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Favorable minimal invasive surgery in the treatment of superior mesenteric artery syndrome: Case report

Leandro Cardoso Barchi*, Aline Marcílio Alves, Carlos Eduardo Jacob, Claudio José Caldas Bresciani, Osmar Kenji Yagi, Tarsila Gasparotto Nogueira, Ivan Cecconello, Bruno Zilberstein

Digestive Surgery Division, Department of Gastroenterology, University of Sao Paulo School of Medicine, USP, Brazil

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ABSTRACT

INTRODUCTION: The Superior Mesenteric Artery Syndrome (SMAS) is a rare form of intestinal obstruction. The diagnosis is based on findings from imaging studies, including vascular compression of the duodenum by the SMA and can be associated with duodenal dilatation.
PRESENTATION OF CASE: We report a case of a patient with SMAS and recurrent episodes of intestinal obstruction, which was successfully treated by laparoscopic duodenojejunostomy.
DISCUSSION: The initial treatment is usually conservative for patient's clinical improvement. Surgery is indicated when conservative treatment fails as well for patients with recurrent symptoms. Minimal invasive surgery might be a good approach, specially in patients who suffers from this disease and currently are in depleted health conditions.
CONCLUSION: The procedure herein demonstrated may be considered safe and resolutive, with good visualization of structures, relative short surgical time and fast post-operative recovery.

1. Introduction

The superior mesenteric artery syndrome (SMAS) is considered a differential diagnosis of intestinal obstructive conditions. It is characterized by extrinsic compression of the third portion of the duodenum by narrowing the aorto-mesenteric angle that occurs primarily due to loss of the sheath of mesenteric fat [1–3].

The diagnosis is based on findings from imaging studies such as vascular compression of the duodenum by the SMA, duodenal dilatation and aorto-mesenteric angle lower than 25° [4].

Conservative treatment with nutritional support for weight gain is recommended initially, however, surgical intervention is indicated for patients with chronic and refractory symptoms [5].

In this case report, we describe a patient with SMAS and recurrent episodes of intestinal obstruction, which was successfully treated by laparoscopic duodenojejunostomy.

2. Presentation of case

J.S, 35 years old male diagnosed with ankylosing spondylitis receiving clinical treatment for 7 years, with sporadic complaints of postprandial vomiting for four years. Vomiting was usually initiated four to six hours after meals, with bilious contents, following periods of joint pain crisis, associated with loss of 23 kg along that period. At first hospitalization, patient showed improvement of his symptoms after controlling the joint pain and regained weight partially. Recurrent symptoms with lesser weight loss during some later episodes of decompensation of rheumatologic disease occurred, until vomiting started containing food scraps and the patient again showed marked weight loss (12 kg).

On first physical examination cachexia was observed and the patient received enteral high calorie diet through a nasogastric tube experiencing weight gain of 12 kg in 4 months, reaching a body mass index of 21.3 kg/m2. Therapeutic test with reintroduction of oral diet during hospitalization was attempted with low acceptance. In some moments, vomiting occurred up to eight hours after food ingestion.

Radiological intestinal transit was performed showing dilatation of the stomach and duodenum and abrupt change in the third portion of the duodenum caliber (Fig. 1A). The scintigraphic studies with Technetium 99 for determination of gastric emptying of solid phase meal showed gastric emptying delay with retention rates of 74% in the first hour, 63% and 33% in the second and third hours, respectively.

Upper Endoscopy showed moderate erosive distal esophagitis and gastric stasis. The double-balloon enteroscopy demonstrated duodenal dilatation due to pulsatile extrinsic compression which was be observed by the endoscopist. An intense erosive duodenitis was also identified. The transposition of the thinning area was possible with caution (Fig. 1B).

Abdominal angiotomography (angio CT) found slight dilatation of the proximal portions of the duodenum, observed until its

* Corresponding author.
E-mail address: leandrobarchi@hotmail.com (L.C. Barchi).

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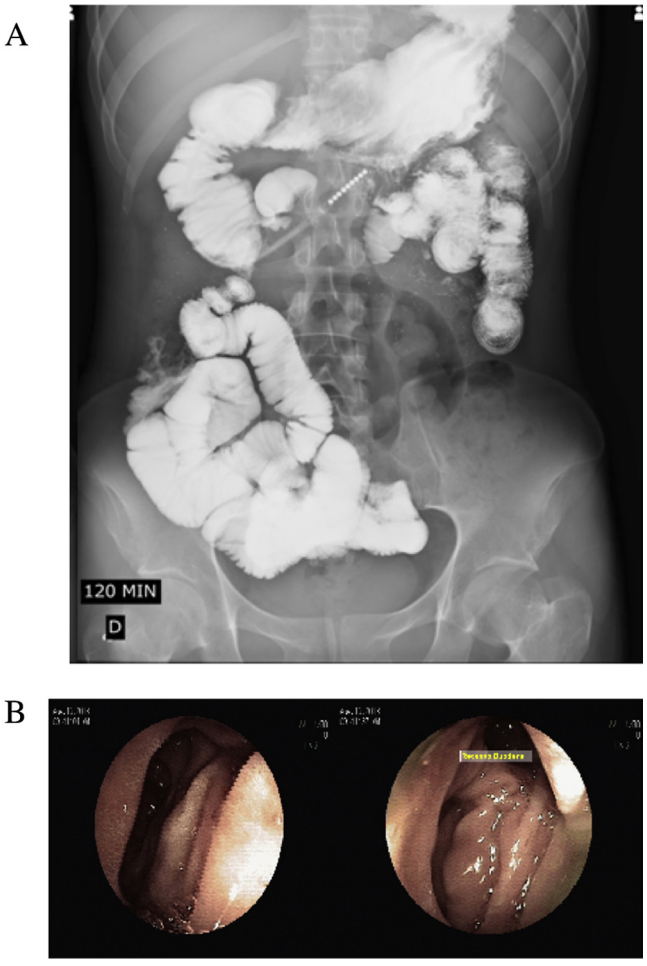

Fig. 1. (A) Radiography of gastrointestinal transit contrasted with abrupt narrowing of the third portion of the duodenum, associated with gastroduodenal dilatation. (B) EBnteroscopy with duodenal extrinsic pulsatile compression (third portion).

junction with the superior mesenteric artery, where it was identified a tapering of the duodenum and angle reduction between the SMA and the abdominal aorta (22°) (Fig. 2).

Once the diagnosis of SMAS was made and after a carefully improvement of patientís condition with enteral nutrition through a nasoenteral tube, laparoscopic duodenojejunostomy was indicated. Our method to perform this operation is with the patient under general anesthesia, in a modified lithotomy position, with the legs apart and flexed slightly; the surgeon is positioned between the legs, the first assistant (camera operator) on the patient's left and the second assistant to the right. After pneumoperitoneum is established, 5 ports are placed; two 5 mm bilateral subcostal ports,

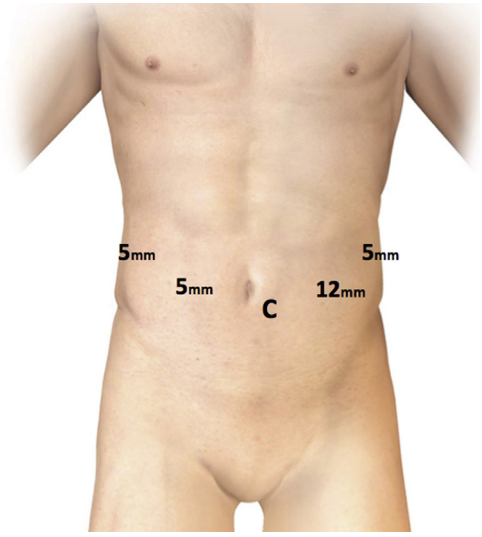

Fig. 3. Ports placements.

one 5 mm and one 12 mm low-abdominal bilateral ports. A 10 mm port is placed 3 cm below and 3 cm to the left of the patient's umbilicus for the camera. (Fig. 3). Intracorporeal pressure is maintained at 12–15 mmHg. The procedure began with the mobilization of the hepatic flexure and the transverse colon. As a result of the distal duodenal obstruction, the proximal duodenal was slightly dilated with some adhesions with the hepatic flexure of the colon. After the liberation of these adhesions, the second portion of duodenum was acessed by a medial approach through the mesocolon, as it is performed during a laparoscopic right colectomy. Once there was enough length of duodenum, a latero-lateral (L-L) laparoscopic duodenojejunostomy using 60 mm linear stapler between jejunum (30 cm from Treitz' angle) and the second portion of the duodenum was performed. The enterotomy for the linear stapler entry was closed using a hand sewn single layered extramucosal technique. No intra-operative upper endoscopy was performed to evaluate the anastamosis patency or presence of leak. The final aspect of the operation is demonstrated in Fig. 4.

Patient recovered with no pain or digestive complaints, accepting liquid diet on the second day after surgery. He was discharged after five days with pureed diet, intestinal transit restored and also partial recovery of weight loss (Fig. 5). After 18 months of follow-up, he is presented free of previous symptoms.

3. Discussion

The SMAS is a rare form of intestinal obstruction and is described as compression of the third portion of the duodenum between the

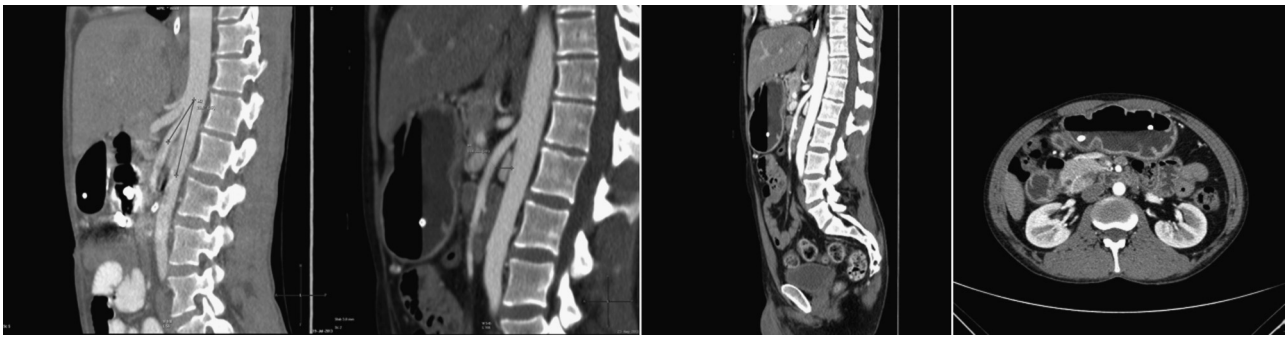

Fig. 2. Abdominal angiotomography: sagittal plane showing angle and distance between superior mesenteric artery and aorta; Axial section showing gastric and duodenal dilatation.

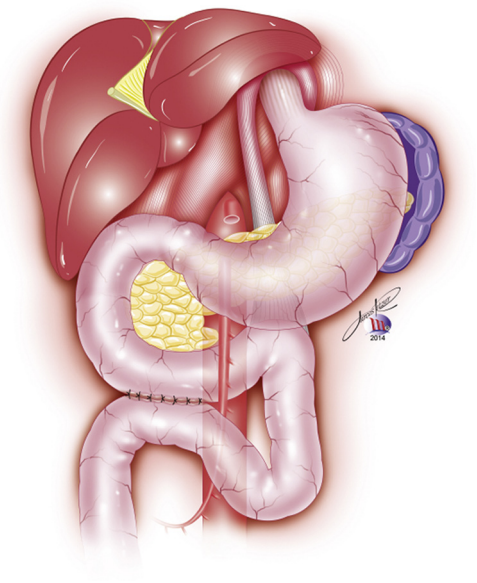

Fig. 4. Final aspect of the operation: duodenojejunostomy is performed without division of the 4th portion of the duodenum.

angle of the SMA and the aorta, which can lead to acute or insidious symptoms, including epigastric pain, bloating, vomiting, anorexia and weight loss.

This unusual form of upper intestinal obstruction was first reported in 1842 by Von Rokitanski and has been known by several names. The most used is Wilkie Syndrome, author who published the largest series of cases in 1927 [6].

It occurs mainly due to marked weight loss as consequent of many different diseases, for instance cancer, bariatric surgery, chronic infections, severe burns, etc. It causes reduction in the mesenteric fat tissue surrounding the duodenum and thus shortening the distance and reducing the angle between the SMA and the aorta (38°–65° to 6°–25°). Other causes may be congenital, such as shorten Treitz' ligament and abnormal origin of the SMA, or anatomical changes caused by surgical procedures such as scoliosis correction and esophagectomy [2,3,5].

The most frequent symptoms are abdominal pain, vomiting/nausea, anorexia and early satiety. The diagnosis of this disease requires a high degree of suspicion by the attending physician due to the great similarity of symptoms with others more common gastrointestinal diseases, such as peptic ulcer, cholelithiasis, pancreatitis, mesenteric ischemia. Several diagnostic methods such as CT, contrast radiological radiography and endoscopy of the upper digestive tract are performed in order to help and confirm the diagnosis. Angio CT with intravenous and oral contrast may be very useful because it allows accurate diagnosis and additional anatomical details [4,7].

In the present case, the patient was diagnosed with ankylosing spondylitis, which manifests with intense joint and spine pain, with progressive limitation of motion. Imaging studies performed in the case showed no correlation between potential anatomical changes in the spine caused by his underlying condition. The initial weight loss was related mainly to periods of exacerbation of symptoms with severe peripheral joint pain and anorexia as well. The upper intestinal obstruction symptoms have settled gradually, as the patient lost weight.

As in this case, the initial treatment is conservative with initial gastrointestinal decompression, correction of electrolyte disturbance and nutritional support for weight regain. Usually, total parenteral nutrition only allows weight stabilization. Preference must be given for enteral feeding tubes because which enable a better response to nutritional therapy. Sometimes, when is necessary, combined therapy with parenteral and enteral nutrition can be applied. This therapeutic approach is often more effective in acute cases and not related to anatomical changes acquired [5].

Surgery is indicated in the failure of conservative treatment or for patients with recurrent episodes of the disease. Minimal invasive surgery might be a good approach, specially in patients who suffers from this disease and currently are in depleted health conditions. The three main surgical proposals for chronic symptoms and after clinical treatment failure are Strong operation, gastrojejunostomy and duodenojejunostomy.

The operation proposed by Strong was the first technique to be widespread to which implies section of Treitz ligament and thus mobilization of the duodenum, removing it from its position between the aorta and the SMA. Currently, this technique has been abandoned. The gastrojejunostomy, another treatment option for this condition, also proved to be more susceptible of failing because it allows recurrence of duodenal obstruction symptoms, as well as increased alkaline reflux and association with closed loop obstruction syndrome. Among the surgical techniques, the one that has demonstrated greater effectiveness in solving symptoms was the duodenojejunostomy. The anastomosis in these cases is usually L-L, under the transverse colon, passing to the right of the mesocolon, after proper identification of structures and retroperitoneal dissection. The duodenum may or may be not sectioned after its fourth portion, in order to perform the anastomosis with satisfactory reports in both scenarios [2,3,9].

In 1998, Gersin and Heniford were the first ones to describe the laparoscopic access, maintaining the anatomical landmarks of the

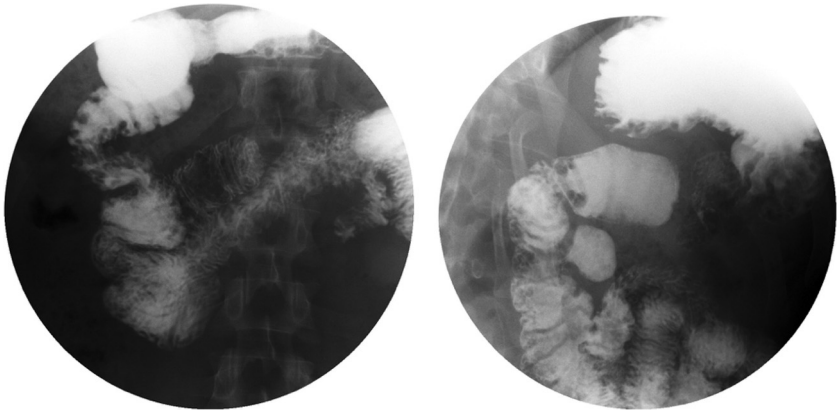

Fig. 5. Postoperative gastrointestinal transit: Free passage of contrast through the anastomosis with significant reduction in gastroduodenal dilatation.

Table 1
In all cases laparoscopic L-L duodenojejunostomy was performed inferring the efficacy of this approach.

AUTHORS	Cases (n = 21)	Type of Surgery
Gersin and Heniford [10]	1 case	L-L Duodenojejunostomy
Richardson et al. [12]	2 cases	Duodenojejunostomy
Bermas et al. [11]	2 casos	Duodenojejunostomy
Wyten et al. [13]	3 casos	Duodenojejunostomy without the division of the duodenum
Munene et al. [14]	13 casos (9 artigos)	Duodenojejunostomy with and without the division of the duodenum

open approach, being spread as a viable alternative in many centers with the advancement of minimally invasive surgery [10].

Because the SMAS is a rare disease, the literature is mainly based on case reports (Table 1). Bermas et al. and Richardson et al. demonstrated success in the SMAS treatment with minimally invasive access reporting good performance and low morbidity with duodenojejunostomy in two cases in each study [11,12]. Recently, Wyten et al. presented a series of three cases, all treated by laparoscopic with L-L anastomosis between the jejunum and duodenum without section of the fourth portion of the duodenum. The results proved to be satisfactory, with short hospitalization and complete remission of symptoms in two patients, and significant improvement in the third [13]. Through the description of one case, Munene et al. performed a systematic literature review where laparoscopic duodenojejunostomy was performed. In this review of nine articles containing 13 patients, the procedure was considered successful in all cases, emphasizing technical advances, proper recognition of the surgical field and its effectiveness [14]. Recently, Giulianoti et al. reported the use of robotics in the SMAS surgery. This advanced technology allows the accomplishment of the anastomosis totally by manual suture, which could be very challenging to be performed by laparoscopy. Yet, robotic surgery provides a more ergonomic position, wristed instruments that allow seven degrees of freedom, tremor filtering and a three-dimensional view of the surgical field [15].

4. Conclusion

The present report confirms the effectiveness of minimal invasive surgery for SMAS. It is appropriate to emphasize the importance of the differential diagnosis of this disease in patients with upper gastrointestinal obstruction with chronic presentation and weight loss history. Laparoscopic duodenojejunostomy, in centers with expertise in gastrointestinal videosurgery, may be considered a safe and resolutive approach, with good visualization of structures, short surgical time and fast post-operative recovery. The biotype of patients with SMAS favors this approach, since they present themselves quite emaciated.

Conflict of interest

The authors have declared no conflicts of interest.

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Ethical approval

It has been approved by ethic committee from São Paulo University—School of Medicine.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Author contribution

Study concept or design: Leandro Barchi, Aline Marcilio.
Data collection: Aline Marcilio, Tarsila Gasparotto, Osmar Kenji.
Data analysis or interpretation: Leandro Barchi, Aline Marcilio, Carlos Jacob.
Writing the paper: Leandro Barchi, Aline Marcilio, Ulysse Ribeiro.
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Guarantor

Leandro Cardoso Barchi.

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