Spectrum of imaging findings of the ileocecal region pathology

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Learning objectives

The aim of our study was to examine the various pathological conditions affecting the imaging appearances of the ileocecal region and to become familiar with the normal imaging results of the ileocecal valve and the broad spectrum of differential diagnoses.

Background

INTRODUCTION

The ileocecal region represents a boundary segment between the small intestine and colon, as well as a junction between the pelvis, the mesentery and the supra mesocolic region via the paracolic gutter.

The pathology of the ileocecal junction is polymorphic, it may be intrinsic: inflammatory, infectious or malignant; or even extrinsic.

Currently, the region has benefited from a wide range of sectional imaging methods: Ultrasound; CT and MRI that allow an accurate analysis of the ileocecal junction thanks to their good spatial resolution.

MATERIALS AND METHODS

A retrospective study involving 69 patients monitored for ileocecal pathologies from April 2010 to September 2014.

All patients underwent an ultrasound after which additional abdominopelvic CT without and with iodinated contrast doses ranging from 500ml to 2cc/kg.

Only 31 patients received complementary entero-MRI (1.5 Tesla).

Findings and procedure details

EPIDEMIOLOGY  -69 patients (44 females and 25 males). -Average age of 38 yrs (ranging from 13 to 69 yrs).
CIRCUMSTANCES OF CLINICAL DISCOVERY

-Pain in the right iliac fossa 90%. -Abdominal mass 60%. -Febrile syndrome 40% -Poor general condition 30% -Transit disorders 20% -Anemia 15%

-5% cases of fortuitous discovery IMAGING

TOMOGRAPHY

-For a complete study of the ileocecal region, CT is often used as it offers better analysis of bowel wall:

-Imaging could be done without oral contrast medium or after ingestion of dye (in case of CT colonography or CT enterography). However, the use of intravenous contrast is systematic.

-Oral contrast mediums used include water, air or even an iodinated contrast medium like gastrografin. (Fig. 1)

MRI: ENTERO-MRI/ colo-MRI

-Advanced imaging technic that allows for accurate exploration of the digestive tract thanks to its rapid sequences and specific contrast media. -Sequences used: T2 weighted fast sequences and gradient echo sequence T1 before and after gadolinium contrast injection. -Oral contrast medium, water++ (hypointesnse T1, Hyper intense T2) (Fig.2)

INFLAMMATORY AND INFECTIOUS DISEASES

Acute appendicitis

Ultrasound

1. Direct signs:

-Diameter> 6 mm -Dedifferentiated wall > 3mm, -Appendicolith

2. Indirect signs:

-Appendiceal fat infiltration -Mesenteric adenomegalies -Localised thickening of the cecal wall -Highly vascularised appendiceal wall

(Fig. 3)
**Tomography**

In practice, CT is performed in case of:

- Inconclusive diagnosis after ultrasound
- Obese patients

- Patients with acute surgical abdomen or generalized pain for which several alternative diagnoses may be considered => **Semiotics same as ultrasound (Fig. 4)**

**Appendiceal abscess**

Patient 27 years. Right iliac fossa pain, 10 days. Mass in right iliac fossa with guarding and fever 39°C. (Fig. 5)

**Appendiceal Mucocele**

- Rare entity found in 0.2% - 0.3% of appendectomy parts. - Discovered incidentally in 50% of cases.

- Associated in about 20% of cases with colonic tumor or an ovarian tumor. (Fig. 6)

  - **Scan CT**

  - More sensitive for detecting wall calcifications. - Hypodense cystic mass tubular in nature in contact with cecum.

+ Patient 43 years. Pain and mass in the right iliac fossa. (Fig. 7)

+ Patient 58 years. RIF pain for several months with fairly good general conditions. Ultrasound oblong cystic lesion RIF. (Fig. 8)

  - **MRI** (Only useful in evaluating the extension of PMP in the event of mucocèle perforation).

**Crohn’s Disease**

- Chronic inflammatory granulomatous and transparietal idiopathic enterocolitis. - Predilection for the terminal ileum and right colon.

- Diagnosis is based on a set of clinical, radiological and histological arguments.
Radiological semiotics

+ Wall thickening:
  - Small intestine >4mm, colon >5 mm
  - Specify length in cm as well as topography

+ Wall Modifications:
  - Multilayer appearance, target-like appearance, fat halo sign or homogeneous wall

+ Extra parietal changes:
  - Densification of the mesentery
  - Hypervascularisation and dilation of blood vessels: comb sign

- Sclerolipomatosis

- Fistulas: lop-sided or connecting with adjacent organs

- Adenomegaly

+ Multifocal lesions:
  - Specify the number of affected ileal loops and topography (Fig. 9, 10).

COMPLICATIONS

Fistulas (Fig. 11); Abscess (Fig. 12); Stenosis (Fig. 13)

Cecal diverticulitis

- Inflammatory thickening of the cecal wall

- Surrounding fat tissue infiltration +++;

- Presence of a diverticulum, contiguous with the maximum colonic inflammation and cecal wall thickening with enhancement after iodinated contrast injection.

- Air-fluid levels in the mesocolon or adjacent to it. (Fig. 14; 15).

Iléocæcal tuberculosis

CT scan
- Inflammatory bowel wall thickening with enhancement after contrast injection appearing as a « target like » lesion or « fat halo » with a hypodense centre and a hyperdense peripheral ring. - Infiltration of the mesenteric fat. - Loco regional lymph nodes. - Complications: fistulas, abscesses.

- The scanner allows percutaneous drainage of abscesses and surveillance after treatment. (Fig 16).

MRI

Allows analysis of:

- The extent of damage, - Bowel wall thickening, - The intensity of bowel contrast enhancement which depends on the degree of local inflammation, - Surrounding bowel environment, - Complications: fistulas, abscesses. (Fig 17)

Differential diagnosis

<table>
<thead>
<tr>
<th>Ulcerations</th>
<th>Tuberculosis</th>
<th>Crohn's disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesenteric densification</td>
<td></td>
<td></td>
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<tr>
<td>Fistula</td>
<td>Less extensive</td>
<td>deep</td>
</tr>
<tr>
<td>Adenomegalies</td>
<td>fat</td>
<td>moderate</td>
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<tr>
<td></td>
<td>less frequent</td>
<td>more frequent</td>
</tr>
<tr>
<td></td>
<td>large and necrotic</td>
<td>Inflammatory</td>
</tr>
</tbody>
</table>

Infectious ileitis

CT scan:

Inflammatory bowel wall thickening of the last ileal loop and the cecum with conservation of bowel wall stratification Mesenteric lymphadenopathy. Complications: Perforations and fistulae +/- (Fig. 18)

TUMORAL PATHOLOGY

Malignant tumors

Adenocarcinoma

CT Scan - Bowel wall thickening asymmetrical in nature and affecting a short segment of GI tract. - Polyp like lesions usually voluminous and located in the cecum. - Minimal
surrounding colic fat infiltration < the degree of wall thickening. -Thickening of the last ileal loop (10 %), malignant or inflammatory

-Regional lymphadenopathy (Fig. 19, 20)

**Lymphoma**

- Predilection for the ileum - The colon is involved in only 0.4 % of cases

**CT scan**

Focal or infiltrative lesion more or less extensive, circumferentially asymmetric.

Moderate stenosis or even may be even absent

Sometimes localized pathological digestive lumen ectasia ("aneurysmal type").

The presence of moderate bowel obstruction syndrome despite the size of the lesions is the most valuable distinctive character between NHL and ADK, it indicates the absence of reactive connective stroma. (Fig. 21)

**Benin tumors**

**Lipoma**

- Cecum = the most common location - Last ileal loop and ileocecal valve may also be affected. - Often asymptomatic but may be responsible for GI bleeding or intussusception

**Tomography:**

- Rounded or oval mass, located within the bowel wall with well defined limits and unenhanced after intravenous contrast (Fig. 22).

**Images for this section:**
Fig. 1: Axial and coronal sections of water-mediated CT Colonography

Fig. 2: Normal Entero-MRI: T2 and T1 weighted sequences after intravenous contrast
**Fig. 3:** - Appendicolith (red arrow) - Infiltration of surrounding appendiceal fat (green arrow)

**Fig. 4:** - Enlarged appendix with surrounding fat infiltration. :acute appendicitis(large arrow) - Mesoceliac appendicitis with slight peritoneal effusion close to its distal end (small arrow)

**Fig. 5:** - Heterogeneous hypoechoic collection located in right iliac fossa (red arrow). - CT : multiloculated collection (•) with contrast enhanced wall associated with surrounding fat infiltration and appendicolith (<) Appendiceal abscess
**Fig. 6:** - Transverse and longitudinal section Ultrasound Cystic mass in the right iliac fossa in relation with a mucocele
**Fig. 7:** - Large perforated appendix (<) adjoining a cystic mass of the right iliac fossa with contrast enhanced spherical wall(*) Appendiceal mucocele with peritoneal pseudo myxoma.

**Fig. 8:** - Abdominal CT :fluid distended Appendix (*) with thin wall. No changes in appendiceal environment nor ascites.
**Fig. 9:** - circumferential multilayer and symmetric thickening of the last ileal loop

**Fig. 10:** - Coronal Contrast-enhanced T1-WI Shows engorged mesenteric vessels (white arrow) surrounding inflamed distal ileum (yellow arrow) forming comb sign. - Axial T2-WI shows thickened terminal ileum (yellow arrow) with mesenteric fat wrapping (white arrow).
Fig. 11: - Entero-enteric fistula
**Fig. 12:** - Surgery for acute appendicitis. Histology came back for Crohn's disease. Postoperative course: Pus oozing from the surgical wound. CT: pelvic collections in psoas muscles (red arrow) and presacral space (yellow arrow) and presacral osteitis.
**Fig. 13:** - Short stenosis complicating Crohn's disease with upstream bowel distension

![Image of stenosis complicating Crohn's disease with upstream bowel distension](image)

**Fig. 14:** - Patient 45, abdominal pain and general tenderness. Abdominopelvic CT with contrast injection: presence in the antimesenteric edge of the cecum of an oval lesion containing an air fluid level with thickened wall enhanced after contrast injection, coupled with significant surrounding fat infiltration: cecal diverticulitis.

![Image of cecal diverticulitis](image)

**Fig. 15:** Patient 35, pain and RIF tenderness fever. Abdominal CT after contrast injection: diverticulum on the antimesenteric edge of the cecum, with infiltration of the adjacent mesenteric fat (yellow arrow). Massive GI bleeding, CT: vascular blush in cecal lumen. Surgery: hemorrhagic cecal diverticulum (red arrow).

![Image of cecal diverticulitis with associated complications](image)
Fig. 16: Patient, 40 yrs, long history of diarrhea. CT enterography: Thickening of cecal wall (yellow arrow), circumferential and symmetric thickening of the proximal part of the last ileal loop (mauve arrow) Target like contrast enhancement surrounding fat infiltration Some common iliac lymph nodes with liquefied center (turquoise arrow) Ileocecal tuberculosis

Fig. 17: Same patient, ENTERO MRI Important thickening of the ileocecal junction slightly hyperintense on T2, (red arrow) T1 hypointense with enhancement after intravenous contrast (red triangle) lymphadenopathy at RIF extending towards the mesentery, some of which are liquefied after intravenous contrast(yellow arrow).
Fig. 18: 18 yrs, pain RIF for 7 days and diarrhea, 37.8 °C febrile, WBC 9000. Inflammatory thickening of the last ileal loop with locoregional lymph nodes without abnormality of the surrounding fat. Good clinical and ultrasonographic evolution under antibiotics.

Fig. 19: - Irregular and asymmetric ileocecal wall thickening, circumferential (red arrow) with infiltration of the adjacent fat (yellow arrow): ADK of the cecum. - Patient 54 years. Emergency surgery for bowel obstruction Abdominal CT: bowel wall thickening malignant in nature taking up the base of the cecum and ileocecal valve (red arrow): Cecal ADK
**Fig. 20:** Malignant lesion at the base of the cecum (red arrow) which is perforated with large abscess (yellow arrow) extending to the right psoas muscle and ipsilateral abdominal wall.

**Fig. 21:** 15 year old child, abdominal pain and tenderness in the RIF. Abdominal CT: irregular ileocecal wall thickening circumferentially asymmetric (red arrow) With locoregional and mesenteric lymph nodes (yellow arrow) Ileocecal lymphoma.
Fig. 22: Last ileal loop lipoma of fat density responsible for Ileo - ileal intussusception
Conclusion

CONCLUSION

The ileocecal junction has a complex anatomy which explains its rich pathological wealth.

Imaging techniques in cross sections, mainly entero-CT and MRI are currently indispensable in the exploration of the region and play a key role in the management of patients.

Personal information

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