Rectal and perirectal conditions: a comprehensive and schematic approach to the anatomy and pathology

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Learning objectives

- To provide a comprehensive review of anatomical landmarks of rectal and perirectal region.
- To revise common and uncommon conditions in this complex anatomic region.
- To highlight the imaging clues for their accurate diagnosis.
Background

Rectum and perirectal space can be affected by a wide variety of tumours and tumour-like conditions, which may present with similar symptoms to those of rectal adenocarcinoma, such as hematochezia, pain, or change in bowel habits.

On the other hand, tumours of the perirectal space are commonly congenital, asymptomatic and they are malignant only in 20-35% of cases (1).

Anatomical characteristics of perirectal space are complex and magnetic resonance (MR) is the modality of choice for its assessment, since it provides high soft tissue contrast and depicts layers of rectal wall as well as anatomic landmarks of pelvis.

It is essential to achieve the best knowledge of these features, since multidisciplinary teams are becoming increasingly important and the radiologist should be a fundamental component of them.
Findings and procedure details

ANATOMY

The rectum is approximately 15cm in length and layers can be well depicted by MR (Fig. 1 on page 14):

- Inner hyperintense layer, mucosa and submucosa (differentiation may be difficult)
- Intermediate hypointense layer, muscularis propria
- Outer hyperintense layer, perirectal fat tissue.

Mesorectum (Fig. 1 on page 14) contains lymph nodes, vessels, and several fibrous septa, and is surrounded by the mesorectal fascia, that represents the circumferential resection margin (CRM) when total mesorectal excision is used as the surgical approach.

The rectum is divided into thirds since outcomes and surgical management are affected by the location of pathology(1) (Fig. 2 on page 15):

- Upper: the lowest edge of pathology is more than 10cm from the anal verge. The anterior wall is covered by the peritoneal reflection. The point of peritoneal reflection attachment occurs at a variable height, particularly in women. Careful assessment of the peritoneal reflection in upper rectal tumors.
- Middle: lowest edge of pathology is located 5-10cm from the anal verge. This segment of the rectum, which lies below the peritoneal reflection, is completely encircled by mesorectum.
- Lower: the lowest edge of pathology is less than 5cm from the anal verge. At this level, the mesorectum tapers sharply; anteriorly the mesorectal fascia fuses with the remnant of the urogenital septum (rectoprostatic fascia in the male; rectovaginal septum in the female). The anorectal junction is held forward by the puborectal sling.

Perirectal space is the pelvic continuation of the retroperitoneum. It is bordered superiorly by the peritoneal reflection and laterally by the endopelvic fascia and lateral ligaments of the rectum. It is subdivided in the mesorectal and retrorectal spaces by the mesorectal fascia. Presacral and rectosacral fascias separate retrorectal space from the presacral space (Fig. 2 on page 15).

RECTAL
Rectal tumours can be classified accordingly to the wall layer where they arise or their most frequent form of presentation (Table 1 on page 13, Table 2 on page 13).

1. Mucosa

Adenocarcinoma

Adenocarcinoma is the most common type of rectal cancer (98%), presented in patients older than 50 years-old.

They often present as an irregular thickening of the rectal wall with ulcerating mucosa. Polypoid pattern is also possible, especially in low grade adenocarcinomas.

They show intermediate signal intensity on T2WI and restriction on diffusion.

MR has lower accuracy than eco-endoscopy in the staging of tumours limited to the mucosa (T1) or to the muscularis propria (T2). Infiltration of mesorectal fat and draining veins (T3) and peritoneal reflection and adjacent organs (T4) are well depicted by MR (Fig. 3 on page 16, Fig. 4 on page 17, Fig. 5 on page 18, Fig. 6 on page 19).

Mucinous is a less frequent (10-20%) subtype of rectal adenocarcinoma, with poorer prognosis. They present large mucin pools hyperintense on T2WI that represent >50% of the tumour (Fig. 7 on page 20, Fig. 8 on page 21).

Lymph nodes with spiculated or indistinct margins or heterogeneous signal intensity are considered pathologic (Fig. 9 on page 22).

Patients with locally advanced rectal cancer received presurgical chemo-radiotherapy (2). Secondary changes to chemo-radiotherapy before total mesorectal excision such as proctitis and ulceration, fibrosis and desmoplastic reaction and changes in mesorectal lymph nodes (Fig. 10 on page 23).

Most local recurrences occur within the first 3 years after surgery and they are usually associated with distant metastases.
CT has a great sensitivity to detect local recurrence but lacks specificity in differentiating recurrence from postsurgical changes. MR offers better specificity, although it also has its challenges. Low signal intensity on T2WI may be secondary to fibrosis, but it cannot rule out cluster of tumor cells within it. Persistence of soft-tissue signal intensity on treated lesions and restriction on DWI suggests residual tumor (local recurrences in Fig. 11 on page 24, Fig. 12 on page 25, Fig. 13 on page 26 and postsurgical changes in Fig. 14 on page 27, Fig. 15 on page 28, Fig. 16 on page 29).

**Lymphoma (Fig. 17 on page 30)**

Colorectal location only represents 6-20% of gastrointestinal lymphomas. They usually occur in male older than 60 years-old with widespread large B-cell lymphoma, although they may also present in uncontrolled longstanding celiac patients as a primary rectal lymphoma (MALT).

They more often present as polypoid masses than concentric wall thickening with ulcerating mucosa, with heterogeneous hyperintensity on T2WI, marked restriction on diffusion and mild-to-moderate contrast-enhancement.

Important clues in the differential diagnosis with adenocarcinomas are the lack of obstruction with aneurysmal dilatation of the rectum and preservation of the mesorectal fat (1).

**Anorectal melanoma (Fig. 18 on page 31, Fig. 19 on page 32)**

It accounts for <2% of all melanoma cases and it presents as a part of metastatic melanoma rather than primary rectal melanoma.

It appears as an intraluminal polypoid mass without colonic obstruction, showing hyperintensity on T1WI because melanin content, although 10-29% of them are amelanotic. They also show high signal intensity on T2WI, avid contrast-enhancement but minimal perirectal infiltration or lymphadenopathies (3)

**Proctitis (Fig. 20 on page 33, Fig. 21 on page 34, Fig. 22 on page 35) (4)**

Inflammation of the rectum and anus may be related to different etiologies that share similar clinical and imaging characteristics: moreover, these features could also mimic malignancy.
On CT, they appear as **concentric wall thickening**, mucosal hyperemia and mural stratification, associated with mesorectal fat stranding and lymphadenopathy.

On MR, active inflammation is depicted by high signal on T2WI and **restriction** on diffusion, whereas chronic processes could present with submucosal fat deposition or low signal on T2WI with **delayed** contrast-enhancement due to fibrosis. Proliferation of mesorectal fat and ingurgitation of vasa recta may also be present.

Proctitis in ulcerative colitis usually extends proximally to the sigma, whereas skip lesions are often en in Crohn's colitis. This last one often presents more severe wall thickening and it is often associated with fistula-in-ano, perirectal abscesses.

Infectious proctitis may be secondary to sexually transmitted infections such as citomegalovirus, N. gonorrhoeae or C. trachomatis. Common anal lesions found in syphilis include ulcers, fissures and condylomata lata.

Other etiologic types of proctitis include stercoral in elderly or neurologically impaired patients with impacted fecal material; radiation in over 50% of patients with prior radiotherapy; and ischemic, very rare due to a rich collateral vascular supply.

### 2. Submucosal

**Metastases**

Secondary neoplastic involvement of rectum is uncommon and it is usually by direct invasion rather hematogenous spread (1)

Direct spread appears as a **target sign** on CT and concentric ring pattern on T2WI due to exaggeration of normal zonal anatomy by infiltrative tumour in the submucosa and around the muscle layer (**Fig. 23** on page 36).

Metastases from hematogenous spread appear as a submucosal mass or as linitis plastica characterized by an **atypical wall thickening with mucosal preservation and non-distensible rectum** that may be overlooked by endoscopy (**Fig. 24** on page 37).

**Well-differentiated neuroendocrine tumour(WDNET)** (**Fig. 25** on page 38)
They arise in the deep portions of the submucosal glands of rectal wall. They are found incidentally in middle-aged patients, since carcinoid syndrome is rare unless liver metastases are present.

They present as solitary submucosal nodules above the dentate line, hyperintense on T2WI with avid contrast-enhancement. Areas of cystic and necrotic degeneration may be present in the large ones.

**Gastrointestinal stromal tumour (GIST)** *(Fig. 26 on page 39)*

Rectum represents the third most common location of GIST (<5%).

On MR, they frequently present as large, eccentric and well-circumscribed masses with solid component with intermediate-to-high signal on T2WI, heterogeneous contrast-enhancement and necrotic degeneration. Unlike adenocarcinomas, GISTs don't usually present perirectal or lymph node invasion neither bowel obstruction.

**Leiomioma and leiomiosarcoma**

Extremely rare mesenchymal tumours frequently presented in female with prior radiotherapy.

They present as polypoid masses isointense-to-mildly hyperintense on T2WI, with variable contrast-enhancement.

**Lipoma and liposarcoma** *(Fig. 27 on page 40)*

They are broad-based intraluminal tumours, sometimes pedunculated, that follow the signal intensity of fat in all sequences. Contrast-enhancement is variable according to the aggressiveness of the tumour.

**Hemangioma**

Benign vascular tumours presented in young men. On MR, there is a diffuse hyperintensity of the thickened wall on T2WI with serpentine flow voids.

**Endometriosis** *(Fig. 28 on page 41, Fig. 29 on page 42)*
Deep infiltrating endometriosis affects women presented with abdominal pain during the menstrual period, infertility and intestinal obstruction.

When endometriomas or deep infiltrating endometriosis signs are detected during pelvic MR, a careful look of the rectosigmoid should be made. Most cases are limited to the serosa and less frequent infiltrating deeply into the intestinal wall. MR signs included:

- **Nodular or masslike bowel wall thickening** in favour of hypertrophy of muscular propria.
- **"Mushroom cap" sign**: T2WI show affection of anterior rectosigmoid wall with low signal of a thickened muscular propria layer and high signal of mucosa and submucosal layers (displaced into the bowel lumen)
- Internal cystic areas or hemorrhagic components may be present.

**Colitis cystica profunda**

Benign tumour-like condition incidentally found in middle-aged patients associated with solitary ulcer and rectal prolapse.

They present as mucin-filled cysts without contrast-enhancement.

**PERIRECTAL**

To simplify the classification of pathology, perirectal masses can be initially categorized into two groups according to presence of intralesional fat (Table 2)(5)

**Anorectal abscess and fistulae (Fig. 30 on page 43)**

They most commonly arise from obstruction and infection of anal glands (90%), especially in patients with Crohn’s disease and immunosuppression. Patients usually present with pain, fever and a fluctuated collection. Fistulae most commonly arise from an abscess, but also from inflammatory bowel disease or malignancy.

On CT, they present as well-circumscribed collections with thickened and contrast-enhanced walls and with debris and air bubbles inside (50%).

On MR, **T2WI with fat-suppression and STIR** sequences have greater accuracy than CT for depicting the extent of the abscess and fistulous tracts and their relationship with
the anal sphincter complex and elevator plate muscles. Rectovaginal and rectovesical fistulas may also be depicted.

Fluid, pus and granulation tissue of the fistulous tracts appear **hyperintense on T2WI with avid contrast-enhancement and restriction on diffusion**. Longstanding fistulas with fibrosis appear hypointense with delayed contrast-enhancement.

Several conditions can mimic perirectal and perianal abscess, such as necrotic or mucinous anorectal tumours, thrombosed hemorrhoids, ruptured Bartholin gland cysts, furuncles and pilonidal cysts.

**Developmental cysts** ([Fig. 31](#) on page 44, [Fig. 32](#) on page 45) (5)

They are the most common retrorectal cystic tumours (60%). They are found incidentally in middle-aged women.

- **Epidermoid and dermoid cysts** are lined with stratified squamous epithelium. On MR, they are well-circumscribed thin-walled cysts, hyperintense on T2WI, without contrast-enhancement. Restriction on diffusion is characteristic of epidermoid cysts, whereas dermoid cysts may present fat nodules (skin appendages).

- **Enteric and neurenteric cysts** are lined either with intestinal mucosa or mature mucosa of endodermal origin with lamina propria, respectively.

Tailgut cysts are enteric cysts with **multilocular** cysts with variable signal intensity depending on mucin content.

Rectal duplication cysts are **unilocular** cysts with low signal bands representing the two layers of smooth muscle.

If they become **infected**, they present thickened and contrast-enhanced walls, pericystic fat stranding and heterogeneous signal may be present.

**Malignant degeneration** may be present, especially in duplication cysts more than tailgut cysts (20 vs. 13%) They present contrast-enhanced nodules, internal septa and irregular wall thickening.

**Sacrococcygeal teratoma** ([Fig. 33](#) on page 46)
Most common congenital tumour in fetus and neonates with female predilection (4:1)

They often developed outside the pelvis (47%) but they can also arise in the presacral space. They are solid-cystic lesions with avid contrast-enhancement. Fat nodules, fat-fluid levels (80%) and calcifications (50%) may be present (6).

**Neurogenic tumours**

Schwannomas and neurofibromas are well-circumscribed tumours with indistinguishably radiological features, but schwannomas mostly show heterogeneous signal intensity and contrast-enhancement, whereas neurofibromas show a target-like pattern with peripheral myxoid stroma hyperintense and central collagenous tissue hypointense on T2WI. They are frequently associated with thickened nerve roots and widened neural foramina.

Malignant degeneration should be suspected in large and irregular tumours with peripheral contrast-enhancement, perilesional edema and intratumoral lobulations.

**Osseous tumours**

**Giant cell tumour** is benign and appears as eccentric and lytic tumour with a thin sclerotic rim, associated with a soft-tissue mass. On MR, they demonstrate moderate hyperintensity both on T1 and T2WI. Aneurysmal bone cyst may be present. **Chordoma** is malignant and appears in older man at midline. Unlike GCT, amorphous and peripheral calcifications are very common (90%) and it presents avid contrast-enhancement (5,6)

**Lipoma and liposarcoma** (Fig. 34 on page 47)

Unlike in the rectal wall, retrorectal liposarcomas are more frequent than lipomas and they are solid tumours with heterogeneous hyperintensity on T2WI with contrast-enhancement and scattered fat foci.

**Benign cyst mesothelioma** (Fig. 35 on page 48)

They are intermediate-grade tumour of the mesothelial cells of the peritoneum presented in childbearing age women, especially with prior surgery or pelvic inflammatory disease.
They present as thin-walled multicystic mass without lymphadenopathies. They rarely extend beyond pelvis, but in this cases scalloping of the liver and spleen may be present without peritoneal implants, unlike peritoneal carcinomatosis (6)

**Other perirectal conditions**

- **Mielolipoma**, well-circumscribed and lobulated solid lesion.
- **Myxoma**, cyst-like lesion with leak of myxomatous tissue.
- **Extramedullary hematopoiesis**, well-circumscribed fat-containing mass adhered to a thickened presacral fascia.
- **Myofibroblastoma**, solid mass heterogeneously hypointense on T2WI (Fig. 36 on page 49)
| Classification of tumor and tumour-like conditions of rectal wall according to their key imaging features. |
|---|---|---|
| **MRI features** | **Enhancement pattern** | **Class features** |
| **Irregular** | Adenocarcinoma | Intermediate signal T2WI, ulcerated mucosa, mucin-filled pools (fleecy subtype) +/− infiltration mesorectal fat | Heterogeneous |
| | Metastases | Heterogeneous and atypical wall thickening | Heterogeneous |
| | Endometriosis | Thinning of the rectum. Iso T1 with foci of hemorrhage. Hipo T2 with foci of endometrial glands. | +/− |
| | Proctitis | Fat stranding, lymphadenopathies | +/+ Delayed (chronic) |
| | Hemangioma | Serpentine flow voids and phleboliths | +++ Flow voids |
| | Hemangioma | Polyp degeneration (usually more than 2 cm) | |
| | Lymphoma | Lack of obstruction, restriction on DWI, aneurismal dilatation | ++ (homogeneous) Lack of obstruction |
| | Melanoma | Hyperintensity T1WI (10-29% amelanotic) | +++ Hyperintensity on T1WI |
| | WDNET | Focal nodular. Hyperintensity on T2WI. Cystic and necrotic degeneration. Avid contrast enhancement | +++ Hyperintensity on T2WI Contract-enhancement |
| | GIST | Large eccentric heterogeneous mass | Heterogeneous Eccentric |
| | Leiomyoma | Polypoid mass | +/− |
| | Lipoma | Broad-based mass. Follow signal of fat | +/− Fat-containing mass |
| | Cystic colitis | Mucin-filled cysts | − Mucin-filled cysts |

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<table>
<thead>
<tr>
<th>Fat-containing</th>
<th>Additional features</th>
<th>Enhancement pattern</th>
<th>Clinic features</th>
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<tr>
<td>Solid</td>
<td>Lipoma</td>
<td>Homogeneous predominantly fat</td>
<td>-</td>
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<tr>
<td></td>
<td>Well-differentiated LPS</td>
<td>Mostly solid with scattered foci of fat</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Malignoma</td>
<td>&quot;lumpy bumpy&quot; Adhered to presacral fascia</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Extramedullary hemangiomas</td>
<td>Well-circumscribed Adhered to presacral fascia</td>
<td>+</td>
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<tr>
<td>Solid-cystic</td>
<td>Sacrococcygeal teratoma</td>
<td>fat nodules, fluid levels and calcifications</td>
<td>+/-</td>
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<td>Dermoid</td>
<td>Fat nodules</td>
<td>+/-</td>
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<tr>
<td>Sacral erosion</td>
<td>Chordoma</td>
<td>Medullary. Calcifications</td>
<td>+++</td>
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<tr>
<td></td>
<td>Giant cell tumour</td>
<td>Eccentric. Anecdotal bone cyst</td>
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<td>Nerve sheath tumours</td>
<td>Heterogeneous or target-like pattern</td>
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<td>Myxoma</td>
<td>Leak of myxomatous tissue</td>
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<td></td>
<td>Endometrioma</td>
<td>+/-</td>
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<td>Tailgut cyst</td>
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<tr>
<td></td>
<td>Duplication cyst</td>
<td>Low signal bands</td>
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<td>Restriction on diffusion</td>
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<tr>
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<td>&quot;Tailgut cyst&quot;</td>
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<tr>
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<td>Mesothelioma</td>
<td>No scalloping, No lymphadenopathies</td>
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**Table 2:** Classification of tumor and tumour-like conditions of perirectal spaces according to their key imaging features. Conditions classified in two categories with the less frequent pattern of presentation resalted in "italic"

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Fig. 1: A. MR depicts layers of normal rectal wall: 1. Mucosa and submucosa, 2. muscularis propria and 3. perirectal fat tissue B. The fatty tissue that surrounds the rectum is called mesorectum (yellow area)

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Fig. 2: Sagittal T1WI depicts normal mesorectal, retrorectal and presacral spaces. Peritoneal reflection (red), mesorectal fascia (blue), presacral fascia (green) rectosacral fascia (black). 1. Levator ani. Rectum is divided in upper, middle and lower thirds according to its distance from the anal verge.

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Adenocarcinoma

TUMOR: Local Staging

<table>
<thead>
<tr>
<th>T stage</th>
<th>Description</th>
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| T1      | Invades submucosa, but does not invade the circular muscle layer of the MP. The depth of submucosal (sm) invasion determines further substaging:  
  T1 sm1—superficial \( \frac{1}{3} \)  
  T1 sm2—superficial \( \frac{2}{3} \)  
  T1 sm3—deep \( \frac{3}{3} \)  |
| T2      | Tumor invades but does not penetrate through the muscular propria; no tumor is seen within the perirectal fat. |
| T3      | Tumor extends through and beyond the MP. The depth of spread determines further tumor substaging:  
  T3a: tumor extends <1 mm beyond the MP  
  T3b: tumor extends 1-5 mm beyond MP  
  T3c: tumor extends 5-15 mm beyond MP  
  T3d: tumor extends >15 mm beyond MP  |
| T4      | Tumor invades adjacent pelvic organs.  
  T4a: peritoneum  
  T4b: other viscera |


Fig. 3: Local staging of rectal adenocarcinoma

Fig. 4: Axial T2 weighted-images (a) show a lateral wall thickening with proven biopsy of adenocarcinoma (asterisk). Notice the not affected hypointense layer representing the muscularis propria (arrows) Coronal T2 weighted-images (b) show a lateral wall thickening with proven biopsy of adenocarcinoma (asterisk). Notice the invasion of the muscularis propria (arrows)

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Fig. 5: Axial T2 weighted-images (a) show a anterior wall thickening with proven biopsy of adenocarcinoma (asterisk). Notice the desmoplastic reaction. Axial T2 weighted-images (b) show a wall thickening with proven biopsy of adenocarcinoma (asterisks) with extension through and beyond muscular (arrow).

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Fig. 6: Axial T2 weighted-images (a) show a wall thickening with proven biopsy of adenocarcinoma (asterisks), with invasion of peritoneal reflection (arrow) Axial T2 weighted-images (b) show a wall thickening with proven biopsy of adenocarcinoma (asterisks) with extension through and beyond muscular (arrow)

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**Fig. 7:** Axial T2 weighted-images (a,b) show a mid-rectum anterior wall thickening with proven biopsy of adenocarcinoma. Notice the heterogeneous signal of the rectal lesion with high signal areas inside (asterisks), that are also present in mesorectal adenopathy (arrow), suspecting mucinous adenocarcinoma.

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**Fig. 8:** Coronal (a) and axial (b) T2 weighted-images depict a low-rectal mass involving left and posterior wall, with heterogeneous high signal suggesting mucinous component (asterisks). Extramural extension to postanal space and infiltration of external sphincter complex are also present (arrowheads).

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**Fig. 9:** Pathologic lymph nodes with indistinct margins and heterogeneous signal intensity on T2 weighted images (red circles)

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**Fig. 10:** Sagittal and axial T2-weighted images (a,b) depict a circumferential rectal wall thickening (arrows) with mesorectal fat infiltration (arrowheads). Diffusion weighted images and ADC map (c,d) show marked restriction. Same patient after neoadjuvancy with RT. A circumferential rectal wall thickening is still present (arrows), lower than initial study, and mesorectal fat infiltration has been replaced by a low signal area due to fibrosis (arrowheads). However, intermediate soft-tissue signal and Diffusion restriction are still present in some areas (asterisks), suggesting residual tumour.

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**Fig. 11**: 82 years-old man with local recurrence of rectal adenocarcinoma 5 years after the diagnosis. Axial CT (a and b) shows a perirectal soft-tissue mass (asterisk in a and b) and a tumoral implant in the ischioanal fossa (arrow in b). On MR, the tumoral implant appears slightly hyperintense on T1WI (arrow in c) and heterogeneously hyperintense on T2WI (arrow in d) with moderate contrast-enhancement.

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Fig. 12: 82 years-old man with local recurrence of rectal adenocarcinoma 26 months after the diagnosis. Axial and sagittal T1WI show a voluminous and heterogeneous mass with areas of necrotic degeneration and hemorrhage. Heterogeneous restriction on diffusion is observed (d) Notice the important distension of the bladder.

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**Fig. 13:** 62 years-old woman with local recurrence of rectal adenocarcinoma 9 months after the diagnosis. Axial and sagittal CT show a presacral mass (yellow arrows) with areas of necrosis and air (asterisk) secondary to a fistulous tract (red arrow) to the small bowel.

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Fig. 14: 82 years-old man with prior rectal adenocarcinoma, treated with surgery, who presented with fever, disuria and constipation. Axial and sagittal CT show a voluminous presacral collection with air and a thickened and hyperemic capsule (arrows), associated to thickening of the bladder and ileon walls and encasement of the ureter.

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**Fig. 15:** 75 years-old woman with prior rectal adenocarcinoma, treated with surgery. Axial CT shows an irregular thickening of the lateral margin of the anastomosis. Axial and coronal T1WI show an ill-defined area of marked low signal intensity (arrows) without contrast-enhancement. No progression was observed during follow-up.

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Fig. 16: 73 years-old man with prior rectal adenocarcinoma, treated with neoadjuvant radiotherapy and surgery. Axial (a and b) and coronal (c) T2WI show post-surgical changes with a presacral fibrosis band (red arrow) but also a local recurrence in the lateral margin of the anastomosis (yellow arrow) with retraction of seminal vesicles (asterisk)

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Fig. 17: 67 year-old man who performed MRI for local rectal cancer staging. Sagittal T2 weighted-image shows a huge, diffuse and ill defined thickening of rectal wall (short yellow arrows) depict outer limits of muscular layer with soft tissue occupying the mesorectal fat and extending cranially until entering the peritoneal cavity (asterisks). Lymphoma was demonstrated by endoscopic biopsy.

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**Fig. 18:** 84 years-old woman with MRI performed for assessment of low digestive hemorrhage. Sagittal T1 (a) and T2 (b) weighted-images show a bulky intraluminal fungating mass (arrows), focally expanding and obscuring the lumen without causing obstruction, with perirectal fat infiltration and lymphadenopathies in the inguinal and mesenteric inferior drainage (asterisks). It shows high signal intensity on T1 because of melanin content (red asterisks in a) and restriction on diffusion (c). Diagnosis of primary anorectal melanoma with rhabdoid changes by biopsy was made.

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**Fig. 19:** 75 years-old male diagnosed with cutaneous melanoma. Rectal metastasis appear as a intraluminal fungating mass with heterogeneous signal intensity on axial (a) and sagittal (b) T2 weighted images (arrows), without causing obstruction.

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**Fig. 20:** 47 year-old man, positive HIV, with MRI performed for rectal local tumor staging. Coronal T2WI shows a diffuse and long thickening of rectal wall (short yellow arrows), with increase submucosal areas due to edema (asterisk), and large lymph nodes accompanying in mesorectal fat (arrowheads). Multiples biopsies demonstrated inflammatory proctitis changes due to cytomegalovirus. Non-malignant cells were found.

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**Fig. 21:** 52 year-old man, with MRI performed for rectal local tumor staging. Coronal and axial T2WI show a diffuse, long and heterogeneous thickening of rectal wall (short arrows). Heterogeneous lymph nodes accompanying in mesorectal fat are also shown (long arrows). Biopsies demonstrated inflammatory proctitis changes due to Lymphogranuloma venereum. Non-malignant cells were found.

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Fig. 22: 78 years-old man presented with constipation, incoercible anal pruritus. Axial contrast-enhanced CT (a) and axial MR show a voluminous perineal soft-tissue mass hyperdense on CT (a) and with low signal intensity on T1WI (b), heterogeneously hyperintense on T2WI (c) and restriction on diffusion (d and e) and infiltration of internal anal sphincter. Diagnosis of giant condyloma of Buschke-Lowenstein was confirmed by biopsy.

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Fig. 23: 78 years-old man with MRI performed for assessment of prostate cancer. Axial T1 weighted image shows infiltration of the anterior wall of rectum by prostate cancer (asterisk)

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**Fig. 24:** 48 years-old woman presented with constipation. Sagittal contrast-enhanced CT (a) and T2 weighted image (b) and axial diffusion (f) and ADC maps (g) show an heterogeneous and atypical concentric wall thickening in a long segment of rectum with infiltration of the surrounding fat without luminal obstruction (arrows in a and b). The lesion shows restriction on diffusion (asterisks on c and d) and increase metabolism at PET-CT (e and f)

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**Fig. 25:** Rectal WDNET in a female patient presented with constitutional symptoms. Axial T1 (a) and T2 (b) weighted images show a focal wall thickening (asterisks) that appears hypointense on T1WI and slightly hyperintense on T2WI. Pathologic lymphadenopathies are observed (arrow on c)

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Fig. 26: 67 years-old woman with rectal GIST. Axial contrast-enhanced CT (a) and axial and sagittal T2 weighted images (b,c) show an heterogeneous and exophytic well-circumscribed rectal mass. Hyperintense foci (arrows on b) suggest possible foci of necrosis. No lymphadenopathy are seen and there is not luminal obstruction. The lesion shows restriction on diffusion (arrows on d and e)
**Fig. 27:** 82 years-old woman with CT and MRI performed for assessment of submucosal lesion detected by proctosigmoidoscopy. Axial and sagittal contrast-enhanced CT (a,b) and axial and sagittal T1 weighted images (c,d) show a well-defined submucosal lesion with fat attenuation (arrows in a and b) and high signal intensity on T1 weighted images (arrows in c and d)

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Fig. 28: Axial T2-weighted images show adhesions in Douglas pouch (arrowhead), causing loss of fat plane and retraction of rectosigmoid. A mass-like thickening of anterior and right lateral wall of rectosigmoid is also seen (arrow). Notice also both ovaries retracted due to adhesions, forming the "kissing ovaries" sign (asterisk).

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Fig. 29: "Mushroom cap" sign: T2-weighted image in sagittal plane depict low signal thickening of muscular propria layer of anterior rectosigmoid wall, attributed to hypertrophy and fibrosis (asterisks), and high signal of mucosa and submucosal layers, which are displaced into the bowel lumen (arrows)

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**Fig. 30:** Female patient with MR performed for assessment of perineal pain. Axial (a,b) and sagittal (c) T2 weighted images and axial T2 fat-suppressed weighted images (d,e) show an anterior perianal fistula, with opening at 12 o'clock (arrowheads), that communicates with a horseshoe perirectal abscess involving rectovaginal septum (asterisk).

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Fig. 31: 40 year-old woman with non-specific perineal pain. Sagittal STIR image depicts a well-defined cystic lesion located in retrorectal space (arrowheads) that did not communicate with rectal wall. Histological surgical resection demonstrated a tailgut cyst.

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Fig. 32: 71 years-old woman with an incidentally found pilonidal cyst. Axial (a) and sagittal (b) contrast-enhanced CT show a well-defined and hypodense lesion close to coccyx (asterisk)

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**Fig. 33:** 1 day-old boy with fetal diagnosis of presacral mass. MR Sagittal T1 (a) and T2 (b) weighted images show a big presacral-precoccygeal mass, with perineal involvement. Heterogeneous signal is seen, with cystic and necrotic areas in T2 (arrowheads) and high-signal areas in T1 suggesting fat component (arrows). Non-malignancy was demonstrated in pathological piece.

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Fig. 34: 64 years-old man presented with perianal pain and constitutional syndrome. Axial contrast-enhanced CT (a) shows a hyperdense mass that infiltrates the rectum and MR shows a retrorectal well-defined and lobulated lesion, slightly hyperintense on T2 weighted images (b) with moderated and delayed contrast-enhancement (c) and restriction on diffusion (d,e). Diagnosis of epithelioid pleomorphic liposarcoma by analysis of surgical specimen was made.

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Fig. 35: 35 year-old woman diagnosed of Ulcerative Colitis and antecedent of proctocolectomy surgery. Sagittal CT (a) and MR T2 weighted-image (b) depict a presacral multiloculated and homogeneous cystic lesion (asterisks). No suspected nodularity is observed.

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**Fig. 36:** 61 year-old man who presented with constipation for few months. Axial T2WI depicts an heterogeneous pararectal solid mass (yellow arrow) bulging over rectum (yellow asterisk) and prostate (white asterisks), both displaced laterally. On ultrasonography, it appears as a well-defined and hypoechoic mass. Surgical treatment was made with mesenchymal origin suspicion, and proven histology was myofibroblastoma.

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Conclusion

Anatomical characteristics of perirectal space are complex and magnetic resonance is the modality of choice for the evaluation of the entire bowel wall thickness and the perirectal tissues.

Radiologists should be able to recognize the key radiological features of conditions of the rectum and perirectal space, so they can help the clinicians in their diagnosis and management.
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References