Looking at jejunum and ileum diseases

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**Learning objectives**

- To recognize the spectrum of pathologies of jejunum and ileum
- To understand the role of barium studies and CT in the evaluation of these small bowel segments
- To present typical imaging findings of many jejunum and ileum diseases

**Background**

Even with the arise of the double balloon enteroscopy, jejunum and ileum are bowel segments whose direct observation is problematic.

Barium studies, CT and more recently CT enterography and MR enterography are important techniques to establish the diagnosis of small bowel diseases.

**Imaging findings OR Procedure details**

This work reviews imaging findings of some jejunum and ileum pathologies observed at our Department in the last three years.

1 - **Congenital or Genetic**

**Peutz-Jeghers syndrome**

Multiple polyps in the gastrointestinal tract and typical mucocutaneous pigmentation characterize this autossomal dominant disease. They are more frequent in the small bowel. The absence of familiar history does not exclude the disease since spontaneous mutations sometimes occur.

Barium examinations usually detect these lesions Fig. 1 on page 6, but according to their size they can also be seen with CT and Ultrasound.

**Meckel diverticulum**
This congenital abnormality, frequently asymptomatic during the whole life, has a high incidence (2% to 3%), reason why all radiologists should be aware of them.

In the majority of cases they occur in the distal ileum, along with the antimesenteric border. The typical appearance is that of a blind ending fluid or gas-filled structure in continuity with small bowel. The diagnosis is more easily made if a complication is present Fig. 2 on page 6.

2 - Tumours

Lipoma

These are one of the most benign tumours of the gastrointestinal tract. Although they usually remain asymptomatic, they can be cause of bowel obstruction or the origin of gastrointestinal haemorrhage. CT diagnosis is easily made, while ultrasound diagnosis is quite more difficult Fig. 3 on page 7.

Adenocarcinoma

The incidence of adenocarcinoma decreases from the duodenum to the ileum. The diagnosis is usually delayed, with metastatic disease being frequently found. At the CT it can appear as a polypoid luminal mass, annular stenosis or mural thickening [1]. Obstruction is usually present Fig. 4 on page 8.

GIST

These tumours can be found in any part of gastrointestinal tract, but are more frequent in the stomach and proximal bowel. CT findings include a mass with smooth contours, heterogeneous enhancement and central areas of necrosis Fig. 5 on page 9 [1].

Lymphoma

It is more frequent at the ileum (2/3 of the cases) according to the distribution of lymphoid tissue. The histologic pattern is also different in the two segments: T type in the proximal small bowel and B type in the distal bowel. Imaging findings are quite variable Fig. 6 on page 10. However, aneurysmal dilatation secondary to internal ulceration in an annular lesion is the classic appearance [1].

3 - Inflammatory
**Radiation enteritis**

Gastrointestinal complications are relatively frequent during and after the radiation therapy. The small bowel is very radiosensitive, particularly the terminal ileum[2]. CT findings include bowel wall thickening and submucosal edema. Adhesions and strictures can also be found, while fistulas are less frequent. In barium studies, besides the already mentioned changes, spiculation of the folds is quite typical Fig. 7 on page 11.

**Jejunum diverticulitis**

Diverticula are found in the jejunum more frequently than in the ileum. Jejunal diverticulosis may be responsible for variable and non-specific symptoms, such as intermittent abdominal pain, constipation and diarrhea [3]. Only 2%-6% of the 2% of people with jejunal diverticulosis will develop diverticulitis. CT findings of jejunal diverticulitis are those of a localized inflammatory process of the jejunum, with or without abscess or perforation [3] Fig. 8 on page 12.

**Crohn disease**

About 80% of Crohn patients have small bowel involvement. Although barium studies are an important tool in the diagnosis and evaluation of this disease's complications (e.g. strictures), they are being gradually replaced by CT and MR enterography. These techniques allow the evaluation of all intestinal layers, the investigation of possible complications, the study of the activity of the disease and to evaluate the structures adjacent to the affected loops, which are particularly important in fistulising disease. Fig. 9 on page 13 Fig. 10 on page 14

**Eosinophilic gastroenteritis**

In spite of the rarity of this condition, it should be part of the list of differential diagnosis in the presence of peripheral eosinophilia and abdominal pain.

Imagiologic features depend on the layer involved: mucosa, muscular and subserosal. In mucosal disease, findings include wall thickening, polyps and ulcers [4]. Muscular involvement course with reduced distensibility, strictures and wall thickening [4].

At last, in the subserosal type, ascites can be found isolated or in combination with mucosal or muscular types’ findings [5] Fig. 11 on page 15. In this type, omental thickening, lymphadenopathy and clustering of small bowel loops can also be found [4].
4 - Others:

Celiac disease

This is a frequent disease, already pointed as perhaps the commonest disease of the small bowel[6]. Barium examinations are in decline, but in expertise hands some radiographic features can easily raise the possibility of this disease. One of the most recognized features is the jejunization of the ileum Fig. 12 on page 16.

Pneumatosis intestinalis

This condition refers to the presence of gas in the bowel wall Fig. 13 on page 17 and its definitive cause remains unclear, probably being multifactorial. The most important thing to do is to distinguish the benign forms from those that can lead to death, keeping in mind that in benign forms, the patients are usually asymptomatic and there are no other abnormal findings. In both forms, the imaging features can be similar [7].

Ascaris

About one billion people are affected by this condition, worldwide. Although the diagnosis is usually established by stool examination, radiographic evaluation can be an important tool. On barium studies, worms may be depicted as elongated filling defects [8] Fig. 14 on page 18. The intestinal lumen of the worm may be opacified by the contrasted material.

Intestinal obstruction

There is a long list of causes which can lead to small bowel obstruction. Adhesions are the most frequent cause. Other causes include tumours, hernias, strictures and bezoars, among others. CT findings vary according to the cause Fig. 15 on page 19.

Intestinal intussusception

It occurs when a proximal segment of bowel (intussusceptum) "projects" in a distal segment of bowel (intussuscipiens). Only 1% of intestinal obstructions are due to intestinal intussusception. It is much less frequent in adults than in children. Typical features can be seen in Fig. 16 on page 20.
Angiodysplasia

Although they can present at birth or be associated with genetic diseases, most of the times they appear late in life. CT enterography examinations can be an important tool in evaluation of obscure gastrointestinal haemorrhage, sometimes associated with angiodysplasias Fig. 17 on page 21.

Images for this section:

Figure 1: Barium study of a 17 year-old man with Peutz-Jeghers disease. In this study we counted several polyps (orange arrows). Double balloon enteroscopy for their removal counted more than 50 polyps, the majority of which had less than 2mm.

Fig. 1
Figure 2: This 74 year-old man presented with severe abdominal pain. CT revealed a Meckel diverticulum (green arrow) perforated by a dense body (yellow arrow), identified during surgery to be a fish bone. The green arrow points the typical blind ending structure, while normal intestinal is depicted with blue arrows.
Figure 3: A – Ultrasound performed for evaluation of abdominal pain showed a hyperechoic lesion inside of a jejunal loop. B, C and D: CT scans from the same patient confirmed the diagnosis of lipoma, with two lesions (ultrasound only revealed one).

Fig. 3
Figure 4: CT scans from a patient with intestinal obstruction symptoms. There was jejunal dilatation (blue arrows) caused by an annular stenosis, configuring a small mass (orange arrows). Peritoneal carcinomatosis was identified (purple arrow).

Fig. 4
Figure 5: A - Ultrasound revealed a heterogeneous mass in the right iliac fossa, apparently adjacent to small bowel loops. B, C and D – CT scans confirmed the presence of a mass with smooth contours and areas of internal necrosis in the ileum. Pathologic examination confirmed the diagnosis of GIST.

Fig. 5
Figure 6: A – Ultrasound image. It is possible to observe wall thickening in a small bowel loop. B and C – CT scans confirmed the ultrasound finding (green arrows). Although these findings were not specific, lymphoma was the diagnosis suggested and posteriorly confirmed.

Fig. 6
Figure 7: A to C - CT scans from a 50 year-old woman with prior history of adenocarcinoma of cervix. Note the bowel wall thickening in the pelvic region (yellow arrows – small bowel; green arrows – colon). D and E – Barium study from another patient showing typical spiculation (blue arrows) of ileum.

Fig. 7
Figure 8: CT study from an old man presented in the Emergency Department with abdominal pain. There was pneumoperitoneum (green arrow) caused by perforation of jejunal diverticula. Note the multiple jejunal diverticula (orange arrows) and the surrounding inflammatory changes (blue arrows).

Fig. 8
Figure 9: A – CT scans show active Crohn’s disease, with ileal wall thickening (purple arrows), mesenteric edema (orange arrow) and vasa recta proliferation. B – CT scans revealed wall thickening in the surgery anastomosis (ileum-colon).

Fig. 9
Figure 10 – A: CT scan shows fistulising Crohn’s disease, with an abscess (green arrow). B: Barium study demonstrated premature opacification of the rectum due to fistulising Crohn’s disease.

Fig. 10
Figure 11: CT scans from a patient with subserosal eosinophilic gastroenteritis. There was an important ascites with thickening of small bowel walls. The presence of blood eosinophilia helped to suspect on the diagnosis.

Fig. 11
Figure 12: Barium study in a patient with suspected celiac disease. Almost pathognomonic of this disease, jejunization of the ileum is observed in all images.

Fig. 12
Figure 13: CT scans from a patient with clinical presentation of acute abdomen. There was Pneumatosis intestinalis in 60cm of ileum (orange arrows). There was also the presence of aeroportia (yellow arrow). There was no CT evidence of arterial or venous thrombosis. The patient underwent exploratory laparotomy.

Fig. 13
Figure 14: Barium examination showed an elongated filling defect in small bowel, almost pathognomonic of *Ascaris Lumbricoides*.
Figure 15: A- CT scan with small bowel dilatation (green arrows) caused by a bezoar. B – It is possible to observe a stop image (orange arrow) caused by adhesions. This was the subjected diagnosis since the patient had previous abdominal surgeries and there was no mass. C – Biliary ileus.

Fig. 15
Figure 16 – A – Ultrasound images show typical findings with a target appearance, with multiple concentric rings. B – CT from the same patient confirmed the diagnosis. At surgery the intussusceptum was identified as a portion of bowel with a previous entero-entero anastomosis.

Fig. 16
Figure 17: A to C – CT enterography – There was accumulation of contrast in the ileum (orange arrows). These findings were compatible with angiodysplasia. Note the artery that feed the angiodysplasia (blue arrow). D – Image from endoscopic capsule confirming the diagnosis (green arrows).

Fig. 17
Conclusion

Although direct observation of jejunum and ileum is already possible with double balloon enteroscopy, barium studies and CT are, nevertheless, less expensive, easier to perform and more available techniques, maintaining therefore a central role in the evaluation of these small bowel segments.

Personal Information

References


