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Gastrointestinal Hemorrhage after Laparoscopic Gastric Bypass

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Gastrointestinal hemorrhage is a potential perioperative complication after Roux-en-Y gastric bypass. The surgeon performing laparoscopic gastric bypass should understand the need for early recognition and management of this complication, as it can be life-threatening. This paper discusses the incidence and clinical presentation of gastrointestinal hemorrhage, mechanisms for hemorrhage, management options, and possible methods of prevention.

Key words: Gastrointestinal hemorrhage, morbid obesity, laparoscopic gastric bypass

Introduction

Gastrointestinal (GI) hemorrhage is a potential perioperative complication after both open and laparoscopic Roux-en-Y gastric bypass (RYGBP). The incidence of GI hemorrhage after laparoscopic RYGBP ranges from 1.1% to 4%.¹⁻⁵ In a review of published literature comparing complications of laparoscopic vs open RYGBP, Podnos et al⁶ reported that the rate of GI hemorrhage after laparoscopic RYGBP was higher than that of open RYGBP (1.9% vs 0.6%, respectively). Therefore, GI hemorrhage is a potential concern in the perioperative management of patients undergoing laparoscopic RYGBP. The reasons for the observed higher rate of GI hemorrhage after laparoscopic RYGBP could be related to a technical factor, such as less frequent oversewing of staple-lines and/or more diligent use of antithrombotics for venous thrombo-

sis prophylaxis during laparoscopic RYGBP. This article discusses the presentation of GI bleeding, its etiology, options for treatment, and available methods for prevention.

Presentation

Patients with GI hemorrhage have their clinical presentation either *early* (within 48 hours) or *late* (after 48 hours) following the index procedure. Early presentation consists of hematemesis, bright red blood in bowel movements and/or hypotension (Figure 1). Early GI hemorrhage, particularly if presenting within the first 6 hours after the operation, is an

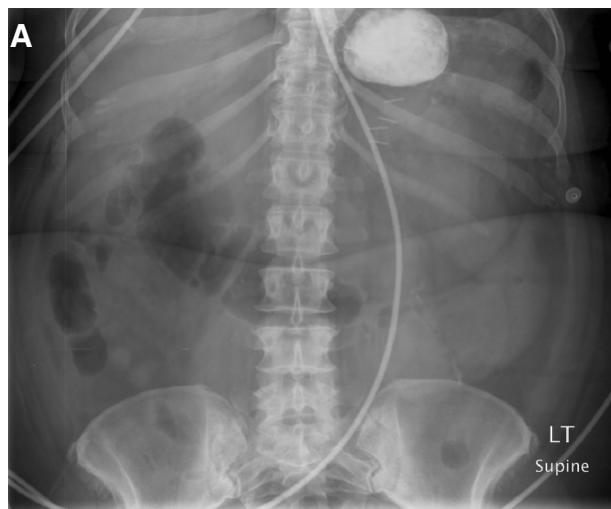


Figure 1A. Gastrografin® contrast study demonstrating gastric outlet obstruction in a patient presenting with hematemesis.

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indication of active and persistent bleeding. The presence of GI hemorrhage in combination with clinical signs of hypotension is another indicator of active bleeding. Clinical signs of hypotension with a rapidly falling hematocrit signify active bleeding but do not indicate whether the bleeding is occurring intraluminally or intraabdominally. The clinical presentation of GI hemorrhage after 48 hours normally consists of passage of melana stool, usually without other clinical manifestation such as a change in the hematocrit or vital signs.² The presence of melena after 48 hours from the index operation usually represents the evacuation of old blood clots which accumulated from the primary procedure and usually does not represent active bleeding.

Etiology and Diagnostic Modalities

The cause for GI hemorrhage after laparoscopic RYGBP is related to the staple-lines. There are four potential sites of staple-line hemorrhage. These sites are the staple-lines at the gastric pouch, the gastrojejunostomy, the jejunojunction, and the bypassed stomach. The mechanisms of bleeding at the staple-lines include bleeding at the transected tissue edges or at the sites of staple penetration of the tissue. For example, if a stapler divides the stomach with a vessel traversing the serosal layer, transection of the vessel can result in staple-line hemorrhage. Similarly, staple penetration of the mucosal layer with piercing of a vessel can lead to bleeding at the point where the staple penetrates the tissue. Since the etiology of GI hemorrhage after laparoscopic RYGBP is from the staple-lines, it is not necessary to perform diagnostic modalities to localize the site of bleeding. The presumed source of bleeding is from the gastric pouch, gastrojejunostomy, bypassed stomach, or jejunojunction staple-lines. The patient's clinical presentation can narrow the possible site of bleeding. The presence of hematemesis points to the gastrojejunostomy or the gastric pouch as the source of bleeding. In contrast, bright red blood per rectum usually points to bleeding from either the bypassed stomach or the jejunojunction.

Management

Initial management of GI hemorrhage consists of fluid resuscitation and preparation for blood transfusions. The primary treatment depends on the clinical presentation and the timing of presentation.⁷ Hematemesis or bright red blood per rectum suggests the potential origin of bleeding and thus dictates the steps in treatment. Hypotension, tachycardia, pallor and vasoconstriction signify active rapid bleeding requiring urgent intervention. The timing of presentation is also critical in the management of GI hemorrhage. Obvious bleeding within the first 6 hours after surgery with a decline in the hematocrit usually indicates active bleeding which will require intervention. In contrast, GI hemorrhage occurring after 48 hours without a change in the hematocrit usually does not require any surgical intervention.

Reoperative intervention consists of either endoscopic therapy or reoperation. Endoscopic therapy is most successful in patients with hemorrhage from either the gastric pouch or gastrojejunostomy. The role of endoscopy is to evacuate the intraluminal blood clots and obtain hemostasis (Figures 1B and 1C). Possible endoscopic methods for stopping staple-line bleeding at the gastrojejunostomy or gastric pouch staple-lines include injection of epinephrine and/or thermal coagulation. A contrast study should be performed routinely after any endoscopic therapy

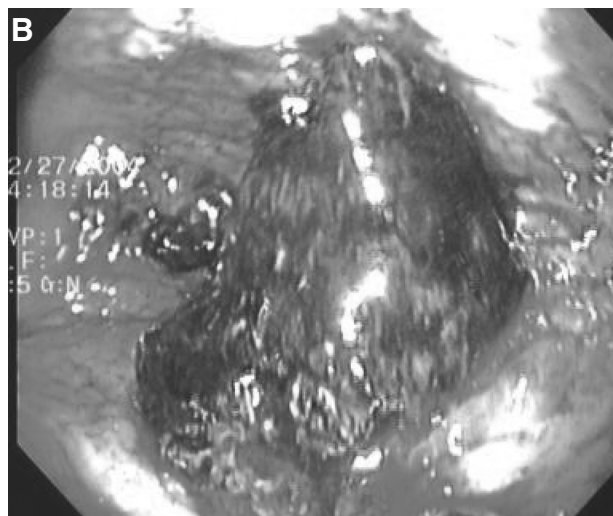


Figure 1B. Endoscopic view demonstrating a blood clot obstructing the gastrojejunostomy.

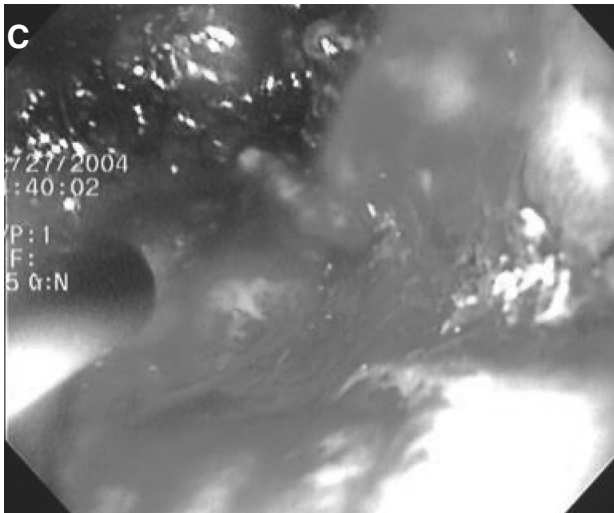


Figure 1C. Endoscopic view demonstrating active bleeding at the gastric pouch staple-line.

to rule out any potential perforations.

Endoscopy has limited application for management of bleeding at the jejunojunostomy because of the long length of the Roux limb, particularly in patients with a 150-cm Roux limb, and the large amount of intraluminal clots prohibiting good visualization. Nevertheless, successful endoscopic management of bleeding at the jejunojunostomy has been described.⁸ There is no role for endoscopic management of staple-line bleeding arising from the bypassed stomach which is inaccessible to the endoscope.

Reoperative intervention is indicated in patients presenting with hemodynamic instability such as the presence of hypotension and tachycardia with decreasing hematocrit or patients presenting with early GI hemorrhage within the initial 6 hours after the operation. Patients with hemodynamic instability represent a subgroup of patients who are bleeding at a rapid rate, and prolonged observation can lead to adverse outcomes. Similarly, the presence of GI hemorrhage within 6 hours after the operation represents active bleeding which results in these clinical manifestations.

Reoperative intervention consists of either laparoscopy or open surgery depending on the patient's hemodynamic stability. If the patient is hemodynamically unstable, laparoscopy is relatively contraindicated because the increased intraabdominal pressure during pneumoperitoneum can

result in worsening of the hemodynamics. The goals at the time of reoperation are to rule out an intraabdominal source of bleeding, evacuate intraluminal clots, and oversee all potential sites of staple-line bleeding.

If the bypassed stomach is distended, a gastrotomy can be performed in the greater curvature of the excluded stomach for removal of intraluminal clots (Figures 2A and 2B). Upon decompression, the staple-line should be oversewn with either running or interrupted sutures. It may be prudent to leave in a gastrostomy tube, for decompression during the ensuing ileus, for potential radiography and for feeding.



Figure 2A. Laparoscopic view demonstrating the distended bypassed stomach in a patient presenting with bright red blood per rectum and hypotension.

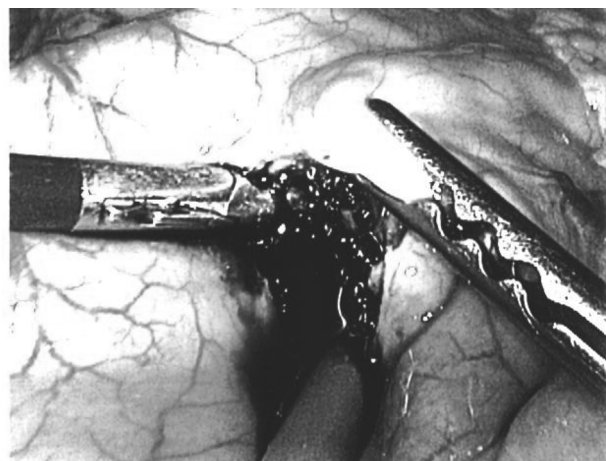


Figure 2B. A gastrotomy was created to decompress 800 mL of blood clots.

It is not necessary to identify the actual site of GI bleeding, because it would be difficult in the majority of cases. The primary goal during reexploration is luminal decompression of blood clots and oversewing of all staple-lines. It is also important to exclude intraabdominal hemorrhage in patients presenting with hypotension and decreasing hematocrit without the clinical signs of GI hemorrhage.

Prevention

There are some potential methods for prevention of staple-line bleeding. One method is to use a linear stapler with a shorter staple height. For example, the white linear stapler load (2.5 mm) is now used for creation of the jejunojejunostomy rather than a blue stapler load (3.5 mm), and the blue stapler load is used for creation of the gastric pouch rather than a green stapler load (4.8 mm). The shorter staple height provides more compression of the tissues and hence results in better hemostasis. However, shorter staple height does not completely prevent staple-line bleeding.

Another method for prevention of staple-line bleeding is the use of a staple-line reinforcement product. Peri-Strips Dry[®] (Synovis, Saint Paul, MN) are composed of two strips of biological tissue derived from bovine pericardium that are applied to the linear stapler and act as a buttressing material at the staple-lines.^{9,10} Seamguard[®] (W. L. Gore & Associates, Flagstaff, AZ) staple-line reinforcement works in a similar fashion using ePTFE instead of biologic tissue. De la Torre and colleagues¹¹ reported the use of Seamguard[®] on 50 laparoscopic RYGBP patients; they did not find any postoperative GI hemorrhages in their study. However, these products are nonabsorbable. The presence of a foreign body next to the GI tract could conceivably result in indolent infection of the foreign body and possible erosion. Recently, bioabsorbable Seamguard[®] has been released for clinical use, and is composed of absorbable Maxon[®] suture material which is degraded within 6 weeks after surgery.

Another potential method for prevention of GI bleeding is to perform routine oversewing of all staple-lines at the primary operation. However, this is a time-consuming task. In the future, we can look for-

ward to possible development of a hemostatic gel that is applied to the stapler before its application, but no such product is currently available in the market.

Conclusion

GI hemorrhage is a potential complication after laparoscopic gastric bypass. Its incidence appears to be higher in laparoscopic RYGBP than in open RYGBP. Diagnostic evaluation is of limited value because the sites of GI hemorrhage are almost certainly the staple-lines. Timing of intervention for GI hemorrhage should be based on the patient's clinical status, including vital signs, hematocrit, and other indications of ongoing hemorrhage. Endoscopic management of bleeding from the gastric pouch may be successful. Laparoscopic exploration will rule out intraperitoneal bleeding and oversewing of all staple-lines may be accomplished. In some patients, a gastrotomy with clot evacuation will be necessary. Preventive measures include the use of staples with shorter staple height, routine oversewing of staple-lines, and/or the use of staple-line reinforcement products.

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