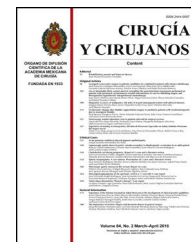




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CLINICAL CASE

Elective laparoscopic right colectomy for caecal volvulus: Case report and literature review[☆]



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KEYWORDS

Caecal volvulus;
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colectomy;
Elective surgery

Abstract

Background: Caecal volvulus is an uncommon cause of intestinal obstruction. Its clinical presentation is non-specific, with the diagnosis usually confirmed by barium enema and abdominal computed tomography. Treatment depends on many factors, and minimally invasive approaches are becoming the treatment of choice.

Clinic case: A 54 years old female, admitted to the Emergency Department with clinical symptoms of intestinal obstruction. On physical examination she had a palpable, firm, and tympanitic mass in the right abdomen, with peritoneal irritation. The radiographs of the abdomen, barium enema and abdominal computed tomography showed caecal volvulus. As she showed a full remission after the barium enema, with no clinical or biochemical data of systemic inflammatory response syndrome or peritoneal irritation, she was discharged to her home. Two weeks later, a laparoscopic right hemicolectomy was performed with an ileo-transverse extracorporeal anastomosis. Her progress was satisfactory, and she was discharged 4 days after surgery due to improvement.

Conclusion: Caecal volvulus is a rare cause of intestinal obstruction, with high mortality rates, and is caused by excessive mobility of the caecum. Its incidence is increasing. Treatment depends on many factors. Early non-surgical untwisting, followed by an elective laparoscopic surgical procedure offers several advantages and reduces mortality.

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PALABRAS CLAVE

Vólvulo cecal;
Tomografía de
abdomen;
Colectomía
laparoscópica;
Cirugía electiva

Colectomía derecha laparoscópica electiva por vólvulo cecal: Reporte de un caso y revisión de la literatura**Resumen**

Antecedentes: El vólvulo cecal es una causa poco frecuente de obstrucción colónica. La presentación clínica es inespecífica y el diagnóstico se confirma mediante colon por enema y tomografía abdominal. El tratamiento depende de múltiples factores. Los abordajes mínimamente invasivos se convertirán en el tratamiento de elección.

Caso clínico: Paciente femenina de 54 años de edad, que ingresa al Servicio de Urgencias con cuadro de oclusión intestinal. Al examen físico, se encontró una masa palpable, firme y timpánica en el hemiabdomen derecho con irritación peritoneal. La placa simple de abdomen, el colon por enema y la tomografía computada mostraron vólvulo cecal. Posteriormente al estudio de colon por enema, presentó remisión completa de los síntomas, sin datos clínicos ni bioquímicos de síndrome de respuesta inflamatoria sistémica o de irritación peritoneal, por lo que fue egresada a su domicilio. Dos semanas más tarde se realizó de manera programada hemicolectomía derecha laparoscópica con ileo transversal anastomosis extracorpórea. Su evolución fue adecuada, egresando en el cuarto día postoperatorio por mejoría.

Conclusión: El vólvulo cecal es una causa rara de obstrucción colónica con alto índice de mortalidad, que es causado por exceso de movilidad del ciego. Su incidencia está en aumento. El tratamiento depende de múltiples factores. La destorsión no quirúrgica temprana, seguida del procedimiento quirúrgico electivo por vía laparoscópica, ofrece diferentes ventajas y disminuye la mortalidad.

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Background

Caecal volvulus is characterised by axial torsion in the caecum, terminal ileum and ascending colon.¹ It was originally described by Rokitsky² in 1837 as a cause of intestinal strangulation. Treatment depends on several factors, including: intestinal viability, haemodynamic condition and the severity and patient comorbidity.³ Total mortality is associated with the presence or absence of gangrene and the type of surgery (elective or emergency), and it is independent of the procedure selected. In emergency surgery reported mortality stands at from 7% to 15% when the intestine is viable, and at 41% when there is gangrene. The mortality rate in elective surgery is low.^{3,4}

Laparoscopic surgery of the colon is possible, safe and viable. It benefits include: pain reduction, swift recovery after surgery, a reduction in the number of days of hospitalisation, early recovery of intestinal function and a better appearance. A minimally invasive approach may be used in elective and emergency surgery.⁵ Surgery at the moment after non-surgical de-torsion has been better studied at the sigmoid volvulus: to date there is insufficient information to determine the optimum moment. Some authors suggest a delay of 3–4 weeks before elective surgery, while others state that an interval of 2–3 days is enough for the preparation of the intestine and the optimisation of patient conditions.⁶ In well-selected cases early non-surgical de-torsion followed by a laparoscopic elective surgical procedure offers a range of advantages and reduces mortality.

We present the case of a caecal volvulus that resolved after study of the colon using an enema, with elective right laparoscopic colectomy.

Clinical case

A 54-year-old female patient with a history of chronic constipation. She referred to a previous hospitalisation due to intestinal blockage, which was resolved by conservative treatment. She was admitted to the A&E Department after suffering 4 h of abdominal distension and pain in the lower right quadrant, sudden, colic type, with nausea, vomiting, constipation and obstipation. Physical examination found: increased peristalsis, major abdominal distension, as well as a palpable firm and tympanic mass in the right abdomen and signs of peritoneal irritation. Laboratory tests showed leukocytosis and hypokalemia. Simple X-ray of the abdomen (Fig. 1) showed caecal dilation, hydro-aereo levels and the absence of gas in the rectal ampule. Given the suspicion of caecal volvulus examination of the colon with an enema was performed (Fig. 2) showing the coffee bean sign. Abdominal tomography confirmed the above findings, without signs of intestinal pneumatosis, liquid or free air in the abdominal cavity, so that perforation or gangrene were ruled out (Fig. 3). After study of the colon using an enema the patient's symptoms remitted, without clinical or biochemical signs of systemic inflammatory response syndrome or peritoneal irritation, so that the patient was discharged.

Two weeks later elective laparoscopic right hemicolectomy was performed with an ileo-transverse extracorporeal

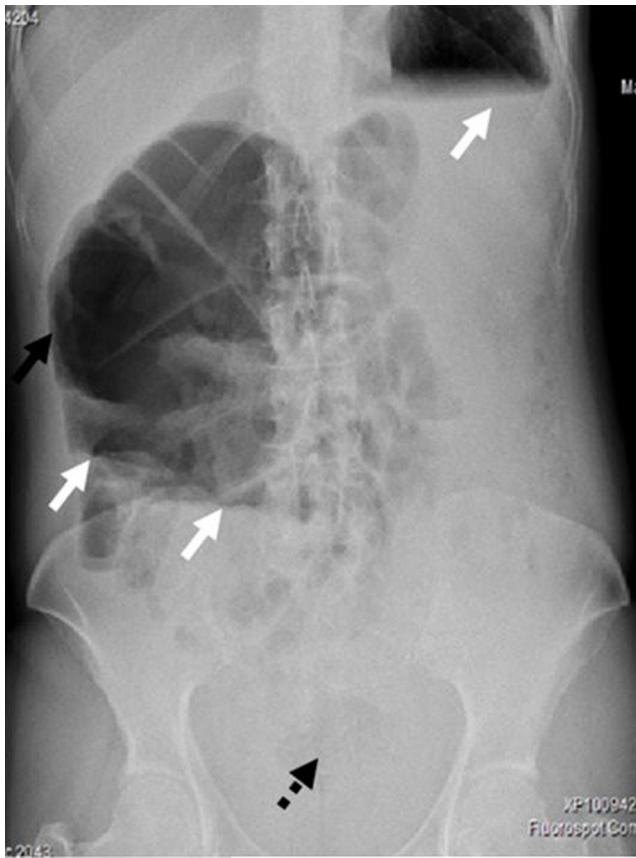


Figure 1 Simple standing X-ray of the abdomen with caecal dilation (black arrow), hydro-aereo levels (white arrows) and absence of air in the rectal ampule (discontinuous black arrow).

anastomosis (Fig. 4). She progressed well and was discharged on the fourth day after the operation due to improvement. Histopathological study reported right colon with chronic ischaemic enterocolitis and chronic peritonitis, lymphoid follicular hyperplasia of Peyer's patches and chronic peri-appendicitis.

Discussion

Caecal volvulus is a rare cause of colon obstruction.¹ It is the second most frequent type of colonic volvulus and represents from 10% to 40% of the total number of cases.³ It is characterised by axial torsion of the caecum, terminal ileum and ascending colon (Fig. 5). Caecal bascule is a type of this condition: it arises at a point where the caecum turns upward and anterior to the ascending colon, giving rise to a valvular mechanism of obstruction. Caecal bascule represents around 10% of all cases of caecal volvulus (Fig. 6).^{1,3,7,8} A volvulus may occur in other parts of the digestive tract, such as the sigmoid colon, stomach, gallbladder, splenic angle or small bowel.^{1,9}

The incidence of caecal volvulus stands at from 2.8 to 7.1 cases per million people per year. It is the cause of from 1% to 1.5% of all adult intestinal obstructions. It is estimated that its incidence is rising by 5.53% per year, while the incidence of sigmoid volvulus remains stable. Caecal volvulus is common in young women. On the contrary, sigmoid

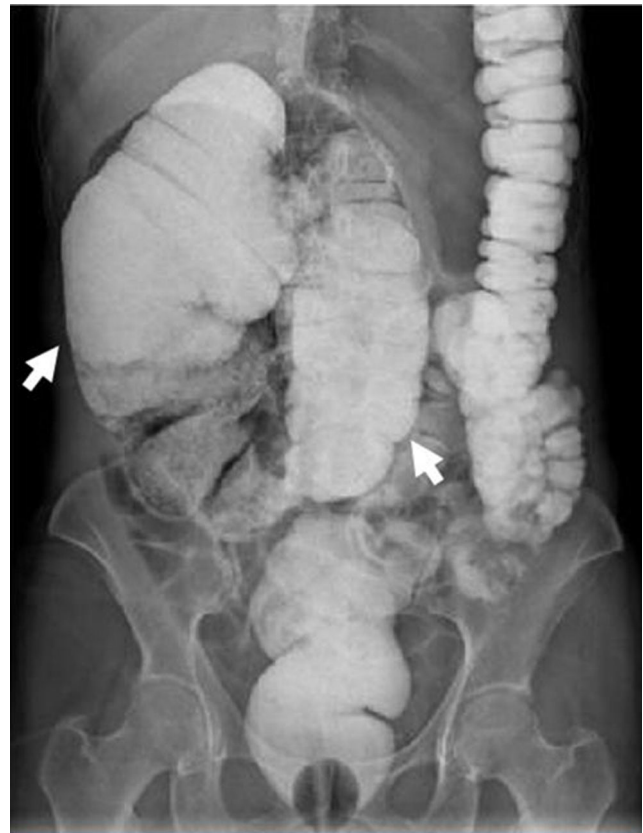


Figure 2 Colon with enema showing the coffee bean sign (white arrows).

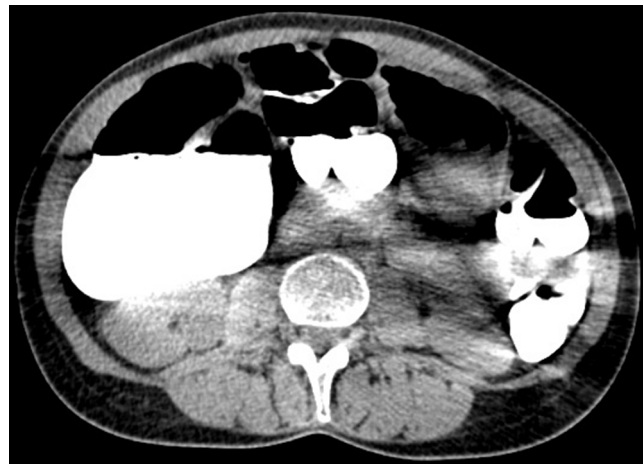


Figure 3 Abdominal tomography. Axial slice showing caecal dilation, hydro-aereo level, with no sign of intestinal pneumatosis or free liquid.

volvulus is common in men above the age of 70 years old.¹⁰ Several predisposing factors have been described, including chronic constipation, abdominal tumours, pregnancy, previous abdominal surgery (in 23–53% of cases), prolonged immobility, high fibre intake, a paralytic ileum and previous colonoscopy.¹¹

During embryological development, the colon is affixed to the parietal peritoneum after anatomical rotation of 270°. Normal rotation with defective fixation or

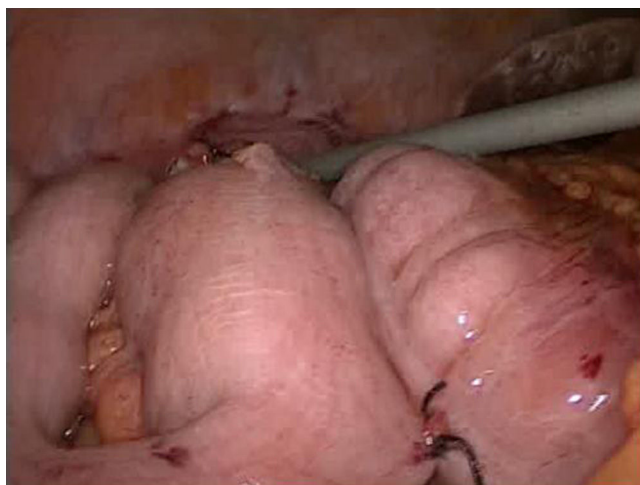


Figure 4 Final laparoscopy showing latero-lateral transverse ileum anastomosis.

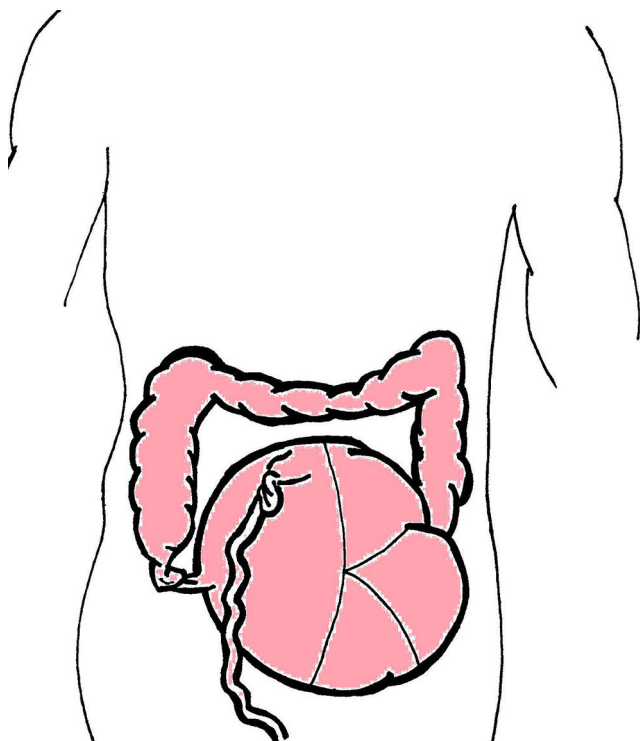


Figure 5 Diagram showing caecal volvulus with axial torsion of the caecum, ascending colon and terminal ileum.

lengthening of the colon due to excessive rotation leads to a mobile caecum.^{7,11} It is thought that a mobile caecum and lack of attachment of the mesentrium, right colon, caecum and terminal ileum to the posterior parietal peritoneum are the main etiological factors in caecal volvulus. In spite of this anatomical predisposition, in some individuals the aetiology involves several factors.^{7,8,11}

Clinical presentation runs from intermittent episodes of pain to abdominal catastrophe; this depends on the pattern, severity and duration of the intestinal obstruction. The most common symptoms are abdominal associated with nausea, vomiting and abdominal dilation.¹¹

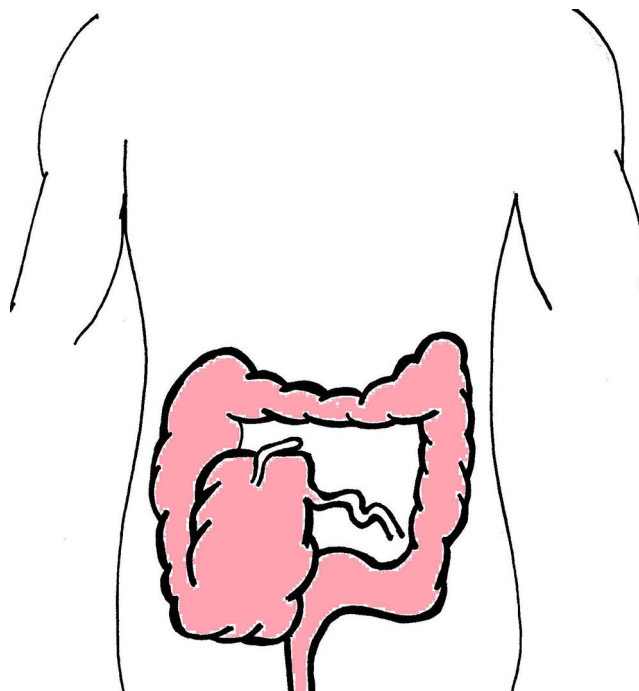


Figure 6 Diagram showing caecal bascule where a turning point upwards and in front of the ascending colon appears in the caecum, causing a valvular obstruction mechanism.

There are 3 clinical syndromes associated with caecal volvulus that may present as recurring intermittent pain (mobile caecum syndrome), acute obstruction and sudden and devastating acute obstruction.¹ In recurring intermittent volvulus patients present pain and chronic abdominal dilation in the lower right quadrant, with temporary symptomatic relief when gasses are channelled or a bowel movement is achieved.^{12,13} This clinical presentation arises in almost 50% of patients before the appearance of an acute volvulus.¹ In patients with an untreated acute volvulus this may progress to strangulation, ischaemia, necrosis and intestinal perforation, with sudden and devastating acute presentation in which there is severe abdominal pain, peritoneal irritation, dehydration and haemodynamic instability.^{1,14,15} The clinical symptoms of acute obstruction due to caecal volvulus and obstruction of the small bowel are similar: it is hard to differentiate them clinically, so that early radiological examination is recommended.^{1,11}

Laboratory analyses are neither sufficiently sensitive nor specific to diagnose caecal volvulus; in patients with intermittent symptoms and early acute obstruction their results are practically normal.

In the case of advanced obstruction, leucocyte count, reactive C protein and blood chemistry reflect the hydro-electrolytic, inflammatory and infectious condition of the patient.^{1,11}

Diagnosis

Simple X-ray of the abdomen is often the initial imaging study. Findings usually include caecal dilation (98–100%), hydro-aereo levels (72–88%), intestinal dilation (42–55%), the absence of gas in the distal colon (82%) and the

presence of dilated intestinal loops in a lateral position to the caecum.^{1,8}

Diagnostic confirmation is by means of colon examination with an enema, abdominal tomography, colonoscopy or exploratory laparotomy. Colon with enema is an imaging study that has traditionally been used to confirm caecal volvulus,⁹ and it has a diagnostic precision of 88%;¹ bird beak sign and the closed-off narrowing of the branch leading from the obstruction are the most common findings.⁹ This has the advantage of ruling out other coexisting abnormalities while it also, in some cases, gives rise to the spontaneous reduction of the volvulus. This technique is not recommended for use in critically ill patients with an advanced obstruction or the suspicion of perforation or gangrene, due to the possibility of leakage of the contrast.^{1,11}

Abdominal tomography is the most precise imaging technique for the diagnosis of caecal volvulus because it rules out other causes of acute abdomen. There are several radiological signs with different degrees of sensitivity and specificity.¹¹ The coffee bean, bird beak and whirl signs are 3 of the most common findings.¹ The coffee bean sign is an axial view of the dilated caecum that is full of air and liquid that can be observed in any space within the abdominal cavity.¹⁶ The bird beak sign is the progressive narrowing of the incoming intestinal end and the outgoing part which ends in the location of the twist.¹ The whirl sign is an image showing a swirl of fibres of soft tissue and fat; in caecal volvulus the whirl is composed of the collapsed caecum, fat and congested mesenteric vessels. The Whirlpool sign consists of the upper mesenteric vein and intestine wrapped around the upper mesenteric artery; when this sign is present an abdominal ultrasound scan must be performed; this is also useful in the diagnosis of poor rotation and volvulus of the middle intestine.³ An appendix full of gas is another sign associated with caecal dilation due to a volvulus.¹ Colonoscopy is considered to be of limited use for the diagnosis and treatment of acute caecal volvulus. The percentage of successful reduction is reported to stand at around 30%. Because of this low success rate, the risk of perforation and the possible delay in surgical treatment, colonoscopy is not recommended as the first line treatment for caecal volvulus.^{1,8,17-19}

Treatment

The treatment of caecal volvulus depends on multiple factors. Gangrene, necrosis or perforation are indicators of resection; right hemicolectomy with transverse ileum anastomosis is the most widely accepted surgical option. In complex clinical situations or when intestinal viability is compromised, ileostomy may be performed with a distal mucus membrane fistula. Untwisting an intestine with gangrene before resection is not recommended, due to the high risk of septic shock.³

Several procedures have been described (with or without resection) for the treatment of a volvulus in a viable intestine. Right hemicolectomy with transverse ileum anastomosis is currently the resection method of choice. Three procedures that do not involve resection are commonly described: isolated de-torsion, caecopexy and caecostomy. Isolated de-torsion is not enough and has a high rate of

recurrence.³ Caecopexy consists of attaching the right colon to the parietal peritoneum, which has a rate of operative mortality of 0–30% and a recurrence rate of 0–40%.¹³ Caecostomy involves inserting a tube into the caecum that emerges through the skin; the caecum is then attached to the anterior abdominal wall. This procedure involves a higher percentage of complications, and these include gangrene, leakage and fistula. The reported operative mortality for caecostomy is from 0% to 40%, while the recurrence rate is from 0% to 33%.^{1,3} In terms of mortality, caecopexy is safer than caecostomy, so that caecopexy is recommended in those patients with a viable intestine that would not tolerate hemicolectomy.³ Caecopexy is also used in patients with mobile caecum syndrome.¹³ Non-surgical decompression is only used in 17% of cases, according to the study by Habali et al.¹⁰ Of the cases treated surgically, procedures involving resection are used in 89%, while procedures without resection are rarely used.

Due to recent technological advances laparoscopic colon resections are increasingly used. In properly selected case right colectomy and laparoscopic caecopexy will become the treatment of choice.^{1,13,20-24} The reported mortality for caecal volvulus stands at 6.64%. The LASSO algorithm identified intestinal gangrene, peritonitis, coagulopathy, age, the use of a stoma and chronic kidney disease to be strong predictors of mortality.¹⁰

Conclusions

Caecal volvulus is a rare cause of intestinal obstruction with high rates of mortality. Excess caecum mobility is a predisposition for this condition and it is becoming increasingly common. The initial clinical and radiological signs are not specific for the definitive diagnosis, so that often the colon is examined with an enema and abdominal tomography is used. The treatment of caecal volvulus depends on multiple factors. The presence of intestinal gangrene and coagulopathy are predictors for mortality, indicating that appropriate diagnosis and treatment are essential.

In properly selected cases, early non-surgical de-torsion followed by elective laparoscopic surgery offers a range of advantages and reduces mortality.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

Conflict of interests

The authors have no conflict of interests to declare.

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