Roux-en-Y Gastric Bypass in the setting of Incidentally Identified Malrotation

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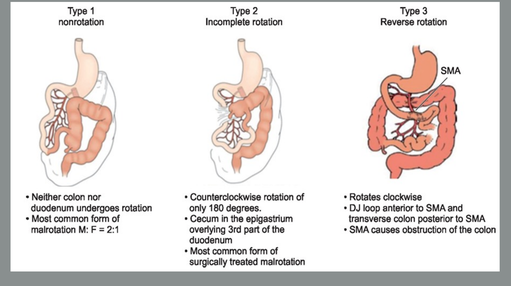


Figure 1. Stringer classification of malrotation: type 1: nonrotation, type 2: incomplete rotation, and type 3: reverse rotation

Harvitkar RU, Joshi A. Congenital Midgut Malrotation Presenting as Acute Duodenal Obstruction in an Adult--Laparoscopic Management. World J Lap Surg 2021; 14 (1):61-64.

Background

- Incidental findings of malrotation during bariatric surgery, with a prevalence of 0.025%, can create unexpected difficulty during the procedure.
- Intestinal malrotation is a congenital abnormality that arises if there is failure of the midgut to rotate 270 degrees counterclockwise and fix to the retroperitoneum during embryologic development.
- Intestinal malrotation can be classified into three different types: nonrotation, incomplete rotation, and reverse rotation.
- 90% are diagnosed during the first year of life.
- 0.2 to 0.5% risk in adults and is often undiagnosed in until abdominal surgery or autopsy because they are largely asymptomatic.
- A gap exists in our knowledge and literature regarding how to manage this congenital condition if incidentally identified at bariatric surgery.

The objective of this study is to review the 6 cases incidental malrotation during bariatric surgery at a single institution of 2230 patients undergoing Roux-en-Y gastric bypass (RYGB) from 2012 to 2023. Furthermore, this series aims to clarify associated preoperative clinical features, operative techniques, and postoperative clinical outcomes and complications.

Case 1

62F with for gastro-esophageal reflux disease (GERD) undergoing laparoscopic revision from a sleeve gastrectomy (SG) to a RYGB .

Surgical Findings:
- **Nonrotation of the small bowel** was identified
- Ileocecal valve identified and small bowel was examined in retrograde manor
- **Roux limb created in a 'mirror-image'** configuration

Postoperative course: Uneventful and was **referred to gastrointestinal specialists for screening colonoscopy** in the next few months given her intestinal malrotation.

Case 2

32M with history of GERD undergoing RYGB after removal of previous gastric band due to infection

Surgical Findings:
- **Nonrotation of the small bowel** was identified
- The Roux limb was created in a 'mirror image' configuration (150cm) but there was tension between the stomach pouch and Roux limb
- **To increase mobility, the mesentery of the proximal Roux limb was divided at the mesenteric border** 50cm distal to perceived duodenojejunal junction, ultimately leaving the Roux limb to be 100cm

Postoperative course: Day 10, patient returned to the hospital with acute abdominal pain, fever, and tachycardia. **CT scan revealed edema of the Roux limb with no free air or fluid collections**. Exploratory laparotomy ruled out intestinal ischemia of the Roux limb. The patient has since recovered to baseline with no other postoperative concerns.

Case 3

48F with revision of SG to RYGB after presenting with persistent abdominal pain, food intolerance, and GERD

Surgical Findings:
- **Incomplete malrotation** with an abnormal duodenojejunal junction
- The right sided Ligament of Treitz was identified when reflecting the terminal ileum anteriorly and superiorly
- Significant pelvic adhesions
- The Roux limb was brought up to the epigastric region in a **'mirror-image' configuration, antecolic, antegastric fashion**
- **Small bowel mesentery of the common channel was closed just distal to the jejunum with the transverse mesocolon** to allow Roux limb to sit to the left, the common channel to sit to the right, and the BP limb to run posteriorly to anteriorly to avoid kinking
- Drain was placed

Postoperative course: **Acute small bowel obstruction** two weeks post-operatively requiring an exploratory laparotomy, lysis of adhesions, and small bowel resection. On day 2 and 16, the patient's course was complicated by severe hemodynamic instability from a **bleed from a branch of the splenic vein** that had avulsed requiring a take back and splenectomy. The patient also had an **anastomotic leak and strictures once the leak healed**. By 6 months post-operatively, the patient was no longer requiring dilations and back to her pre-operative baseline.

Case 4

34 F with history of myocardial infarction who underwent laparoscopic RYGB for morbid obesity.

Surgical Findings:
- **Nonrotation of the small bowel** was identified during adhesiolysis
- The right colon was midline, and all the small bowel was in the right abdomen
- The procedure was ultimately completed by performing an **antecolic retrogastric gastric bypass** with a 150 cm Roux limb

Postoperative course: Uneventful.

Case 5

40M with history of non-insulin dependent diabetes and GERD who underwent laparoscopic RYGB for morbid obesity.

Surgical Findings:
- **Nonrotation of the small bowel** was identified, with the colon was on the left and the small bowel was on the right
- The duodenum was identified after running the entire small bowel from the ileocecal valve, which was located midline, retrograde until the first and second portion of the duodenum were identified
- **Careful attention was paid during the rest of the procedure to maintain the Roux limb in proper orientation without twisting of the bowel and the mesentery** given the abnormal anatomy

Postoperative course: Uneventful.

Case 6

40F with history of non-insulin dependent diabetes and congestive heart failure who underwent robotic RYGB for obesity

Surgical Findings:
- **Nonrotation of the small bowel** was identified
- A 150cm Roux limb was constructed and 75cm biliopancreatic limb
- **Appendectomy was also performed**

Postoperative course: Admitted a month later **with visceral hypersensitivity** and poor oral intake. **Esophagogastroduodenoscopy (EGD) at the time noted moderate edema with superficial ulceration at the anastomosis**. The patient's oral intake improved. The patient was progressing well her oral intake decreased with a COVID-19 infection. **EGD at admission at this time showed resolution of the ulceration and edema.** The patient received supportive care and has been meeting her calorie and protein goals since that time.

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	Malrotation	RYGB	All Bariatric Surgeries
Sex (% male)	33.3	20.9	21.3
BMI (mean)	44.9	50.1	50.1
Co-morbidities (% with any comorbidity)	100	85	81.6
DM (%)	33.3	37.6	34.4
OSA (%)	50	52.9	49.1
Essential HTN (%)	66.7	68.8	66.3

Table 1. Comparison of patient characteristics between all bariatric surgeries, RYGB, and cases with identified malrotation

Discussion

The authors describe an intraoperative algorithm to RYGB for patients with incidentally identified malrotation (Figure 2).

There are three main post operative considerations we identified from our case series.
1) Transparency of diagnosis: The patient should be made aware of their diagnosis of malrotation and the impact it had on their operation.
2) Both surgeon and patient should have increased vigilance of post operative small bowel complications.
3) There should be consideration of the long-term effects on screening colonoscopy.

While technically more difficult, a minimally invasive RYGB is feasible for the experienced bariatric surgeon. However, the risks of complications are increased, especially in the setting of partial malrotation. Thus, the decision to proceed with RYGB should be considered on a case-by-case basis.

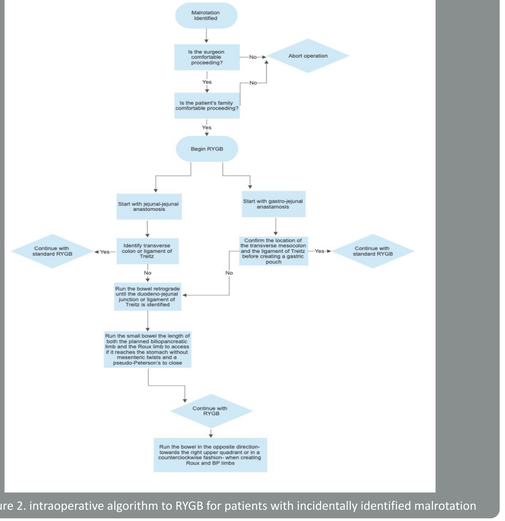


Figure 2. intraoperative algorithm to RYGB for patients with incidentally identified malrotation