



# Blood clot causing small bowel obstruction after Roux en-Y Gastric bypass: a Case Report & Review of Literature

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**Abstract:** The gold standard procedure and most commonly performed bariatric surgery internationally is the Roux En-Y Gastric Bypass (RYBG) surgery. A major complication of the RYBG is small bowel obstruction (SBO; 5% incidence), most frequently caused by intra-abdominal adhesions (65–75%), followed by internal hernias, volvulus, malignancy, intussusception, Crohn's disease, carcinomatosis, intraluminal blood clot, port site hernias, jejunojejunostomy anastomosis strictures, paralytic ileus, and superior mesenteric artery syndrome. In this review of literature, we present a small bowel obstruction case caused by a blood clot (inside the lumen) at a bleeding site within a jejunojejunostomy staple line of a surgical patient. The patient's past-medical history is significant for recurrent deep venous thrombosis (DVT) and pulmonary embolism (PE). The SBO was diagnosed by computed tomography (CT) post-operatively and the patient underwent emergent explorative laparoscopy for management. The intraluminal clot that was found upon examination was evacuated by enterotomy followed by a primary closure with no evidence of continued active bleeding and without need for revision of the jejunojejunal anastomosis. It was concluded that the anti-coagulant medication (Enoxaparin 50 mg BID) being administered to the patient most likely precipitated the intraluminal bleeding at the anastomosis. Based on our findings, early diagnosis and management of SBO in the early perioperative period could likely reduce the percent of this in bariatric patients.

**Keywords:** Laparoscopy; complications; small bowel obstruction (SBO); gastric bypass

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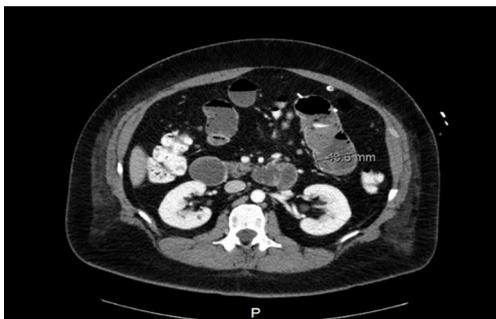
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## Introduction

The RYBG procedure was initially presented by Dr. Edward E. Mason, Dr. Chikashi Ito in 1967, followed by its laparoscopic counter-part by Dr. Alan C. Wittgrove and Dr. G. Wesley Clark in 1994. The LRYBG has become the gold standard and most commonly performed bariatric procedure in the USA and is amongst the most complex of laparoscopic procedures (1,2). It is generally accepted that a minimum of one hundred cases are required in order to truly master the advanced laparoscopy skills required for this procedure; a strong correlation exists between higher

case volumes performed and reduction in complications and mortality (3).

However, as the obesity epidemic still rising exponentially and thus the number of elective LRYBG procedures performed, so does the frequency of associated complications, including SBO. A SBO can be partial (able to pass gas or have bowel movements) *vs.* complete (occasional passage of stool and gas with residual remaining in the colon), closed (an adhesive band or hernia ring occludes the lumen at two points compromising the bloody supply) *vs.* open, and proximal *vs.* distal. The patient typically presents with cramping, abdominal pain, nausea and vomiting (with



**Figure 1** Shows multiple levels of SBO. SBO, small bowel obstruction.



**Figure 2** CT show dilated small bowel loop.



**Figure 3** Lateral view showing the dilated loops.

associated dehydration, hypochloremia, hypokalemia, hypovolemia, and metabolic alkalosis), obstipation, and abdominal distention (2). The diagnosis is made via an abdominal/upper GI series X-ray, a barium enema, and a CT scan.

In most cases, SBO is secondary to numerous adhesions

within the patient's abdominal cavity usually from previous abdominal surgeries. The second most common cause is internal hernias that can become incarcerated, constricting the bowel lumen and compromising the blood supply. As mentioned above, there are a plethora of other causes including malignancy, intussusception, Crohn's disease, carcinomatosis, intraluminal blood clot, port site hernias, jejunojejunostomy anastomosis strictures, paralytic ileus, and superior mesenteric artery syndrome (leading to compression of the third portion of the duodenum). In the case of our patient, the cause of her SBO was an intraluminal blood clot (<0.2%), which was located in the distal portion of the small intestine and required immediate extraction due to the potential complications of anastomotic line disruption and peritonitis (4).

### Case presentation

The patient is a 39-year-old female with past medical history significant for recurrent DVT and PE (anti-coagulated on Enoxaparin 50 mg BID, resumed 2 days after surgery), who underwent an elective LRYGB procedure. One week after the surgery, the patient presented to the Emergency Department with nausea, vomiting and abdominal pain. A CBC revealed a leukocytosis of 15.3 K/uL and vitals were significant for intermittent tachycardia (85–118 bpm). An abdominal CT with IV contrast was obtained, which showed a SBO with a transition point at the distal point to the jejunojejunal anastomosis (*Figures 1-3*). After a few hours of observation in the ED, the patient became increasingly diaphoretic and her WBC increased to 19 K/uL. A clinical decision was made to immediately take the patient to the OR for emergent exploration.

After the patient was placed supine on the table and underwent successful general anesthesia, her previous laparoscopic incision sites were opened and used for trocar insertion. Initial inspection of the abdominal cavity revealed no clear cause for obstruction such as twisting or adhesive bands and no obvious pathology was evident other than dilation of the Roux En-Y limb and biliopancreatic limb. The Roux En-Y limb was followed down to the jejunojejunal anastomosis, which had remained patent. The anastomosis was pressed with bowel graspers and began to milk into the distal bowel. The caliber of the distal bowel normalized with passage of these contents, which were blocking this area. The clot was delivered via an incision into the blind end of the biliopancreatic limb, which showed up a large blood clot inside the lumen, that was cleared and

removed in pieces using the suction and manual extraction combined. There was no clear evidence of active bleeding from the jejunojunal anastomosis. Because of the friability of the intestinal walls and absence of active bleeding, the anastomosis lifted without revision and the enterotomy was closed with staples with a 1 mm height, as is the generally recommended size. The postoperative hospital period was without any complications, and the bowel function returned on post-operative day (POD) #4. Then the discharge day was on POD #5.

## Discussion

Our literature review on presentations of intraluminal blood clots after a RYGB procedure resulting in an acute SBO revealed only 10 documented cases (limited to those written in English, 6 of which were in the US) from 2001–2017, demonstrating the irregularity of this particular surgical outcome. However, the severity of this complication, albeit rare, of the post-operative state of gastric bypass patients should be documented as a possible outcome; obstructions caused by intraluminal blood clots can have grave consequences, not only intestinal perforation, peritonitis, but mortality also must be considered.

Bleeding is commonly the root cause of clot formation at anastomotic staple lines. Most SBO from intraluminal blood clots take place within second till fifth day after a gastric bypass procedure (2). While early administration of anti-coagulants post-operatively is a well-known cause of bleeding in surgical patients, previous studies have shown that Enoxaparin, which the patient was taking for DVT prophylaxis, does not increase the risk of bleeding after bariatric surgery (5).

Our patient did not represent any signs of intersignal bleeding post-operatively such as hematochezia or melena. A mild postoperative ileus and edema were present at the anastomotic site and may have contributed to the stagnation of blood within the bowel, which facilitate the formation of such a large blood clot inside the lumen. The abdominal CT scan was an important tool used to diagnose the bowel obstruction and allowed us to exclude other causes of post-operative complications such as a collection from the anastomotic disruption or leakage, formation of an abscess, or a developing extra-luminal hemorrhage (6).

While post-operative increase in heart rate and elevated leukocytic count and acute abdominal agonizing pain are reasons for emergent laparoscopic diagnostic intervention after the weight loss procedure, some literature reviews

recommend to revise the anastomosis after the blood clot obstruction due to a staple line site bleeding (7). While we usually test the patency and possibility of active bleeding exitance at the gastro-jejunal anastomosis with an EGD intraoperatively, the jejunojunal anastomosis is difficult to test endoscopically. However, we postulate that laparoscopic removal of a blood clot by enterotomy and removal of the thrombus without doing revision of the anastomosis is sufficient if there is no evidence of active bleeding and resolved this patient's SBO (8).

## Conclusions

Although rare, the development of a blood clot inside the bowel lumen should always be considered as a possible cause of SBO in the early perioperative period (2–5 days) of patients who have undergone a RYGB procedure. In this patient, administration of the anticoagulant medication may have exacerbated or caused the bleeding occurring at the stapled jejunojunal anastomosis. Early suspicion and diagnosis of the clot by the abdominal CT scan allowed for immediate management via laparoscopic exploration. This not only resolved the patient's SBO but also prevented major post-operative consequences related to bowel perforation, all without revision of the anastomosis as there was no active bleeding.

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None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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