Evaluation of the colon with CT in Emergency Department

Poster No.: C-1041
Congress: ECR 2012
Type: Educational Exhibit
Authors: I. Ferreira¹, A. B. Ramos², S. Magalhães², J. Pires², M. Certo²;
¹V.N. Famalicão/PT, ²Porto/PT
Keywords: Ultrasound, CT, Conventional radiography, Gastrointestinal tract, Emergency, Abdomen, Diagnostic procedure, Inflammation, Volvulus, Diverticula
DOI: 10.1594/ecr2012/C-1041

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Learning objectives

- To identify the main pathologies of the colon approached with CT, in the emergency department.

- To present typical imaging findings, specific of each disease.
Background

A wide range of abdominal pathologies can be identified in the emergency department and the patients' complaints are often vague and unspecific. Accordingly, a CT is usually performed before any endoscopic evaluation. CT allows to identify many of colonic pathologies, not always establishing a definitive diagnosis but frequently guiding the investigation and the best treatment.
Imaging findings OR Procedure details

The present work reviews the imaging findings of some of the most frequent colonic pathologies evaluated at the emergency department of our hospital. Although CT is the main performed technique, we will also display some ultrasound and abdominal radiographic images.

1 - Foreign bodies

Not infrequently, we receive patients with foreign bodies in the rectum and, less frequently, in the sigmoid. Usually, it is difficult to obtain a proper clinical history and there is commonly an important delay before patients look for medical help.

Colonoscopy can be counter-indicated depending on the introduced object. According to this, CT is an important tool to evaluate the degree of colonic traumatism and adjacent structures, as well as the characteristics of the introduced object Fig. 1 on page 9.

2 - Epiploic Appendagitis

Epiploic appendagitis is a rare, benign condition, which is more frequent between the 2<sup>nd</sup> to the 5<sup>th</sup> decades of life. Abdominal pain, frequently resembling acute abdomen, is the typical clinical first manifestation. Bearing this in mind, the correct diagnosis of this entity can avoid unnecessary hospitalizations and surgical interventions [1].

CT main features include a round or oblong fatty pericolic lesion, located laterally or anteriorly to the colon, with variable surrounding inflammatory changes [2] Fig. 2 on page 9.

This pathology is more frequently found at sigmoid and descendent colon [3].

3 - Appendicitis

Invariably, a patient with right lower quadrant pain and no other medical history performs an ultrasound to exclude appendicitis. CT is reserved for fat patients and for those without conclusive ultrasound, since CT is more accurate [4]. CT findings include dilatation of appendix (transverse diameter > 6mm), wall thickening, appendix enhancement after contrast administration, and inflammatory changes in surrounding tissues Fig. 3 on page 10. The presence of air in the appendix is not a useful sign in distinguishing normal
from abnormal appendix [5]. An appendicolith, found in up to 40% of cases, along with pericecal inflammation or a mass, is considered diagnostic for appendicitis [6].

CT is also the best technique for the assessment of appendicitis' complications, such as pneumoperitoneum or abscess.

4 - Diverticulitis

Colon diverticulosis is very frequent in people over the age of 60, particularly in Western countries, according to the type of diet. Only 25% of these individuals will have symptomatic disease, which is clinically presented as acute diverticulitis or gastrointestinal bleeding.

Acute diverticulitis is more frequent in the left colon, particularly in sigmoid colon. According to this, typical clinical presentation is left lower abdominal quadrant pain, fever and increase of analytic inflammatory markers in blood.

Although we use ultrasound as the first imaging study, a CT examination is usually performed either to confirm ultrasound findings as to evaluate complications as abscess, perforation and fistula.

CT findings include the presence of diverticula in an area of thickening and inflammatory changes extending to the surrounding fat Fig. 4 on page 11.

Sometimes it is very difficult to distinguish acute diverticulitis from colon cancer. The presence of pericolic lymph nodes is more frequent in cancer [7] but, a biopsy is needed for the definitive diagnosis.

5 - Volvulus

This entity refers to the torsion of a part of the alimentary tract, more frequently the sigmoid colon and the cecum. It is not very frequent, counting for less than 10% of intestinal obstruction in the majority of countries.

If it occurs in the cecum, the obstruction will occur in the small bowel, while when it is in the sigmoid, there will be a distal colon obstruction.

Although insensitive, CT signs of twisting - namely: whirl, ileocecal twist, X-marks-the-spot, and split wall - are specific of cecum Volvulus [8]. The cecum is also typically directed toward the left upper quadrant.

In sigmoid Volvulus, CT findings include the abnormal position of the sigmoid colon in the right-upper quadrant or mid epigastrium, and swirling of the mesentery at the level
of the Volvulus [2, 9] Fig. 5 on page 11. A bird-beak appearance of the afferent and efferent colonic segments is also considered a classic finding [10].

6 - Toxic Megacolon

This rare entity is characterized by marked distension of a segment or the entire colon. Even though it can occur as a complication of any colitis Fig. 6 on page 12, it is more frequently found in association to ulcerative colitis.

Disease criteria include distension >6cm and systemic sepsis. Plain abdominal radiographies are enough for the diagnosis, but CT can help differentiating the etiology (e.g. ischemic colitis).

7 - Pseudomembranous Colitis

_Clostridium difficile_ infection has several causes, but it is related to antibiotic and chemotherapy treatments in the majority of the cases.

Clinical symptoms are unspecific, including diarrhea, fever and abdominal pain.

Common findings on CT are:

- Marked wall thickening, greater than in any other inflammatory or infectious disease of the colon, except Crohn disease [11];

- Accordian sign, consisting in the trapping of oral contrast between the thickened haustral folds [12];

- Less pericolonic inflammation than in other types of colitis;

- Ascites is occasionally seen in severe cases and is uncommon in other inflammatory bowel diseases [13]. Fig. 7 on page 13

8 - Inflammatory bowel disease - Crohn Disease (CD) and Ulcerative Colitis (UC)

In our emergency department, the majority of patients with these diseases have already a diagnosis, and the CT is used to evaluate patients with clinically active disease and to rule out complications.

In CD, CT shows wall thickening, fibrofatty proliferation and inflammation of adjacent tissues. Serosal irregularity can be seen, but usually the normal haustral pattern is preserved Fig. 8 on page 14 Fig. 9 on page 15.
In UC wall thickening begins in the anus (being less pronounced than in CD) and there are no skip lesions or mesenteric changes. Other typical feature is that the colon frequently resembles a lead pipe.

9 - Colon cancer

In Portugal, colon cancer is the second cause of death related to cancer, only behind lung cancer.

CT is used for staging the disease, but it can also be the first examination to raise the suspicion of colon cancer, particularly in the emergency department. There are no specific tomographic features and its appearance is quite variable: polypoid mass, segmental wall thickening or annular constriction [2]. Associated findings as metastases or involvement of other organs reinforce the suspicion. Fig. 10 on page 15 Fig. 11 on page 16

10 - Typhlitis

Typhlitis occurs in patients under chemotherapy, HIVinfected, under immunosuppressive therapy (e.g. transplanted patients) among others, reason why it is also known as neutropenic enterocolitis.

The cecum and ascending colon are typically affected, while terminal ileum is much less involved. Besides the typical segmental involvement of colon, combined with the proper clinical findings, CT findings are those typically found in other colitis, including wall thickening and inflammatory changes of adjacent fat Fig. 12 on page 17. Note that CT is the preferred examination because of the risk of rupture with colonoscopy or contrast enema examinations [6].

11 - Ischemic colitis

It is more frequently associated with small vessels occlusion than with mesenteric arteries or veins occlusion. If so, the segment of colon involved can have tomographic features that resemble those of Crohn’s disease or Pseudomembranous Colitis. When larger vessels are involved, the areas affected will typically follow anatomic distribution of the vessel involved Fig. 13 on page 18.

12 - Pneumatosis intestinalis
This condition refers to the presence of gas in the bowel wall Fig. 14 on page 19 and its definitive cause remains unclear, being, probably, 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. In both forms, the imaging features can be similar [14].

13 - iatrogenic

Colon perforation during colonoscopy, particularly in association with polipectomy, is a well-known complication although it is rare. In the suspicious of perforation, CT is usually an important tool in patients evaluation.

Perforation is also a complication of stent placement, in this case more frequently found, some studies pointing to 5% of cases. CT helps to confirm the suspicious of perforation and can help in evaluate stent position Fig. 15 on page 20.

14 - Polyposis

Poliposys syndromes course with multiple polyps affecting colon and sometimes the small bowel accordingly with the syndrome. Only large polyps will be recognizable at CT Fig. 16 on page 20.
Figure 1: Images from an 80-years-old man who presented himself in the emergency department with a foreign body in the colon. A – A CT topogram shows a huge foreign body with tubular form. B, C and D – CT scans confirming the position of the “tube” in the colon. Incredibly, there was no colon perforation. Surgical removal was needed.

Fig. 1

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 2: A (axial) and B (coronal) CT scans. Note the oblong fatty pericolic lesion (orange arrows), a typical finding of epiploic appendagitis.

Fig. 2

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT

Figure 3 – Acute appendicitis. Retrocecal appendix with wall thickening and contrast enhancement of the appendix (yellow arrows). An abscess is also observed (blue arrow). Although not always present, in this case an appendicolith is seen (green arrows).

Fig. 3
Figure 4: CT scans of a patient with acute diverticulitis. The green arrows point to the multiple diverticula in the sigmoid colon. The colon is thickened (orange arrow) and there are significant inflammatory changes in the surrounding fat. There is a little amount of free fluid (images A and B).

Fig. 4

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 5: A – Abdominal radiography shows distension of the sigmoid colon in the mid epigastrium. B to D: CT scans from the same patient confirmed a sigmoid volvulus with twisting of mesenteric vessels.

**Fig. 5**

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 6: Toxic Megacolon in an 88 years-old women. A – CT topogram revealing marked distension of the cecum (10cm), transverse colon (>7cm) and of the descendent colon. B, C and D – CT scans didn’t show wall thickening but contrast enhancing was noted. In spite of the less distension of sigmoid and rectum, no obstructive cause was found (green arrow – air in the rectum). All arterial branches were permeable. The patient died a few hours later.

Fig. 6

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Fig. 7

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT

Fig. 8

Figure 7: A and B - CT scans, axial and coronal, with extensive wall thickening and edema of colon. In image A it is possible to observe the contrast entrapment between colon folds – accordion sign. Descendent colon was also involved (B).

Figure 8: Axial (A and B) and coronal (C and D) CT scans from a 66 years-old woman with known C hepatitis who presented to the emergency department with abdominal pain, asthenia and weight loss. There were no significant findings in the ultrasound. CT demonstrates thickening and stenosis of the terminal ileum (yellow arrows). Similar findings were observed in a small segment of the distal descendent colon (green and orange arrows). These skipping lesions led us to raise the hypothesis of Crohn's disease, which was posteriorly confirmed by colonoscopy biopsies.
Figure 9: CT scans shows marked wall thickening of the entire colon. The diagnosis of Crohn’s disease was established because of transmural involvement and the marked proliferation of vasa recta.

Fig. 9

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 10: Study from a 90 years-old man who presented with abdominal pain. A – Ultrasound images show a large mass in the right abdomen.; colon origin was suggested. B, C and D – CT scans confirm the origin of the mass in the colon. Histology revealed the mass to be an adenocarcinoma. Note a synchronous lesion in the sigmoid colon.

Fig. 10

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 11: Study from a patient complaining from one-week constipation. The colonoscope could not go through the rectum because of the amount of stool. The tumour was not identified. A – plain film revealed colon distension with stool and gas. B, C and D – CT scans show the typical apple core appearance of a tumour in the sigmoid colon (blue circles). CT confirmed cecum distension (orange arrow). Note the wall thickening of distal descendent colon (yellow arrow) which was due to tumour involvement.

Fig. 11

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 12: A-D: CT scans from a young woman with HIV infection. There is an obvious difference between the ascendant colon and transverse colon wall’s thickness (orange arrow). Cecum and ascendant colon have wall thickening and some inflammatory changes in pericolic fat are noted.

Fig. 12

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 13: CT scans from a patient with ischemic colitis. The involvement of ascending colon (blue arrow), transverse colon (green arrows) and small bowel point to thrombosis of superior mesenteric artery or vein. Extensive thrombosis of superior mesenteric vein (yellow arrows) extending to the confluence with splenic vein (orange arrow).

Fig. 13

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT

Figure 14: CT scan from a patient under corticosteroid therapy due to a Lupus disease. Besides Pneumatosis intestinalis (blue arrows) there was also wall enhancement after contrast in the colon and small bowel. Mesenteric arteries and veins remain normal. The patient was treated conservatively with antibiotics and elemental diet. One week later, CT scan was normal.

Fig. 14
Figure 15: A – CT topogram revealed air delimitating the liver (blue arrows). Note the two sigmoid stents. B, C and D: Pneumoperitoneum was confirmed (orange arrow). Part of one stent was inside the other. There are multiple small bubbles of free air surrounding the sigmoid colon, which confirm the origin of pneumoperitoneum.

Fig. 15

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Figure 16: CT from a 50 years-old man presenting in the emergency with one week constipation. There were multiple polipoyd lesions in all segments of colon (yellow arrows). Note the two large polyps in the distal descendent colon (orange arrows), the cause of obstruction. He had no family history of polyps. Genetic tests aren’t yet finished.

Fig. 16

© Radiology, Centro Hospitalar do Porto - V.N. Famalicão/PT
Conclusion

CT plays an important role in the evaluation of abdominal disorders at the emergency department. Not infrequently are the patients' complaints due to a colonic disease. CT accurately defines the extent of the disease, guides the institution of the best treatment and orientates for an eventual endoscopic study.
Personal Information
References


