

College of Health and Medical
Technologies
Department of Radiology
Technologies



MAGNETIC RESONANCE IMAGING OF THE GASTROINTESTINAL TRACT

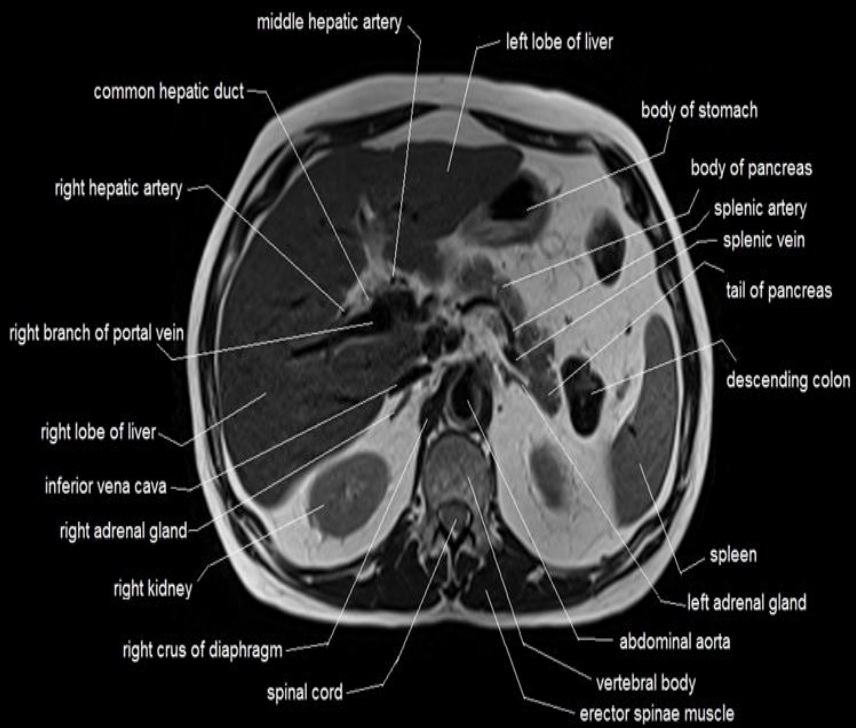
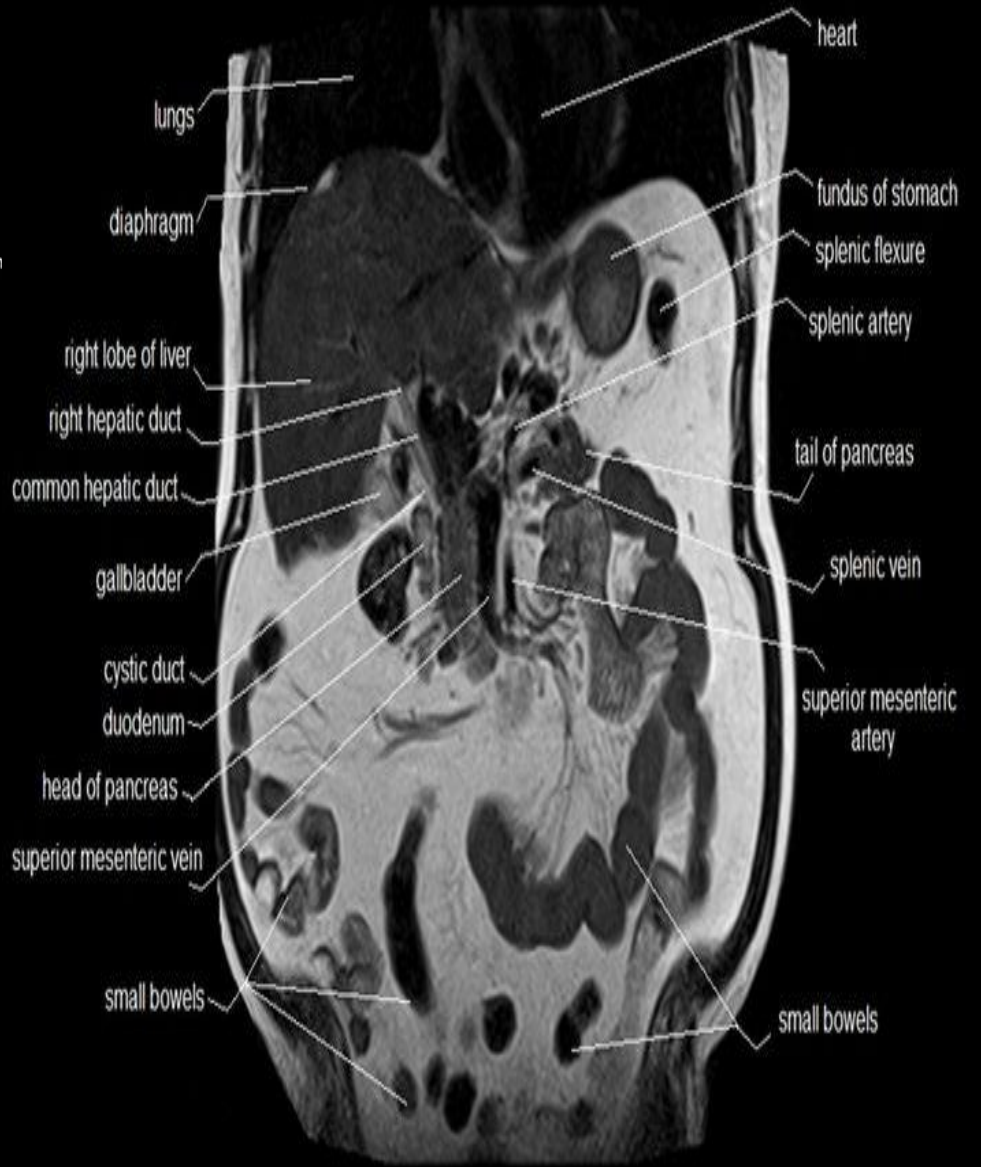
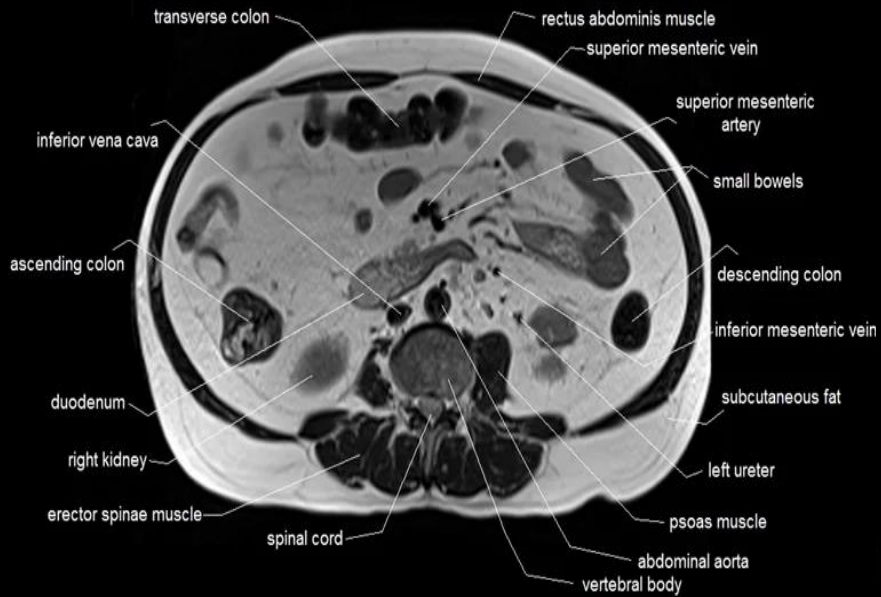
2 nd stage

LECTUER 8

Ahmed Salman Jassim
MSc Radiographic Imaging

2023





Indications

1. Suspected perianal fistula
2. Local staging of anorectal cancer
3. Evaluation of inflammatory bowel disease

Contraindications

1. Standard MRI contraindications—see Chapter 1
2. Some gadolinium-based contrast agents are contraindicated in patients with known or suspected renal dysfunction—see

Contrast Agents

Contrast agents that can be used to alter the signal intensity within the bowel can be classified as positive contrast agents (high signal on T₁ and T₂ weighting) or negative agents (low signal on T₁ and T₂ weighting) but are usually biphasic (high signal on one sequence, low signal on the other).

Water is a biphasic agent but is typically resorbed quickly, so a variety of formulations to increase osmolality are employed, as discussed earlier on page 56. They include Klean-Prep or 250 mL of mannitol 10% solution made up to 1 L with water. Air within the bowel is a natural contrast agent and is usually sufficient for rectal and anal MRI.

Motion Artefacts

The time taken to obtain a scan can be in the order of several minutes if spin echo (SE) sequences are used. Consequently, it is important to minimize peristalsis and respiration artefacts.

Buscopan or glucagon may be used to try to minimize peristalsis.

A prone position or a compression band can be used to help reduce respiratory motion of the anterior abdominal wall.

The artefact, which is propagated from the anterior abdominal wall during respiration, is also due to the high signal from fat. Consequently, fat suppression sequences can help minimize this.

Pulse Sequences

- The sequences used for imaging the abdomen and gastrointestinal tract will depend on the nature of the clinical problem.
- Very fast sequences such as breath-hold gradient echo (GE) and single-shot fast-SE sequences may be used to minimize any movement artefact. However, they do suffer from relatively poor contrast resolution.
- Standard fast-SE T₁-weighted and T₂-weighted sequences (with gadolinium and fat suppression added as necessary) are often used as baseline sequences, but on occasion these suffer from movement artefact.
- The optimal plane of the sequences will be determined by the clinical problem, but axial scans are frequently used in the first instance with orthogonal planes (coronal or sagittal), as required.

Techniques

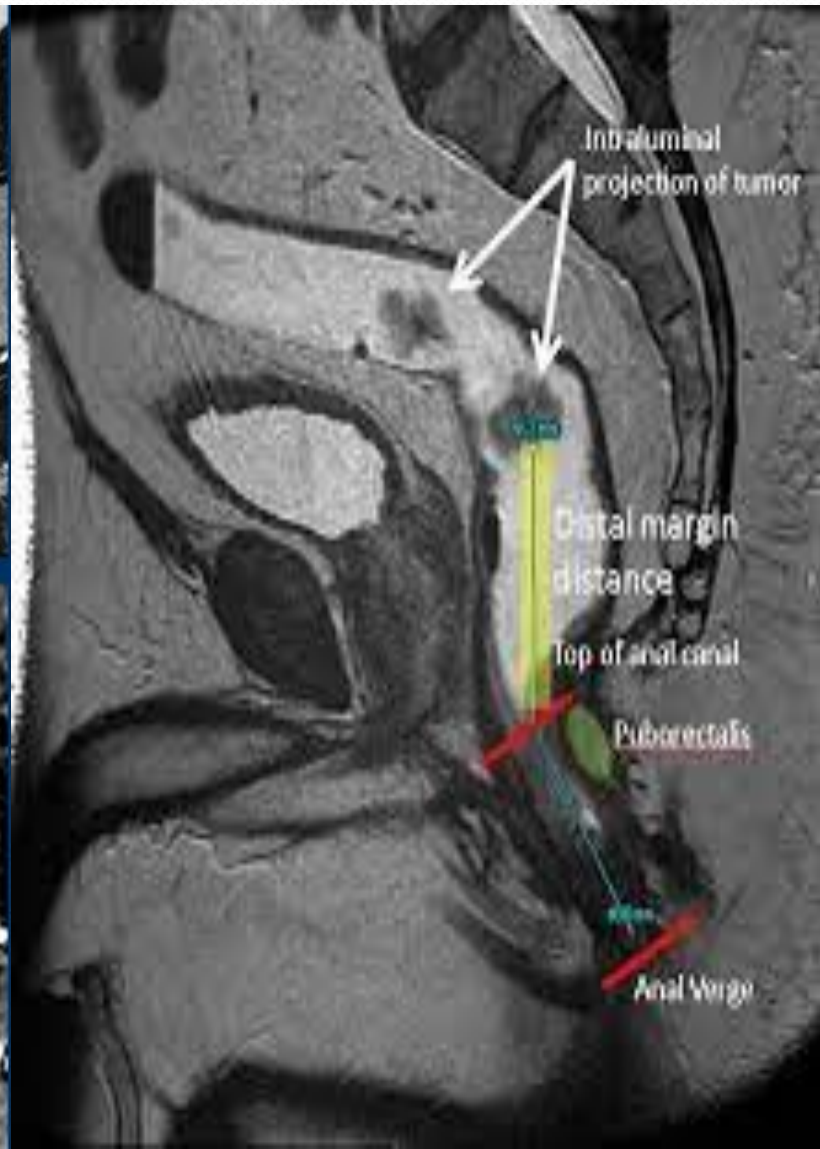
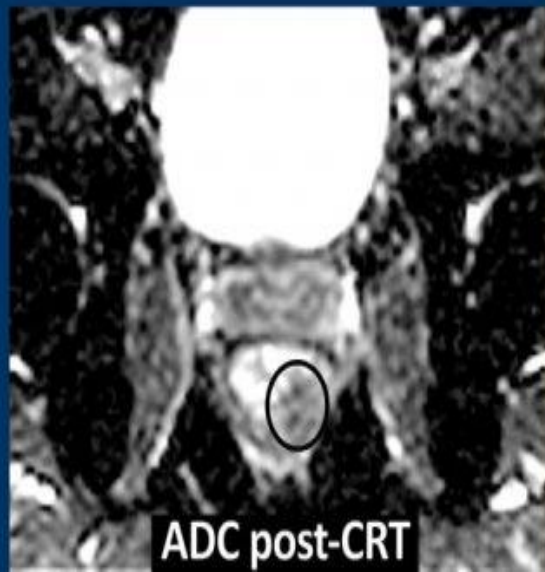
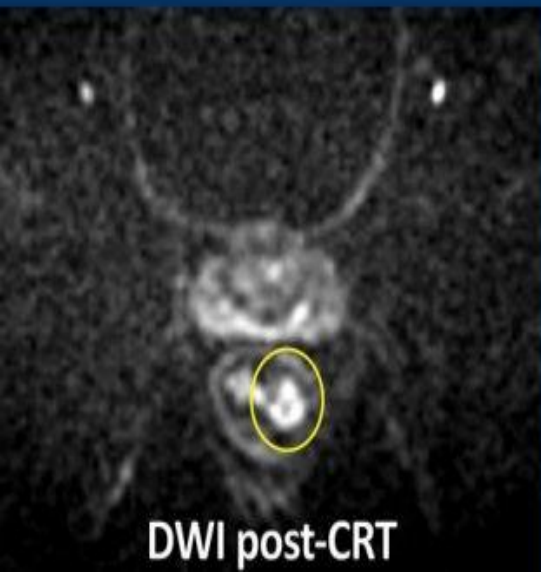
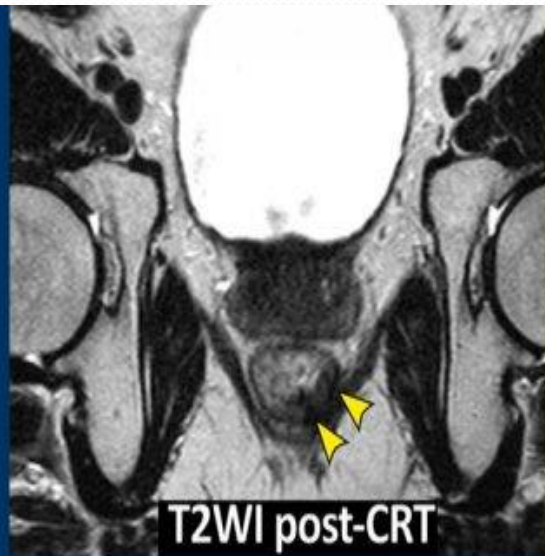
Suspected perianal fistula

1. No special patient preparation required; the patient is scanned supine in the MRI scanner.
2. Buscopan is not routinely used
3. The anal canal is angulated forward from the vertical by about 45 degrees. Initial midline sagittal T2 scan is used to identify the orientation of the canal. Oblique axial and coronal high-resolution scans at right angles, and parallel to the anal canal complex, are obtained to facilitate interpretation. T2W SE (with fat saturation) or short tau inversion recovery (STIR) are particularly useful sequences, but T1W SE and occasionally scans following intravenous gadolinium using T1W with fat saturation may also assist

Local staging of anorectal cancer

1. Patient scanned supine; Buscopan not routinely used.
2. Sagittal T2-weighted SE sequence of central pelvic structures. Large field of view axial T2 scan of the whole pelvis. Use these scans to plan high-resolution 3-mm axial T2W images perpendicular to and also parallel to the long axis of the tumour. Coronal high-resolution scans are useful for low rectal tumours. Diffusion weighted scans may also be useful.
3. Anal cancer staging needs to include the groins

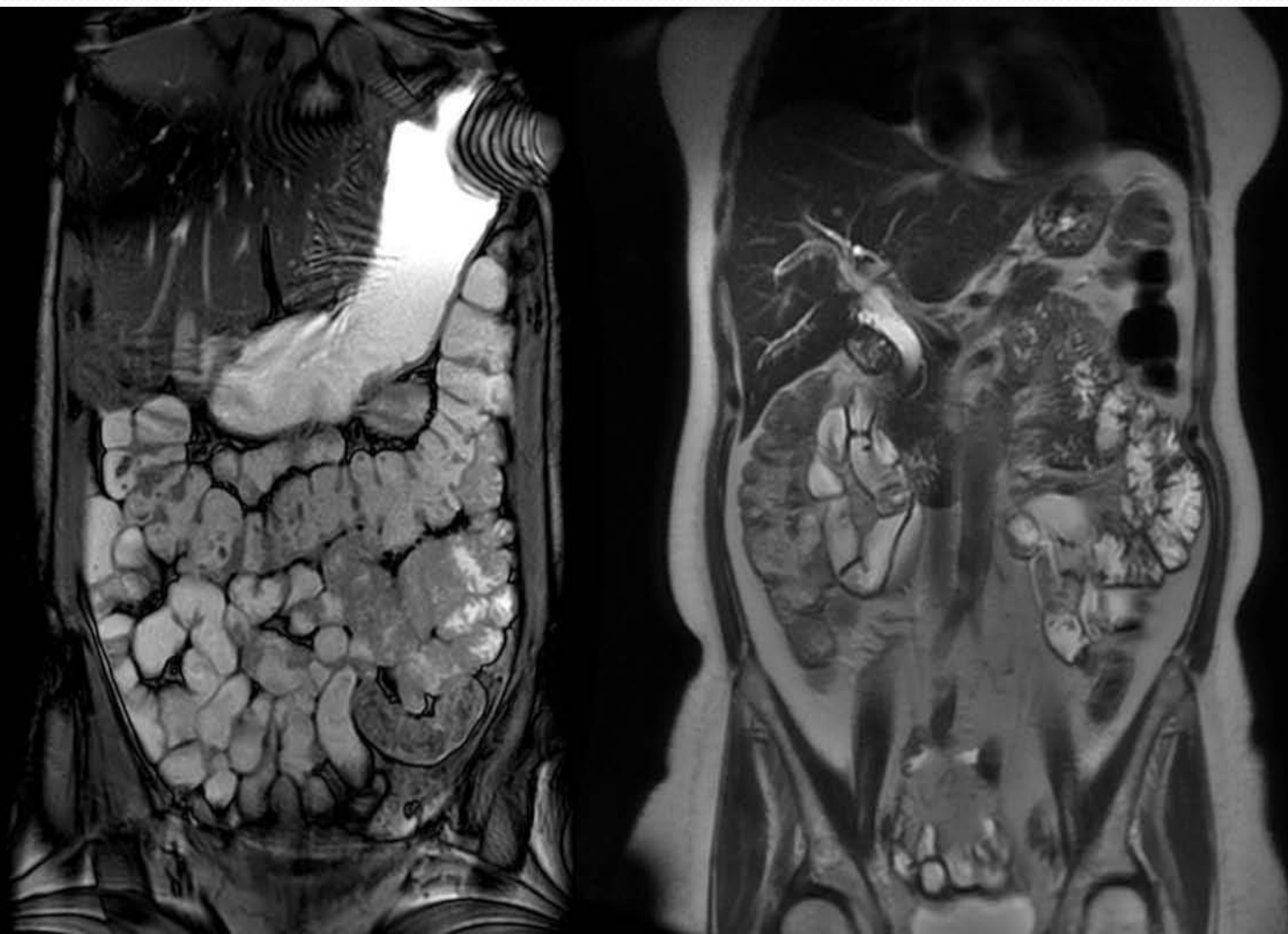
Local staging of anorectal cancer



Small-bowel magnetic resonance enteroclysis

1. Pass Bilbao-Dotter tube to DJ flexure using fluoroscopy.
2. Transfer patient to MR scanner and obtain venous access.
3. Scan prone (though some centres scan supine) and obtain 'scout' localizer.
4. Connect Bilbao-Dotter tube to enteroclysis pump (situated in control room if not MR compatible). Infuse ($80\text{--}100\text{ mL min}^{-1}$) oral contrast under MR fluoroscopy (coronal thick-slab single-shot sequence, e.g. half Fourier acquisition single-shot turbo spin echo [HASTE] to monitor filling of small bowel to ileocaecal valve). Check for reflux to stomach and slow/stop if significant. Stop infusion when contrast reaches colon.
5. Give Buscopan 20 mg intravenously.
6. Obtain sequences in coronal and transverse axial planes using HASTE and FISP sequences to include one fat-saturated sequence.
7. 3D T₁W fat suppressed (e.g. volumetric interpolated breath-hold examination [VIBE] sequences pre- and postintravenous gadolinium).

Small-bowel magnetic resonance enteroclysis



Small-bowel magnetic resonance enterography

1. Steadily drink oral contrast (ideally 1.5 L) over 30–45 min and scan immediately.
2. Obtain venous access and give Buscopan 20 mg i.v.
3. Obtain sequences in coronal and axial planes using HASTE, FISP sequences (or manufacturer's equivalent) to include one fat-saturated sequence. Coronal precontrast 3D T₁W fat suppressed (e.g. VIBE).
4. Give gadolinium-based contrast agent i.v.
5. Obtain fast 3D T₁W fat-suppressed (e.g. VIBE) sequences in coronal and axial planes.
6. Diffusion weighted imaging may be helpful

Small-bowel magnetic resonance enterography





THANKS