

## Radiological Case Report / Caso Clínico

**Cecal Volvulus: an Uncommon Cause of Bowel Ischemia***Vólvulo do Cego: uma Causa Incomum de Isquémia Intestinal*Fernanda Gomes<sup>1</sup>, Filipa Costeira<sup>1</sup>, Sónia Vilaça<sup>2</sup>, Sobrinho Falcão<sup>2</sup>, Pedro Oliveira<sup>1</sup><sup>1</sup> Department of Radiology, Braga Hospital, Braga, Portugal<sup>2</sup> Department of Surgery, Braga Hospital, Braga, Portugal

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e-mail: fmgomes2@gmail.com**Abstract**

Cecal volvulus consists of a torsion of the cecum, the ascending colon and sometimes the terminal ileum around its own mesentery, due to excessive mobility and poor fixation of the cecum to the retroperitoneum.

Cecal volvulus is often difficult to diagnose clinically, emphasizing the significant role of imaging methods.

This report presents a case of acute onset of intestinal pain due to a cecal volvulus complicated with vascular compromise and gangrene.

**Keywords**

Cecal diseases; Intestinal volvulus.

**Resumo**

O vólvulo do cego é definido como uma torção do cego, do cólon ascendente e, por vezes, do íleo terminal, em torno do seu próprio mesentério. É precipitado em casos de excesso de mobilidade e de fraca fixação do cego às estruturas do retroperitoneu.

Trata-se de uma patologia de difícil diagnóstico clínico, assumindo a imagiologia um papel fundamental no seu diagnóstico.

É descrito um caso de dor abdominal aguda associada a um caso de vólvulo cecal complicado por isquemia.

**Palavras-chave**

Doenças do cego; Vólvulo intestinal.

**Introduction**

Volvulus is defined as torsion of an organ on a pedicle to a degree sufficient to cause symptoms. It may involve any segment of the gastrointestinal tract.<sup>1</sup>

Cecal volvulus presents with nonspecific symptoms including intermittent and recurrent abdominal distension, abdominal pain, constipation, nausea and vomiting. In rare cases cecal volvulus may cause bowel obstruction (it represents 1% of all causes).<sup>1,2,3</sup>

Cecal volvulus can be a potentially fatal condition due to associated vascular compromise as related in this report.<sup>1,2,3</sup>

Moreover, it is an entity that is hard to diagnose clinically and which may present unspecified symptoms, highlighting the role of imaging findings.

Disorders that cause colon distention can act as fulcrum for rotation and precipitate cecal volvulus in individuals with congenital defects of right colon fixation.<sup>1</sup>

Three different categories of cecal volvulus can be recognized: the axial torsion (type I), which occurs when the cecum twists in the axial plane around its long axis and can be identified the right lower quadrant; the loop torsion (type II), in which the cecum both twists and inverts, occupying the left upper quadrant; and the cecal bascule (type III), which occurs when the cecum folds anteriorly without any torsion.<sup>4,5,6</sup>

**Clinical History**

A 65-year-old woman was admitted to the emergency department with 12 hours of intermittent abdominal pain

and distension. Laboratory studies showed increased white blood cell count ( $11.8 \times 10^3$  cells/uL) and C-reactive protein (5,85 mg/L). The patient did not have a relevant past medical history. An abdominal radiograph (Figure 1) was requested as part of the diagnostic workup, followed by abdomino-pelvic computed tomography (CT) (Figure 2, 3 and 4). For the study a multi-slice helical abdomino-pelvic CT was performed using a 16-slice scanner (Toshiba Aquilion®). Contiguous 3mm multiplanar reformations were obtained from a single acquisition after a bolus of 150 mL of intravenous iodinated contrast at a rate of 3 mL/s, with a scan delay of approximately 70s. Oral contrast material was not administered. A cecal volvulus was suspected based on the imaging findings. The patient underwent an emergent exploratory laparotomy, confirming the diagnosis of cecal volvulus and excluding the presence of a mass or intestinal adhesions. A right hemicolectomy with ileo-colic anastomosis was performed due to intestinal ischemia (Figure 5), with immediate restoration of intestinal continuity. During the postoperative period no major complications were observed and the patient was discharged six days after surgery, with no major intestinal complaints reported at follow-up in the outpatient clinic.

**Discussion**

In Western countries, cecal volvulus affects preferentially younger women, with an average age at presentation of 50-68 years.<sup>7</sup>

Previous colonoscopy, laparoscopy, barium enema or pregnancy and obstructive lesions in the distal colon are



**Figure 1** – Supine abdominal radiograph reveals a focal loop of air-distended bowel in the left upper quadrant.



**Figure 2 a, b)** – Axial contrast-enhanced CT image shows a markedly dilated cecum located in left upper quadrant (asterisk). It is also noted a mild thickening of the cecal bowel wall (yellow arrow), a small amount of ascites and a reduced mural enhancement (green arrow) concerning for bowel wall ischemia. There are no signs of pneumoperitoneum or pneumatosis.



**Figure 3** – The “whirl sign” of cecal volvulus (blue arrow). Contrast-enhanced coronal CT image shows a dilated and stool-filled cecum located in the left upper quadrant. This appearance results from twisted collapsed bowel with enhancing engorged vessels radiating from the twisted bowel. There is a marked distension of the displaced cecum and distal colon decompression. There is no free intraperitoneal or portal venous gas.

recognized as risk factors for the development of cecal volvulus.<sup>8</sup>

Radiography and CT are the most important imaging methods for diagnosis of cecal volvulus.<sup>3</sup>

Although radiography might suggest the diagnosis in almost half the cases, other imaging methods are frequently used to confirm it.<sup>1,2</sup>

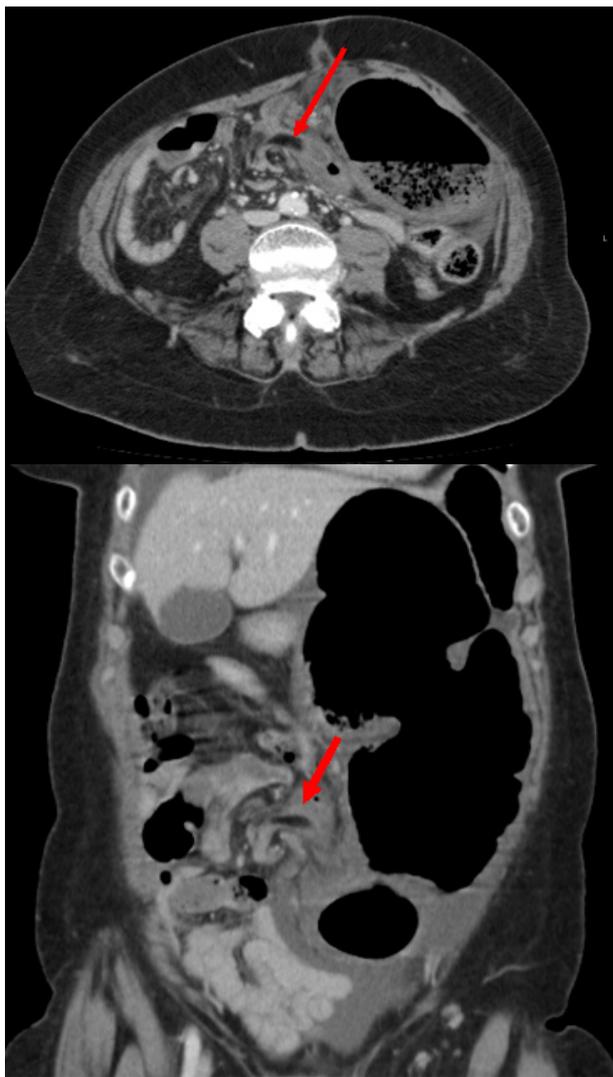
The key finding for its diagnosis is the recognition of cecum outside of the right lower quadrant. In cases where cecum remains in the right lower quadrant, it is often a challenging diagnosis.<sup>6</sup> In this case, the cecum occupies the left upper quadrant of the abdomen representing a loop torsion (type II) of cecal volvulus.

The classical “bird beak sign”, originally applied to the appearance of sigmoid volvulus consisting on a contrast enema studies, is caused by tapering of the barium column toward the torsion site. This sign can also be appreciated on axial CT images of the loop-type cecal volvulus.<sup>1,3,4</sup>

The “whirl sign” is a specific CT sign of bowel volvulus and has first been described for the volvulus of the midgut and sigmoid colon and later for cecal volvulus.<sup>9</sup> It represents the enhancing engorged mesenteric vessels that radiate from the twisted loops of bowel and creates a swirling strand of soft-tissue attenuation within a low-attenuating fatty mesentery, resembling a hurricane.<sup>1,2,9</sup>

Published case series noted that the location of the mesenteric twisting is highly accurate in differentiating cecal from sigmoid volvulus.<sup>10</sup> Therefore when the mesenteric twisting is present to the right of midline is suggestive of caecal/ascending volvulus and when in the midline or to left of midline indicates the presence of a sigmoid volvulus.<sup>8</sup>

Other CT findings are the “split wall sign” - caused by adjacent mesenteric fat invagination in the twisted bowel which creates the impression of colon wall splitting by fat - and the “X-mark-the-spot sign” - referring to the crossing loops of bowel at the site of the transition. 2 The X-marks-



**Figure 4 a, b)** – Enhanced axial and coronal CT images showing apparent separation of cecal walls by adjacent mesenteric fat secondary to incomplete twisting, named “split-wall sign” (red arrow). There is a small amount of ascites.

the-spot represents a complete bowel volvulus which creates a crossing configuration centered around a single point. This sign was not clearly defined in the reported case, probably indicating incomplete bowel twisting.

Although these findings are not always present, they can help in the differential diagnosis with other causes of bowel obstruction in which there is no bowel twist.<sup>2</sup>

Early diagnosis and intervention is crucial in cases of cecal volvulus to avoid complications as bowel ischemia and infarction.

Volvulus of gastrointestinal tract is often a challenging diagnosis for radiologists that need to be aware of its predisposing factors, differential diagnosis and classic signs sensitivity and specificity.

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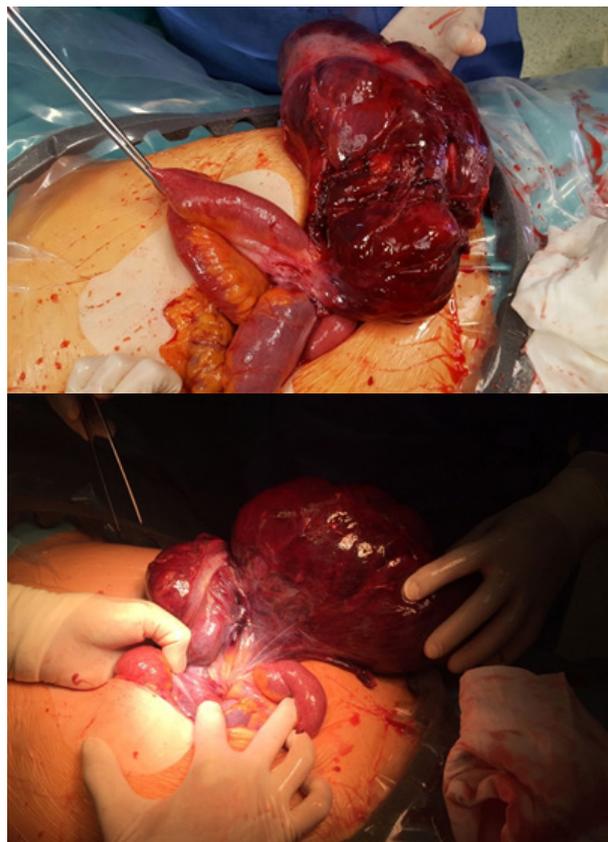
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#### Ethical disclosures / Divulgações Éticas

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**Figure 5 a)** – The patient had an emergent exploratory laparotomy confirming the diagnosis of cecal volvulus. Intra-operative image showing a segment of discolored ischemic right colon with signs of gangrene. A right hemicolectomy was performed due to non-viability. **b)** Torsion of the mesenteric vascular pedicle is also showed.

Unlike sigmoid volvulus, where the treatment of choice in cases without gravity signs consists of endoscopic detwisting followed or not by surgery, in cases of cecal volvulus, surgery is always required even in the absence of complications.<sup>8</sup> The preferred treatment is surgery with colectomy of the volvulized segment, usually an ileocecal resection.<sup>8</sup> The presence of an ischemic or gangrenous right colon is an indication for right hemicolectomy. Detorsion and colopexy is not recommended because of the high risk of recurrence.<sup>8</sup>

We report a case of 65-year-old woman who presented to the emergency department with an acute onset of abdominal pain due to ischemia of a volvulized cecal segment, with emphasis in radiological imaging features that might be helpful in suggesting the diagnosis and the presence of ischemia/gangrene, which have been noted to occur in 29% of the patients at the time of laparotomy and is associated with increased mortality.<sup>11</sup>

Abdomino-pelvic CT with intravenous contrast media is recommended for diagnosis and detection of complications associated with cecal volvulus.

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*Confidentiality of data:* The authors declare that they have followed the protocols of their work center on the publication of data from patients.

*Confidencialidade dos dados:* Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação dos dados de doentes.

*Protection of human and animal subjects:* The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code

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of Ethics of the World Medical Association (Declaration of Helsinki). *Proteção de pessoas e animais*. Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial.

### **Bibliography**

1. Gastrointestinal Imaging Edited by Angela D. Levy, Koenraad J. Mortele, Benjamin M. Yeh 2015.
2. Peterson CM, Anderson JS, Hara AK, Carena JW, Menias CO. Volvulus of the gastrointestinal tract: appearances at multimodality imaging. *Radiographics*. 2009;29:1281-93.
3. Rosenblat JM, Rozenblit AM, Wolf EL, DuBrow RA, et al. Findings of cecal volvulus at CT. *Radiology*. 2010;256:169-75.
4. Moore CJ, Corl FM, Fishman EK. CT of cecal volvulus: unraveling the image. *AJR Am J Roentgenol*. 2001;177:95-8.
5. Jaffe T, Thompson WM. Large-bowel obstruction in the adult: classic radiographic and CT findings, etiology, and mimics. *Radiology*. 2015;275:651-63.
6. Tonerini M, Pancrazi F, Lorenzi S, Pacciardi F, Ruschi F, et al. Cecal volvulus: what the radiologist needs to know. *Global Surgery*. 2015;1:15-8.
7. Hasbahceci M, Basak F, Alimoglu O. Cecal volvulus. *Indian J Surg*. 2012;74:476-9.
8. Perrot L, Fohlenb A, Alves A, Lubranoa J. Management of the colonic volvulus in 2016. *J Visc Surg*. 2016 Jun;153:183-92.
9. Frank AJ, Goffner LB, Fruauff AA, Losada RA. Cecal volvulus: the CT whirl sign. *Abdom Imaging* 1993;18:288-9.
10. Macari M, Spieler B, Babb J, Pachter HL. Can the location of the CT whirl sign assist in differentiating sigmoid from caecal volvulus? *Clin Radiol*. 2011;66:112-7.
11. Anderson JR, Welch GH. Acute volvulus of the right colon: an analysis of 69 patients. *World J Surg*. 1986;10:336-42.