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Mesosigmoidoplasty: an alternative technique for sigmoid volvulus in critically ill patients

Mesosigmoidoplastía: una técnica alternativa para el manejo de vólvulos de sigmoides en pacientes críticos

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ABSTRACT

Sigmoid volvulus is a rare but potentially life-threatening condition in elderly patients undergoing sigmoid colon resection and primary anastomosis. Mesosigmoidoplasty is a non-resective procedure for viable sigmoid volvulus with low rates of mortality and morbidity. We report a mesosigmoidoplasty as modified by Olaf Beach to treat a sigmoid volvulus in an 89-year-old woman in a critical state. Total operation time was less than a hundred minutes. After three days in the Critical Care Unit, her postoperative recovery was uneventful. The hospital stay was seven days. During a follow-up of one year, there was no recurrent volvulus. According to Olaf Beach about correcting the factor of narrow and long mesosigmoid, this procedure may be a more simple and safe alternative to treat sigmoid volvulus in elderly critical patients.

RESUMEN

El vólvulo de sigmoides es una entidad rara, pero potencialmente letal, sobre todo en pacientes de edad avanzada que son sometidos a resección de colon sigmoides y anastomosis primaria. La mesosigmoidoplastía es un procedimiento no resectivo para vólvulos de sigmoides en condiciones viables con tasas bajas de mortalidad y morbilidad. Reportamos la realización de la técnica mesosigmoidoplastía basada en la modificación de Olaf Beach para el tratamiento del vólvulo de sigmoides en una paciente de 89 años de edad en estado crítico. El tiempo total de la cirugía fue menos de 100 minutos. Tres días en la Unidad de Cuidados Críticos y una recuperación postquirúrgica sin acontecimientos notables. El tiempo de estancia hospitalaria fue de siete días. No hubo recurrencia durante un seguimiento de un año. Acorde al concepto de Olaf Beach de corregir el factor predisponente de un estrecho y largo mesosigmoides, este procedimiento podría considerarse más simple y una alternativa segura para el tratamiento de vólvulo de sigmoides en pacientes críticos.

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INTRODUCTION

The incidence of colon volvulus has variations in different regions of the world, called the volvulus belt. It is an endemic area that including Africa, South America (Brazil), Western Europe, the Middle East, Russia, and India. In these areas, the colon volvulus accounts for between 13 and 42% of all intestinal obstructions, in contrast to North America, Eastern Europe, and Australia, where it is less than 5% of intestinal obstructions.[1] According to the series described sigmoid colon volvulus represents between 40 and 80% of cases. That of the cecum between 10 and 40%. Volvulus of the of transverse colon between 1 and 4%, and at the splenic flexure between 1 and 2%.[1,2]

Mesosigmoidoplasty is a non-resective technique for the management of sigmoid colon volvulus that is still viable, technically simpler, and with less postoperative morbidity. It corrects the pathologic condition based on a long and narrow mesentery susceptible to

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torsion on its axis. Olaf Beach and collaborators (2003) modified the original technique by shortening the mesosigmoid with all its layers and widening it without altering its vascularization, limiting its mobility and the risk of torsion. This study aims to describe the mesosigmoidoplasty technique modified by Olaf Beach in an elderly patient in critical condition, with satisfactory results.

PRESENTATION OF THE CASE

An 87-year-old female patient with a history of smoking since the age of 30, chronic obstructive pulmonary disease of 10 years of evolution in treatment with bronchodilators, uncontrolled type 2 diabetes mellitus, and arterial hypertension in treatment with metoprolol, came to the emergency department of referring the onset of liquid bowel movements 5 days before admission (Bristol 7). She referred to having five bowel movements per day and a weight loss of approximately 8%. Her weight on admission was 62.6 kg (14 days prior she weighed 68 kg). She came with colicky, intermittent, progressive abdominal pain, accompanied by abdominal distension, nausea, gastro-alimentary vomiting, and the sudden absence of liquid evacuations. Physical examination revealed: dehydrated mucous membranes, hypoventilation in the bilateral pulmonary infrascapular region, distended abdomen, absent peristalsis, pain on palpation, positive rebound sign, and hyperthympanic percussion. The vital signs were heart rate (HR) 120 BPM temperature (Temp) 37 ºC, respiratory rate (RF) 29 breaths per minute, and blood pressure (BP) 100/50 mmHg. Labs reported leukocytes 15,000 per field, neutrophils 89%, hemoglobin 11 g/dl, platelets 150,000/mm^3, glucose 347 mg/dl, creatinine 4.7 mg/dl, Na 123 mEq/l, K 5.7 mEq/l, and BUN 25 mg/dl. Ancillary diagnostic tests were: chest X-ray and anteroposterior abdomen film in standing position showing a coffee bean image *(Figure 1A)*. With the diagnosis of acute abdomen and probable sigmoid volvulus, and the lack of infrastructure (as colonoscopy service, sigmoidoscope, and laparoscopy tower) it was decided to take her to an exploratory laparotomy.

Under general anesthesia, a 30 cm long supra-infra-umbilical midline incision was made. A dilatated proximal colon and sigmoid volvulus with counterclockwise rotation was observed, without vascular compromise, necrosis, or perforation. The detorsion of the sigmoid was done manually and decompression was done using an anterograde cabs maneuver from the transverse colon to the upper third of the rectum. Gas and intestinal fluid were expelled thus allowing mobility and exposure of the mesosigmoid. The mesosigmoid was exposed and the first sigmoid branch was located through a longitudinal incision through

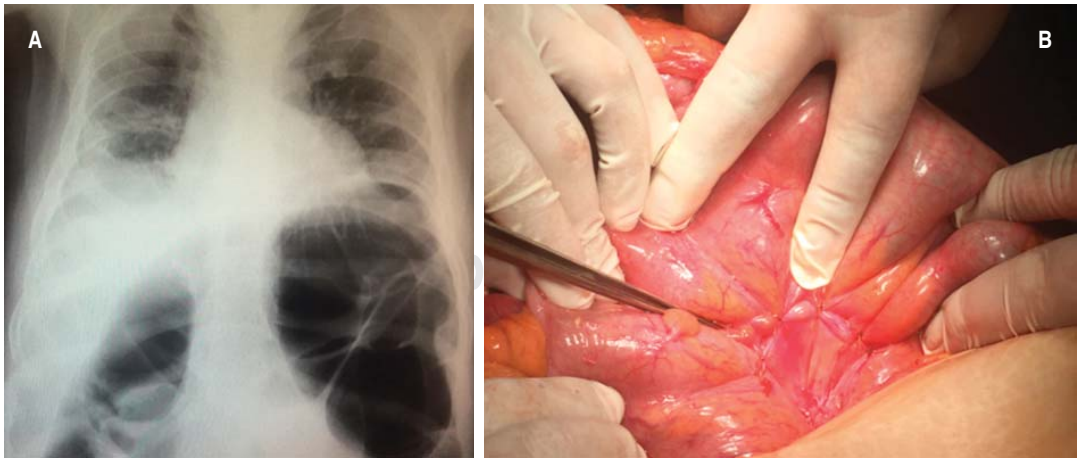

Figure 1: (A) *Coffee bean image and* ***(B)*** *macroscopic view of completed mesosigmoidoplasty.*

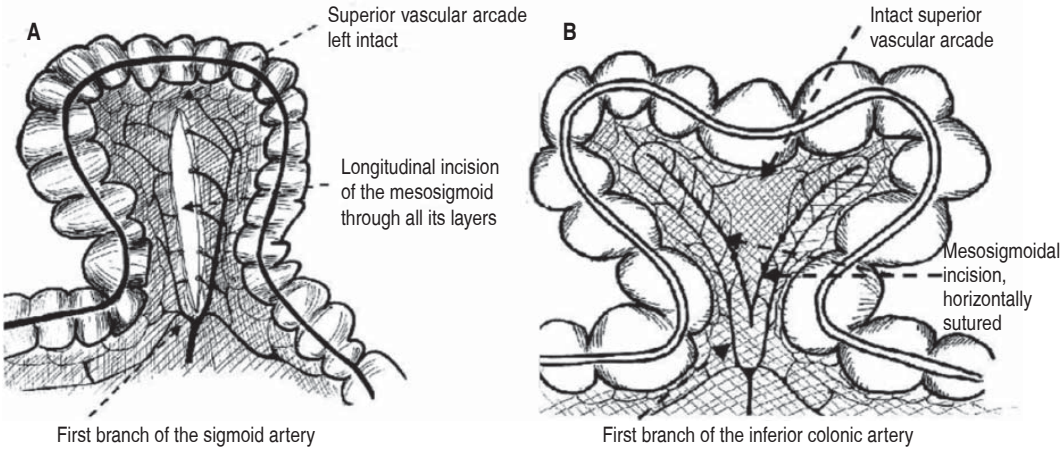

Figure 2: ***(A)*** *First and* ***(B)*** *second step of modified mesosigmoidoplasty. Modified from: Bach O, Rudloff U, Post S. Modification of mesosigmoidoplasty for nongangrenous sigmoid volvulus. World J Surg. 2003; 27: 1329-1332.*

the mesentery, the central vessels were ligated preserving the first sigmoid branch and the peripheral arcades close to the intestinal wall *(Figures 2A and 2B)*. After this first incision, the mesosigmoid was closed transversely with separate stitches with 0-0 polyglycolic acid taking the entire thickness of the wall avoiding taking the peripheral vessels, which resulted in a shortening of the mesosigmoid *(Figure 1B)*. The abdominal wall was closed and the patient was sent to the ICU. During her stay treatment was provided for water-electrolyte imbalance, acute renal, and acute respiratory failure. Enteral nutrition was started by nasogastric tube, of 1,000 kcal of polymeric diet for a patient with pneumopathy by intermittent infusion for three days. She was successfully extubated on the third postoperative day and discharged from the ICU to the ward on the fourth day. The nasogastric tube was removed and oral nutrition was continued. She tolerated a total of 2,700 kcal until the fifth postoperative day. She was discharged on the seventh day without complications. At one year follow-up, she was reported to have had an adequate evolution and absence of recurrences.

DISCUSSION

The original technique of mesosigmoidoplasty was described by Tiwary and Prasad in 1979. However, it is currently in disuse because of its high recurrence rate. Olaf Bach modified the technique by making a longitudinal incision of both peritoneal sheets which envelope the mesosigmoid while preserving the peripheral vessels and the main vessel of the vascular arcade.[3] The longitudinal space is closed horizontally with absorbable suture, either with separate or continuous stitches. Before the procedure, it may be useful to evacuate the bowel contents by placing a transanal cannula to release the intraluminal pressure and facilitate the surgical technique.[3,4] In this way, less mobilization of the mesosigmoid is achieved, which prevents again its torsion and a volvulus.

After hydric therapy, a choice includes endoscopic devolvulation, laparotomy, or urgent laparoscopy, depending on the hemodynamic stability of the patient. Various diagnostic and therapeutic methods have been proposed in recent years, sometimes leading to a change in therapeutic attitude. The goals in the treatment of sigmoid volvulus are: first of all decompression and devolvulation of the colon by rigid rectosigmoidoscopy or colonoscopy using a flexible endoscope. Rigid rectosigmoidoscopy can reach 30 cm proximal from the anal margin. The literature favors using a flexible colonoscope over a rigid one, particularly in evaluating ischemia because of the reported low rate of perforations. It is not

indicated in a patient with a high suspicion of volvulus since it can fail to detect ischemia in up to 24% of cases.[1] A flexible colonoscope can reach the entire length of the colon and can be used in different locations of a colon volvulus.

The use of the colonoscope can revert emergency surgery to elective surgery; success rates of 70-95% with a morbidity of 4% and mortality of less than 3% have been reported in recent series.[5-7] However, if there is evidence of intestinal ischemia and necrosis, the patient should undergo urgent laparotomy. Secondly, surgical management is indisputable due to the high recurrence rates recorded at 45-71% in the face of conservative management after decompression and endoscopic devolvement.[8] The available procedures are: resection of the affected intestinal segment and depending on the hemodynamic and intestinal conditions of the patient, an intestinal anastomosis or colostomy can be performed. In addition, there are other procedures such as manual devolvement with fixation of the colon to adjacent structures and/or abdominal wall or pelvic wall (colopexy), the Hartman procedure, mesosigmoidoplasty and proctocolectomy.[1,8] Of the procedures mentioned, those that perform intestinal resection report a lower recurrence rate (< 10%) as opposed to non-resective procedures (9-44%), but with higher postoperative morbidity of up to 30% and mortality of 3%.[2]

The treatment of sigmoid volvulus has a twofold objective: a) to resolve the occlusive condition and b) to prevent a recurrence. Decompressive colonoscopy is considered the treatment of choice, with an effectiveness of 70-90%, a recurrence rate of 18-90%, and a mortality rate of 5-35% when in recurrence.[9,10] Once the urgent condition has passed, elective surgical treatment can be done 48-72 hours after reduction or postponed until the patient's hemodynamic conditions improve. This elective surgery is associated with a mortality rate of 16%. After surgery, the mortality rate for recurrence is 9%. Patients with greater comorbidities have a mortality of 11-21%, while after elective surgery it is 5-6%.[2,11] M. Kapan et al. analyzed 63 patients with sigmoid volvulus treated by sigmoidectomy with primary anastomosis in the same procedure. They compared 31 patients undergoing emergency surgery versus 32 patients undergoing elective surgery. They found no statistically significant differences in morbidity and mortality. They only reported an increased rate of surgical site infection in the emergency group, associated with lack of bowel preparation.[12] However, the study does not mention the hemodynamic status, which must be considered when performing bowel anastomosis. During emergency surgery, manual devolvulation as the only surgical procedure in a stable patient with sigmoid volvulus without vascular compromise or evidence of gangrene and/or intestinal perforation is associated with a 14-38% recurrence rate and a 14% mortality rate.[13,14] Thus, the best option in a similar scenario is sigmoidectomy with primary anastomosis, since it has a lower mortality (8-13%) compared to the Hartman procedure (25-50%).[15]

Although resection and anastomosis have been recommended, in most studies the risk of intestinal leakage through the anastomosis remains controversial. One of the most important causes related to intestinal leakage is the extension of necrosis beyond the site of intestinal anastomosis. Also, the presence of feces in the lumen of the bowel, lack of experience of the surgeon in manual or stapler anastomosis, shock, poorly controlled diabetes mellitus, acute renal failure, and steroid use are risk factors that are related to anastomotic leakage and result in increased morbidity and mortality.[16,17] Two multicenter studies conducted in France found four risk factors associated with increased mortality in patients with sigmoid volvulus, both studies include emergency surgery, age over 70 years, malnutrition (defined as weight loss of more than 10% of weight in less than six months), and neurological damage.[18,19] The knowledge of these factors mentioned above completely changes the surgeon's perspective when selecting intestinal resection with the performance of a terminal colostomy and the Hartman procedure, leaving intestinal anastomosis for a second surgical time until the patient's clinical conditions improve

to reduce morbidity and mortality.[16,17] M. Kapan and collaborators report in their study that anastomotic leakage is the most common complication in patients undergoing emergency surgery, with intestinal resection plus primary anastomosis, with a rate of 1.0-6.3%. This rate could increase to 10% in patients with gangrene. They conclude that in patients in stable conditions, the morbimortality of sigmoid resection with primary anastomosis in emergency and elective surgery is similar, and in unstable patients, it is different.[12,16]

A retrospective study compared results in the management of sigmoid volvulus between the laparoscopic and open approaches.[20] The rate of anastomotic leakage and length of hospital stay was similar in both groups. Only the recurrence rate was higher for the laparoscopic approach as opposed to the open approach (12-0%). Currently, the use of laparoscopic surgery as elective and/or emergency surgery for sigmoid volvulus has matched the results of open surgery, with the added benefits of minimally invasive surgery. Similar results are shown in isolated cases, in which laparoscopic colostomies and intestinal resections are performed in high-risk patients, reducing complications and avoiding open surgery.

Its use in selected cases depends on the surgeon's judgment, experience and skill, and it is especially recommended in emergency cases with reproducible results.[21,22]

Mesosigmoidoplasty is a non-resective procedure indicated in cases in which the sigmoid colon is still viable. Low postoperative morbidity has been reported, with surgical wound infection rates of 2.7% and post-surgical ileus of 8%, mortality between 0-11%, related to the patient's comorbidities and not to the surgical procedure, and a recurrence rate of 2. 7-70%.[2,11] This high recurrence could be due to the scarce literature, and the minimal number of patients in the different case series, emphasizing that in most of the series the original technique is used ins stead of the modified technique. However, there are situations concerning the technique that may contribute to recurrence and increased complications. For example, the fear of damaging the sigmoid vessels at the moment of dissecting the mesosigmoid, leaving a sufficient length of mesosigmoid for a recurrence, or, that when shortening the mesosigmoid the stitches may involve one of the vascular arches and compress the vessel once knotted, causing ischemia and necrosis. However, there are situations in which this technique should not be performed, such as Hirschsprung's disease, due to the alteration in the motility of the intestine, and in situations where there is frank necrosis of the sigmoid colon.[23,24]

Mesosigmoidoplasty can be used as an emergency treatment or elective surgery, especially in elderly patients with multiple comorbidities and a high risk of postoperative complications that increase morbidity and mortality. It is a simple procedure that does not take more than 40-60 minutes. It does not require bowel preparation, and since it is not resective it avoids the risk of anastomotic leaks, a second intervention to restore intestinal transit, and the need for colostomy care.[25]

This is why it was chosen, with an adequate evolution of the multiple comorbidities, reduced risk of complications, and immediate surgical management despite the scarcity of our hospital resources and infrastructure.

On medical follow-up at one year, the patient reported no complications or recurrence.

CONCLUSIONS

In a hospital setting, as our unit, where infrastructure, equipment, and medical resources are not available for endoscopic devolvulation and elective laparoscopic surgery, mesosigmoidoplasty may be an interesting alternative in the treatment of sigmoid volvulus in settings that do not involve necrosis of the sigmoid and based on the surgeon's good judgment. This type of procedure, technically simple and not requiring special equipment, may decrease the risk of postoperative complications with successful patient survival.

Ethical considerations

Human procedures must conform to the principles established in the declaration of Helsinki of the World Medical Association (WMA) in its latest version, the Guidelines for Clinical and Epidemiological Research of the Council for International Organizations of Medical Sciences (CIOMS), the Code of Ethics of the World Medical Association, the Belmont Report, the Good Clinical Practice Guidelines, the Federal Law for the Protection of Personal Data in Possession of Individuals, and the provisions of the General Health Law Title Five and the Regulations of the General Health Law, the Good Clinical Practice Guidelines, the Federal Law for the Protection of Personal Data in Possession of Individuals, and with the provisions of the General Health Law Title Five and the Regulations of the General Health Law on Health Research, and NOM-012-SSA3-2012, which establishes the criteria for the execution of health research projects involving human subjects, as well as with the norms of the research ethics committee of the institution where the research is carried out.

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