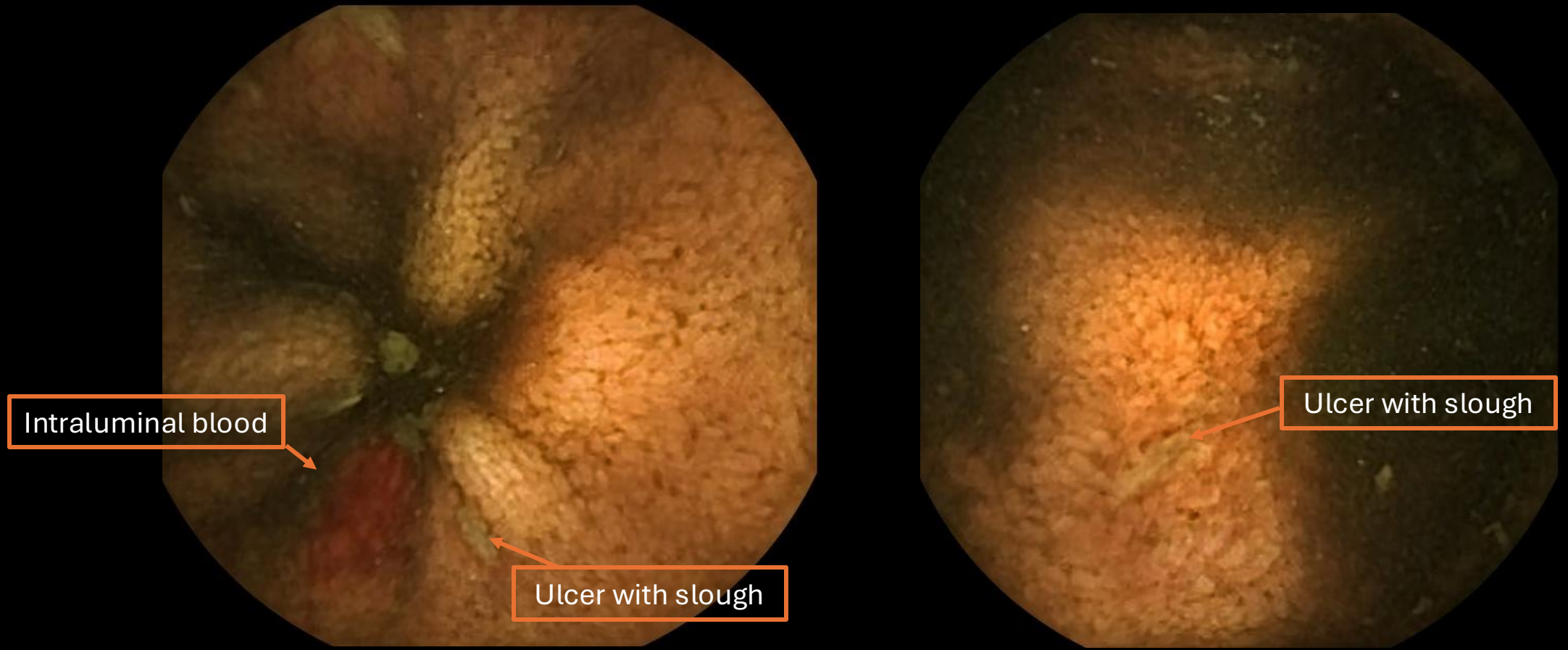




This case shows the ability of VCE to demonstrate jejunal disease that is often occult on MRE.

Extraluminal disease occult on VCE (1)

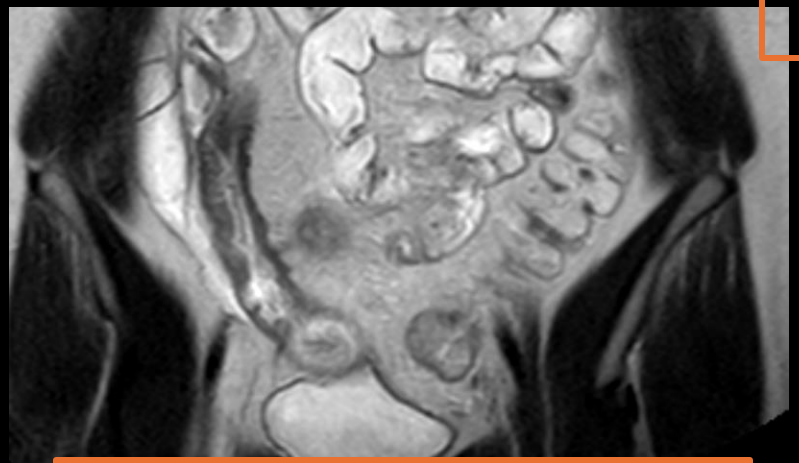
30F, CT showed ileal luminal narrowing and mural thickening, colonoscopy showed terminal ileal ulceration.



VCE scored as showing mild disease activity

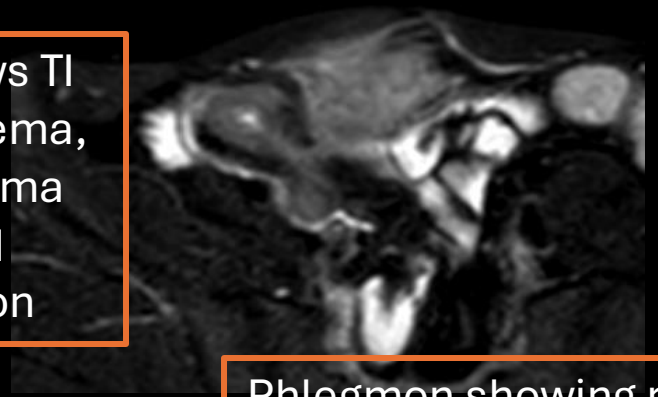
Extraluminal disease occult on VCE (2)

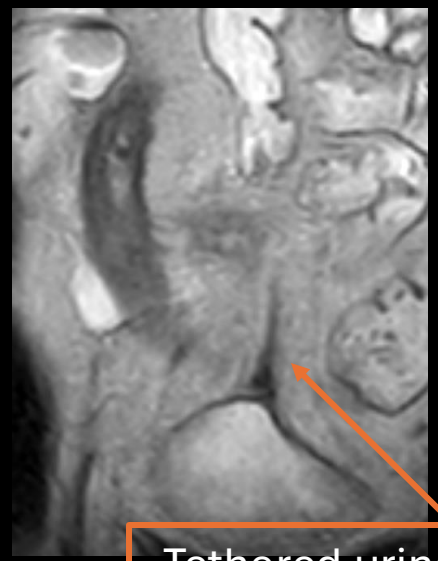
Subsequent MRE of the same patient



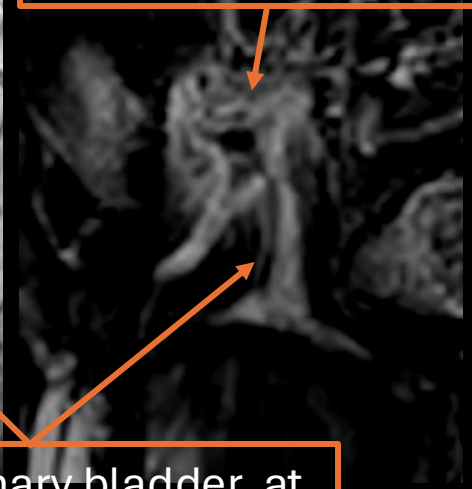
Long segment terminal ileal thickening with adjacent mesenteric phlegmon

T2FS shows TI mural oedema, with oedema around phlegmon

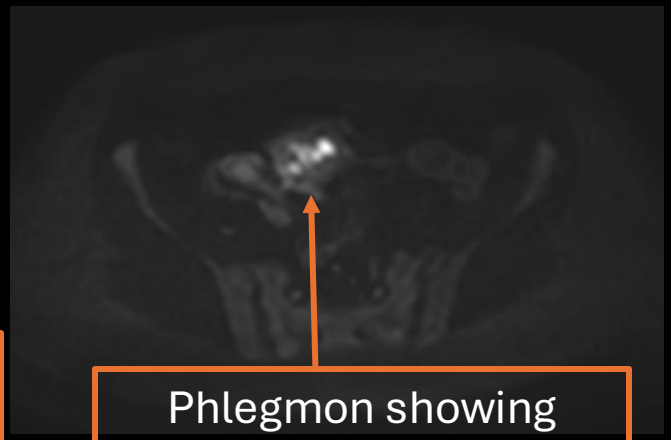




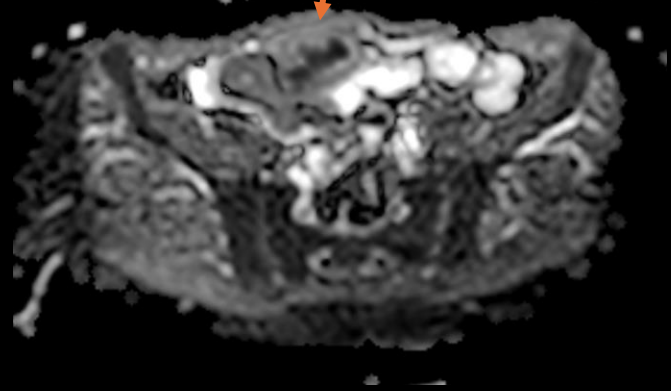
Phlegmon showing rim enhancement



Tethered urinary bladder, at risk of fistulation



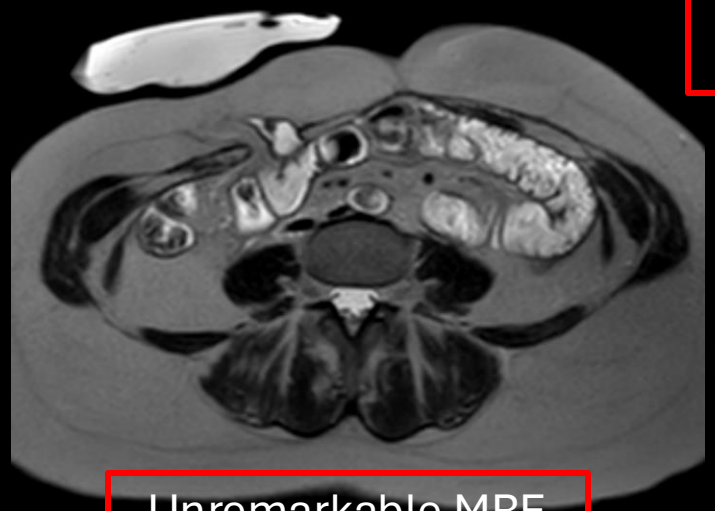
Phlegmon showing restriction on DWI/ADC



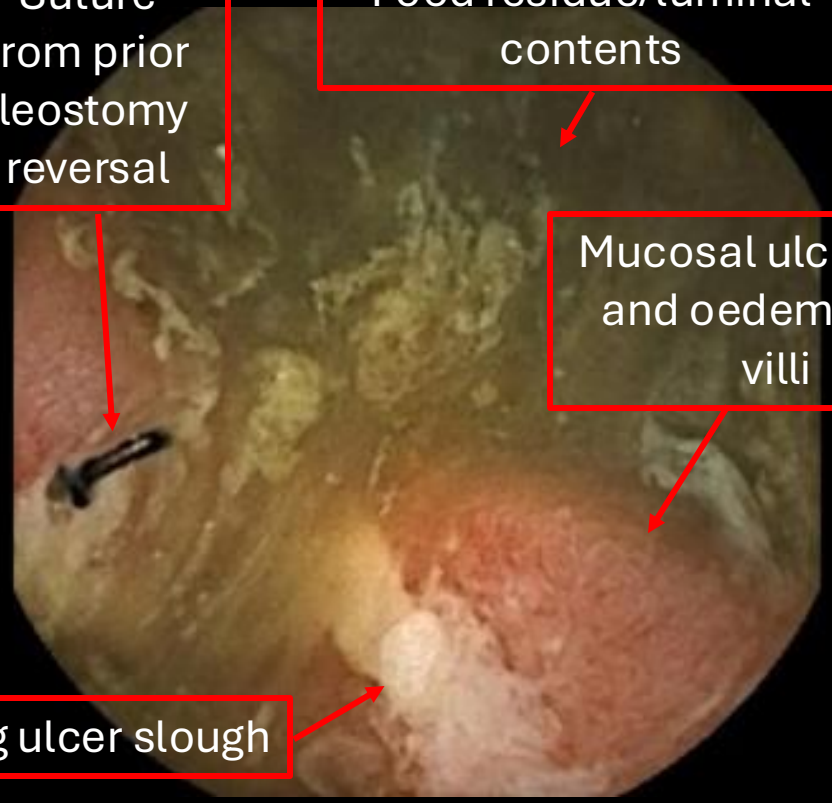
This case shows MRE's superiority in assessing penetrating complications, and their potential underestimation on VCE.

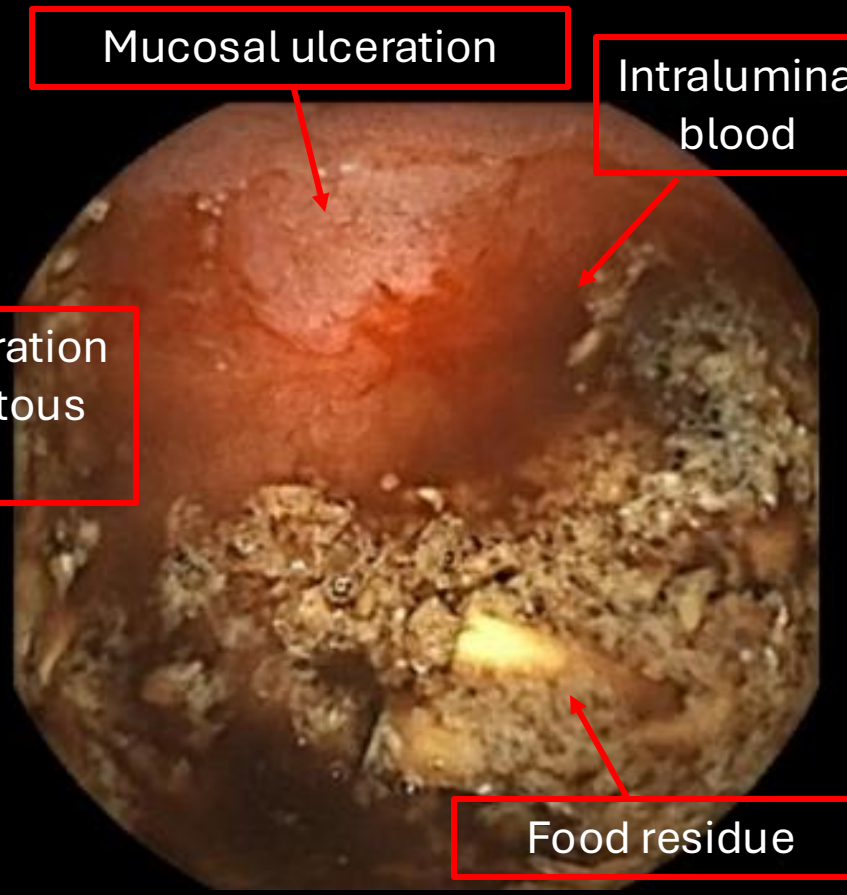
Mucosal disease underestimation on MRE

49F with Crohn's and prior end ileostomy. Blood in stoma output. Stomoscopy showed non-specific mild inflammation at 10-15 cm.



Unremarkable MRE



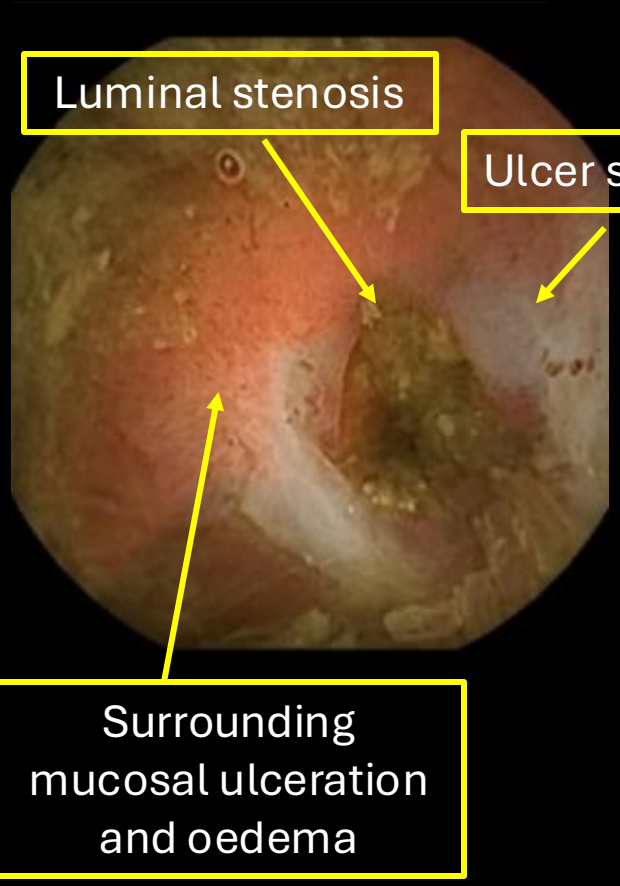


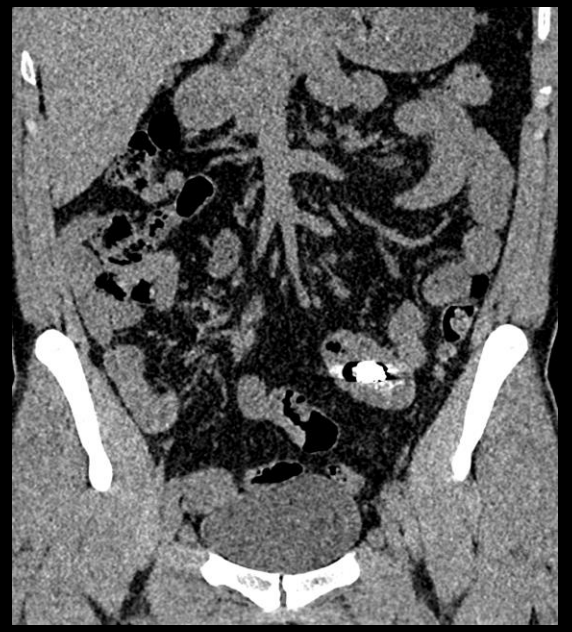
<u>This case demonstrates the ability of VCE to highlight mucosal disease occult on MRE</u>

Capsule complications: holdup at Crohn's stricture

40M with known multifocal small bowel Crohn's, normal MR 3 years prior.

Patency capsule prior, felt to be in colon on radiograph and VCE given.



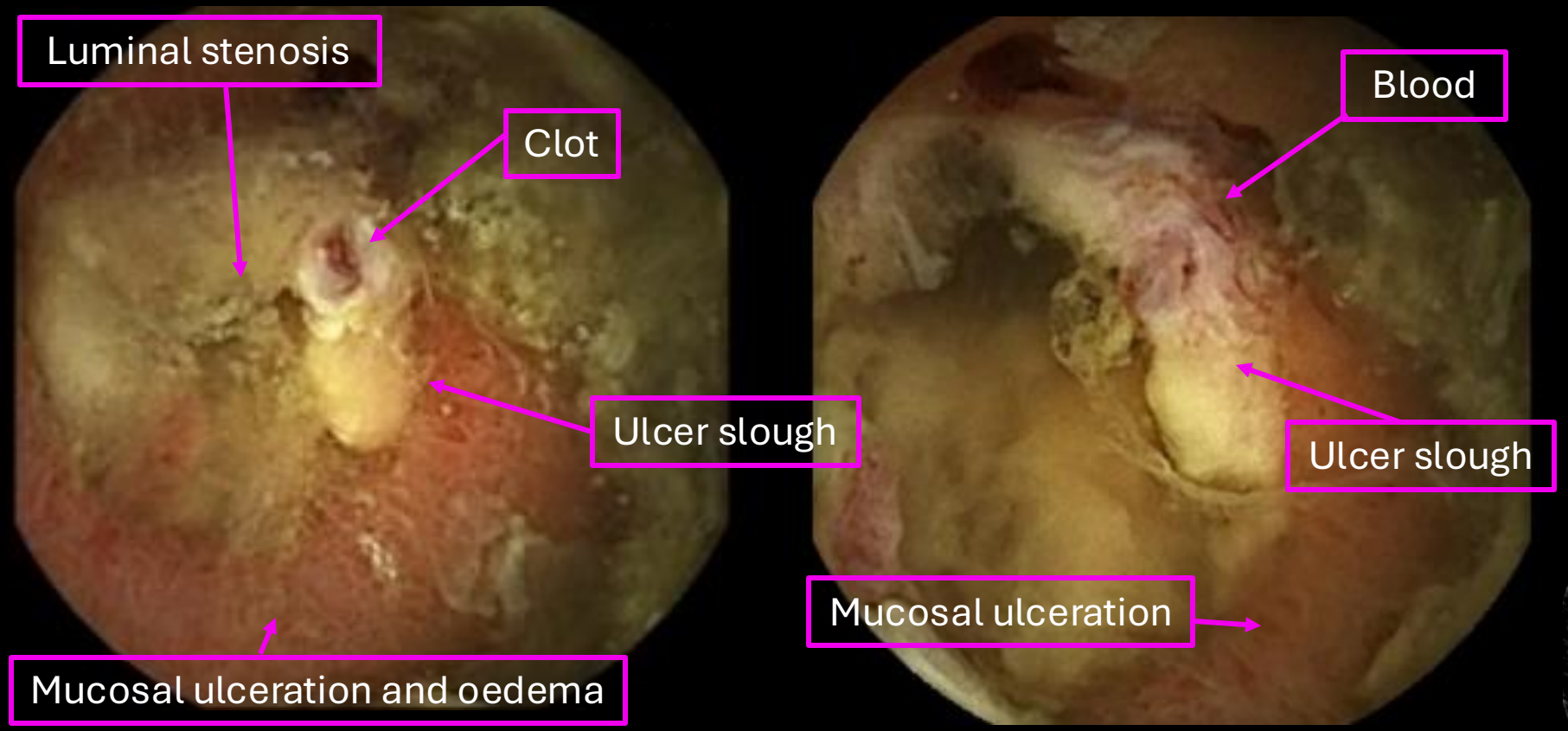


CT 2 days after VCE ingestion shows capsule still within small bowel, but no obstruction.

The patient remained asymptomatic, but required double-balloon endoscopy to remove the capsule.

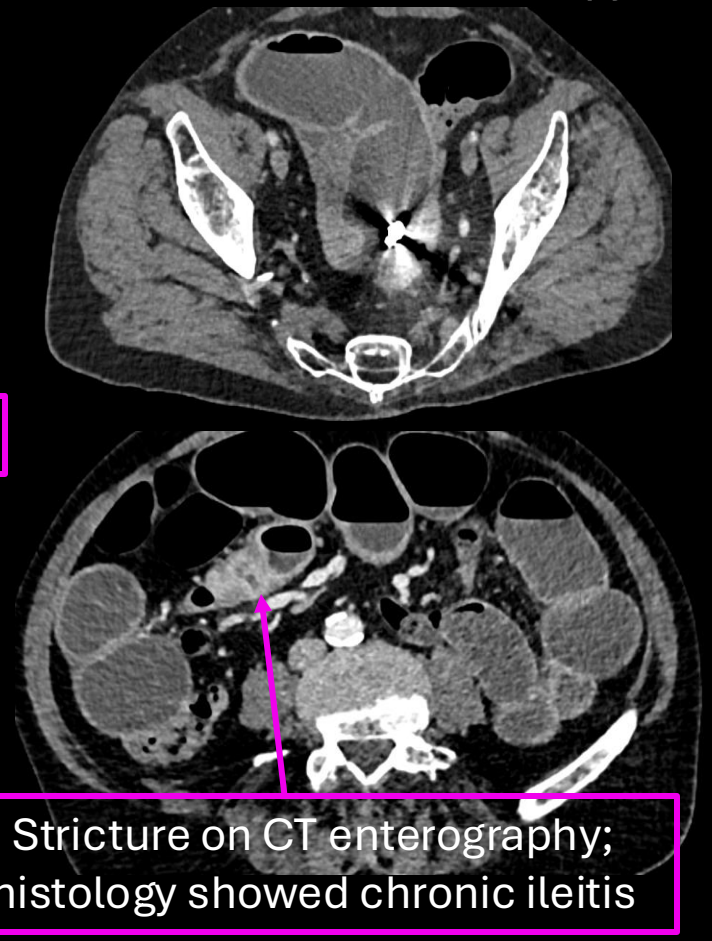
Capsule complications: obstruction

60M with hereditary haemorrhagic telangiectasia; VCE to assess for small bowel disease.



The capsule could not pass this ulcerated stenosis, and the patient subsequently developed obstructive symptoms

CT shows capsule obstructed in the ileum; it was retrieved with double balloon endoscopy.



Stricture on CT enterography; histology showed chronic ileitis

Summary and learning points

- Video capsule endoscopy is a useful tool in the assessment of small bowel Crohn's, and gastrointestinal radiologists should be familiar with its usage and normal appearances.
- Video capsule endoscopy can highlight mucosal disease occult or underestimated on MR enterography.
- Video capsule endoscopy is limited in assessing penetrating and extraluminal disease.
- Capsules can become obstructed at stenoses and strictures; patency capsules are useful beforehand if this is a concern.