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Sigmoid volvulus. Review of literature

Vólvulo de sigmoides. Revisión de la literatura

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Palabras clave: *vólvulos sigmoides, isquemia, colostomía, procedimiento de Hartmann, no resectivo.*

ABSTRACT

Sigmoid volvulus remains a relatively rare cause of acute abdomen, with a 60% mortality rate in complicated cases with higher prevalence among older males with a history of limited sufficiency. It often debuts as an occlusive clinical picture with few unspecific biochemical alterations, except in advanced cases with objective signs of colonic ischemia and abdominal sepsis. As to imaging diagnosis, the simple abdominal X-rays show the characteristic and best-known "coffee bean" sign. Nevertheless, the computed tomography scan is still considered the gold standard with high specificity and sensitivity. Early diagnosis in stable patients allows an extensive range of surgical, endoscopic, or interventional options, either transitory or definitive. Complicated cases with abdominal sepsis or hemodynamic compromise often require surgical management with a higher rate of complications.

RESUMEN

El vólvulo sigmoideo representa una causa relativamente rara de abdomen agudo, con una mortalidad de hasta 60% en casos complicados. La mayor prevalencia se presenta en hombres de edad avanzada con historial de autosuficiencia limitada. Debuta como un cuadro oclusivo intestinal con alteraciones bioquímicas inespecíficas con datos de isquemia intestinal o sepsis abdominal en casos complicados. En cuanto a estudios de imagen se presenta el signo del "grano de café" en la radiografía simple, el cual es el más característico y conocido; sin embargo, la tomografía axial continúa siendo el estándar de oro por su alta tasa de sensibilidad y especificidad. El diagnóstico oportuno permite múltiples opciones endoscópicas y quirúrgicas para su tratamiento, transitorio o definitivo. La sepsis abdominal y el compromiso hemodinámico suelen requerir manejo quirúrgico urgente con una tasa mayor de complicaciones.

INTRODUCTION

The term "volvulus" comes from the Latin *volvere* ('vɔl.ve.re/), meaning twist. The twisting of a segment of the alimentary tract was first described in 1550 in the Ebers papyrus; the first description of sigmoid volvulus was made by Rokitansky in 1836.[1,2]

By definition, a volvulus is the torsion of an organ through an axis on its vascular pedicle; in the case of sigmoid volvulus, this causes the formation of a closed loop in which there is compromised blood circulation. The leading cause is a failure or laxity of the peritoneal fixation, called fixed point to cecal adhesions, abdominal mass, gestational uterus, and adenopathy.[3]

Volvulus of the gastrointestinal tract remains a vital etiology of acute abdomen, not because of its frequency, but because of the complications' severity, making early diagnosis imperative.[3] The most frequent cases are cecum and sigmoid volvulus.[4] If mesenteric circulation is compromised or colonic distension compromises irrigation, ischemia develops, leading to necrosis in case of late diagnosis with massive bacterial translocation and sepsis.

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Epidemiology

Sigmoid volvulus is the third leading cause of colonic obstruction (10%),[3] with a variable incidence, which tends to be higher in regions

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Table 1: Risk factors for volvulus-differential features.

Sigmoid	Colonic
Chronic constipation	Chronic constipation
Recurrent occlusion	High-fiber diet
Laxative dependence	Frequent use of laxatives
Hirschsprung's disease	History of abdominal surgery
Diabetes mellitus	Failure in the embryological process
Neuropsychiatric history	Pregnancy
Prolonged bed rest	History of pelvic surgery
Chagas disease (megacolon)	Colonoscopy
Hospitalization in a medical facility	

of India, Africa, and Middle Eastern countries, but relatively lower in the United States, Australia, New Zealand, and Western European countries. More than 95% of cases involve the sigmoid colon.[5] Fifty to 80% of sigmoid volvulus are the most common etiology of intestinal occlusion in developing countries.[6] In Western countries, it usually occurs in patients in the sixth to eighth decade of life with chronic medical conditions, neuropsychological disability, or constipation. Recent studies report a 2:1 prevalence of sigmoid volvulus in men, mainly in elderly patients (over 70 years), and a 3:1 prevalence of cecal volvulus in young women (under 60 years).[1,7]

There are two peaks of higher incidence: the first is from the first to the third decade of life due to intestinal malformations from the embryonic process, excessive exercise, or common mesentery for small and large intestines; the second peak from 60 to 79 years of age, associated with chronic constipation, distal obstruction, and significant neurocognitive disorder.[8]

Etiology and pathophysiology

The etiology of volvulus is multifactorial, usually occurring in patients with predisposing factors, such as a redundant sigmoid colon, failure of the standard fixation of the mesentery, ileus, high fiber diets, chronic constipation, gas distention, abnormal postures in children with cerebral palsy, Chagas disease with megacolon and malrotations in the embryonic process.[3]

In a case-control study by Akinkuotu et al,[9] a significant increase in rectosigmoid length was found in patients who required surgical intervention.

In the sigmoid, a rotation of 180 degrees is considered physiologically normal; however, a more significant than these 180 degrees leads to complications such as obstruction, ischemia, necrosis, and, consequently, perforation. During sigmoid volvulus, colonic distension causes increased intraluminal pressure resulting in decreased capillary perfusion, which causes mural ischemia, aggravated by mesocolon venous occlusion due to the mechanical phenomenon of compression and axial rotation.[1]

Early mucosal ischemia leads to bacterial translocation and gas production, which increases colonic distension and systemic involvement. If the torsion is not reversed early, a vicious circle is created, leading to necrosis, possible perforation, and, subsequently, to ischemia-reperfusion syndrome, which will result in a state of distributive shock.[10]

Diagnosis

The most common condition occurs in patients over 60 years of age and under psychiatric treatment that causes chronic constipation, together with risk factors *(Table 1)*.[1,6,10] It presents with colicky abdominal pain, nausea, vomiting, and constipation; there is usually abdominal distention, variable degrees of

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tenderness, decreased or increased peristaltic sounds, and empty rectal ampulla on digital examination, although a percentage may be asymptomatic initially. Thirty-three percent of patients have the triad of sigmoid volvulus, emesis, colicky pain with constipation, and abdominal distention.[1] Thirty to 40% of patients will have a history of intestinal occlusion.[8] The duration of symptoms can be from a few hours to several days.

The emergency presentation usually involves peritonitis or shock related to ischemia or perforation, with a frequency of 25 to 35% of patients with sigmoid volvulus.[7]

On plain radiography, the diagnostic key to sigmoid volvulus is the dilated colon without haustra, inverted "U" shaped and in the midline towards the upper quadrants. The "coffee bean" sign is produced by the central image created by the contact of the medial walls of the volvulus loop and the lateral walls that give rise to the edges of the bean *(Figure 1)*.[3] However, only 60% of patients are diagnosed by abdominal radiography. The presence of linear pneumatosis suggests imminent perforation due to intestinal necrosis; the presence of free air suggests intestinal perforation.[11]

The study of choice is computed tomography due to its sensitivity of 100% and specificity of > 90% since it allows the creation of multiplanar reconstructions that facilitate the definitive diagnosis[1]. The findings are better than those of plain radiography; the specific signs of both CT and radiography for sigmoid and colonic volvulus are shown in *Table 2*.[3,11] However, up to 25% of the patients did not present these characteristic signs *(Figure 1)*.

Barium enema shows the characteristic "folded paper" or "bird's beak" image at the point where the volvulus is formed.[11] Its usefulness as a therapeutic, diagnostic method will be explained later.

Lactate elevation in cases of ischemic disease or sepsis data, in case of sepsis, is usually the only change in the biochemical profile. Similarly, blood biometry, electrolytes, general urine test, and an immunological pregnancy test should be requested for all women of childbearing age, as well as alkaline phosphatase and liver function tests, including bilirubin, amylase and lipase count in all cases of abdominal pain to rule out any other pathology.

TREATMENT

Timely diagnosis in stable patients allows multiple surgical, endoscopic, or interventional diagnostic-therapeutic options, whether transitional or definitive. The first step in treating uncomplicated sigmoid volvulus is to perform a therapeutic, diagnostic colonoscopy to assess sigmoid viability and its detorsion.[1] If images suggest necrosis, biochemical data of ischemia, or the endoscopic resource is not accessible, the patient requires emergency surgery *(Figure 2)*.

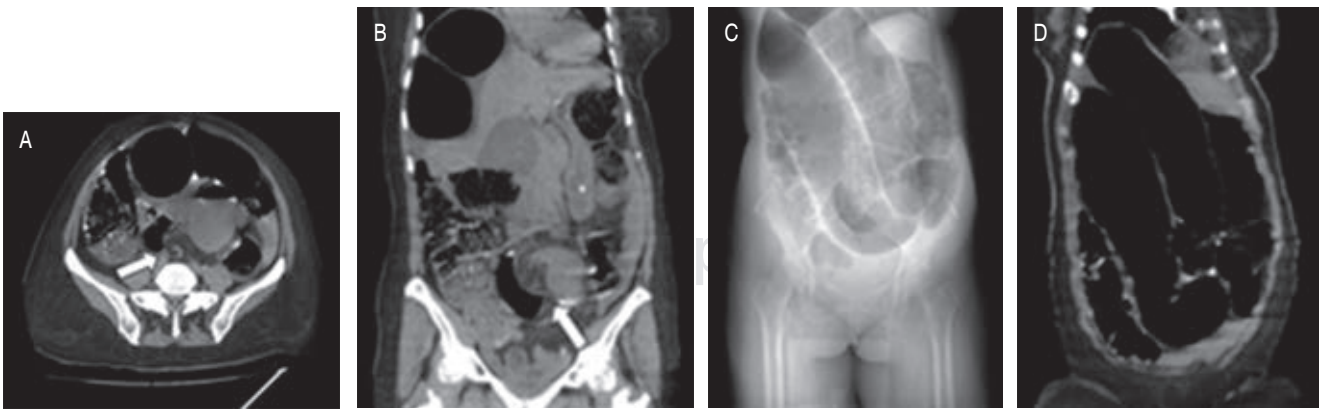

Figure 1: *Simple CT scan showing the characteristic sign of a sigmoid volvulus with a "whirlpool image" (arrow) in axial* ***(A)*** *and coronal* ***(B)*** *sections. The characteristic sign of the sigmoid volvulus of "coffee bean" is also shown* ***(C and D)****.*

Table 2: Radiological signs of volvulus.

	Sigmoid volvulus	Colonic volvulus
Abdominal radiography	Dilated bowel loop with hydro aerial levels	Loop distension extending from the right upper quadrant to the epigastrium or left upper quadrant
	"Coffee bean" sign	Single hydro aerial level
	Absence of gas in rectal ampoule	
Computerized axial tomography	Dilated bowel loop with an absence of haustra	Colon dilatation
	Whirlpool sign: twisting of the mesentery and mesenteric vessels	Focal air dilatation with haustra in the left upper quadrant
	"Bird's beak" sign	Whirlpool sign: twisting of the mesentery and mesenteric vessels
	"Coffee bean" sign	"Bird's beak" sign
	"X" sign: crisscrossing of intestinal loops at the site of torsion	"X" sign: the intertwining of intestinal loops at the site of torsion
	Sign of "divided wall": due to mesenteric fat invaginating into intestinal wall	

Non-surgical and endoscopic treatment

The initial treatment in cases without perforation or ischemia is endoscopic detorsion, which is effective in 60 to 95% of cases, can be performed with sigmoidoscopy or flexible colonoscopy, and a decompression probe is usually left in place for one to three days to maintain reduction, allowing continuous decompression and facilitate mechanical preparation of the colon if necessary. With exclusive endoscopic management, the mortality is 6.4%, with a long-term recurrence in 43 to 75% of patients and a recurrence during the same hospitalization of 3 to 5%.[7] It offers a transitional therapeutic possibility for unstable patients with high preoperative risk and the benefit of good colonic preparation and optimization of general conditions before definitive treatment.

A percutaneous endoscopic colostomy is a promising option that has demonstrated low morbimortality and is indicated in patients with high anesthetic risk for whom general anesthesia is impossible. Long-term studies with a more significant number of patients are needed to support this recommendation.[1]

A barium enema is still a viable option. It is traditionally indicated in patients without hemodynamic instability or the need for urgent surgery and without necrosis or perforation. It has a success rate of 69%. However, it has high morbidity (23%), mortality (6.4%), and recurrence of 43-75% compared to flexible endoscopy, which has a success rate of 76% and recurrence of 25, 0.3, and 6%, respectively, respectively. It is not considered a first-choice therapeutic alternative at present due to this results.[2]

Sigmoidoscopy is indicated in hemodynamically stable patients; it allows

Figure 2: *There is evidence of a segment of approximately 120 cm with ischemic findings.*

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colon viability and devolvement assessment with a success rate of 70-95%, a morbidity of 4%, and a mortality of 3%. Flexible endoscopy is preferred over rigid endoscopy.[12] After decompression, a rectal probe is placed for up to 72 hours. Currently, the consensus is to perform a resection and elective surgical management two to five days after endoscopic devolvement, due to the high recurrence rates (45-71%) for exclusive endoscopic management, in addition to a mortality of 9 to 36% during the same period.[12,13]

Colon plication with percutaneous colostomy is a relatively new procedure, initially described in 1990 and traditionally used in geriatric patients with a contraindication to general anesthesia or an ASA score of > 3; it consists of colonic fixation to the abdominal wall using an endoscopic colostomy.[12] In a 2019 Japanese study with eight patients and a follow-up of 22.8 months, no recurrence was observed; however, there are no multicenter studies with large samples or studies in obese populations to evaluate its application in a Western population.[14]

Endoscopic detorsion will not be possible in 5 to 22% of patients and require emergency surgical treatment. Five to 25% of patients will have ischemia, perforation, peritonitis, or septic shock as initial presentation, requiring emergency surgery.[7]

Surgical treatment

The indicated treatment will be surgical in cases initially presenting with signs or symptoms of intestinal ischemia or perforation *(Figure 2)*. Also, in patients in whom advanced mucosal ischemia and perforation, or imminent perforation, are observed during endoscopy, the procedure should be aborted, and emergency surgical management should be implemented,[7] based on three essential surgical techniques: 1) detorsion and plication of the mesentery, 2) bowel resection and anastomosis, and 3) Hartmann's procedure,[2] but in patients with more favorable conditions for safe anastomosis the treatment of choice is resection with primary anastomosis.

According to the guidelines of the American Society for Gastrointestinal Endoscopy, surgical intervention is the indicated therapy in patients presenting peritonitis, ischemia, perforation, clinical deterioration, or a cecal diameter greater than 12 cm; in patients with an ischemic or perforated bowel, a mortality of up to 44% has been found. In patients with alarm data, devolvement of the bowel should not be performed to prevent reperfusion syndrome; in these cases, resection of the volvulus area should be performed in its same position.[11,15]

Some classifications of surgical procedures for treating sigmoid volvulus divide them into resection and unresectable techniques. The patient's general and the colon's local conditions are fundamental in deciding the technique.

Unresectable

Currently, unresectable techniques are reserved for cases where the affected segment is viable, in patients with high preoperative risk or with conditions of transoperative instability, or as a palliative measure in patients with lower life expectancy and when the endoscopic resource is not viable.

Sigmoid plication has the advantage of not requiring colon preparation for its performance; however, the recurrence rate with this procedure is 22%[16] and is associated with a 3% mortality rate.[1]

Mesosigmoidoplasty, initially described by Tiwary and Prasad in 1979, is a non-resection procedure indicated in cases where the sigmoid colon is still viable during the surgical event; it is no longer used due to its high recurrence rate. It consists of a longitudinal incision of the mesosigmoid and a transverse closure.[3] Low postoperative morbidity has been reported with surgical wound infection rates of 2.7% and postsurgical ileus of 8%, mortality of 0-11% related to the patient's comorbidities and not to the surgical procedure itself, and a recurrence rate of up to 80%.[17]

Extraperitonealization of the sigmoid was first described in 1970 as a safe alternative for acute, uncomplicated sigmoid volvulus and was used to prevent recurrences in young,

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healthy patients; it involves the creation of a pocket between the peritoneum and the fascia of the posterior rectus muscle, which exteriorizes the sigmoid colon through a peritoneal opening in the left parietocolic gutter; the approach is usually through a paramedian incision, and the edges of the peritoneum are then approximated to the colon with absorbable sutures to avoid herniation of small bowel loops into it. It is associated with minimal morbidity and mortality rates; this technique is said to successfully prevent volvulus recurrence, even when there is generalized dilatation of the colon, thus offering a viable option for the geriatric population or those with significant comorbidities.[18]

Resection techniques

Resection surgical treatments are further divided into reconstituted and non-reconstituted (Hartmann's procedure) techniques; the latter is suggested for patients presenting hemodynamic instability, acidosis, hypothermia, or coagulopathy;[15] however, at present, colonic resection with the restoration of continuity is considered the standard treatment.[16]

The established resection procedures are performed in two stages and comprise two technical variants: 1) sigmoid resection in the first stage by the Rankin-Mikulicz technique complemented with extraperitoneal closure of the colostomy, and 2) sigmoid resection with colostomy and Hartmann pouch complemented with intraperitoneal anastomosis of the colon in the second stage. Resection of the affected sigmoid loop is usually a sufficient extension of colonic resection; however, subtotal colectomy should be considered in cases associated with colonic atony, double volvulus, or megacolon.[1] Resection of infarcted bowel should be performed without distortion and with minimal manipulation to prevent the release of endotoxins, potassium, and bacteria into the general circulation and prevent colonic perforation.[7]

Colostomy is recommended if there are adverse local or systemic conditions or the surgeon's experience is limited.[1] The maturation of a colonic stoma allows bypass of the intestinal transit. It allows fixation of the volvulus loop to the abdominal wall as a preventive measure to avoid the recurrence of the loop torsion.

In the case of volvulus, the creation of a stoma with a double lumen is recommended since it prevents future recurrences of the volvulus, as well as adequate monitoring of colonic transit and the simplest restoration of intestinal continuity as a delayed elective procedure,[1] with the following alternatives:

- **Loop:** in which one lumen is used for fecal discharge while the other functions as a mucosal fistula, thus avoiding the elevation of intra-abdominal pressure; it requires a transversal cut of 50% of the diameter of the loop.
- **Double stoma:** it can be used after resection and presents two lumens, one in which fecal matter is discharged and the other through which mucus is discharged, known as a mucosal fistula. In this case, a complete section of the intestine and separation by skin segment is performed.
- **Bloch-Paul-Mikulicz (shotgun):** it is performed after resecting a segment of the colon; then, the ends are joined together at the level of the posterior face, which gives a passage for fecal waste and a mucosal fistula.

Initially described by Henri Albert Hartmann in 1923 for the management of colorectal cancer, the Hartmann procedure consists of a sigmoidectomy without restoration of bowel continuity, with terminal colostomy in the left lower quadrant, with primary closure of the rectal stump preserving the possibility of eventual restoration of bowel continuity.[17]

In the context of sigmoid volvulus, it is indicated when there is colonic ischemia with fecal peritonitis, hemodynamic instability, or a poor general condition of the patient,[17] as well as in cases of lower volvulus with colonic necrosis extending to the rectosigmoid junction and making it impossible to bring the colonic segment to the skin.[1] The critical points of the procedure involve the (a) definition of

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the resection margins; (b) retrograde dissection from the sigmoid towards the splenic flexure along Toldt's white line; (c) opening of the retroperitoneum and exposure of the left ureter; (d) identification of the inferior mesenteric vein; e) identification of the hypogastric nerves for their preservation; f) control of the inferior mesenteric or superior hemorrhoidal vascular stalk; g) liberation of the mesosigmoid and intestinal resection; and h) closure of the distal stump and maturation of the terminal stoma.

Resection with primary anastomosis

Primary anastomosis is generally performed in cases where the colon is viable; there is no hemodynamic instability, coagulopathy, acidosis, or hypothermia, which preserves the basic principles for successful anastomosis, including well-vascularized proximal and distal margins, free of active disease and tension. The anastomosis should also be hemostatic and circumferentially tight and, if possible, performed in a patient with adequate nutrition and controlled systemic disease. It is to satisfy these conditions that less invasive transitional procedures have become popular in recent years, with a delayed definitive procedure, under the best local and general conditions of the patient, constituting the procedure of choice in the context of elective surgery to prevent recurrent episodes of sigmoid volvulus.[7]

For manual anastomosis, of great complexity for colorectal anastomosis, the use of a layer of continuous stitches with slow absorption monofilament material is preferred since it is associated with less tissue reaction and lower risk of infection; a good example is the slow absorption polydioxanone-based sutures provides, a long preservation of tensile strength and a low bacterial adherence.[19] Although the technique of manual intestinal anastomosis is not correctly standardized (inter-suture distance, the distance of the suture to the anastomotic edge, and the suture tension), the classic manufacture of the posterior wall, followed by the closure of the anterior wall with Cushing or Connel Mayo stitches, with or without reinforcement with a second line of sutures with invaginating Lembert stitches, has satisfactory results.[19] No statistically significant difference has been found in favor of continuous stitches compared to interrupted stitches based on the percentage of anastomotic leakage or anastomotic tensile strength.[20]

Mechanical anastomosis is supported by tools to perform an airtight closure by stapling all the intestinal layers, which helps to optimize surgical time. The most used circular stapler for end-to-end or end-to-side anastomosis, with three lines of directional staples at different levels, allows achieving better hermeticity, less tissue stress, and the better perfusion of the anastomotic edges.[21] They can be reinforced with a layer of a manual suture with invaginating hemostatic stitches. Several studies support the theory that there is no significant difference between manual and mechanical anastomosis-both results in adequate healing and adequate tensile strength, with a similar rate of anastomotic leakage.[4]

In addition, safety factors for mechanical anastomosis have been described, which are:

1. Review the anastomotic labrum to ensure that they are intact.
2. That both ends of the colon are perfectly joined.
3. Reinforce the anastomosis with an omentum or serosal patch.
4. The pneumatic test consists of applying an intestinal clamp in the proximal portion of the anastomosis, filling the cavity with physiological solution, and then blowing air through the rectum to verify the permeability of the anastomosis.
5. If leakage sites are identified, they will be repaired with invaginating stitches.

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Various monitoring methods have been proposed for follow-up. C-reactive protein (CRP), an acute phase reactant with a half-life of 19 hours, used in a serial measurement method –CRP ratio– has shown a negative predictive factor of 97% at three, four, and five postoperative days with a cutoff less than or equal to 1.5 times its baseline

value. A value above this cutoff suggests the performance of a contrasted tomography for the timely diagnosis of anastomotic leakage with a sensitivity of 73% and specificity of 91%. The limitations of this type of study when evaluating anastomotic leakage are the need for a proper reference method, not having CRP measurements at patient admission or daily measurements, not having a control group, and not having imaging studies in all patients.[22,23] Tachycardia, fever, leukocytes, and in general, the torpid postoperative evolution with a high index of suspicion continues to play an essential role in the timely diagnosis of anastomotic leakage.

Fecal diversion through a loop ileostomy or proximal colostomy, most used in oncologic surgery, offers protection for high-risk colorectal anastomosis from a technical aspect. Protective ileostomy patients demonstrated a significantly higher complication rate in high-output stomas than colostomy patients. In comparison, colostomy patients had a higher complication rate for wound infection, contained abdominal eventration, and bowel transit reconstitution.[24-26]

Complications

Complications are those typical of closed-loop obstruction: ischemia, necrosis, perforation, or strangulation *(Figure 3)*. In some patients in whom the sigma is redundant, the mesentery elongated, and the pedicle narrow, small bowel loops may wrap around the pedicle so that the twist of the volvulus drags them, and small bowel ischemia occurs. This association is called sigmoid ileus knot, found in 5-8% of sigmoid volvulus.[3]

The presence of severe comorbidities (chronic obstructive pulmonary disease, systemic arterial hypertension, cardiac ischemic disease, heart failure, diabetes, chronic renal failure, hemiplegia, and Parkinson's disease), as well as the presence of shock, prolonged duration of symptoms, and the combination of colonic and ileal volvulus, had all been significantly associated with the risk of colonic necrosis. No relationship between patient age and colonic necrosis has been demonstrated.[1]

Colonic necrosis and peritonitis are the two main risk factors for mortality.[1]

Anastomotic complications (leakage, postoperative bleeding, and stricture) require a second operation with an incidence of up to 50% of permanent stoma.[17]

Anastomotic dehiscence (AD) is defined as a clinical manifestation that includes leakage of intestinal contents and gases through a drain from the primary wound or fistula to a neighboring organ and findings of reoperation for localized (collection) or generalized peritonitis secondary to anastomotic leakage (usually recorded as dehiscence).

The critical period in the occurrence of anastomotic failure is between the third and fifth postoperative day, which is the time when the suture has the least resistance. During this period, there is a decrease in the amount of collagen in the submucosa, which also coincides with a precarious situation in vascularization. Both facts cause this lower strength in the anastomosis. The overall incidence of this complication in colorectal surgery varies between 3.4 and 6%, which rises to 15% if the lower colorectal anastomosis is specifically analyzed after a previous resection.[24]

High-risk factors for anastomotic leakage are male sex, malnutrition, severe cardiovascular disease, steroid use, history of alcohol abuse, perioperative blood transfusion, advanced age, obesity, and patients with a history of pelvic radiation, in whom a protective ileostomy may be considered.[25]

Among the studies that selectively used a dysfunctional stoma are those of Gastinger and colleagues, who performed a retrospective multicenter study of a total of 2,729 patients, where 881 received a stoma, and 1,848 did not; they found no difference in overall anastomotic leak rates between the two groups but found a significantly lower rate of surgical intervention in patients who had a protective stoma.[27]

A dilated proximal colon increases the risk of postoperative anastomotic leak.[1] Oren et al. found no significant difference in mortality between the Hartmann procedure (22%) versus resection with anastomosis

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(19%) in patients who underwent surgery for a complicated volvulus. The risk of anastomotic leak and hospital stay were similar between the laparoscopy and laparotomy approaches.

Prognosis

In patients with gangrene, a mortality rate of 11 to 60% has been seen, while in patients without gangrene, it is reduced to less than 10%; the recurrence of volvulus in patients who did not undergo surgery is 84% and varies in its presentation from hours to weeks.[11]

There are factors to consider in favor of not restoring intestinal transit, such as an ASA score > III, age > 75 years, presence of neoplasia, reluctant patient, and impossibility to access the rectal stump, among others, which represents 8-12% of all patients with a stoma.[17]

For anastomotic reconnection, the laparoscopic route is preferred since it presents fewer serious complications (multiorgan failure, reoperation), infection (sepsis, septic shock, intra-abdominal abscesses), lower mortality (12%), a lower percentage of anastomotic leakage (1.2%) and fewer parietal complications, along with shorter hospital stay (1.5 days); however, the availability of the appropriate laparoscopic resource and an experienced surgeon should be factors to be considered when choosing the method of transit restitution.[17]

CONCLUSION

Sigmoid volvulus represents an emergency entity whose timely diagnosis allows us to

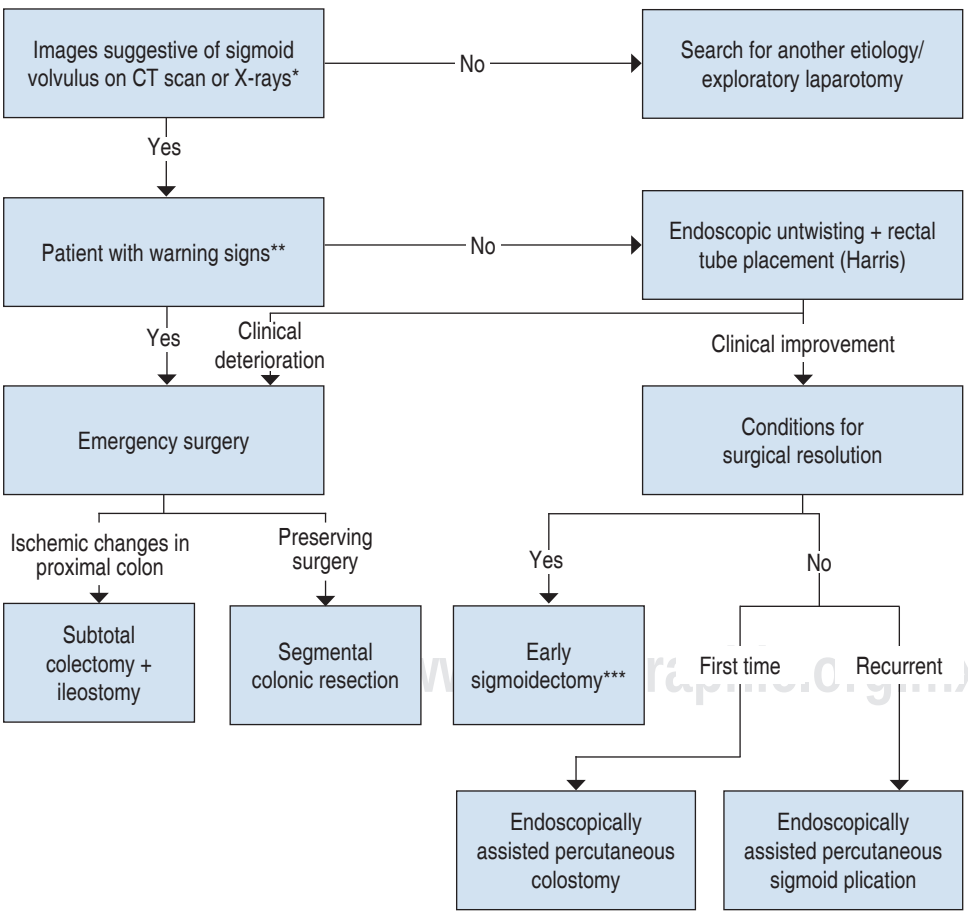

Figure 3:

Therapeutic decision-making concerning findings in patients with abdominal pain.
** See radiological images in Table 2.*
*** Peritonitis or perforation data.*
**** During the same hospital admission or as soon as possible to prevent a recurrence.*

outline each case to offer a stepwise, minimally invasive treatment and favor a safe transition to standard resection procedures in the best possible conditions. However, it is essential to know the large arsenal of transitional procedures that the general surgeon can use in unstable patients or those with significant comorbidities who do not benefit from an invasive procedure with a long duration and high postoperative risk.

REFERENCES

1. Perrot L, Fohlen A, Alves A, Lubrano J. Management of the colonic volvulus in 2016. J Visc Surg. 2016; 153: 183-192.
2. Ballantyne GH. Review of sigmoid volvulus: history and results of treatment. Dis Colon Rectum. 1982; 25: 494-501.
3. Ibáñez Sanz L, Borruel Nacenta S, Cano Alonso R, Díez Martínez P, Navallas Irujo M. Vólvulos del tracto gastrointestinal. Diagnóstico y correlación entre radiología simple y tomografía computarizada multidetector. Radiologia. 2015; 57: 35-43.
4. Mangiante EC, Croce MA, Fabian TC, Moore OF 3rd, Britt LG. Sigmoid volvulus. A four-decade experience. Am Surg. 1989; 55: 41-44.
5. Tirol FT. Cecocolic torsion: classification, pathogenesis, and treatment. JSLS. 2005; 9: 328-334.
6. Halabi WJ, Jafari MD, Kang CY, Nguyen VQ, Carmichael JC, Mills S, et al. Colonic volvulus in the United States: trends, outcomes, and predictors of mortality. Ann Surg. 2014; 259: 293-301.
7. Vogel JD, Feingold DL, Stewart DB, Turner JS, Boutros M, Chun J, et al. Clinical practice guidelines for colon volvulus and acute colonic pseudo-obstruction. Dis Colon Rectum. 2016; 59: 589-600.
8. Gingold D, Murrell Z. Management of colonic volvulus. Clin Colon Rectal Surg. 2012; 25: 236-244.
9. Akinkuotu A, Samuel JC, Msiska N, Mvula C, Charles AG. The role of the anatomy of the sigmoid colon in developing sigmoid volvulus: a case-control study. Clin Anat. 2011; 24: 634-637.
10. Lubrano J, Paquette B, Delabrousse E, Koch S, Mantion G. Volvulus du sigmoide. EMC Gastroenterol. 2012; 7: 1-6.
11. Naveed M, Jamil LH, Fujii-Lau LL, Al-Haddad M, Buxbaum JL, Fishman DS, et al. American Society for Gastrointestinal Endoscopy guideline on the role of endoscopy in the management of acute colonic pseudo-obstruction and colonic volvulus. Gastrointest Endosc. 2020; 91: 228-235.
12. Vandendries C, Julles MC, Boulay-Coletta I, Loriau J, Zins M. Diagnosis of colonic volvulus: findings on multidetector CT with three-dimensional reconstructions. Br J Radiol. 2010; 83: 983-990.
13. Hooper J, Gutman N. Colostomy guideline. USA: United Ostomy Associations of America; 2017.
14. Imakita T, Suzuki Y, Ohdaira H, Urashima M. Colonoscopy-assisted percutaneous sigmoidopexy: a novel, simple, safe, and efficient treatment for inoperable sigmoid volvulus (with videos). Gastrointest Endosc. 2019; 90: 514-520.
15. Sánchez-Medina R, Suárez-Moreno R, Aguilar-Soto O, Cuéllar-Gamboa L, Ávila-Vargas G, Di Silvio-López M. Anastomosis manual versus anastomosis mecánica en cirugía colorrectal. Cir. 2003; 71: 39-44.
16. Orean D, Atamanalp SS, Aydinli B. An algorithm for the management of sigmoid colon volvulus and the safety of primary resection: experience with 827 cases. Dis Colon Rectum. 2007; 50: 489-497.
17. Barbieux J, Plumereau F, Hamy A. Current indications for the Hartmann procedure. J Visc Surg. 2016; 153: 31-38.
18. Avisar E, Abramowitz HB, Lernau OZ. Elective extraperitonealization for sigmoid volvulus: an effective and safe alternative. J Am Coll Surg. 1997; 185: 580-583.
19. Slieker JC, Daams F, Mulder IM, Jeekel J, Lange JF. Systematic review of the technique of colorectal anastomosis. JAMA Surg. 2013; 148: 190-201.
20. Volk A, Kersting S, Held HC, Saeger HD. Risk factors for morbidity and mortality after single-layer continuous suture for ileocolonic anastomosis. Int J Colorectal Dis. 2011; 26: 321-327.
21. Campos-Badillo JA, Rojas-Huizar JA, Vargas-Ávila AL, Chávez-Acevedo S, López-Olivera KD. Mesosigmoidoplastía: una técnica alternativa para el manejo de vólvulos de sigmoides en pacientes críticos. Cir Gen. 2019; 41: 300-306.
22. Ramos FM, Rivas RF, Fernández LA, Loinaz SC, Fernández CJ, De la Portilla JF. Proteína C reactiva como predictor de fuga anastomótica en cirugía colorrectal. Comparación entre cirugía abierta y laparoscópica. Cir Esp. 2017; 95: 529-535.
23. Guevara-Morales GR, Regalado-Torres MA, Cantarell-Castillo E, Castro-Salas R, Maldonado-Barrón R, Castellanos-Juárez JC. Utility of C-reactive protein in the early diagnosis of anastomotic leakage in colorectal surgery. Cir. 2018; 86: 432-436.
24. Hanna MH, Vinci A, Pigazzi A. Diverting ileostomy in colorectal surgery: when is it necessary? Langenbecks Arch Surg. 2015; 400: 145-152.
25. Klek S, Pisarska M, Milian-Ciesielska K, Cegielny T, Choruz R, Salówka J, et al. Early closure of the protective ileostomy after rectal resection should become part of the Enhanced Recovery After Surgery (ERAS) protocol: a randomized, prospective, two-center clinical trial. Wideochir Inne Tech Maloinwazyjne. 2018; 13: 435-441.
26. Gavriilidis P, Azoulay D, Taflampas P. Loop transverse colostomy versus loop ileostomy for defunctioning of colorectal anastomosis: a systematic review, updated conventional meta-analysis, and cumulative meta-analysis. Surg Today. 2019; 49: 108-117.
27. Gastinger I, Marusch F, Steinert R, Wolff S, Koeckerling F, Lippert H; Working Group 'Colon/Rectum Carcinoma'. Protective defunctioning stoma in low anterior resection for rectal carcinoma. Br J Surg. 2005; 92: 1137-1142.

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