CASE REPORT

Laparoscopic revisional surgery for an unusual complication of Roux-en-Y gastric bypass

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Accepted 29 May 2018

SUMMARY

With the worldwide epidemic of obesity, there has been an increase in the numbers of primary and revisional procedures of bariatric surgery such as the Roux-en-Y gastric bypass (RYGBP). Nevertheless, this type of surgery is not exempt from complications. An excessive length of non-functional Roux limb proximal to the jejunojejunostomy can cause abnormal upper gastrointestinal symptoms after laparoscopic RYGBP. We present the case of a female patient who presented these unspecific abdominal symptoms after laparoscopic RYGBP who underwent laparoscopic resection in order to reduce the length of the dilated blind loop responsible for the symptoms.

BACKGROUND

Obesity has become a relevant public health issue thus bringing about an increasing number of bariatric procedures performed. Accordingly, a parallel increase in revisional operations can be expected. There are several complications that necessitate revision after a standard Roux-en-Y gastric bypass (RYGBP) procedure. Among them, a redundant blind afferent Roux limb at the gastrojejunostomy, coupled with postprandial pain that resolves after vomiting is referred to as 'Candy Cane Syndrome'. We describe a similar syndrome which occurs after laparoscopic RYGBP with the distension of an excessively long blind intestinal loop adjacent to the jejunojejunostomy. We refer

Figure 2 Final step of laparoscopic Roux-en-Y gastric bypass. (A) Arrowhead: gastrojejunostomy. Arrow: jejunojejunostomy. Asterisk: gastric limb. (B) Mechanical suture triggered to divide the loop that connects the gastrojejunostomy with the jejunojejunostomy. Arrowhead: gastrojejunostomy. Arrow: jejunojejunostomy. Asterisk: gastric limb. (C) Arrowhead: gastrojejunostomy. Arrow: jejunojejunostomy. Asterisk: gastric limb. Square: biliopancreatic limb.

to it as 'Inverted Candy Cane Syndrome' (ICCS). To our knowledge, the latter has not been previously described as a complication of gastric bypass surgery. Therefore, we present the case of patient with ICCS after laparoscopic RYGBP.

CASE PRESENTATION

We present the case of a 24-year-old woman diagnosed with morbid obesity who underwent laparoscopic RYGBP at a different institution. Four years after the procedure and having lost 47% of her initial body weight, she complained of unspecific colic abdominal pain and intermittent diarrhoea, worsened by oral intake.

INVESTIGATIONS

Initially, clinical tests were performed, ruling out coeliac disease and parasitological infection, but presenting a positive test for the detection of *Clostridium difficile* toxin. Consequently, she was treated with a 14-day course of metronidazol and probiotics with partial improvement of the symptoms. Due to persistent diarrhoea, upper and lower endoscopies were performed with no relevant findings. An upper gastrointestinal series was not performed because, having carried out an upper endoscopy that showed normal gastrojejunostomy, afferent and efferent loops, it was inferred that the pathogenesis of the patient's symptoms lied on a

Figure 1 Revisional surgery. (A, B, C) Arrow: jejunojejunostomy. Asterisk: dilated and devitalised afferent Roux limb at the jejunojejunostomy. (D) Arrow: triggered mechanical suture adjacent to jejunojejunostomy. Asterisk: dilated and devitalised afferent Roux limb at the jejunojejunostomy. Arrowhead: biliopancreatic limb.

To cite: Raices M, Fuente I, Rodríguez F, et al. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2018-224759

Figure 3 (A) Correct placement of the foot of the Roux-en-Y. (B) Long blind loop adjacent to the gastrojejunostomy (Candy Cane syndrome). (C,D) Long and dilated blind loop adjacent to the jejunojejunostomy (Inverted Candy Cane syndrome).

more distal segment of the small bowel, therefore not visible through an upper gastrointestinal series.

TREATMENT

One month after endoscopies were performed, the patient presented at our emergency department with exacerbated abdominal pain and signs of peritoneal inflammation on physical examination. Imaging findings (CT) were inconclusive and based on the presumptive diagnosis of internal hernia, urgent laparoscopic exploration was performed. Following the examination of the abdominal cavity, a long blind loop originating from the Roux-en-Y jejunojejunostomy was observed. The said loop was dilated and hypercontractile compared with other intestinal loops (figure 1A–C). Petersen's space and the mesenteric gap were revised and there were no signs of mechanical obstruction or internal hernia. The blind loop was resected with one cartridge of 60mm mechanical suture (figure 1D). Oral intake was reinstated the first day after surgery and the patient was discharged 2 days after the procedure with no postoperative complications. Anatomopathological examination revealed signs of mucosal ischaemia on the resected specimen.

OUTCOME AND FOLLOW-UP

Seven months later, the patient remains asymptomatic.

DISCUSSION

Bariatric patients commonly have complaints of postprandial discomfort, nausea and vomiting. Common causes of these symptoms include transient food intolerance, symptomatic cholelithiasis, overeating, marginal ulceration and gastrojejunal strictures.¹ However, in most cases, a certain aetiological

diagnosis cannot be reached, especially when a blind loop and subsequent bacterial overgrowth are suspected.²

The most frequently performed technique of laparoscopic RYGBP combines a supramesocolic gastrojejunostomy and jejunojejunostomy.³ At the end of the laparoscopic RYGBP, after the jejunojejunostomy has been performed, a single mechanical 45 mm suture (white cartridge) is triggered to divide the loop that connects the gastrojejunostomy with the jejunojejunostomy thus creating the biliopancreatic limb (figure 2A–C). Consequently, two blind and, ideally, short loops are created, one of them afferent to the gastrojejunostomy, and the other one afferent to the jejunojejunostomy.

So far, there have been few reports describing a condition that originated from excessive length of the afferent Roux limb at the gastrojejunostomy called Candy Cane syndrome. The most common clinical feature of this condition is postprandial epigastric pain with resolution of pain after vomiting an unexpectedly large volume of gastric content. Other non-specific symptoms include acid reflux, nausea and rapid satiety.⁴ Until now, there are no reported cases of patients with clinical manifestations associated with the presence of a redundant segment of small bowel afferent to the jejunojejunostomy. We describe the case of the patient whose gastrointestinal symptoms were associated with an excessive length of Roux limb proximal to the jejunojejunostomy—the ICCS. In this particular case, the loop connecting the gastrojejunostomy and the jejunojejunostomy had an excessive length given that the jejunojejunostomy was performed too distant to the gastrojejunostomy, as shown in figure 1. Consequently, when dividing the loop creating the biliopancreatic limb, a blind redundant loop afferent to the jejunojejunostomy was indeed created. As opposed to the Candy Cane Syndrome and due to ICCS anatomical findings, abdominal pain alleviated after vomiting was not present, and non-specific pain and diarrhoea are predominant. These symptoms seemed to progress with time and likely represent a combination of worsening dysmotility and/or increasing dilation of the Roux limb. The pathophysiology of both syndromes is very poorly understood. Reviewing the literature, there were only few case reports and small case series addressing Candy Cane syndrome.^{5–6} Clinical manifestations might be due to the excessive length of the afferent limb left at the time of initial operation causing a type of blind loop syndrome⁷ characterised by poor drainage and bacterial overgrowth.^{8–9} Technically, this translates into the initial placement of the foot of the Roux-en-Y (figure 3A) too distal or too proximal to the gastrojejunostomy, causing a long and dilated blind loop adjacent either to the gastrojejunostomy (Candy Cane syndrome) (figure 3B) or the jejunojejunostomy (ICCS) (figure 3C,D). After ruling out other more common causes of post RYGBP abdominal discomfort, the diagnosis of the original 'Candy Cane Syndrome' is based on clinical symptoms, endoscopy and radiological imaging. Upper gastrointestinal series and endoscopy are often the initial tests used to detect any anatomical abnormalities and assess for causes of the symptoms. However, due to the different anatomical causality involved in ICCS, patients may have to undergo other tests, including CT scan, in order to arrive at the proper diagnosis given that endoscopy would reveal normal anatomy.

Supported by published literature on revisional bariatric surgery, laparoscopic surgical resection of the redundant limb proved to be successful in resolving this patient's symptoms.^{10–12}

In conclusion, ICCS is a rare disorder after gastric bypass. It occurs as a result of initial misplacement of the Roux-en-Y jejunojejunostomy when laparoscopic gastric bypass is performed

through a technique described in the literature as 'simplified', consisting of two loops and a Roux-en-Y anastomosis. Increasing recognition and thorough work-up should be given to establish the diagnosis of this phenomenon so that patients can be surgically treated, since we believe that this syndrome could be a more common problem than appreciated. Future studies may better characterise this possible syndrome; however, until more data are available, surgeons should consider minimising the size of the blind afferent loop left at the time of initial RYGB. Laparoscopic resection of the elongated afferent limb is a safe and effective treatment with excellent outcomes.

Patient's perspective

'Prior to the surgery I felt very bad, the abdominal pain prevented me from doing my daily tasks normally, the diarrhoea for more than 3 months caused my quality of life to be affected. I depended on medications every day to get out of my house, the pain and colics became stronger, causing intolerance to the intake of liquids and solids.

After the surgery, already in the immediate post-operative I began to feel better, the diarrhoea disappeared along with the colics and the pain. I was able to resume my activity normally and not take medication of any kind.'

Learning points

- Initial misplacement of the foot of the Roux-en-Y in bariatric surgery may cause a wide variety of postoperative syndromes.
- Inconclusive complementary examinations may not exclude a technical feature of the index procedure as the cause of postbariatric surgery syndromes.
- Laparoscopic revisional bariatric surgery is a useful diagnostic and therapeutic tool.

Contributors All authors have contributed to the development of this manuscript in the following manner. MR, IF, FR: Conception and design, acquisition of data

or analysis and interpretation of data. MR, IF, FR: Drafting the article or revising it critically for important intellectual content. FW: Final approval of the version published, agreement to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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