

Laparoscopic duodenojejunoscopy omega loop with braun anastomosis as a treatment for superior mesenteric artery syndrome

Baraa K. Alnabulsi, MBBS, Jameel T. Miro, MBBS, Osama H. Faidah, MBBCH, FRCSI, Mahmoud A. Hamo, MD, FACHARZT.

ABSTRACT

تعد متلازمة الشريان المساريقي العلوي من الظواهر السريرية النادرة التي تحدث جراء ضغط الجزء الثالث من الأثنى عشر بواسطة الشريان الأبهر البطني والشريان المساريقي الأعلى، وقد يحدث الخطأ في تشخيص مثل هذه الحالات. نستعرض في هذا المقال حالة مريضة تبلغ من العمر 24 عاماً، وكانت تعاني من متلازمة الشريان المساريقي العلوي وعلى أثر ذلك أُجريت لها عملية التنظير الجراحي بعمل تفاجر بين الصائم والأثنى عشر (تفاجر براون) واستخدام حلقة أوميغا. جاءت المريضة إلى المستشفى وقد بلغ مؤشر كتلة جسدتها 14.9، كما أنها كانت تعاني من آلام غامضة في البطن وخصوصاً في المنطقة الشرسوفية. ولقد بدأت هذه الآلام منذ 4 أعوام وكانت تمتد إلى الظهر مع ظهور الأعراض التالية: الحموضة، والقيء المتكرر، ونزول الوزن بشكل واضح خلال الستة أشهر الماضية. تم تشخيص الحالة في البداية على أنها التهاب القولون المزمن، واتضح فيما بعد خطأ هذا التشخيص حيث أظهرت نتائج الأشعة المقطعية والتنظير الشعاعي إصابة المريضة بهذه المتلازمة النادرة. أُجريت لها عملية التنظير الجراحي بعمل تفاجر بين الصائم والأثنى عشر (تفاجر براون) واستخدام حلقة أوميغا، وكانت نتائجها إيجابية، ولم تظهر نتائج الأشعة بعد شرب المحلول عن طريق الفم أي تسرب، كما كان التفاجر واضحاً. وبعد ذلك خرجت المريضة من المستشفى وكانت تتبع حمية عادية.

Superior mesenteric artery (SMA) syndrome is a rare clinical phenomenon caused by compression of the third portion of the duodenum by the overlying SMA, and can be easily misdiagnosed. We report a case of SMA syndrome treated with laparoscopic duodenojejunoscopy omega loop with Braun anastomosis. A 24-year-old women with body mass index of 14.9 presented with a 4-year history of vague abdominal pain mainly at the epigastric region, radiating to the back associated with heartburn, repeated vomiting, and significant loss of weight during the previous 6 months. The case was misdiagnosed as acute pancreatitis. The SMA syndrome was diagnosed using CT-scan and fluoroscopy. Laparoscopic omega loop with Braun anastomosis was preformed. She did well postoperatively, and Gastrografin study showed

no leak and a patent anastomosis. She was subsequently discharged on regular diet.

Saudi Med J 2011; Vol. 32 (2): 188-191

From Prince Sultan Center for Advanced Laparoscopic Surgery (Alnabulsi, Faidah, Hamo), King Fahad General Hospital, Jeddah, and the Department of General Surgery (Miro), Medical Faculty, Umm Alqura University, Makkah, Kingdom of Saudi Arabia.

Received 16th October 2010. Accepted 3rd January 2011.

Address correspondence and reprint request to: Dr. Baraa K. Alnabulsi, Prince Sultan Center for Advanced Laparoscopic Surgery, King Fahad General Hospital, PO Box 8488, Jeddah 21196, Kingdom of Saudi Arabia. Tel. +966 (2) 6606111 Ext. 2624. Fax: +966 (2) 6672942. E-mail: tc1_sk@yahoo.com

Superior mesenteric artery (SMA) syndrome, also called Wilkie's syndrome, is a rare clinical phenomenon caused by compression of the third portion of the duodenum by the overlying superior mesenteric artery.¹ The first successful operative treatment, a duodenojejunoscopy, was performed by Stavely in 1908.² A narrowed angle between the aorta and SMA may be seen in various situations: in patients who experience rapid weight loss (leading to a reduction of mesenteric fat surrounding the SMA), external cast compression, anatomic variants (a short/high ligament of Treitz, or an unusually low origin of the SMA), and spinal cord injury and/or spinal surgery. The diagnosis of SMA syndrome has been made with fluoroscopy and CT-scan. We report a case of SMA syndrome from Saudi Arabia treated by laparoscopic duodenojejunoscopy omega loop with Braun anastomosis, and our objective in presenting this particular case is to emphasize on the new approach in performing laparoscopic duodenojejunoscopy omega.

Case Report. A 24-year-old woman with body mass index of 14.9 presented with a 4-year history of vague abdominal pain, mainly at the epigastric region

that radiated to the back associated with heartburn, repeated vomiting, and significant loss of weight during the previous 6 months. She sought medical advice at several hospitals before reaching our institution without any diagnosis. We diagnosed and treated her as acute idiopathic pancreatitis, which was based upon the biochemical picture and the CT-scan of the abdomen; she was also positive for *Helicobacter pylori* and treated accordingly. One month later she presented with the same complaints, but the severity of her symptoms progressed. Upper gastrointestinal endoscopy was carried out showing normal mucosa with no apparent pathology. Barium meal and CT-scan of the abdomen was repeated. The fluoroscopy after swallowing the barium showed a J-shaped stomach, and a dilated second duodenal part with abrupt constant vertical cutoff (Figure 1), associated with “to-and-fro” peristalsis against an obvious obstruction with minute jets of contrast squirting through. The CT-scan of the abdomen showed marked retroperitoneal and mesenteric fat loss (Figure 2), and a narrowing of the angle between the aorta and the SMA measuring approximately 14° (Figure 3). Furthermore, reduction of the aorto-mesenteric distances measuring approximately 3.6 mm was presented with dilatation in the second duodenal part. Interestingly, the CT-scan showed Nutcracker syndrome (Figure 4) of the left renal vein compressed between the abdominal aorta and the SMA. The diagnosis was established based on the CT-scan and the barium meal. She did not respond to high caloric augmentation via total parenteral nutrition as a conservative treatment, so she was counseled for duodenojejunostomy omega loop with Braun anastomosis.

The operation was carried out under general anesthesia. A nasogastric tube was inserted to deflate and drain the stomach. She was placed in the supine position,

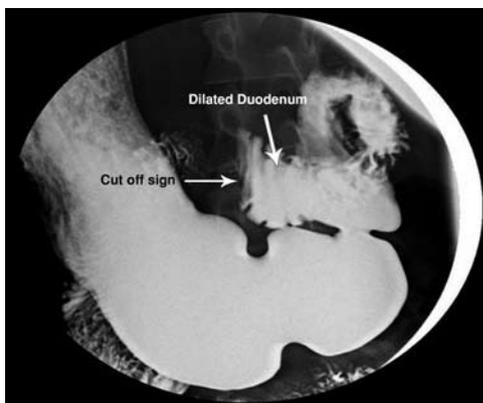


Figure 1 - Fluoroscopy showing J-shaped stomach, dilated second duodenal part with abrupt constant vertical cutoff at the third duodenal part.

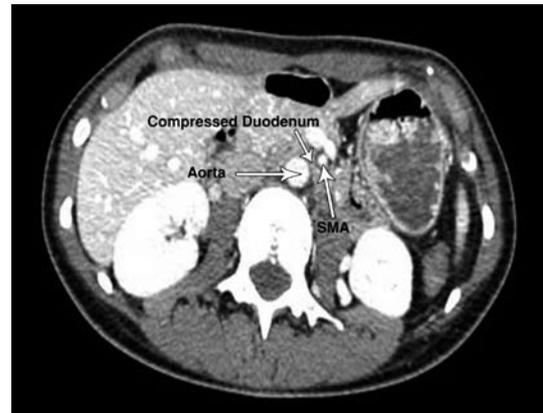


Figure 2 - Axial abdominal CT image with intravenous contrast (arterial phase) showing compression of the third part of duodenum between the aorta and SMA at the left paravertebral line. SMA - superior mesenteric artery



Figure 3 - Sagittal reconstruction of the CT showing the angle between the aorta and the SMA measuring approximately 14°. SMA - superior mesenteric artery



Figure 4 - Axial abdominal CT image with intravenous contrast (venous phase) showing the compression of the left renal vein between the abdominal aorta and the SMA. SMA - superior mesenteric artery

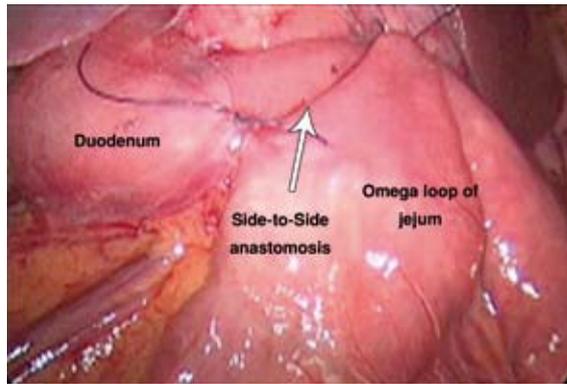


Figure 5 - Proximal jejunum was run until the loop could be brought easily (omega loop) to the dilated duodenum, side-to-side anastomosis.

and both legs and arms were kept apart. Insufflation was carried out up to 14 mm Hg. We used a 10-mm camera, with a 45-degree lens. Four trocars were inserted as following: First port was of 10 mm size and inserted by supra-umbilical incision, the second port was 12 mm bladeless inserted at left mid subcostal region, the third port was 5 mm between the previous 2 ports, and the last port was 10 mm placed in the mid right subcostal. The second part of the duodenum was identified, which was obviously dilated. The ligament of Treitz was identified. The proximal jejunum was dissected until the loop could be brought easily (omega loop) to the dilated duodenum without tension (Figure 5). Two limbs were stitched to secure its position. Then the duodenum and the jejunum were entered with harmonic shears. Then a stapling device 2.5 mm/60 mm was deployed. The defect was closed by a stapling device. Then the jejuno-jejunal anastomosis was carried out (Braun anastomosis) by a stapling device, and a drain was placed in the anastomosis area. On day one postoperatively, a water-soluble swallow study was carried out with no evidence of leak or stenosis. Three weeks later she presented to our clinic for follow up. She was free from her previous symptoms, eating normally with better appetite, with a one kg increase in her weight. Four months after the operation she visited our clinic with a 4 kg increase in weight, and no complaints.

Discussion. Superior mesenteric artery syndrome was first described by von Rokitansky in 1842.³ The incidence of clinically significant and appropriately confirmed disease has been estimated to range from 0.01-0.08%.¹ It is related to anatomical and mechanical factors; the third part of the duodenum is compressed passing under the SMA secondary to the acute angle between the SMA and aorta or less frequently high retroperitoneal attachment of the ligament of

Treitz. The angle is between 38-65° in physiological conditions, but in severe cases it may be less than 10° in patients with SMA syndrome.¹ The SMA-aorta distance at the level of the duodenum is between 10-28 mm normally.¹ In patients with SMA syndrome, the distance between these vessels may have a distance of 6 mm.¹ The SMA syndrome may be caused by several reasons starting with a high fixation of the ligament of Treitz and any operation that fixes the SMA into a more posterior position, as has been reported after ileo-anal anastomosis.⁴ Spinal deformities, particularly surgical correction of congenital spinal deformities, alter the natural position of the aorta via iatrogenic hyperlordosis.⁵ Abdominal aortic aneurysm, paralysis, and full body casts have also been previously reported as a cause of SMA syndrome,⁶ hence, SMA also being called cast syndrome. The SMA syndrome may develop in patient subjected to prolonged supine positions such as trauma and burn patients.⁷ The syndrome can also present as one of the rare complications of Roux-en-Y gastric bypass with a prevalence of 0.6% due to dramatic weight loss, which will lead to retroperitoneal fat loss.⁸ Familial cases have been reported in monozygotic twins who developed idiopathic SMA syndrome.⁹ We report a case in a native Saudi family.

The SMA syndrome patients present with vague postprandial epigastric bloating, nausea, and vomiting associated with gradual weight loss, and they may have hypoalbuminemia, hyperkalemia, and hypocalcemia due to malnourishment. There is a high correlation between the reduction of the SMA-aorta distance and the severity of the symptoms.¹⁰ It may present with cholecystitis due to biliary dyskinesia secondary to the SMA syndrome, and some of the patients may present with acute pancreatitis, possibly due to the same etiology of stasis. Diagnosis is based on upper gastrointestinal series and CT. In the upper gastrointestinal series, the proximal duodenum is dilated and vertical or oblique compression on the third portion of duodenum during the fluoroscopy is suggestive of SMA syndrome.¹¹ The CT angiography must be performed in difficult cases with coronal image to show the aorta SMA distance and the sagittal reconstruction to show the angle between the vessels. Although endoscopy is of minor positive diagnostic value, it was advised in the literature to rule out any intraluminal pathology.¹ The syndrome has been successfully treated by simply altering positions. The prone position or left decubitus position will help as a conservative therapy with high caloric augmentation. Surgical options can be lysis of the ligament of Treitz considered one of the surgical options available for SMA syndrome treatment. During open surgery period, the success rate was 79% compared to 75%

in the era of minimal invasive surgery. The percentage was replicated but the second study was carried out only on 4 patients.¹ We believe the success rate will be higher with laparoscopic surgery if the sample size were bigger, because laparoscopic surgery will lead to fewer adhesions. Recurrence after ligament liberation occurs simply as a result of postoperative adhesions tethering the bowel into a similar position as the ligament of Treitz previously had done.¹ The best surgical option is laparoscopic duodenojejunostomy, and there are multiple publications concerning this procedure with good success rates to cure SMA syndrome.^{11,12,13} Another vascular approach has been reported with infrarenal transposition of the SMA.¹⁴ Our experience in the field of laparoscopy and bariatric surgery helped us to perform omega loop and Braun anastomosis.

Gastroparesis after corrective surgery is a frequently encountered problem due to gastric and duodenal atony, and regurgitation has been described in long standing SMA cases. There is a lack of evidence on how to treat gastroparesis after corrective surgery for SMA syndrome.³ This is why we believe it is important to carry out Braun anastomosis to prevent possible regurgitation in a long standing obstruction. Specifically, we carried out duodenojejunostomy omega loop not Roux-en-Y anastomosis, performing Braun anastomosis will help to avoid close room in the digestive system. Both omega loop with Braun anastomosis and Roux-en-Y anastomosis are known techniques for duodenojejunostomy. We performed the omega loop with Braun anastomosis for more drainage. Literature suggests that symptoms before and after duodenojejunostomy are the same, and only the frequency of vomiting will decrease,¹⁵ therefore, we think more drainage will help.

In conclusion, SMA syndrome can be easily misdiagnosed, especially when the patient presents with increased pancreatic enzymes (pancreatic secretion against obstruction, rupture of ductular apparatus, and glandular tissue result in the appearance of variable amounts of amylase in the peripheral blood by way of the venous drainage of the pancreas, and by lymphatic absorption from the peritoneum).¹⁶ A barium meal study and a CT-scan will evaluate the diagnosis of SMA syndrome. The laparoscopic omega loop with Braun anastomosis showed a good outcome regarding patient symptoms and weight gain. Adding Braun anastomosis to the omega loop prevents regurgitation of food and enzymes.

Acknowledgment. We gratefully acknowledge the contributions of Dr. Mohammed Babatin, Consultant Gastroenterologist as the primary doctor following the case from the very beginning, Dr. Ahmad F. Nayal, Consultant Radiologist for diagnosing the case, and reviewing the CT and barium meal studies, Dr. Alwaleed Al-Sawaf, Resident of Plastic Surgery, and Dr. Amal Alawami, Intern, for their essential assistance.

References

1. Fraser JD, St Peter SD, Hughes JH, Swain JM. Laparoscopic duodenojejunostomy for superior mesenteric artery syndrome. *JLS* 2009; 13: 254-259.
2. Gersin KS, Heniford BT. Laparoscopic duodenojejunostomy for treatment of superior mesenteric artery syndrome. *JLS* 1998; 2: 281-284.
3. Aslam MI, Finch JG. Prolonged gastroparesis after corrective surgery for Wilkie's syndrome: a case report. *J Med Case Reports* 2008; 2: 109.
4. Ballantyne GH, Graham SM, Hammers L, Modlin IM. Superior mesenteric artery syndrome following ileal J-pouch anal anastomosis. An iatrogenic cause of early postoperative obstruction. *Dis Colon Rectum* 1987; 30: 472-474.
5. Shah MA, Albright MB, Vogt MT, Moreland MS. Superior mesenteric artery syndrome in scoliosis surgery: weight percentile for height as an indicator of risk. *J Pediatr Orthop* 2003; 23: 665-668.
6. Balmaseda MT Jr, Gordon C, Cunningham ML, Clairmont AC. Superior mesenteric artery syndrome after resection of an arteriovenous malformation in the cervical cord. *Am J Gastroenterol* 1987; 82: 896-899.
7. Kepros JP. Superior mesenteric artery syndrome after multiple trauma. *J Trauma* 2002; 53: 1028.
8. Abou-Nukta F, Valin E, Rao S, Kim D, Contessa J, Reinhold R. Superior mesenteric artery syndrome in patients undergoing gastric bypass surgery. *Surg Obes Relat Dis* 2005; 1: 95-98.
9. Wilkie DPD. Chronic duodenal ileus. *Am J Med Sci* 1927; 173: 643-649.
10. Unal B, Aktas A, Kemal G, Bilgili Y, Güliter S, Daphan C, et al. Superior mesenteric artery syndrome: CT and ultrasonography findings. *Diagn Interv Radiol* 2005; 11: 90-95.
11. Bermas H, Fenoglio ME. Laparoscopic management of superior mesenteric artery syndrome. *JLS* 2003; 7: 151-153.
12. Palanivelu C, Rangarajan M, Senthilkumar R, Parthasarathi R, Jani K. Laparoscopic duodenojejunostomy for superior mesenteric artery syndrome. *JLS* 2006; 10: 531-534.
13. Jo JB, Song KY, Park CH. Laparoscopic duodenojejunostomy for superior mesenteric artery syndrome: report of a case. *Surg Laparosc Endosc Percutan Tech* 2008; 18: 213-215.
14. Pourhassan S, Grottemeyer D, Fürst G, Rudolph J, Sandmann W. Infrarenal transposition of the superior mesenteric artery: a new approach in the surgical therapy for Wilkie syndrome. *J Vasc Surg* 2008; 47: 201-204.
15. Ylinen P, Kinnunen J, Höckerstedt K. Superior mesenteric artery syndrome. A follow-up study of 16 operated patients. *J Clin Gastroenterol* 1989; 11: 386-391.
16. Janowitz HD, Dreiling DA. The plasma amylase. Source, regulation and diagnostic significance. *Am J Med* 1959; 27: 924-935.