Journal of Visceral Surgery (2016) 153, 183—192

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

REVIEW

Management of the colonic volvulus in 2016

L. Perrot[a,*], A. Fohlen[b], A. Alves[a], J. Lubrano[a]

[a] *Service de chirurgie viscérale et digestive, centre hospitalier régional et universitaire, avenue de la Côte-de-Nacre, 14000 Caen, France*
[b] *Service de radiologie, centre hospitalier régional et universitaire, avenue de la Côte-de-Nacre, 14000 Caen, France*

Available online 28 April 2016

KEYWORDS
Volvulus;
Colon;
Cecum;
Sigmoid;
Endoscopy

Summary Colonic volvulus is the third leading cause of colonic obstruction worldwide, occurring at two principal locations: the sigmoid colon and cecum. In Western countries, sigmoid volvulus preferentially affects elderly men whereas cecal volvulus affects younger women. Some risk factors, such as chronic constipation, high-fiber diet, frequent use of laxatives, personal past history of laparotomy and anatomic predispositions, are common to both locations. Clinical symptomatology is non-specific, including a combination of abdominal pain, gaseous distention, and bowel obstruction. Abdominopelvic computerized tomography is currently the gold standard examination, allowing positive diagnosis as well as detection of complications. Specific management depends on the location, patient comorbidities and colonic wall viability, but treatment is an emergency in every case. If clinical or radiological signs of gravity are present, emergency surgery is mandatory, but is associated with high morbidity and mortality rates. For sigmoid volvulus without criteria of gravity, the ideal strategy is an endoscopic detorsion procedure followed, within 2 to 5 days, by surgery that includes a sigmoid colectomy with primary anastomosis. Exclusively endoscopic therapy must be reserved for patients who are at excessive risk for surgical intervention. In cecal volvulus, endoscopy has no role and surgery is the rule.

Introduction

The term ''volvulus'' comes from the Latin ''volvere'' meaning twist. It was first described by Rokitansky in 1836 [1]. Colonic volvulus is the third leading cause of colonic obstruction in the world, following colorectal cancer and complicated sigmoid diverticulitis [2]. Any mobile segment of the colon can be affected by volvulus [3]. According to various series in the literature, the sigmoid is involved in 60—75% of cases, cecum in 25—40% of cases, transverse colon in 1—4% of cases and splenic flexure in 1% of cases. There are numerous publications in the literature, but many of these are dated, have low numbers of patients and inadequate follow-up. The aim of this review is to build a decision algorithm for diagnostic and therapeutic management of colon volvulus. After a brief review of the epidemiology and etiology of colon volvulus, we discuss common and specific points of the diagnosis and treatment of sigmoid and cecal volvulus.

Epidemiology

The incidence of colon volvulus varies in different regions of the world. Thus, in the so-called ''volvulus belt'', an endemic area that includes Africa, South America, Russia, Eastern Europe, the Middle East, India and Brazil, colonic volvulus represents 13 to 42% of all intestinal obstructions

* Corresponding author.
E-mail address: laurentperrot@hotmail.com (L. Perrot).

http://dx.doi.org/10.1016/j.jviscsurg.2016.03.006
1878-7886/

[4–7]. In ''Western'' countries where the incidence is low (North America, Western Europe, Australia), colonic volvulus represents less than 5% of all intestinal obstruction. The latest large-scale epidemiological study, published by Halabi et al. [8], reported on 63,749 cases of colonic volvulus among 3,351,152 cases of intestinal obstruction over a 9-year period. During this period, the authors observed a stable incidence of sigmoid volvulus, however, the incidence of cecal volvulus increased by 5% per year.

Similarly, the volvulus location and its clinical setting vary by region. In the ''volvulus belt'' countries, sigmoid volvulus usually occurs in young men (from the 4th decade onward with a male:female sex-ratio of 4:1). For this reason, some authors consider that endemic sigmoid volvulus is a different clinical entity than sporadic volvulus [9]. In Western countries, sigmoid volvulus preferentially affects elderly males (age > 70) while cecal volvulus affects somewhat younger females (age $\leq$ 60), as highlighted in the study by Halabi et al. [8].

Etiology

The etiology of colon volvulus is probably multifactorial. Some factors are common to all locations of volvulus, such as chronic constipation, high fiber diet, frequent use of laxatives, history of laparotomy and anatomic predisposition.

Dolicho-sigmoid, the presence of an elongated sigmoid colon on a narrow mesenteric base, is the most commonly cited predisposing factor for sigmoid volvulus. An anatomical study performed on 590 cadavers demonstrated ethnic anatomical differences [10]. The length and height of the sigmoid were significantly longer and the root of the mesosigmoid narrower in Africans, with no difference between men and women. In the case-control study of Akinkuotu et al. [11], there was a significant increase in the length of the mesosigmoid, the maximum width of the mesosigmoid and the lumenal circumference of the colon in patients who underwent surgery for sigmoid volvulus. However, there was no significant difference in the maximal width of the mesosigmoid root. The authors concluded that the combination of a high and wide mesosigmoid with a narrow root predisposed to sigmoid volvulus. While there are clearly anatomical predispositions, it remains unclear whether they are congenital or acquired [12].

Anatomical predispositions have also been reported for cecal volvulus. Thus, cecal volvulus may be linked to failure of parietal fixation of the ileocecal region during embryological counterclockwise cecal rotation from the left side of the abdomen towards the right iliac fossa. In an autopsy series of 125 cadavers, Ballantyne et al. observed a complete absence of ileocecal attachment in 11% of cases and cecal hypermobility allowing rotation in 26% of cases [2].

Some risk factors are more specific to cecal volvulus such as history of previous colonoscopy, laparoscopy and pregnancy [13]. Other risk factors favor the development of sigmoid volvulus, such as diabetes, neuropsychiatric history leading to reduced autonomy, institutional placement and prolonged bed rest. Finally, in younger patients, sigmoid volvulus is often associated with megacolon due to such causes as Hirschsprung's or Chagas disease [4].

Pathophysiology

In sigmoid volvulus, mesosigmoid twisting of up to 180° is considered physiological. In approximately 2% of cases, the volvulus reduces spontaneously [2]. Torsion beyond 180° leads to complications such as colonic obstruction, ischemia or necrosis with perforation. For unknown reasons, the twist preferentially occurs in the counterclockwise direction in 70% of cases [14]. Fibrosis of the mesosigmoid, seen in 86% of operated patients, is more a result than a cause of the torsion, due to cicatrization after reversible ischemia in the relapsing forms of volvulus [15]. During sigmoid volvulus, colonic distension causes an increase in intralumenal pressure, which results in decreased capillary perfusion; this mural ischemia is aggravated by mesocolic vessel occlusion by mechanical phenomena of compression and axial rotation [16]. Early mucosal ischemia promotes bacterial translocation and bacterial gas production, further increasing colonic distension and toxic phenomena. If colonic torsion is not promptly reversed, this creates a vicious circle leading to colonic necrosis and ischemia-reperfusion. These phenomena result in a state of mixed septic and cardiovascular shock. Figs. 1 and 2 describe the two mechanisms of torsion in sigmoid volvulus, with axial mesocolic volvulus being more common than organo-axial volvulus (75% vs. 25% [17]).

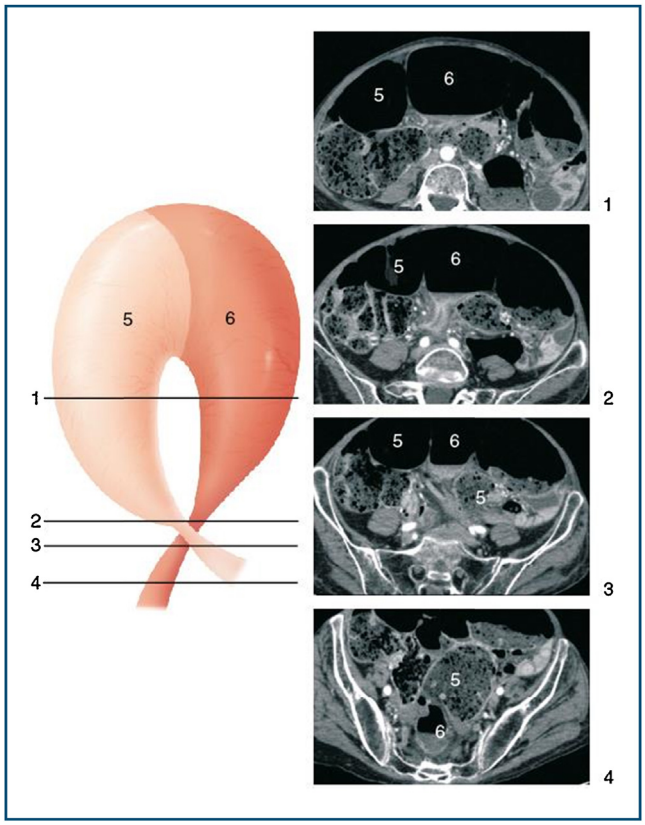

Figure 1. Mesenterico-axial sigmoid volvulus: CT appearance. Slices 1 through 4 are localized on the schematic drawing. Identified points 5 and 6: 5: proximal limb; 6: distal limb.
Image from Lubrano et al. [17], © 2012 Elsevier Masson SAS. All rights reserved.

There are two distinct anatomical types of cecal volvulus (Fig. 3): axial rotation of the ileocecal region around its mesentery, generally in a clockwise direction (90%) and anterior-superior folding of the cecum without axial rotation, commonly called cecal bascule [4]. Cecal bascule is less common than true rotation of the ileocecal region and causes less vascular compromise since there is no true mesenteric torsion [18].