Mysteries to be solved in the ileocecal area: Tricks to reach a correct diagnosis

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Introduction

• The structures of the ileocecal region (cecum, ileocecal valve, terminal ileum and appendix) may be affected in many pathological processes, many of them, common in clinical practice. The disease may involve only one of the structures, a number of them simultaneously, or may be part of a general process.

• The clinical presentations are varied, from an asymptomatic discovered incidentally, to severe cases of acute abdomen. In both cases and in others the role of imaging is crucial.

• In the case of incidental findings is essential adequate knowledge of normal anatomy and anatomic variations to avoid diagnostic errors, especially from the ileocecal valve, because some of the variants can simulate a neoformative processes.

• For symptomatic processes, acute pain in the right iliac fossa is one of the most common forms of clinical practice, and there are many possible underlying pathologies with diverse therapeutic approaches (surgical / non-surgical), so it is necessary precise etiologic diagnosis in most cases is possible because of the imaging techniques.
Anatomy

- **Terminal ileum**: Is the most distal region of the small intestine, which ends opening to the postero-medial side of the cecum, through the ileocecal valve. It is characteristic of this region, the increasing lymphoid tissue in the wall thickness (Peyer's patches), which explains that is a frequent site of involvement by lymphoma, and that the inflammatory conditions at this level are very evident.

- **Ileocecal valve**: Is a structure which acts as muscular sphincter, responsible for controlling the passage of intestinal contents into the colon is not too fast. It consists of two segments protrude to the light in the posteromedial aspect of the cecum, formed by the muscle layer and coated ileum mucosa. The distal region, where both ends approach is called frenula. There are two different types of valves according to the standard mark on the cecal wall.
  - Lipstick shaped slit.
  - Papillary: domed shaped. It is important to recognize this type as normal variant because it can be mistaken with polyps or focal masses.
• The appearance of the valve can be different according to the fullness of the cecum, the patient's position (supine or prone) or depending on whether it is open or closed.

• Signs allowing to reliably recognize the absence of pathology are:
  – its relationship to the terminal ileum.
  – both lips are symmetrical to each other, relative to the valve orifice.
  – the presence of fat. Lipomatosis of the ileocecal valve. It is a common finding, usually patients are asymptomatic and requires no treatment. Consists of a thickening of the two valve lips for fatty infiltration of the submucosa.

• **Cecum:** In most cases is completely coated by the peritoneum (except at 5% in which the rear face directly contacts the ischial fascia), which gives a certain mobility in the abdominal cavity. This mobility explains its ability to volvulate or herniate. Furthermore, due to the movement of the cecum, we can increase the number of false negative diagnosis of colonic polyps, being misinterpreted as feces when they change locations with the position of the patient.
Normal ileocecal valve

Dilated cecum

Terminal ileum
• **Appendix:** Is a tubular structure that ends in fornix, mobile, and with peristalsis, which can measure 2 to 20 cm in length. Communicates with the cecum by a hole that is located below the entrance of the ileocecal valve. Although traditionally considered a vestigial organ, today is thought to have an important role in the immune system, mainly in children.

Dilated appendix (blue arrow) in a patient with an intestinal obstruction due to a colonic tumor (no inflammatory signs are seen).
Pathology

• The most common pathologic finding is the wall thickening. According to its characteristics, it is possible to orient the diagnosis towards benign or malignant. The signs to be valued are:
  
  - Type: asymmetric or circumferential.
  - Contour: smooth or irregular.
  - Degree: the more marked thickening have mass appearance.
  - Conservation or not the layer structure of the wall.
  - Extension: focal or segmental.
  - Smooth or abrupt transition to healthy neighboring regions.
  - Involvement of perilesional fat.
Crohn Disease

• Most common inflammatory process of terminal ileum and cecum.

• Homogeneous attenuation of thickened bowel wall on CT.

• Mural stratification lost: indistinct mucosa, submucosa, muscularis propria.

• Mesenteric fibro-fatty proliferation.

• Enlarged mesenteric lymph nodes.

• Mesenteric hyperemia.

• Engorged mesenteric vessels = active inflammation.
Crohn disease: markedly thickened walls affecting ileum terminal with loss of mucosal pattern and correction of its contours, with vascular congestion and enlarged lymphatic nodes.
Infectious Ileocolitis

- Causes acute diarrhea.
- Common causative agents:
  - Yersinia
  - Campylobacter
  - Salmonella
- Mural thickening of cecum and terminal ileum.
- RLQ adenopathy.
- Imaging findings indistinguishable from mesenteric adenitis (may be same disease).

Transmural thickening without loss of stratification of the terminal ileum with inflammatory changes in the mesenteric fat.
Appendicitis

- Medial wall of cecum and terminal ileum may be thickened by inflammation starting in appendix.

- Appendicular wall is thickened and lumen usually distended.

- Often have cluster of mildly enlarged nodes, especially with subacute inflammation.

- May have associated abscess following perforation of appendix.
Thickened appendix (blue arrow) and inflammatory signs in the mesenteric fat, with a little bit of abdominal free liquid.

There is an abscess in intimate contact with the sigmoid colon, and mural thickening of the sigma due to inflammatory changes.
Cecal Diverticulitis

• Can usually identify other diverticula and normal appendix.

• Cecal wall thickened with adjacent inflammatory changes.

Cecal diverticulitis, complicated with mesenteric thrombophlebitis and hepatic abscess due to septic embolic.
Typhlitis

- Massive mural thickening of cecal ± ascending colon wall.

- Presents as fever, RLQ tenderness in immunosuppressed patient.

Patient with neutropenic fever due to chemotherapy (Acute myeloblastic leukemia). Presents a massive thickening of cecal region.
Colon Carcinoma

• Cecum accounts for 25% of colon adenocarcinoma.

• Usually bulky mass without obstruction.

• Surface irregularity identifies mucosal origin.

• May occlude base of appendix and simulate appendicitis clinically and on imaging (dilated lumen of appendix).

• Adjacent lymphadenopathy is common.
Transmural thickening suggestive of neoplasm of the cecum. Inflammatory changes are observed due to a perforation at that level.
Intestinal Lymphoma

- Lymphoma may cause dramatic bowel wall thickening.
- May have significant adenopathy or involvement of other organs.

*Intestinal lymphoma case with affection of the ileocecal region.*
Carcinoid Tumor

- Thickening of distal ileum wall and mesenteric mass.
- Mesenteric mass often has focus of calcification.
- Desmoplastic response in mesentery.
- Small bowel loops and mesenteric vessels may have stellate configuration and distorted course.

Carcinoid tumor with thickening of the adjacent ileum loops.
Mesenteric carcinoid tumor with thickening of intestinal loops due to retraction and fibrosis. Hepatic metastasis.
Thickening of the cecum, without peritoneal infiltration, due to a carcinoid tumor.
Appendicular Mucocele

- Round or oval, thin-walled, cystic mass near tip of cecum.
- May have curvilinear calcifications in wall.

Pseudomyxoma peritonei due to rupture of an appendicular mucocele.
Intussusception

- Due to tumor or inflammation of ileum or ileocecal valve.
- May identify mass within lumen.
- Intraluminal crescent of intussuscepted ileal mesenteric fat.
- Ileocecal intussusceptions in adults are usually obstructive and due to a lead mass (neoplastic, benign or malignant).
Invaginated mesenteric fat and vessel from terminal ileum intussusception.

The cause of intussusception is an appendicular mucocele.
Ileocecal intussusception (the lead mass was demonstrated in the surgery room: colon carcinoma).
Ischemic Colitis

- Compromise of mesenteric blood supply leading to colonic injury.

- Major predisposing cause in elderly: Non occlusive vascular disease (hypoperfusion).

- Diagnostic clue: pneumatosisis, mesenteric venous gas, symmetric bowel wall thickening or thumbprinting on CT.

- Commonly located at watershed segments of colon.
Portal vein gas in peripheral location (blue arrow).

Mesenteric vein gas (red arrow): always look for this sign.
Conclusion

• It is essential to know the normal anatomy and variants.

• The most frequent pathological findings is: mural thickening.

• Broad differential diagnosis.

• CT (the best diagnostic test), is optimal for:
  - Evaluation of intra and extramural disease in RLQ.
  - Try to characterize disease extension.
  - Recognize mural thickening characteristics (symmetry, contour, etc.).
  - Search for associated findings.