

Re-do Roux-en-Y Gastric Bypass in a Patient with Known Midgut Malrotation

Muhammad Ali Karim, MRCS, Moustafa Mansour, MRCS, Abdulmajid Ali, FRCS, FRCS (Glasgow)

ABSTRACT

A 40-year-old woman presented with small bowel obstruction caused by an internal hernia through Peterson's defect. The patient was known to have midgut malrotation (MM) and also had laparoscopic Roux-en-Y gastric bypass for morbid obesity 6 years prior. An open revision of Roux-en-Y gastric bypass was performed as a result of ischemia of alimentary limb. She made a slow but uneventful recovery and was discharged home.

MM is a rare congenital anomaly that requires the surgeon to be well aware of the unique variation in anatomy to perform a mirror image of the routine Roux-en-Y gastric bypass.

At the end of this case report, we present a short literature review of published data related to MM encountered during Roux-en-Y gastric bypass.

Key Words: Laparoscopic surgery, Obesity surgery, Intestinal volvulus, Roux-en-Y bypass.

INTRODUCTION

Midgut malrotation (MM) is a rare congenital anomaly resulting from the abnormal rotation of the midgut during embryologic development. Because of its anatomic variance, it gives rise to a unique spectrum of clinical presentations ranging from acute presentation in neonates to remaining asymptomatic for life.¹ When asymptomatic, MM is often discovered incidentally in adults during abdominal surgery or diagnostic abdominal radiography.

There are limited published data of incidental findings of MM in bariatric surgery and no literature available related to revision of Roux-en-Y gastric bypass in patients known to have MM. Although internal hernia through the Peterson's defect is a well-known complication of laparoscopic Roux-en-Y gastric bypass, this condition coexisting with MM makes the surgery challenging.

CASE REPORT

A 40-year-old female presented to the emergency department with acute onset of abdominal pain. She was known to have congenital midgut malrotation (MM), which was discovered when she had undergone laparoscopic Roux-en-Y gastric bypass for morbid obesity 6 years prior. Two years later she developed intestinal obstruction caused by adhesions, which was successfully treated by laparoscopic adhesiolysis. She had past medical history of non-insulin-dependent diabetes mellitus that she controlled with diet.

On examination, she appeared to be dehydrated and septic with periumbilical tenderness. Subsequent investigations including a computed tomography (CT) scan of the abdomen revealed acute dilatation of the gastric remnant (**Figure 1**). The on-call team managed the acute gastric dilatation by a percutaneous CT-guided gastrostomy using a 12-Fr gastrostomy tube. Pain recurred the next day and a gastrografin study through the gastrostomy tube raised the suspicion of obstruction at the jejuno-jejunostomy. The small bowel was visualized on the right side of the abdomen. A laparotomy was thus performed and revealed an internal hernia through the Peterson's defect (**Figure 2**). The antecolic alimentary limb of the Roux-en-Y measured 70 cm and showed signs of impending ischemia (**Figure 3[A]**). Decision was therefore taken to excise the alimentary limb and revise the bariatric

Department of Surgery University Hospital Ayr, Ayrshire and Arran, Dalmellington Road, KA6 6DX, United Kingdom

Ayr University Hospital, Ayrshire and Arran Dalmellington Road, KA6 6DX, United Kingdom

Address correspondence to: Mr. Abdulmajid Ali, Consultant Upper GI and Bariatric Surgeon Dalmellington Road, KA6 6DX, UK E-mail: abdulmajid.ali@aaaht.scot.nhs.uk

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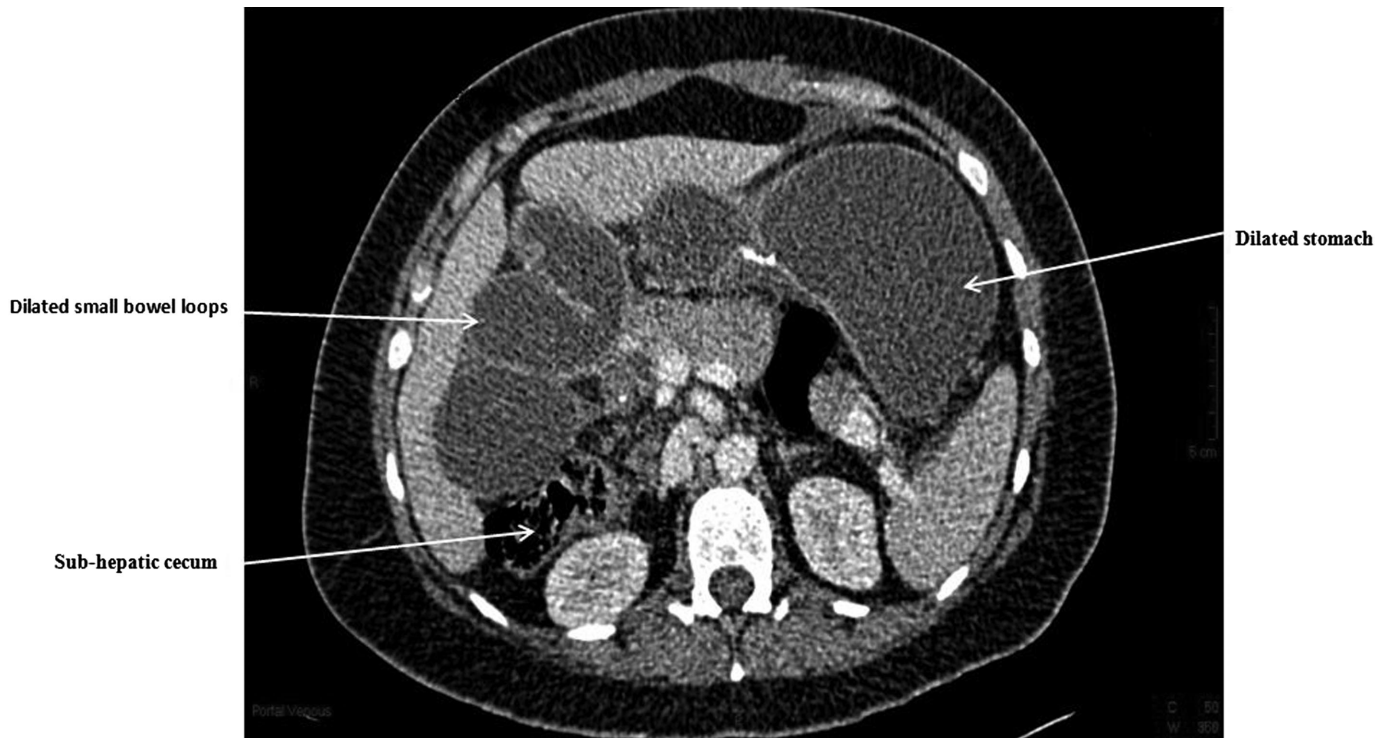


Figure 1. Computed tomography scan showing evidence of small bowel obstruction (dilated stomach and small bowel loops) and MM (subhepatic cecum).



Figure 2. Internal hernia through Peterson's defect (*arrow*).

procedure. The cecum was identified in the subhepatic space (incomplete malrotation) (**Figure 1**) and the ligament of Treitz toward the right of midline; there was no Ladd's band identified. The internal hernia was reduced. The alimentary limb was disconnected from the biliary limb and the small gastric pouch (**Figure 3[B]**). The jejunal loop was

placed antecolic and gastro-jejunostomy refashioned using a 25-mm circular stapler. A side-to-side jejuno-jejunostomy was formed using a linear stapler 70 cm from gastro-jejunostomy (**Figure 3[C]**). The Peterson's defect and the mesenteric defect at the jejuno-jejunostomy were closed using continuous polypropylene sutures. The gastrostomy tube was left in situ. The patient made a slow but steady recovery; an oral and per-gastrostomy tube gastrografin study did not show any leak or obstruction at day 7. She was gradually started on an oral diet and the gastrostomy tube was removed after 18 days. She required in-hospital counseling by the bariatric team, which included a psychologist, and was discharged in good health 22 days after the surgery.

DISCUSSION

MM is a rare congenital anomaly that effects 1/6000 live births, with as much as 90% of the cases diagnosed within the first year of birth.² The condition develops when abnormal rotation of the midgut occurs during embryologic development. Physiologic herniation of the primitive intestinal loop occurs in the sixth week of development when it elongates and is too large to be contained in the abdominal cavity. The midgut is characterized by its blood supply; the superior mesenteric artery extends from the second part of

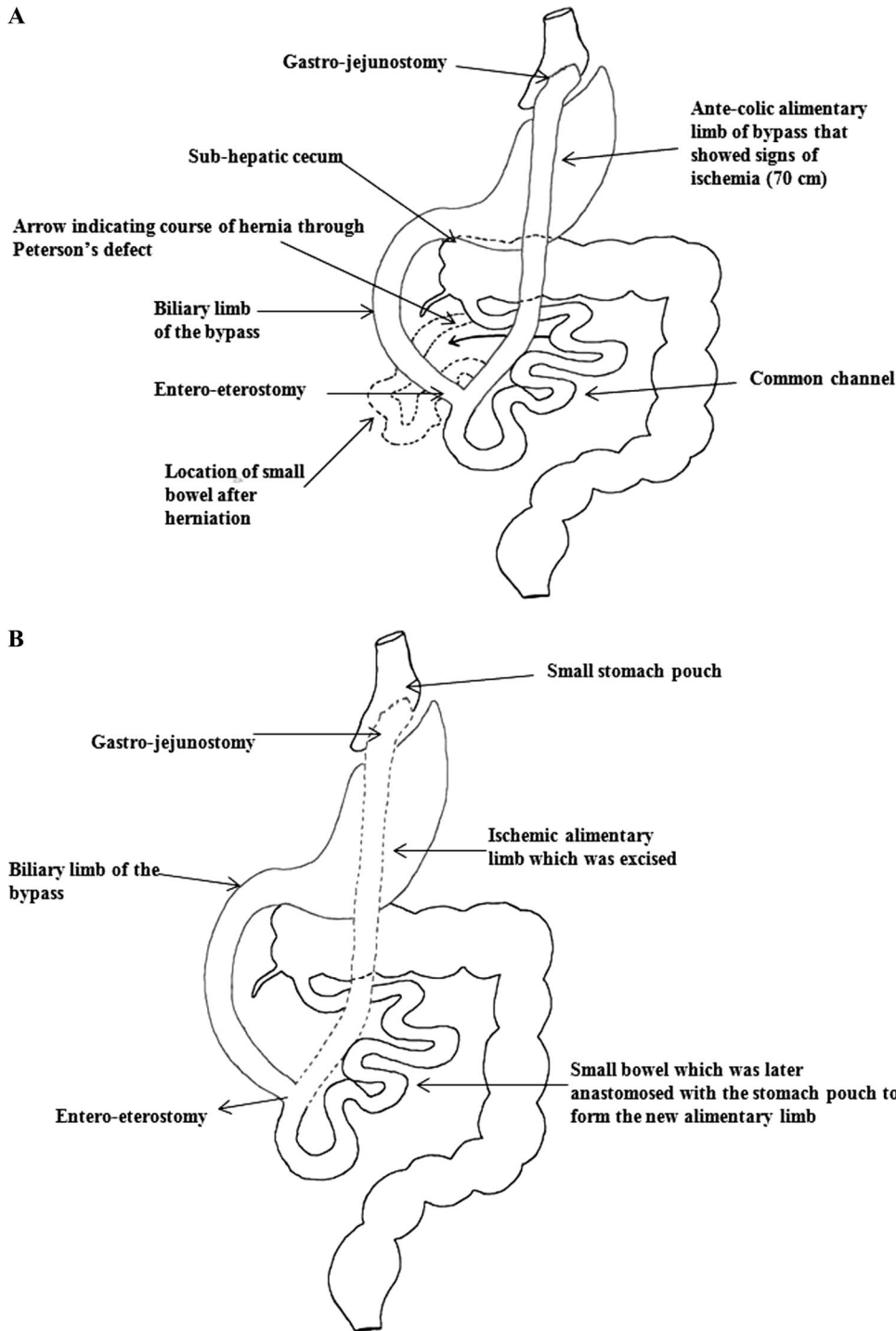


Figure 3. (A) Malrotated midgut with subhepatic location of the cecum, the course of internal hernia through the Peterson's defect, and the ischemic alimentary limb. It also shows the hepato-biliary limb of the gastric bypass. (B) Internal hernia reduced and the alimentary limb, which was disconnected at the gastro-jejunostomy and the entero-eterostomy. (C) Redo Roux-en-Y gastric bypass with the ischemic alimentary limb replaced and the gastro-jejunostomy and an entero-eterostomy refashioned.

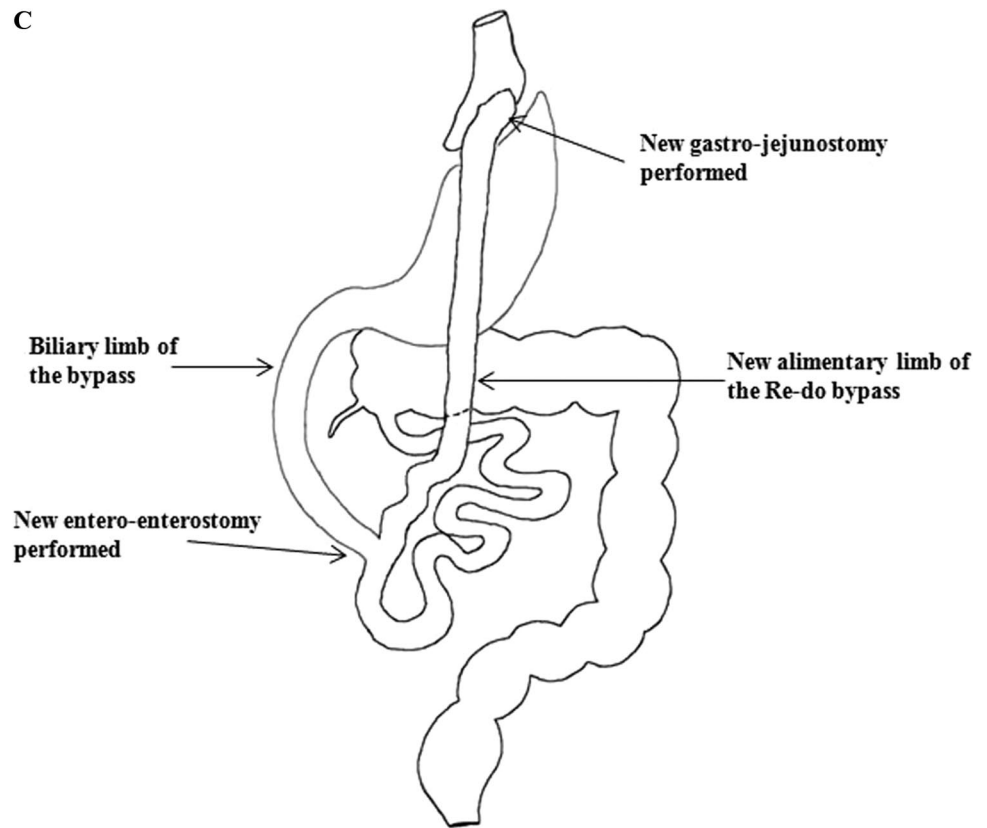


Figure 3. Continued.

duodenum to the proximal two thirds of the transverse colon and rotates 270° counterclockwise along the axis of the superior mesenteric artery before returning to the abdominal cavity at the tenth week of development. The proximal jejuno-ileal loops lead the return and occupy the left side in the abdominal cavity and the later returning caudal limb of the midgut, also called the *ceco-colic limb*, comes to lie on the right side and the transverse colon anterior to the duodenum. The cecum now descends and comes to lie in the right lower quadrant. During this process the small bowel mesentery gets attached to the posterior abdominal wall extending from the second part of the duodenum to the ileo-cecal junction.³ This is a complex process and a variety of anomalies are known. Arrest of midgut rotation at 90° is called *nonrotation* and is associated with colon returning first into the abdomen; it occupies the left side and the jejunoileal loops occupy the right side.³ *Incomplete rotation* occurs when the midgut rotation is partial and the cecum lies in the right upper quadrant attached to the abdominal wall by a peritoneal fold called *Ladd's band*, named after American pediatrician William E. Ladd (1880–1967). Mesentery of the small bowel in these cases is narrow and prone to twisting, causing a volvulus. In *reverse rotation* the primary

loop rotates 90° clockwise and when it returns into the abdomen, the transverse colon lies behind the duodenum and the superior mesenteric artery.³

Reported cases of MM encountered while performing bariatric surgery are rising as bariatric surgery is gaining wide acceptance in the wake of health and the economic impact of obesity. We performed a literature search for published data on EMBASE, MEDLINE, and Google from the years 1980 to 2012 using the words synonymous with “bariatric surgery” and “midgut malrotation.” We included gastric bypass procedures performed to treat morbid obesity. The search revealed that 19 such cases have been reported in total. One patient underwent robotic-assisted laparoscopic gastric bypass and division of Ladd's bands.⁴ Two patients were converted to open procedure because of difficulty in identifying the anatomy.⁵ Two centers reported that the procedure was abandoned when anatomy was found to be abnormal: one patient was found to have MM and the procedure was performed at a later date,⁶ and the other patient had situs inversus.⁷ Ladd's bands were divided in six patients^{5,6,8–10} and/or prophylactic appendectomy, along with gastric bypass, was performed in six patients.^{4,5,8,9,11} There was one

case of small bowel obstruction one week postoperatively that required laparoscopic surgery.⁶ No mortality in association with MM and gastric bypass has been reported.

There were no reported cases of internal hernia after gastric bypass in patients with MM. In normal subjects who undergo gastric bypass, the incidence of internal hernia ranges from 3.1% to 16%.^{12–14} One of the common potential sites of internal hernia after Roux-en-Y gastric bypass is the Peterson's space, which is a defect between the small bowel loops involved in the bypass and the transverse meso-colon. Another potential site of internal hernia is the mesenteric defect at the site of jejuno-jejunostomy. There is no consensus in the literature about whether the closure of mesenteric defects is effective.^{15,16} In our literature review, four case reports mentioned that the mesenteric defect was closed but the remaining reports did not comment on whether it was performed.^{4,17–19} In our practice we close the mesenteric defect at the jejuno-jejunostomy with continuous nonabsorbable sutures. To our knowledge our patient is the only reported case of internal hernia after laparoscopic gastric bypass in a patient known to have MM. Will MM affect the incidence of internal hernia after LGB differently? It is hard thus far to comment. Because this is our second experience with a patient with MM,¹⁸ and the first encounter with a case of internal hernia with MM, it might be reasonable to infer that the management of complications of laparoscopic gastric bypass in patients with MM is not beyond the scope of an experienced bariatric surgeon and that MM is not a contraindication for weight loss surgery.

CONCLUSION

MM is a rare congenital anomaly, and it is not a contraindication to weight loss surgery if the surgeon has advanced skills and a comprehensive knowledge of the anatomic variation to deal with unexpected perioperative outcomes.

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