

# Management of Acute Bleeding after Laparoscopic Roux-en-Y Gastric Bypass

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**Background:** The authors reviewed the incidence of hemorrhage after laparoscopic Roux-en-Y gastric bypass (LRYGBP). The purpose of this study was to determine the incidence of this complication and to evaluate various treatment options.

**Material and Methods:** The records for 450 consecutive patients who had undergone LRYGBP over a 30-month period, were retrospectively reviewed. In all patients, the abdominal cavity had been drained with 2 19-Fr closed suction drains. The charts of patients who had developed an intraluminal or an intra-abdominal bleed were chosen for further review.

**Results:** 20 patients (4.4%) developed an acute postoperative hemorrhage. The bleeding was intraluminal in 12 cases (60%), manifested by a drop in hematocrit, tachycardia and melena. The other 8 patients (40%) developed intra-abdominal hemorrhage, confirmed by large bloody output from the drains. 3 patients (15%) with intraluminal bleeding were unstable and required a reoperation. All others were successfully treated with observation, and 15 patients (75%) required blood transfusions.

**Conclusions:** The diagnosis and treatment of acute intraluminal bleeding after LRYGBP represents a surgical dilemma, mainly due to the inaccessibility of the bypassed stomach and the jejuno-jejunostomy, as well as the risks associated with early postoperative endoscopy. The presence of large intra-abdominal drains allows for bleeding site localization (intraluminal vs intraabdominal) and for more accurate monitoring of the bleeding rate. Most cases respond to conservative therapy. Failure of conservative management of intraluminal bleeding, however, is more problematic and may require operative intervention. A treatment algorithm is proposed.

**Key words:** Morbid obesity, bariatric surgery, gastric bypass, hemorrhage

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## Introduction

Obesity-related co-morbidities, such as coronary artery disease, hypertension, diabetes, and obstructive sleep apnea place bariatric surgery patients at a higher than average risk for operations. Furthermore, postoperative complications such as pulmonary embolus and abdominal catastrophes are potentially fatal causes of morbidity in this population.<sup>1,2</sup> Acute postoperative bleeding is an uncommon complication of bariatric surgery. Its diagnosis and treatment, however, represent a surgical dilemma, mainly due to the inaccessibility of the partitioned excluded stomach and the risks associated with early postoperative endoscopy. We, therefore, reviewed the incidence of hemorrhage after laparoscopic Roux-en-Y gastric bypass (LRYGBP) at our institution. Our study's purpose was to determine the incidence of this complication, evaluate the various preventive and treatment options, and provide a potential management algorithm.

## Methods and Materials

Institutional Review Board approval was obtained, and the records for 450 consecutive patients who had undergone LRYGBP over a 30-month period, were retrospectively reviewed. The patients received 5,000 IU of subcutaneous heparin 1 hour before and every 8 hours after the surgery for deep venous thrombosis (DVT) prophylaxis. The procedure was performed using a 7-trocar technique. A fully transected 30-45 cc lesser curvature-based gastric pouch

was created using both 4.8-mm (green cartridge) and 3.5-mm (blue cartridge) linear staplers (Ethicon Endo-Surgery, Cincinnati, OH). The former were reinforced with bovine pericardial staple-line reinforcement (PeriStrips Dry<sup>®</sup>, Synovis Surgical Innovations, St. Paul, MN). The gastrojejunostomy was then created using a 3.5-mm linear stapler and completed in two layers using absorbable running sutures (hand-sewn). The jejunostomy, on the other hand, was created and completed using only 3.5-mm linear staplers. Medium-sized clips (Ethicon Endo-Surgery, Cincinnati, OH) were then applied to the final jejunostomy staple-line for additional hemostasis. In all patients, two 19-Fr closed suction drains (Blake Silicon Drains, Ethicon Endo-Surgery) had been placed in the abdominal cavity for detection of anastomotic leaks. The charts of patients who had developed either an intraluminal or an intraperitoneal bleed were chosen for further review.

## Results

Table 1 summarizes the results. Twenty patients (4.4%) developed an acute postoperative hemorrhage. One other patient developed very heavy menses, requiring blood and platelet transfusions and was excluded from the results. The bleeding was intraluminal (IL) in 12 cases (60%), manifested by a drop in the hematocrit, and melena. The other 8 patients (40%) developed intra-abdominal (IA) hemorrhage, confirmed by large bloody output from the drains and a falling hematocrit. All patients were initially treated conservatively with observation and discontinuation of subcutaneous heparin. Ten patients with IL bleeding and 5 patients with IA hemorrhage became symptomatic and required blood transfusions.

Three patients (15%) remained unstable, necessitating operative exploration. In one, intra-operative

**Table 1. Summary of patients with acute bleeding after LRYGBP**

Patient	Age/Gender	BMI	OSA	DM	HTN	Msk	IA/IL	%Hct fall	Transf	Reop	LOS
1	45 F	46	+	-	-	+	IA	24	-	-	3
2	40 M	45	+	+	+	+	IA	56	+	-	6
3	35 M	41	+	-	+	+	IA	40	-	-	4
4	34 F	76	-	-	-	+	IA	38	+	-	3
5	56 F	40	-	-	+	+	IL	50	+	-	4
6	42 M	73	+	-	+	+	IL	45	+	-	5
7	38 F	50	+	-	-	+	IL	44	+	-	5
8	35 M	41	+	+	-	+	IL	35	-	-	4
9	44 F	47	+	-	-	+	IL	50	+	-	3
10	33 F	44	+	-	-	+	IL	44	+	+	7
11	44 F	38	+	-	-	+	IL	31	+	+	18
13	65 M	51	+	-	-	+	IL	37	+	-	4
14	55 M	45	-	+	+	+	IA	63	+	-	5
15	46 M	46	+	+	+	+	IL	29	+	-	6
15	60 M	40	+	-	+	+	IA	36	+	-	3
16	33 F	40	+	-	+	+	IL	36	+	-	5
18	39 M	50	+	-	+	+	IA	31	+	-	5
19	37 M	50	+	-	-	+	IL	38	+	+	7
20	56 F	41	-	+	+	+	IA	22	+	-	5

OSA = obstructive sleep apnea; DM = diabetes mellitus (type 1 or 2); HTN = hypertension; Msk = musculoskeletal complaints; IA = intra-abdominal; IL = intraluminal; Transf = blood transfusion; Reop = reoperation; LOS = length of hospital stay.

(a) Bleeding from the gastro-jejunostomy staple-line.

(b) Gastric remnant bleed and distention. Incidental finding during laparotomy for a gastric pouch leak.

(c) Coagulopathy secondary to vitamin K deficiency (? related to ETOH abuse history).

(d) Bypassed stomach bleed and distention.

endoscopy was utilized to examine all of the staple-lines; an adherent clot was present at the gastro-jejunosomy but no active bleeding was noted. The second patient was re-operated for peritonitis where a gastric pouch tear was discovered and treated; the bypassed stomach was also distended with blood. The third patient also developed bleeding and distention in the bypassed stomach. In all three patients, decompressive gastrostomy tubes were placed in the bypassed stomach and all the staple-lines were oversewn. There were no mortalities.

## Discussion

Many series have been published in the bariatric surgery literature pertaining to the diagnosis and treatment of chronic gastrointestinal (GI) bleeding secondary to marginal ulcers, gastritis, peptic ulcer disease or even malignancy in the remnant stomach.<sup>3-13</sup> Acute postoperative bleeding, on the other hand, is an uncommon complication of LRYGBP. Nguyen<sup>14</sup> recently reported a 3.2% incidence of early postoperative GI hemorrhage following LRYGBP. Oliak and colleagues<sup>15</sup> also documented a 2.7% incidence of bleeding in their series of 225 patients, mostly in the early subset of patients. In their respective series of 1,500 and 500 patients, Higa<sup>16</sup> and Wittgrove<sup>17</sup> reported a 0.8% incidence of postoperative hemorrhage. However, they neither clarified the source of the bleeding, nor the exact treatment and outcomes for each case. Finally, De Maria<sup>18</sup> and See<sup>19</sup> did not report any bleeding complications in their series of 281 and 70 patients, respectively.

In our group of 450 LRYGBP procedures, 20 patients (4.4%) developed an acute postoperative hemorrhage. These differences may be due to technical variations, reporting accuracy and the threshold parameters used to differentiate bleeding from normal postoperative hemodilution. We defined hemorrhage as the presence of melena or persistently large bloody output from the drains, along with tachycardia, hypotension, oliguria, and a decreasing hematocrit. Most of our patients were symptomatic, and all but three remained stable and responded to conservative management with discontinuation of subcutaneous heparin and, in some cases, blood

transfusion.

Intraluminal bleeding after LRYGBP presents a unique dilemma, mainly due to the inaccessibility of the bypassed stomach and the jejuno-jejunosomy, as well as the risks associated with early postoperative endoscopy. Strodel<sup>10</sup> and Sinar<sup>13</sup> previously described their experiences and recommendations for post-gastric bypass endoscopy in the management of occult/chronic bleeding. However, patients in those series had undergone VBG or other uncut gastroplasties; even then, the success rate was <70%. Sundblom<sup>5</sup> and Silecchia<sup>11</sup> have promoted CT or ultrasound guided percutaneous access to the bypassed stomach for esophagogastroduodenoscopy (EGD) or virtual endoscopy. Both methods, once again, are time-consuming and unsuitable for the evaluation of immediate post-LRYGBP hemorrhage. Tagged red blood cell scan is commonly used in the management of lower GI bleeding. However, with the exception of two case reports,<sup>14,20</sup> its utility after gastric bypass is unknown.

Unfractionated and low molecular weight heparin (LMWH) are also commonly used in bariatric surgery for DVT prophylaxis. However, there is no consensus as to the true incidence of DVT/pulmonary embolus (PE) in morbidly obese patients or even the exact prophylactic methods that need to be used.<sup>21-24</sup> Published reports have compared various LMWH dosages and their resultant incidence of bleeding in gastric bypass patients.<sup>25,26</sup> However, no comparison has been made to unfractionated heparin in the bariatric literature.

Finally, the role of the recent use of non-steroidal anti-inflammatory or the newer COX inhibitor agents, is unknown in this study.<sup>27</sup> All the patients in our series listed musculoskeletal and arthritic complaints as obesity-related co-morbidities and used these agents frequently – in some cases daily – for treatment. All patients were instructed in writing to discontinue their use for at least 7-10 days preoperatively. Their compliance, however, is unknown, as is the necessity to discontinue these medications for longer periods of time.

The newer generation of endoscopic staplers (six-row) or bovine pericardial staple-line reinforcement strips decrease the incidence of anastomotic bleeding.<sup>28</sup> No randomized data, however, exists regarding their effectiveness in LRYGBP. Finally, the use

of closed suction surgical drains is thought to facilitate the detection and non-operative management of anastomotic leaks.<sup>29</sup> However, similar benefits have not been studied in the management of acute bleeding after LRYGBP.

Re-operative laparotomy with or without intraoperative endoscopy has remained the diagnostic and therapeutic method of choice in those patients who have failed conservative management.<sup>30</sup> Laparoscopically-assisted enteroscopy, however, may be an alternative solution. It can be performed via a peroral or transenterotomy approach and has been applied successfully to the localization and treatment of symptomatic occult small and large bowel tumors and arteriovenous malformations.<sup>31-35</sup> This method avoids potential pitfalls associated with laparotomy, such as wound or respiratory complications, increased pain, and prolonged hospital stay. To our knowledge, this technique has not been utilized in gastric bypass patients to identify the source of postoperative hemorrhage.

A treatment algorithm for the management of acute bleeding following LRYGBP in stable patients is proposed in Figure 1. As with other proposed algorithms, it must be tailored to each individual case. Providing a very comprehensive approach to this relatively uncommon problem encourages an initial course of conservative management, while maintaining vigilance and a low threshold for aggressive intervention in these otherwise difficult patients.

In summary, acute postoperative bleeding is unusual following LRYGBP. Most cases respond to conservative therapy, and re-operation is rarely indicated. The presence of two large intra-abdominal drains, one in the subhepatic space in proximity to the pouch and bypassed stomach and the other in the peritoneal cavity near the jejunum-jejunostomy, allows for bleeding site localization (intraluminal vs intraabdominal), and a more accurate monitoring of the bleeding rate. Failure of conservative management, however, requires operative intervention, such as laparoscopy-assisted enteroscopy and possible laparotomy. Meanwhile, randomized trials are required to assess the effectiveness of using low molecular weight heparin, the newer generation of endoscopic staplers, and staple-line reinforcements in reducing the incidence of postoperative hemorrhage in LRYGBP.

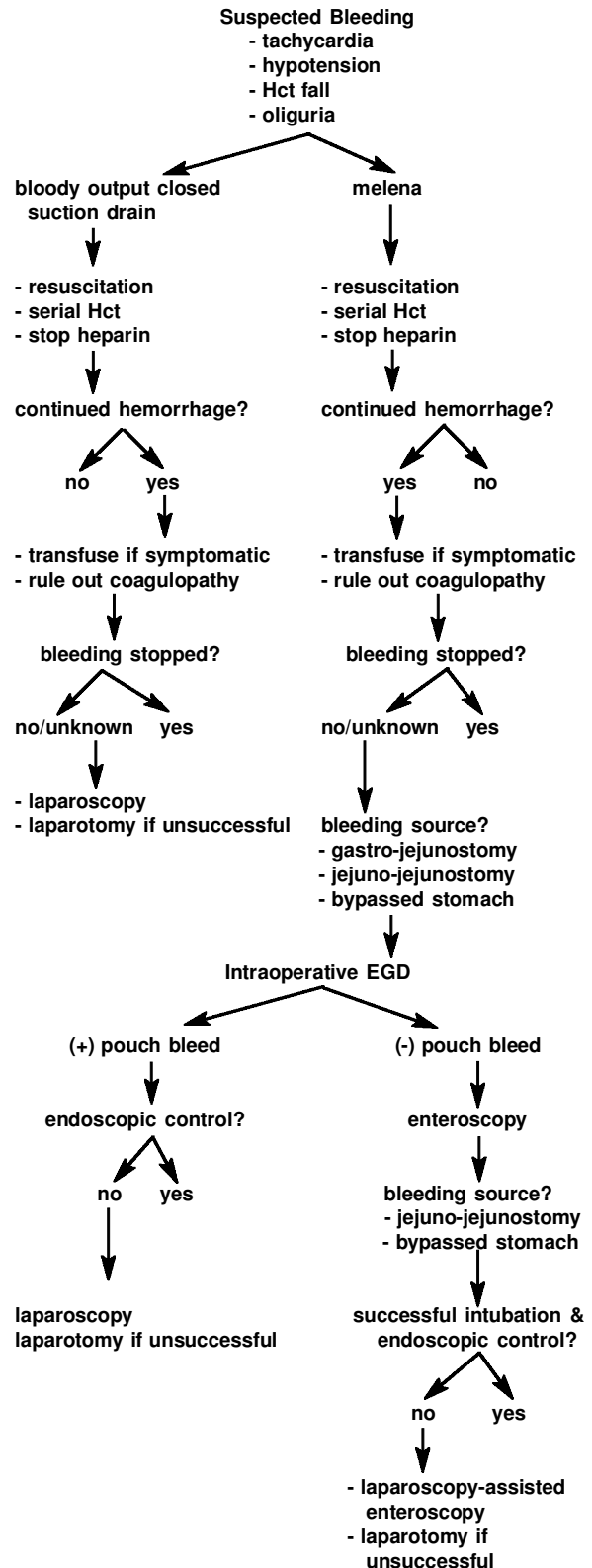


Figure 1. Proposed ALGORITHM for the management of hemorrhage in stable patients after LRYGBP.

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