The Role of Imaging in Inflammatory Bowel Disease: recommendations from the 2019 joint ECCO-ESGAR Guideline

A Bhagwanani, V Eze, A Plumb, SA Taylor

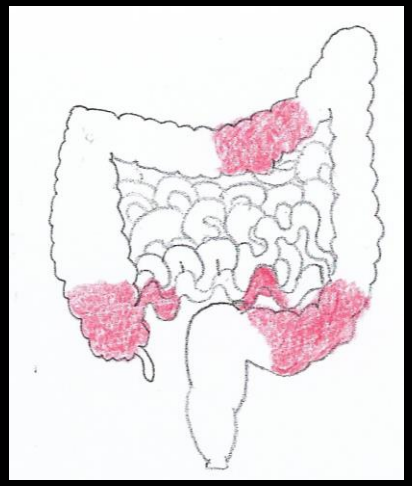
University College London Hospital, UK

Introduction

- Inflammatory bowel disease (IBD) is an umbrella term describing chronic inflammatory disorders of the gastrointestinal (GI) tract, of which Crohn's disease (CD) and ulcerative colitis (UC) are the most common.
- Among European countries, the United Kingdom has the highest prevalence at a reported rate of 373 per 100,000 population [3].
- The aim of this educational exhibit is to summarise the role for radiological imaging in the diagnostic pathway as per the recent consensus guidelines published by the European Crohn's and Colitis Organisation (ECCO) and the European Society of Gastrointestinal and Abdominal Radiology (ESGAR) in 2018/9 [1-2].
- Particular emphasis is made on the role of imaging in initial diagnosis, monitoring of therapeutic response and the detection of complications.

Background

Crohn's Disease

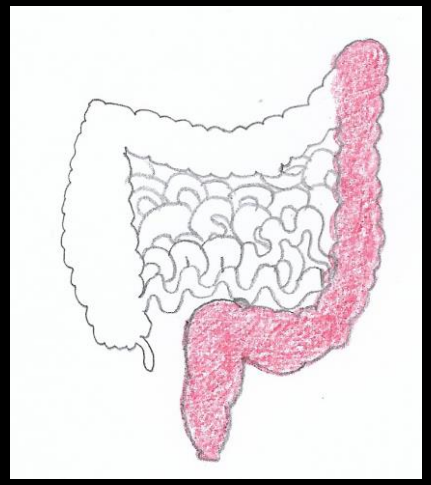


Affects any part of the gastrointestinal tract with classic 'skip involvement'

Transmural inflammation

Extra-intestinal manifestations

Ulcerative Colitis



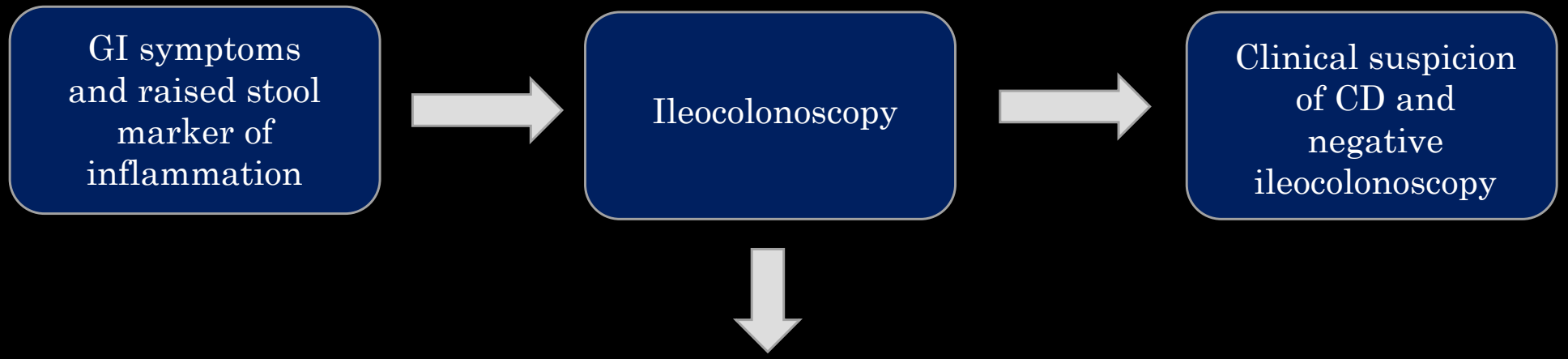
Continuous proximal involvement from the rectum

Mucosal and submucosal inflammation

Extra-intestinal manifestations

Initial Diagnosis

The diagnosis and management of IBD relies on a combination of clinical, biochemical, stool, endoscopic, cross-sectional imaging and histological investigations with no single test alone being diagnostic.



A minimum of two biopsies from the inflamed regions should be obtained.

The most useful endoscopic features of UC are continuous and confluent colonic involvement with clear demarcation of inflammation and rectal involvement. The most useful endoscopic features in CD are discontinuous lesions, presence of strictures and fistulae, and perianal involvement.

Diagnosis | Monitoring | Complications

The ileocaecal region is usually visualised adequately on endoscopy. For evaluation of the small bowel in suspected Crohn's disease, imaging modalities include:

Small bowel capsule endoscopy (SBCE)

Superior for assessment of proximal small bowel involvement.

Contra-indications include gastrointestinal obstruction, strictures and swallowing disorders.

Intestinal ultrasound (IUS)

IUS and MRI show similar diagnostic accuracy for small bowel CD. However IUS is less accurate for defining CD extent.

CT Enterography (CTE)

MR Enterography (MRE)

Both CT and MRI demonstrate comparable high sensitivity and specificity. MRI is preferred due to the absence of radiation, particularly in young patients.

The choice of imaging for small bowel disease will depend on local expertise and availability with cross-sectional imaging indicated for obstructive/stricturing small bowel disease.

Diagnosis | Monitoring | Complications

Monitoring known IBD – therapeutic response

Ulcerative Colitis

For follow-up of active disease in UC, endoscopy remains the gold-standard for investigation of large bowel disease.

IUS is a non-invasive alternative for sigmoid/descending colonic disease but has a low sensitivity for rectal disease and may miss disease in deep pelvic loops.

Crohn's Disease

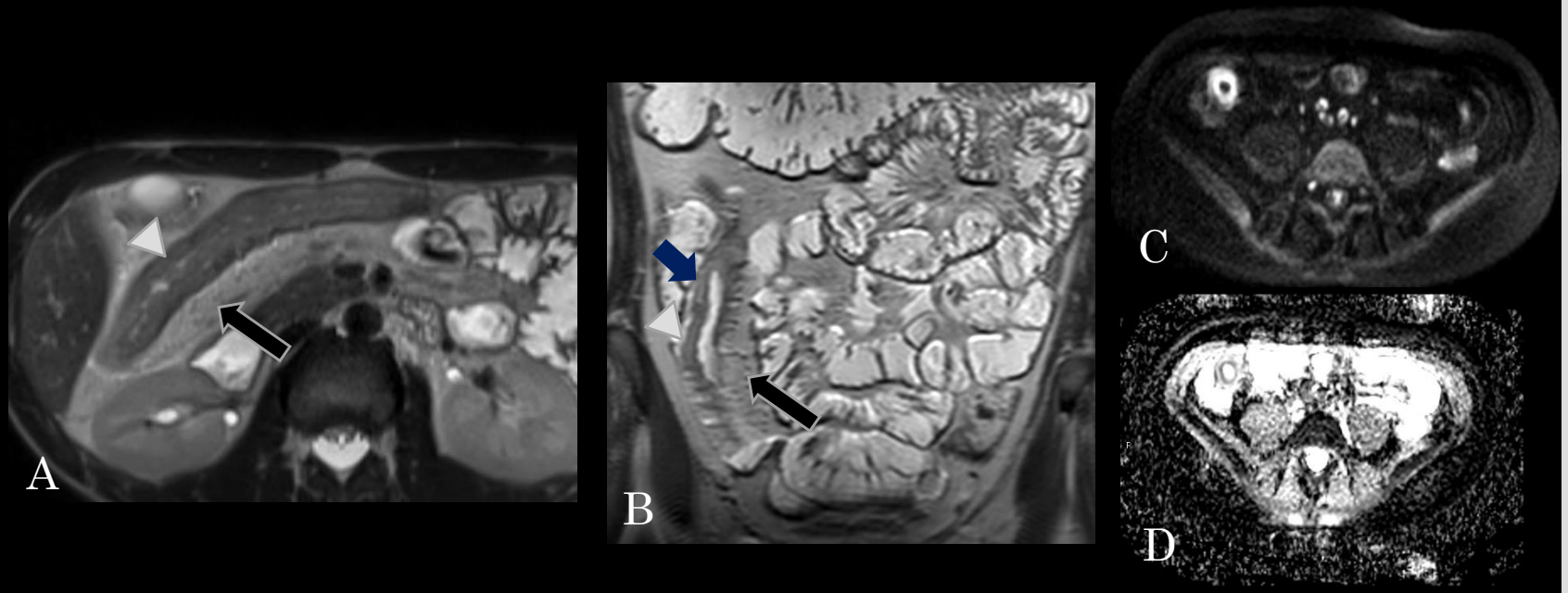
Evaluation should be aimed at detecting mucosal and transmural healing. IUS and MRE appear to be of similar value for monitoring transmural healing in CD during treatment.

Upper GI involvement should be primarily monitored by endoscopy.

MRE, with diffusion-weighted sequences, has a high diagnostic accuracy for detecting active inflammation and provides information about wall thickening, oedema and extraluminal complications. It has a high accuracy for monitoring therapeutic response.

Mucosal ulceration and wall T2 hyperintensity are the most consistently useful features for active inflammation.

Fig 1: Axial and coronal MR images show features of active severe inflammation of the right colon and terminal ileum including severe bowel wall thickening (arrowheads), fat wrapping (black arrows) and mural T2 hyperintensity consistent with oedema (blue arrow). DWI and ADC map (C and D) show unequivocal restricted diffusion involving the inflamed terminal ileal segment.



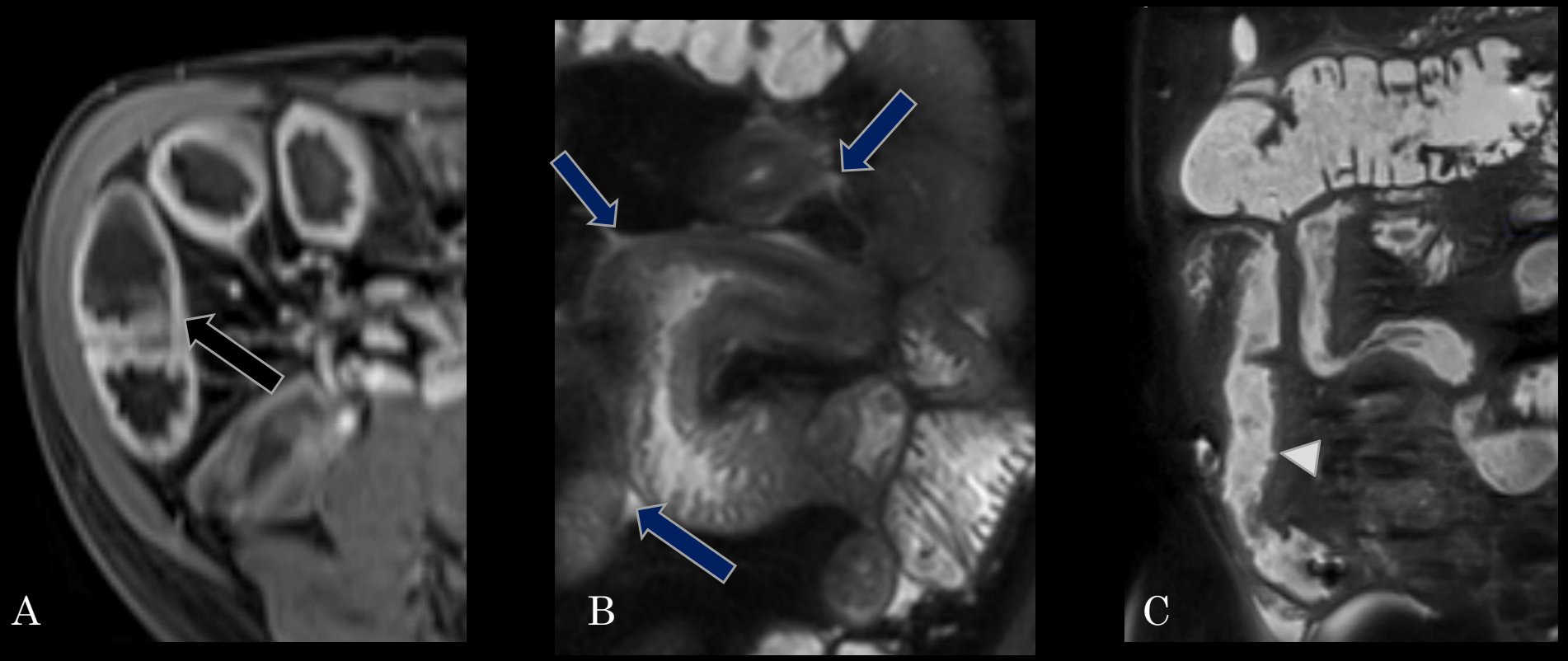


Fig 2: Early enhancement (A, black arrow) and perimural fluid (B, blur arrows) are important MR features of active inflammation. Deep mural ulceration (C, arrowhead) is also associated with increased disease activity.

Based on current studies, IUS appears to be a valuable method to determine transmural healing in CD, with bowel wall thickness and vascularisation appearing to be the most relevant parameters.

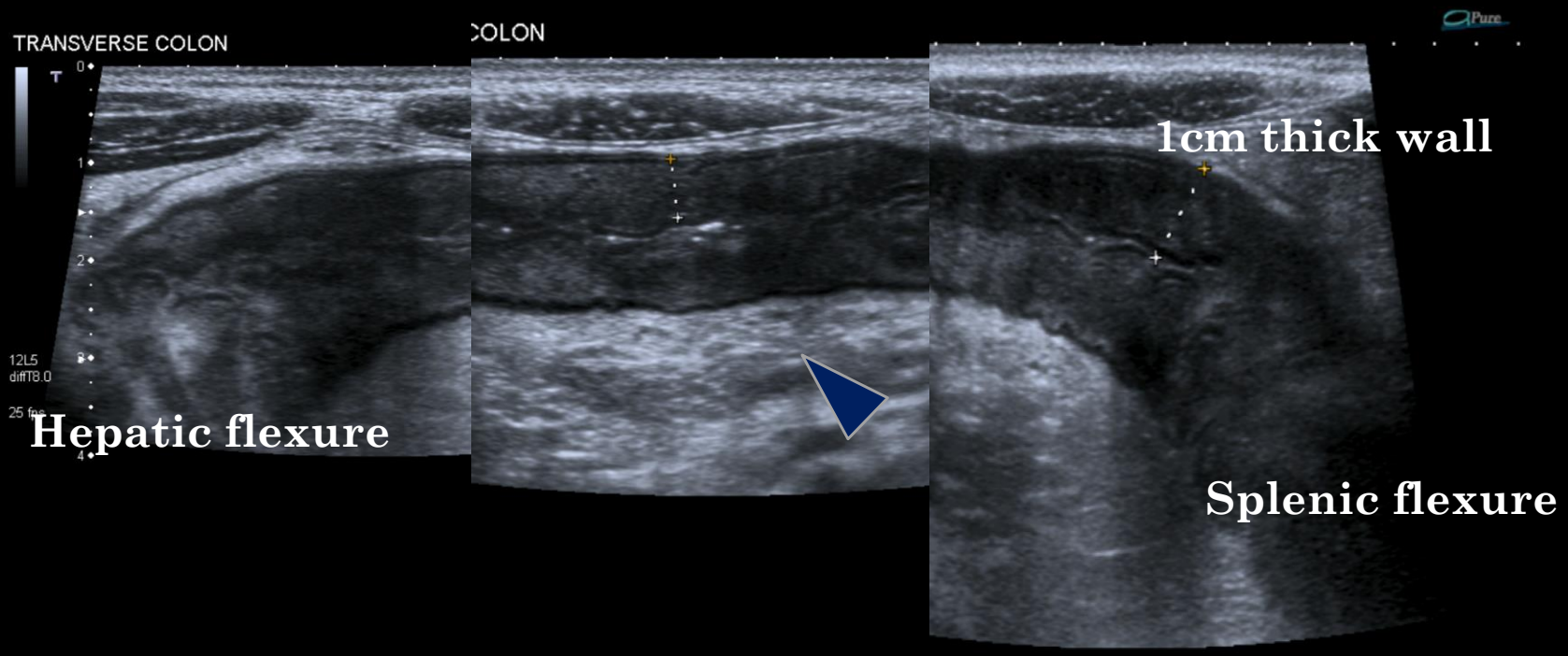


Fig 3: 'Stitched' view of the transverse colon showing features of severe inflammation on IUS. These include severe bowel wall thickening (dashed line), loss of haustral markings and echogenic fat wrapping (arrowhead).

Diagnosis | **Monitoring** | Complications

Extra-intestinal disease, such as fistulae and abscesses, should be monitored with cross-sectional imaging in combination with clinical and laboratory parameters. MRI is slightly superior for monitoring perianal CD with trans-rectal ultrasonography (TRUS) an alternative option.

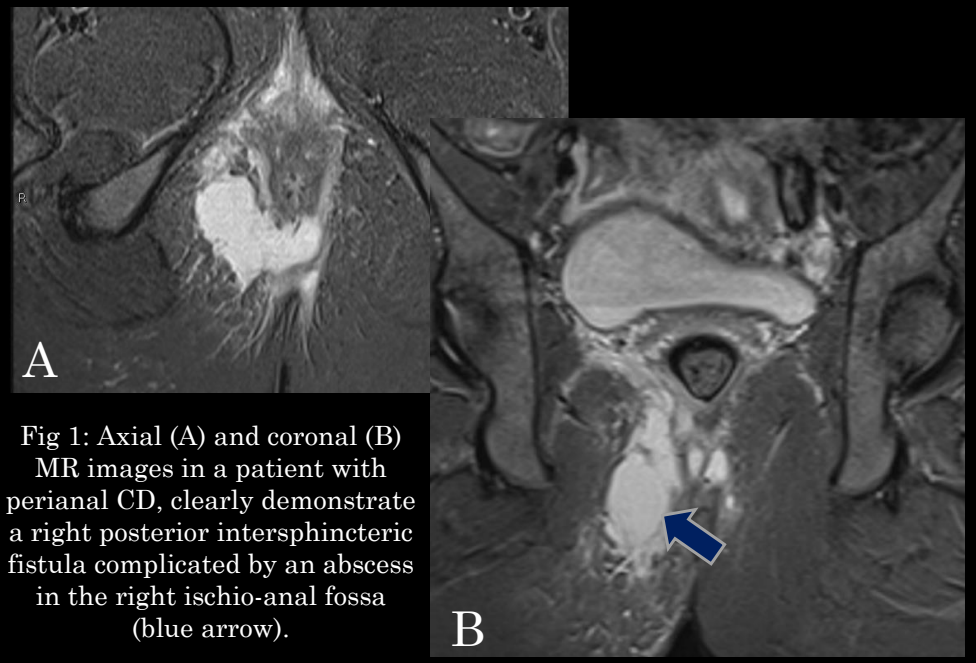


Fig 1: Axial (A) and coronal (B) MR images in a patient with perianal CD, clearly demonstrate a right posterior intersphincteric fistula complicated by an abscess in the right ischio-anal fossa (blue arrow).

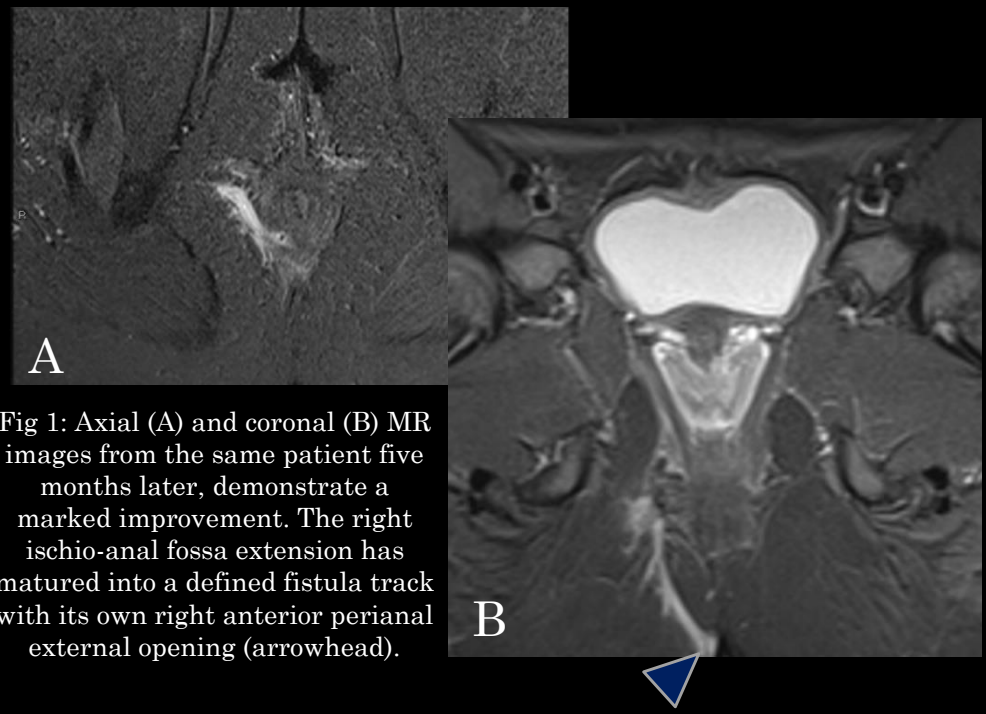


Fig 1: Axial (A) and coronal (B) MR images from the same patient five months later, demonstrate a marked improvement. The right ischio-anal fossa extension has matured into a defined fistula track with its own right anterior perianal external opening (arrowhead).

MR enteroclysis is not significantly more sensitive or specific than MR enterography. It is less well tolerated and requires minimal radiation exposure for fluoroscopic nasojejunal placement. Accordingly, it is not routinely recommended.

Barium studies are less sensitive and specific than MRE, IUS or SBCE. Radiation exposure also makes barium studies less appealing and they should be avoided unless local facilities preclude alternative imaging.

CT should be reserved for the emergency setting due to radiation exposure. CT has a high detection rate for complications including perforation, strictures and abscesses.

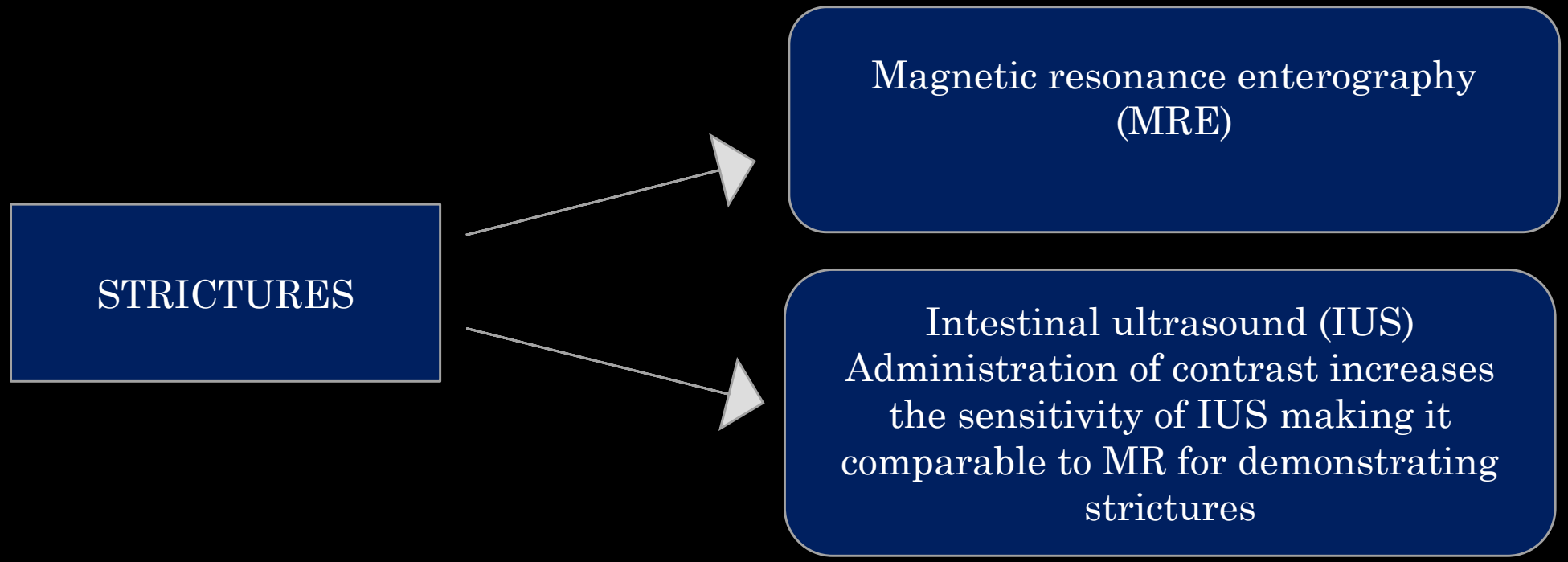
Positron emission tomography (PET) does not appear to detect more lesions than MRE. There is insufficient evidence to include this test in clinical practice.

Monitoring known IBD – asymptomatic patients

In patients with IBD who have reached clinical and biochemical remission, monitoring is aimed at early recognition of a disease flare. Asymptomatic patients with abnormal biochemical parameters may have an imminent disease flare. After excluding infection, endoscopic or cross-sectional imaging [or both] should be performed.

	Validity	Responsiveness to changes in condition	Practicality
Endoscopy	Gold standard	Gold standard	Requires bowel preparation
Faecal calprotectin	Good	Good – rises quickly in cases of relapse	Quick result
CRP	Moderate	Moderate	Quick result
Capsule endoscopy	Good	Good	Requires bowel preparation but generally well tolerated
MR Enterography	Moderate	Moderate – not suitable for early recognition of recurrence	Requires oral preparation for bowel distension
Intestinal ultrasound	Unknown	Unknown	Non-invasive and well tolerated

Detecting complications - strictures

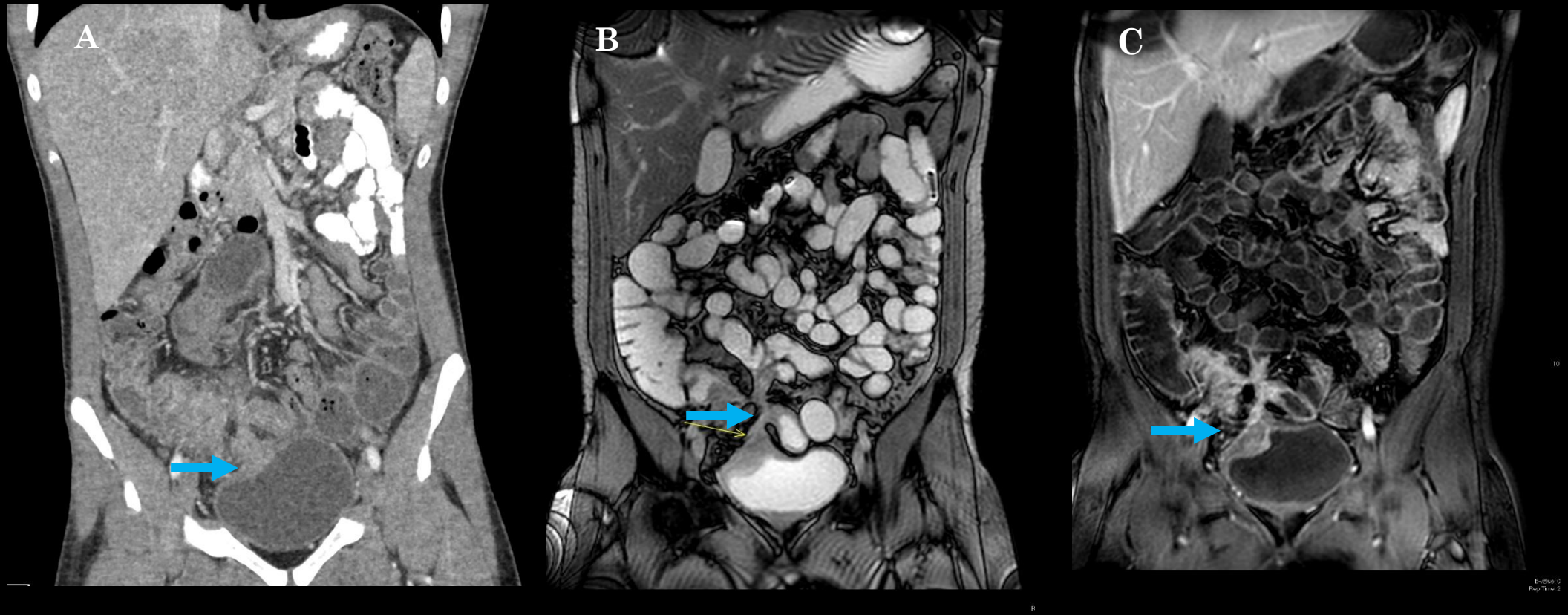


CT enterography has a similar sensitivity and specificity to MRE but is less preferred due to radiation dose

Detecting complications - fistulae and abscesses

Abdominal or pelvic fistulas	Peri-anal fistulae/abscesses
MR Enterography is preferable for deep seated and pelvic fistulae	MRI is the most accurate for detecting perianal complications
CT Enterography and IUS also have high accuracy for detecting intra-abdominal abscesses and fistulae - Higher positive predictive value of CT compared to IUS	Trans-rectal ultrasound (TRUS) is an alternative to MRI
	EUA can be combined with either MRI or TRUS to improve accuracy

Fig 6A: Contrast enhanced CT showing distal ileal bowel loops adherent to the bladder and possible fistulation. B and C:Coronal T2 weighted image and T1 VIBE post-contrast images respectively depicting multiple ileo-ileal fistulae in a “starfish” configuration and an entero-vesical fistula.



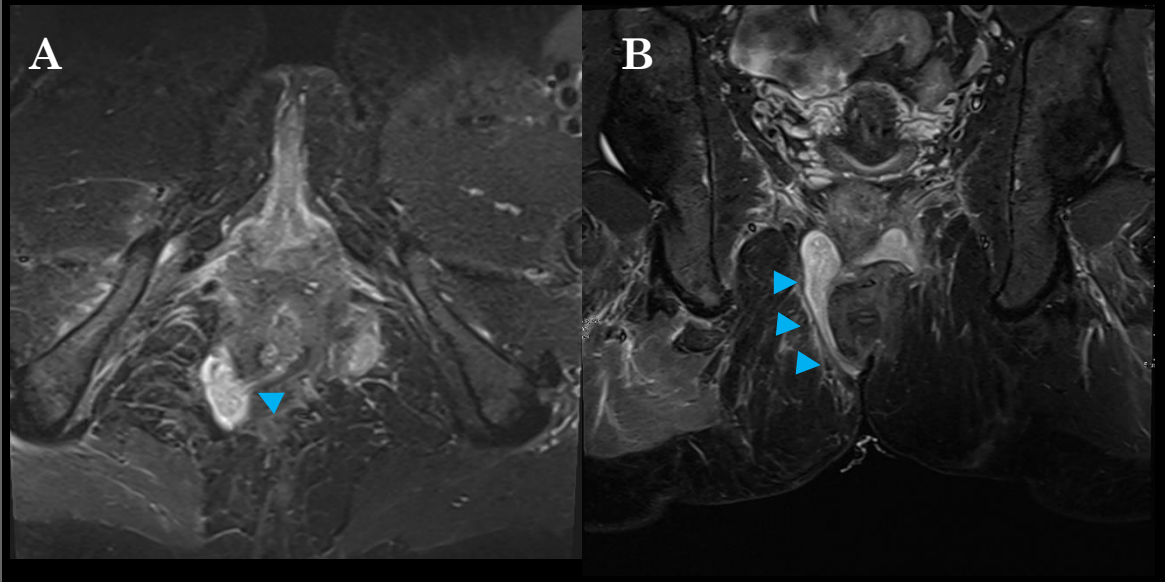
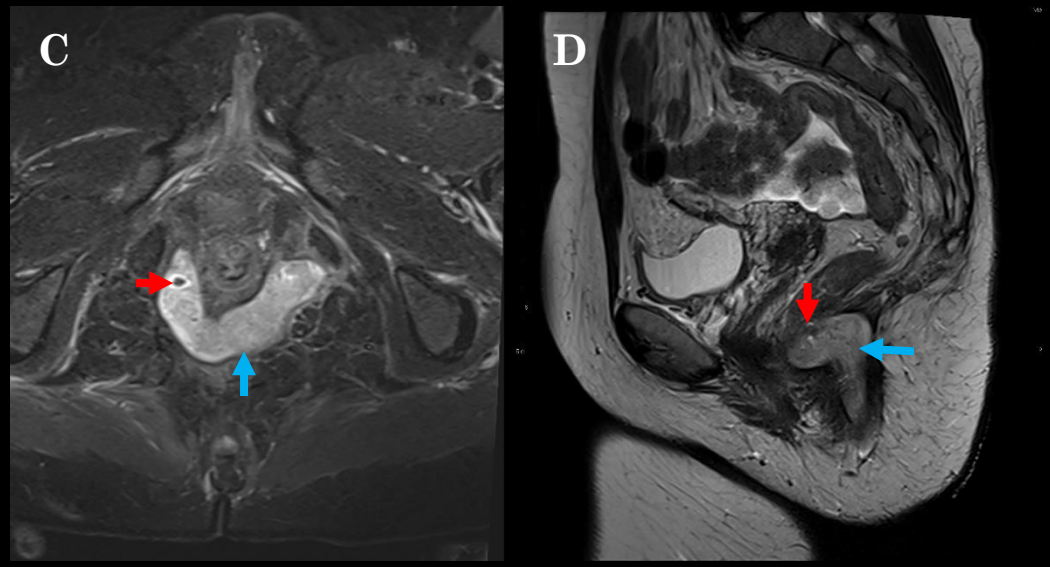


Fig 7A: Axial STIR image showing a trans-sphincteric fistula arising from the 7 o'clock position. B: Coronal STIR of the same patient showing the fistula extension and external opening (blue arrowheads).

C: Axial STIR showing horseshoe abscess within the body of puborectalis muscle and involving the left and right ischio-anal fossae (blue arrows). D: Sagittal T2 image showing abscess posterior to the anal canal. Note the internal gas locules (red arrows)



Detecting complications – Ileal pouch anal anastomosis (IPAA)

The imaging modality required is dependent on the clinical suspicion, expertise and local availability

- To assess mucosal status
- Intraluminal strictures or anastomotic leaks

→ Endoscopy

For suspected extraluminal complication
- Fistulae
- Abscesses
- Sinus tracts

→ Pelvic CT, MRI TRUS or Transperineal ultrasound (TPUS)

Contrast pouchogram can also assist in the assessment for pouch strictures, fistulae and leaks.

Detecting Complications - Emergencies

Abdominal radiographs can be performed as first line to assess for toxic megacolon*

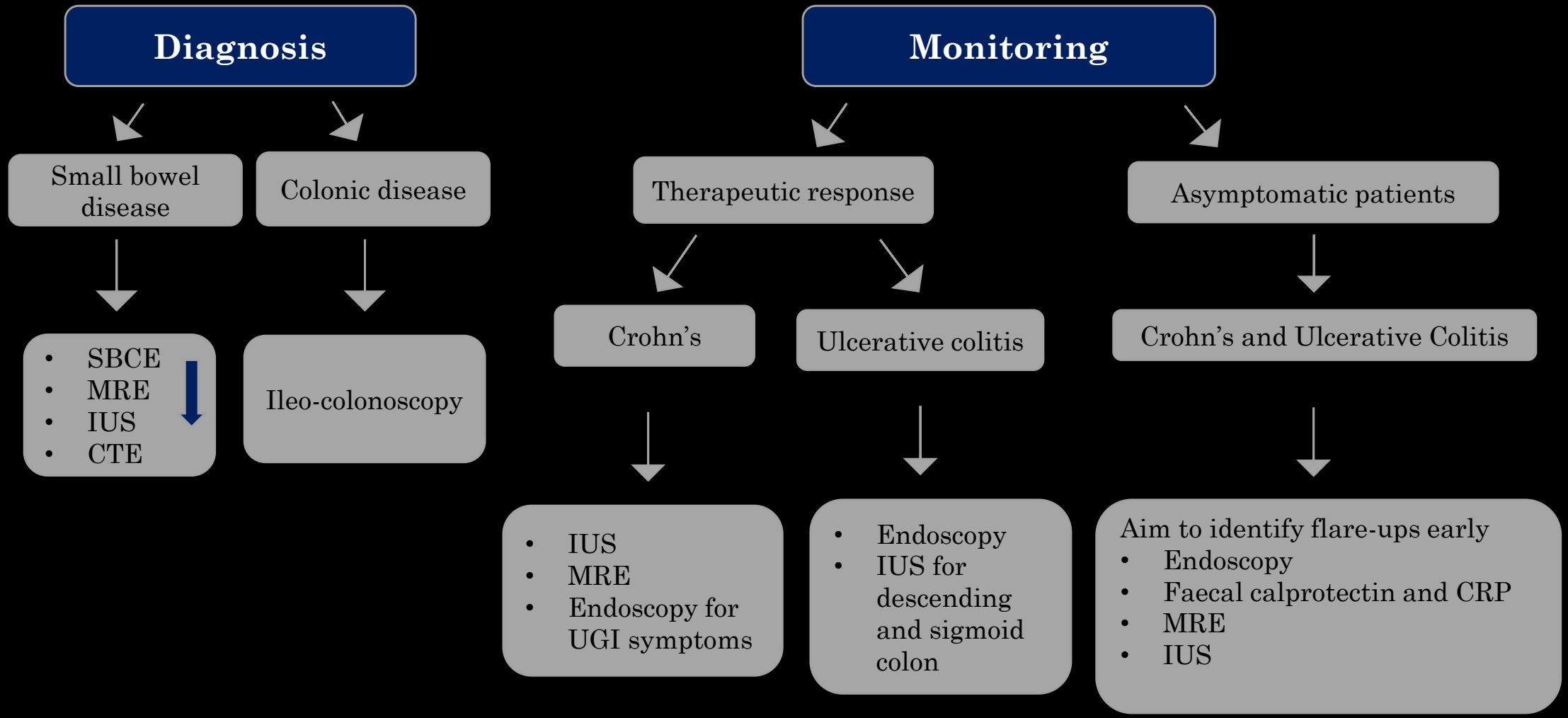
CT can also be performed as first line imaging in selected cases and should be performed in all cases of suspected perforation.

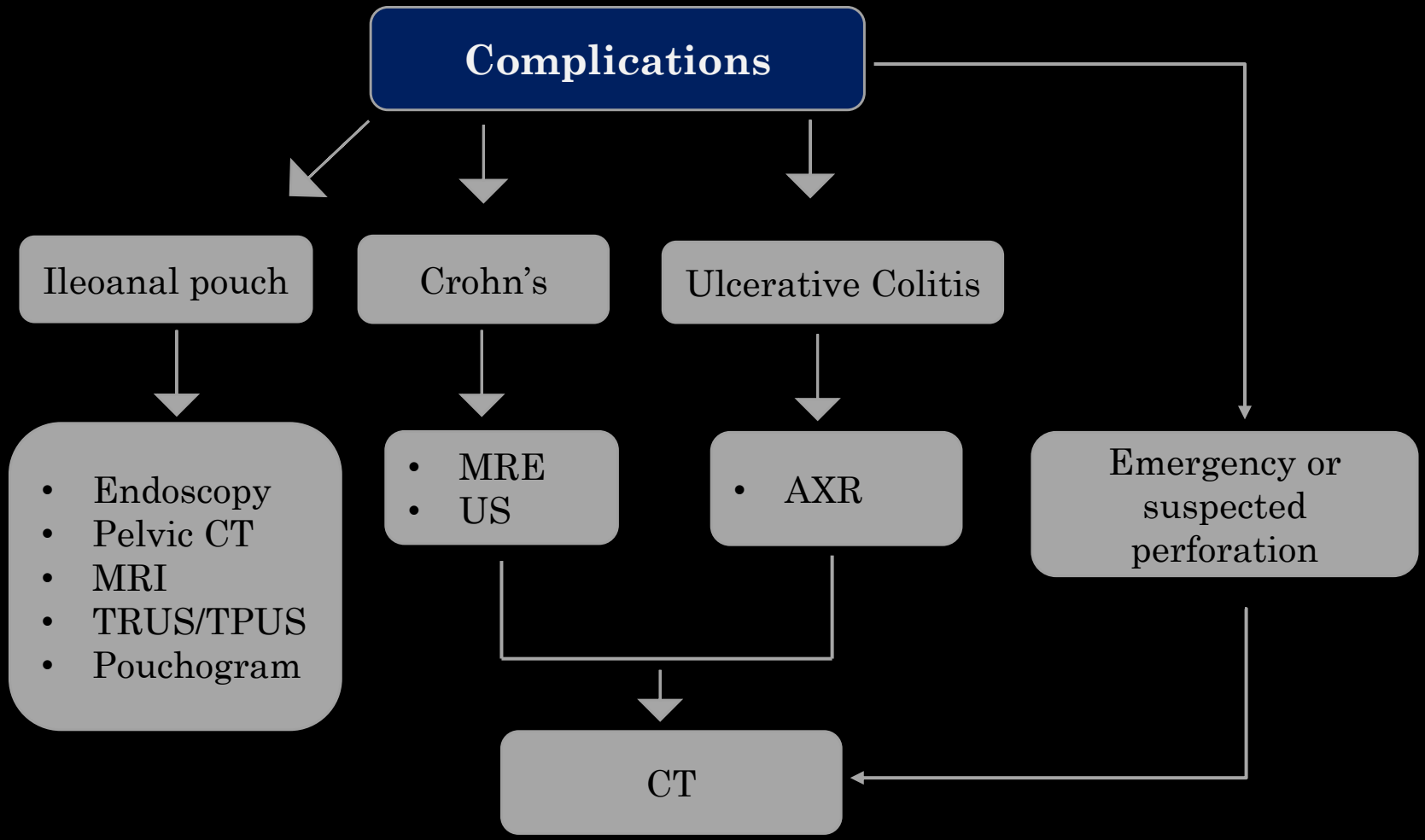
Low dose CT enterography should be considered as it has comparable yield to full dose CT.

Post operatively, CT is the best modality to assess for complications

*Defined as transverse colon diameter of >5.5cm

Summary


Diagnosis
Small bowel disease
Colonic disease
SBCE
MRE
IUS
CTE
Ileo-colonoscopy
Monitoring
Therapeutic response
Asymptomatic patients
Crohn's
Ulcerative colitis
Crohn's and Ulcerative Colitis
IUS
MRE
Endoscopy for UGI symptoms
Endoscopy
IUS for descending and sigmoid colon
Aim to identify flare-ups early
Endoscopy
Faecal calprotectin and CRP
MRE
IUS



References

[1] European Crohn's and Colitis Organisation. 2019. *ECCO-ESGAR Guideline for Diagnostic Assessment in IBD Part 1: Initial diagnosis, monitoring of known IBD, detection of complications*. [Online]. Oxford University Press. [Accessed 23 August 2018]. Available from: https://academic.oup.com/ecco-jcc/article/13/2/144/5078195

[2] European Crohn's and Colitis Organisation. 2019. *ECCO-ESGAR Guideline for Diagnostic Assessment in IBD Part 2: IBD scores and general principles and technical aspects.* [Online]. Oxford University Press. [Accessed 24 August 2018]. Available from: https://academic.oup.com/ecco-jcc/article/13/3/273/5078200#132701875

[3] GBD 2017 Inflammatory Bowel Disease Collaborators. *The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017.*
Lancet Gastroenterol Hepatol. 2019. Available from: https://doi.org/10.1016/S2468-1253(19)30333-4