

Acute Mesenteric Venous Thrombosis Following Laparoscopic Roux-en-Y Gastric Bypass

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ABSTRACT

Background and Objectives: Acute mesenteric venous thrombosis has not been previously reported as a complication following Roux-en-Y gastric bypass.

Methods: The authors present 3 cases from a single-center experience of over 1500 patients as well as a review of the literature.

Results: The presenting symptoms are nonspecific, and the diagnosis is often made after infarction of the intestine has occurred. A high index of clinical suspicion is required for timely diagnosis and treatment. A computed tomography scan combined with diagnostic laparoscopy are the gold standard diagnostic tests, and early anticoagulation is the optimal treatment. Diagnostic laparoscopy is essential to evaluate the degree of bowel ischemia and the need for resection.

Conclusion: Acute mesenteric venous thrombosis following Roux-en-Y gastric bypass is a severe and potentially life-threatening complication that requires early exploration and anticoagulation.

Key Words: Acute mesenteric venous thrombosis, Laparoscopic Roux-en-Y gastric bypass.

INTRODUCTION

Roux-en-Y gastric bypass is the gold standard operation for morbid obesity due to its consistently excellent results and low morbidity and mortality.^{1,2} Laparoscopic Roux-en-Y gastric bypass, first described in 1994,³ has become increasingly popular among bariatric surgeons and their patients.^{2,4,5} Several studies of large numbers of patients followed for up to 2 years have reported equivalent success rates to that of open gastric bypass with lower morbidity and mortality rates. The California Institute for Minimally Invasive Surgery has had a similar experience with over 1500 patients undergoing laparoscopic Roux-en-Y gastric bypass.

Acute mesenteric venous thrombosis is a severe, life-threatening complication of abdominal surgery that has not been previously described as a complication of gastric bypass. We report 3 cases in our experience of over 1500 patients and a review of the literature. The aim of this review is to acquaint the bariatric surgeon with the risks, clinical presentation, management, and strategy to prevent this complication.

CASE 1

MM, a 50-year-old male with a body mass index (BMI) of 56 and a weight of 354 lbs, complained of hypertension and asthma in addition to his obesity. A laparoscopic approach was used to perform the jejunojejunostomy and creation of the gastric pouch; however, attempts to pass the Roux limb through the defect in the mesocolon were unsuccessful; thus, conversion to laparotomy was performed. In addition, a defect in the staple line of the jejunojejunosotmy was noted and closed with suture in 2 layers. The gastrojejunostomy was performed using a retrocolic approach with an EEA-21 stapled anastomosis, and a subsequent leak test with air was negative. His postoperative course was uneventful, and the patient was discharged on the fourth postoperative day. He was seen in follow-up 1 day later and found to be doing well. Against medical advice, he undertook a lengthy car trip and upon returning, presented to the office complaining of increasing abdominal pain 9 days after his gastric bypass. He was admitted to the hospital, hydrated, and brought to the operating room for exploration. He was

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found to have a venous infarction of his entire small bowel from the gastric pouch to the mid transverse colon, including the third and fourth portion of the duodenum. The entire infarcted bowel was resected, leaving a gastrostomy tube in the defunctioned stomach, a nasogastric tube, and an end-colostomy. A second-look laparotomy was performed the following day, and the colostomy was found to be infarcted. It was resected to an end (Hartmann) pouch. The postoperative course was complicated by sepsis, renal failure, respiratory failure, and gastrointestinal hemorrhage. He eventually recovered from these over several months and was transferred to a regional transplant center for intestinal transplantation. While awaiting a donor, he succumbed to septic complications of a urinary tract infection.

CASE 2

DC is a 53-year-old male with a 20-year history of obesity who weighed 404 lbs and had a BMI of 65 kg/m² prior to surgery. His comorbid diseases included hypertension, congestive heart failure, Pickwickian syndrome, venous insufficiency, and asthma. Preoperatively, he underwent pulmonary function testing (which revealed chronic obstructive pulmonary disease), lower extremity duplex ultrasonography (negative), and a left heart catheterization (negative). After the initial laparoscopic port was placed, it was decided that completion of the laparoscopic procedure was not feasible due to the patient's body habitus, and his procedure was converted to an open Roux-en-Y gastric bypass, using a retrocolic approach and an EEA-21 stapled gastrojejunostomy. The operation was uncomplicated; a leak test with air was negative, and a gastrostomy was placed. He had an uneventful postoperative course and was discharged on the fourth postoperative day. He presented 18 days following surgery with collapse and shortness of breath. He was suspected of having a pulmonary embolus and was admitted to the intensive care unit. Because angiography was technically not feasible due to his weight and spiral computed tomography (CT) would pose a significant risk of nephrotoxicity given an elevated creatinine, the patient was given empiric thrombolytic therapy in addition to anticoagulation, fluid hydration, and inotropic support of his heart. Over the ensuing period, he developed abdominal distension with small bowel obstruction and a profoundly septic state. Following contrast radiography demonstrating a focal narrowing (**Figure 1**), he was explored on the 22nd postoperative day and found to

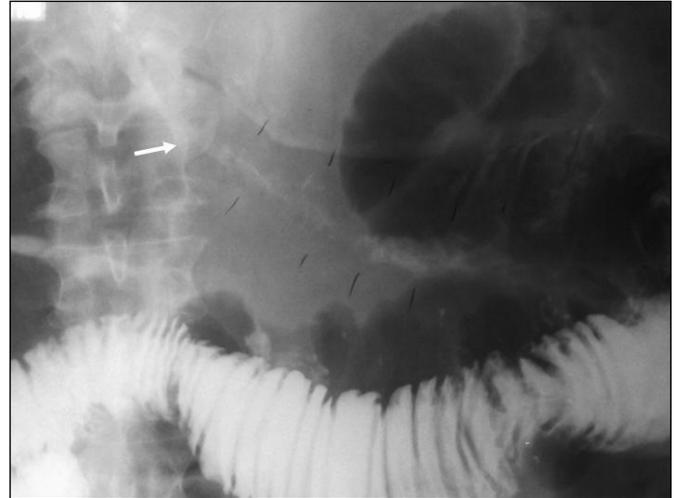


Figure 1. Contrast radiographic small bowel follow-through, demonstrating a focal narrowing of a loop of small bowel (string sign).



Figure 2. Gross specimen of necrotic bowel removed. Histopathologic examination demonstrated venous infarction with full thickness necrosis.

have a section of necrotic small bowel due to mesenteric venous thrombosis (**Figure 2**). A small bowel resection was performed. The patient subsequently improved and was discharged 9 days later.



Figure 3. Computed tomography scan, demonstrating central lucency of the superior mesenteric vein with peripheral enhancement as a sign of acute mesenteric venous thrombosis.

CASE 3

AR is a 36-year-old female with a 25-year history of obesity, a BMI of 49, and a weight of 283 lbs. Her comorbid factors include chronic back pain, hirsutism, and irregular menses. She underwent a laparoscopic Roux-en-Y gastric bypass, using an antecolic approach with a 2-layered hand-sewn gastrojejunostomy. Her operation was uncomplicated; she had an uneventful postoperative course and was discharged from the hospital on the second postoperative day. On the eighth postoperative day, she developed constant and diffuse abdominal pain that progressed in severity over the following 3 days. On presentation at this time, she appeared toxic with mild distension and had moderate tenderness with peritoneal signs. She was suspected of having an anastomotic leak. She was admitted to the hospital for volume resuscitation and a CT scan with oral contrast to be followed by exploratory surgery. The CT scan demonstrated mesenteric venous thrombosis without other abnormalities (**Figure 3**). Exploratory laparoscopy confirmed the diagnosis with the finding of prominent veins filled with clots of the omentum and mesentery; however, the bowel was perfectly viable. The procedure was terminated, and the patient was placed on intravenous heparin followed by oral warfarin therapy for 6 months. She tested negative for factor V Leiden or prothrombin gene mutation. At the time of preparation of this manuscript, she was 3 months from surgery and asymptomatic.

DISCUSSION

Acute mesenteric venous thrombosis can be a catastrophic condition with a nonspecific presentation and a delay in diagnosis until laparotomy or postmortem examination. The causes are varied and involve prothrombic states, hematologic disorders, inflammatory diseases, postoperative state, cirrhosis, blunt trauma or decompression sickness.⁶ Prothrombotic states may include obesity, antithrombin III deficiency, protein C or S deficiency, factor V Leiden, oral contraceptive use, pregnancy, or neoplasms. Hematologic disorders include polycythemia vera, essential thrombocytosis, and paroxysmal nocturnal hemoglobinuria. Inflammatory diseases include pancreatitis, peritonitis, intraabdominal infections, inflammatory bowel disease, and diverticulitis.

Although the subacute and chronic form may be indolent and ultimately benign, the acute form may result in gangrene of the bowel with peritonitis and septic shock. Pain out of proportion to physical findings particularly in the presence of one or more risk factors should raise clinical suspicion and prompt the necessary diagnostic workup. Historical findings may include nausea, vomiting, anorexia, and colicky pain often present for more than 48 hours prior to seeking medical attention. Physical findings may range from normal to peritonitis septic shock.

Normal blood tests do not exclude the diagnosis, and abnormal findings suggest a picture of irreversible bowel ischemia. Leucocytosis with a left shift and a metabolic (lactic) acidosis are typical of late findings. Abdominal radiographs may demonstrate an ileus, pneumatosis intestinalis, bowel wall edema with thumbprinting or intraperitoneal or portal vein air. Computed tomography with intravenous contrast is the test of choice and is diagnostic in up to 90% of patients.⁷ Findings include mesenteric venous engorgement, collateralization and intraluminal filling defects with central lucency, and enhancement of the venous walls. Mesenteric edema as well as the aforementioned findings of plain radiography may also be seen. Other tests, such as transabdominal Doppler ultrasound, mesenteric angiography, or magnetic resonance imaging are either operator-dependent, less accurate, or more costly and thus do not provide an advantage over CT. Surgical exploration, preferably laparoscopic, may provide the definitive diagnosis when other modalities, including CT, yield negative or equivocal findings. Additional testing for protein C and S defi-

ciencies, factor V Leiden, prothrombin gene mutation, hyperhomocystinemia, and paroxysmal nocturnal hemoglobinuria is essential once the diagnosis is made.

Even when the diagnosis is made with a CT or another imaging modality, the importance of diagnostic laparoscopy as an adjunct cannot be understated. Radiographic modalities including CT are notoriously inaccurate in determining the extent of bowel ischemia. Furthermore, obese patients may not manifest the symptoms or physical signs of peritonitis. Diagnostic laparoscopy can confirm the suspected diagnosis, determine the extent of involvement as well as the need for bowel resection or a second look in 24 to 48 hours. Preparation for surgery should include aggressive fluid resuscitation, broad spectrum antibiotics, perioperative monitoring with electrocardiogram, blood pressure, and oxygen saturation. A urinary catheter is standard, and intraarterial pressure monitoring and pulmonary artery catheterization should be reserved for critically ill patients or those with significant underlying cardiorespiratory impairment. A thorough exploration may be performed via laparoscopy with early conversion if extensive resection is warranted. Equivocal findings may require subsequent second-look laparoscopy or laparotomy 24 to 48 hours later.

All patients should be treated with anticoagulation. Aggressive intravenous hydration, bowel rest, and total parenteral nutrition are important adjunctive measures. The duration of anticoagulation is dependent upon the presence of a prothrombotic state, which may require life-long treatment. Otherwise, the treatment duration is identical to that for treatment of deep venous thrombosis or pulmonary embolism, which is 6 to 12 months.⁶ Thrombolysis has been used with success in anecdotal reports; however, large studies are lacking. The mortality rate of acute mesenteric thrombosis is 20% to 50%,⁸ and recurrence is common within the first 30 days.

A review of the literature with a PubMed search failed to demonstrate any previously reported cases of acute mesenteric venous thrombosis following bariatric surgery. Included were published reviews as well as large prospective and retrospective studies. Of studies reporting on 2284 patients who underwent laparoscopic Roux-en-Y gastric bypass,^{4,5,9,10} 4289 patients who underwent open Roux-en-Y gastric bypass,¹¹⁻¹³ 2383 who underwent biliopancreatic diversion,^{14,15} and 252 who underwent duodenal switch,¹⁶ not one reported case of acute mesen-

teric venous thrombosis was found. Although pulmonary embolism is a frequent cause of perioperative mortality following bariatric surgery, the overall incidence of reported venous thromboembolic complications is 0% to 2%.^{17,18}

The 3 cases reported here are based on a single-center experience of over 1500 Roux-en-Y gastric bypasses of which the majority were performed with the laparoscopic approach. One was performed open (immediate conversion after placement initial ports), one was laparoscopic-assisted, and one was completely laparoscopic. All patients were discharged home and were doing well at their initial follow-up visit within the first 7 days of their operations. The symptoms of acute mesenteric venous thrombosis began on days 8, 9, and 18 for each of the 3 patients. Two presented with frank peritonitis, and their diagnoses were made intraoperatively, while the third patient presented with acute abdominal pain and was diagnosed by CT scan and confirmed with exploratory laparoscopy. Anticoagulation was started very early in the 2 survivors; one was presumed to have a pulmonary embolism and treated empirically with thrombolysis followed by anticoagulation. From our limited experience, early anticoagulation appears essential to limit thrombosis and improve survival.

CONCLUSION

Although not previously reported following Roux-en-Y gastric bypass, acute mesenteric venous thrombosis may occur and cause death. Symptoms tend to develop within the first month but well after the patient has recovered from surgery and been discharged from the hospital. A high index of suspicion is necessary as this entity is often diagnosed at a late and irreversible stage. CT scan and early diagnostic laparoscopy are the tests of choice, and early anticoagulation is the optimal treatment. Diagnostic laparoscopy serves to confirm the diagnosis and evaluate the degree of bowel ischemia. Additional workups should include assessment of prothrombotic states to determine the duration of treatment. In the absence of such states, the duration of anticoagulation is recommended to be equivalent to that of other venous thromboembolic events, or 6 to 12 months.

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