Acute colorectal carcinoma: MDCT findings of uncommon and emergency presentations

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**Learning objectives**

- To review CT findings to acute or atypical presentations of colorectal carcinoma (CRC) in patients attending to our emergency department.
- To describe the multi-detector computed tomography (MDCT) signs associated with the different forms of acute presentation in selected clinical cases.
- To correlate imaging findings with surgical and histopathologic analysis results.

**Background**

Colorectal cancer is a common malignancy tumor that results in significant morbidity and mortality. This tumor is the second commonest cause of cancer death among both males and females in developed countries. The clinical symptoms of CRC are commonly chronic or of slowly progression.

Occasionally this pathology may be associated with a wide spectrum of acute presentations and complications that cause clinical symptoms not specific or uncommon. These forms of acute presentation may require surgical treatment. Various authors described the association of the emergency presentation in colorectal cancer with worse prognostic and poorer long-term survival outcomes, when compared with elective patients, both in the presentation and the surgical risk involved. Several studies describe the relationship of this disease with predisposing factors such as age, female gender, obesity and the association with advanced stages of disease.

There is a great variability in the forms of acute presentation, ranging from incidental or early to advanced presentations with colonic complications, both in the clinical onset and the course of the disease. They may require emergency surgical treatment.

The variety of symptoms in these patients and the overlap between the various acute conditions can complicate the diagnosis causing delays in treatment with worse prognosis. Performing MDCT has proved useful because it allows us to perform differential diagnosis with other abdominal pathologies, detect other serious complications secondary to colon cancer and facilitates an early and accurate diagnosis in the preoperative staging, especially in the emergency department where mild and severe patients are attended.

MDCT allows rapid, cost-effective evaluation of patients with acute abdominal pain. Multidetector-row computed tomography has greatly improved image quality, due to the
combined advantages of high speed and outstanding spatial resolution with the possibility of multiplanar reconstructions and 3D images.

**Imaging findings OR Procedure details**

Retrospectively, we review MDCT findings of acute presentations of CRC in selected clinical cases of patients attending the emergency department. We determine the MDCT signs associated with the acute CRC and correlated the imaging findings with surgical and pathologic analysis results.

MDCT was performed using a 64-detector row CT scanner. We injected 120 mL of non-ionic contrast material intravenously at rate of 3cc/sg, and images were acquired in the portal phase in most of the cases. On other selected cases, depending on the clinically suspected abnormality, water oral or rectal was administrated.

We present selected clinical cases of early or incidental tumors with clinical onset, and in other cases advanced presentations with complications in the course of the disease detected on urgent MDCT.

We include several conditions involving local complications or systemic presentation. Bowel obstruction is the most frequent presentation.

We review few cases of colon carcinoma presented with perforation and infection conditions such as abscess or fistula formation.

Various local complications may be present with inflammatory conditions, such as intussusception, perforation, abscess or fistula formation between the colon and adjacent structures. Another appearance may mask other inflammatory processes like diverticulitis or appendicitis. Focal ischemic colitis, due to submucosal edema associated to CRC secondary to obstruction are also described in our review.

**ACUTE COLORECTAL CARCINOMA COMPPLICATED WITH BOWEL OBSTRUCTION**

Colorectal carcinoma complicated with intestinal obstruction is a common form of acute presentation, with rates about 8-29%.

MDCT has proved useful for evaluating the cause of the obstruction. Different reformatted contrast-enhancement images can be useful to identify the transition point and the obstruction lesion (Fig 1a - 1b).
Left-side colon tumor is more likely to obstruct the colon lumen, because the diameter of the loop is smaller than the ascending colon. However, lesions located near the ileocecal valve area can cause distal small bowel obstruction (Fig 2a - 2b).

**COLON CARCINOMA PRESENTING AS INTUSSUSCEPTION**

CRC associated with intussusception is infrequent, accounts for 5% of all intussusception in adult people. Frequently, it is caused by underlying disease, adenocarcinoma of the colon is the commonest malignant neoplasm associated.

The CT demonstration of a bowel within-bowel configuration with or without contained mesenteric fat or vessels is diagnostic of intussusception (Fig 3a - 3b). Detection of an enhanced mass within intussusception at MDCT may be accurate. However, recognition of the lead mass and distinct from bowel loops is not easy. An MDCT scan shows the classic findings of a targetlike or sausage-shaped or a mass mimicking a kidney.

**COLON CANCER PRESENTED WITH PERFORATION AND INFECTIOUS CONDITIONS SUCH AS ABSCESS OR FISTULA FORMATION**

Colorectal carcinoma may occasionally be associated with a wide spectrum of colonic complications that cause nonspecific acute abdominal pain. Several local complications may be present with inflammatory-infectious conditions.

Perforation of the colon, fistula formation or direct tumour invasion can result in the formation of an abscess. Abscesses predominate located in the peritoneal cavity as a low-density collection adjacent to the perforated tumor (Fig 4a - 4b). However, inflammations spread along the tissue planes and may lead to abscesses in unusual locations such as the retroperitoneum, the abdominal wall, the psoas muscle and the thigh (Fig 5a - 5b), and the perirectal to perineal space (Fig 6a - 6b). Fistula formation between the colon and adjacent structures is an uncommon presentation of the acute colorectal carcinoma, usually associated with long-standing tumors and in advanced stages (Fig 7a - 7b).

Severe pericolic fat stranding, in cases with small air extraluminal bubbles and soft-tissue mass with fluid-density sometimes with fistula formation, shows a different MDCT pattern for the accurate diagnosis and differentiates inflammatory diseases from colon cancer.

**ACUTE COLON CARCINOMA SIMULATING A N ACUTE APPENDICITIS**

Acute CRC can mascarade as inflammatory conditions when coexisting with acute appendicitis or acute diverticulitis. In emergency department, these cases commonly lead
to diagnostic errors, because the signs and symptoms are more marked in inflammatory conditions, and is possible ignore other findings in CT as a possible underlying CRC.

CRC with **appendicitis presentation** is unfrequent, ranges about 10-25%. On CT images, we can identify an irregular cecal wall thickening or a well-delimited polypoid mass at cecum (Fig 8a - 8b). The tumoral growing and secondary appendiceal luminal obstruction are the mechanisms causing appendicitis.

A similar situation occurs in the cases of acute CRC complicated with **diverticulitis**. Regardless some studies that have described an overlap in the CT findings, there are signs on MDCT associated with diverticulitis or colon cancer to help us in the differential diagnosis. In the diagnosis of diverticulitis, the most specific findings are pericolonic stranding and length of the involved segment of more than 10 cm. On the other hand, for the colon cancer, the most specific signs are the presence of pericolonic lymph nodes and luminal masses (Fig 9a - 9b).

**ISCHEMIC COLITIS ASSOCIATED WITH COLON CANCER**

This form of presentation has been reported to be present in 1-11% of the patients with obstructive colonic cancer. On MDCT images, colon ischemia or submucosal edema appear as smooth and annular wall thickening with a homogeneous or layered enhancement pattern, generally adjacent to tumour segment (Fig 10a, 10b and 10c). The thickening and hypoattenuation predominantly affects the middle layer of the wall.

The mechanism of colon ischemia is induced generally by bowel obstruction. The inflammation spread from the serosal side, adhesions and subsequent impaired venous or lymphatic drainage might be the initial process that develops edema with thickening and hypoattenuated pattern.

**COLORECTAL CANCER WITH SYSTEMIC COMPLICATIONS**

Systemic complications such as liver metastases, and venous thromboembolism with subsequent pulmonary infarct may be asymptomatic CT findings at the time of diagnosis and may become an atypical presentation of colorectal cancer (Fig 11a - 11b).

There is a long-recognized association between cancer and thrombosis on several reports. Neoplastic disease is considered a risk factor to pulmonary embolism. Approximately 3% of the patients with colorectal cancer develop venous thromboembolism within 2 years after the diagnosis. Advanced cancer stage at the time of the diagnosis and presence of comorbid medical conditions are associated with the development of pulmonary embolism.
Images for this section:

Figure 1: Acute CRC presenting as bowel obstruction

Axial contrast-enhanced MDCT (1a) and endorectal contrast administration coronal reformatted (1b) showed as irregular and focal thickening of the left colon (the classic “apple core” appearance) (arrows), with large-bowel obstruction. Histopathological inspection of the resected specimen revealed an adenocarcinoma with transmural infiltration and focal surrounding infiltration.

**Fig. 1:** Figure 1: Acute CRC presenting as bowel obstruction
Coronal (2a) and axial reformatted (2b) contrast-enhanced MDCT images showed mass-like thickening of right colon (arrows) obstructing ileocecal area and dilated small bowel loops (arrowheads). There are signs of local tumor extension such as invasion through the wall, infiltration of pericolic fat and lymphadenopathies. Histopathological evaluation of the resected specimen revealed tumor at ileocecal valve area with pericolic extension of disease and infiltrated surrounding structures, omentum and right ovary.

**Fig. 2:** Figure 2: Colon carcinoma in cecal area
Figure 3: Colon carcinoma presenting as intussusception

Coronal-reformatted (3a) contrast-enhanced MDCT images showed a wide colocolic invagination, ascending and a large segment of transverse colon into a descending colon, due to adenocarcinoma of intussusception colon. On histopathological examination of the resected specimen (3b) a colon adenocarcinoma was found.

Fig. 3: Figure 3: Colon carcinoma presenting as intussusception
Coronal (4a) contrast-enhanced MDCT images showed a segmental thickening of the descending wall (arrows). There was also stranding of the pericolic fat with paracolic abscess (low-density lesion) located in the omentum (arrowhead). Histopathological examination of the specimen (4b) confirmed the imaging findings. It was found colon adenocarcinoma complicated with abscess.

**Fig. 4:** Figure 4: Colon cancer presenting with abscess
Figure 5: Colon cancer complicated with psoas and thigh abscess

Coronal (5a) and axial (5b) reformatted contrast-enhanced MDCT images showed focal mass-like thickening of the cecum (arrowhead). Extracolic spread of tumor along the tissue planes appeared as severe inflammatory changes in the proximal segment of thigh such as stranding of the pericolic fat, small air extraluminal bubbles and low-attenuated collection between iliacus muscle (arrows).

At surgery (5c), perforating cecal cancer with pericolic extension the disease, retroperitoneal and thigh abscess were found.

**Fig. 5:** Figure 5: Colon cancer complicated with psoas and thigh abscess
Figure 6: Rectal cancer complicated with Fournier’s gangrene

Axial reformatted MDCT images, at bladder (6a) and perineal level (6b), showed a rectal tumor (arrows). There were severe pericolic inflammation changes that spread along the tissue planes in perirectal space with abscesses in perianal area (arrowheads). Fournier gangrene was confirmed at surgery and histopathologic analysis.

**Fig. 6**: Figure 6: Rectal cancer complicated with Fournier’s gangrene
**Figure 7: Colon carcinoma complicated with fistula formation**

*Enterocolic fistula*

*Colovesical fistula*

**Fig. 7a**
Coronal-reformatted (7a) contrast-enhanced MDCT image showed sigmoid tumour (arrowhead) with a fistula path between the sigmoid colon and adjacent small bowel loop (thin arrow).

Histopathological analysis revealed a sigmoid adenocarcinoma with pericolic fat infiltration. Adjacent small bowel loop was also affected.

**Fig. 7b**
Coronal reformatted (7b) contrast-enhanced MDCT image of other patient, showed a fistula formation between the sigmoid tumor and the bladder (thick arrow). Histopathological evaluation revealed a sigmoid adenocarcinoma ulcerated with pericolic fat infiltration. At cystoscopy, signs of chronic inflammation in the bladder wall were found.

**Fig. 7:** Figure 7: Colon carcinoma complicated with fistula formation
Figure 8: Colon cancer associated to acute appendicitis

Coronal reconstruction MIP (8a) contrast-enhanced MDCT images showed appendix inflamed with wall enhancement and surrounding fat stranding (arrowhead). There was a well-limited polypoid mass at cecum with endophytic growth (arrow). Histopathological analysis of the resected specimen (8b) revealed acute appendicitis and giant sessile polypoid mass located at cecum, with colonic adenocarcinoma over villous adenoma.

Fig. 8: Figure 8: Colon cancer associated to acute appendicitis
Fig. 9: Caso 9: Sigmoid cancer presenting as acute diverticulitis

Axial (9a) and coronal (9b) reformatted contrast-enhanced MDCT images showed focal, mass-like thickening of the sigmoid colon (thick arrow) with adjacent stranding of the pericolonic fat and pericolonic inflammatory changes (arrowheads). There were also enlarged lymph nodes associated (thin arrow). Histopathological analysis of the resected specimen revealed ulcerated adenocarcinoma with marked necrosis, perforation and abscess formation. There were acute diverticulitis in the tumoral zone.
Axial (10a), sagittal (10b) and coronal (10c) reformatted images showed a tumor of sigmoid colon (arrowheads). Proximal to tumor segment there was smooth and diffuse wall thickening with layered enhancement pattern (arrows) secondary to submucosal edema. Histopathological evaluation of the resected specimen revealed a sigmoid adenocarcinoma with mucosal ulceration and necrosis of the colonic wall segment.

Fig. 10: Ischemic colitis associated with colon cancer
Axial (11a) contrast-enhanced (arterial phase) MDCT image showed bilateral pulmonary thromboembolism (thin arrows). Coronal (11b) reformatted contrast-enhanced image (venous phase scan) showed intraluminal defect at right femoral vein (arrowhead). Focal and irregular thickening wall located in the right colon was described (thick arrow). Ulcer adenocarcinoma of the right colon was confirmed in optical colonoscopy and biopsy.

**Fig. 11:** Colorectal cancer presenting with pulmonary thromboembolism and deep vein thrombosis
Conclusion

- Colorectal cancer may be associated with a wide spectrum of colonic complications that cause not specific symptoms and uncommon CT findings, which sometimes overlap with imaging features of other acute pathological conditions.
- Occasionally, this pathology may require emergency surgical treatment that had been related with high risk surgery and poor prognosis.
- Currently available MDCT has contributed to improve the diagnosis, to increase accurate information and to help in the differential diagnosis.
- MDCT is also useful to preoperative staging and treatment planning.

Personal Information

References