

Fatal Fulminant Pancreatitis After Laparoscopic Gastric Bypass Surgery

Cunchuan Wang · Yixing Ren · Jun Chen · Youzhu Hu ·
Jingge Yang · Peng Xu · Yunlong Pan · Jinyi Li

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Abstract Current widespread application of laparoscopic techniques in Roux-en-Y gastric bypass (RYGBP) is making surgical safety an increasingly important issue. We report one case that resulted in death due to postoperative fulminant acute pancreatitis after laparoscopic RYGBP was performed when this procedure was still relatively new in China. The patient was a chronically obese 19-year-old male. Weight loss medications had been ineffective, and preoperative body mass index was 40.7. Preoperative examination revealed moderate steatohepatitis. Laparoscopic RYGBP (LRYGBP) was performed. Early manifestations of clinical shock appeared 13 h after the laparoscopic surgery. A second laparoscopic examination showed small-vessel hemorrhage at the posterior wall of the jejunojejunal anastomosis, with blood clot formation resulting in Roux limb and afferent loop obstruction. Fulminant acute pancreatitis developed in the patient 18 h after the second surgery. The patient died 15 days later from systemic multiorgan insufficiency. LRYGBP (postcolon) is a technically demanding procedure for surgeons who are not experienced in this operation. In addition, surgical tolerance is reduced in morbidly obese patients. Therefore, special care should be taken during surgery, and hemostasis must be achieved at all bleeding sites. Increased perioperative surveillance allows for early detection and management of severe complications.

Keywords Morbid obesity · Gastric bypass · Laparoscopy · Severe acute pancreatitis

C. Wang (✉) · Y. Ren · J. Chen · Y. Hu · J. Yang · P. Xu ·
Y. Pan · J. Li
The Center of Minimally Invasive Surgery,
First Affiliated Hospital of Jinan University,
Guangzhou 510630, China
e-mail: wangcunchuan@tom.com

Introduction

Laparoscopic Roux-en-Y gastric bypass (LRYGBP) has become a frequent operation for morbid obesity [1]. It provides long-term weight loss for patients with body mass index (BMI) >40 (>35 in the presence of comorbidities) and is more effective than exercise and diet [2]. Fulminant pancreatitis is defined by the appearance of one of the following clinical conditions within 72 h of acute pancreatitis resulting from any cause: renal failure (serum creatinine >2.0 mg/dL), respiratory failure (PaO₂ ≤60 mm Hg), shock (systolic blood pressure ≤80 mm Hg, maintained for 15 min), coagulopathy (prothrombin time <70% and/or activated partial thromboplastin time >45 s), septicemia (temperature >38.5°C, white blood cell count >16.0 × 10⁹ cells/L, base excess ≤4 mmol/L, maintained for 48 h, blood/secretion bacterial culture negative), or systemic inflammatory response syndrome (temperature >38.5°C, white blood cell count >12.0 × 10⁹ cells/L, base excess ≤2.5 mmol/L, maintained for 48 h, blood/secretion bacterial culture negative). As a traumatic treatment method, surgery can indeed induce fulminant acute pancreatitis; however, this rarely occurs after LRYGBP. We report a case of death due to postoperative fulminant acute pancreatitis occurring after LRYGBP when this procedure was still relatively new in China.

Case Report

A 19-year-old male presented to our hospital because of significant weight gain over 8 years, where weight loss medications produced no improvement. Examination showed BMI 40.7, steatohepatitis, alanine transaminase 53 U/L, and prolactin slightly elevated; other examinations

showed no obvious abnormalities. Preoperative assessment showed that this patient had no surgical contraindications. LRYGBP was performed on August 9, 2004, under general anesthesia with endotracheal intubation. The body of the stomach was divided from the <curve by ultrasonic scalpel. The stomach was then raised and dissected by using an ETS-Flex45 Endoscopic Linear Cutter (Ethicon, Cornelia, GA, USA) with blue TR45B 3.8-mm staple cartridges. The stomach was carefully dissected while entering the lesser sac, and no damage to the pancreas was evident. A small gastric pouch ~20 mL in volume was preserved during the operation. The jejunum was divided 50 cm from the duodenojejunal junction using TR45B staple cartridges. The distal jejunum was raised superiorly behind the transverse colon and the body of the stomach and was anastomosed with the proximal stomach using TR45B staple cartridges. The anastomosis diameter was 4 cm. The Roux limb (distal small intestine) and the afferent loop (125 cm long) were anastomosed side to side using TR45B staple cartridges, and the ETS-Flex45 insertion site was closed with size 000 absorbable sutures in an interrupted “8” shape. Approximately 175 cm of small intestine was bypassed. Mesenteric tears were sutured laparoscopically using 4–0 silk sutures.

The patient developed painful upper abdominal distension 13 h after the surgery, becoming tachycardic (120–130 beats/minute) with blood pressure of 130/80 mm Hg. Rapid fluid replacement and pethidine acesodyne did not produce satisfactory results. Twenty hours after surgery, the patient’s heart rate was still between 135 and 185 beats/minute, blood pressure was approximately 70/50 mm Hg, 350 mL pink fluid drained from the gastric drain tube, and 50 mL pink fluid had drained from the abdominal cavity drain tube.

A diagnosis of postoperative hemorrhagic shock was suspected, and the patient was immediately transferred to the surgical theater for laparoscopic examination and bleeding management. A trocar was inserted through the original surgical insertion site, and the Roux limb and afferent loop were found distended, and tension was markedly increased. Approximately 1,500 mL of dark red hemoserous fluid was present in the abdominal cavity. After the abdominal cavity was washed out repeatedly, the stomach was dissected at the gastric sinus. Five hundred milliliters of gastric content containing bile-like fluid was suctioned from the bypassed stomach cavity. Approximately 60 g of blood clot was found to be adherent to the lateral edge of the jejunojejunal (JJ) anastomosis. The blood clot and the staples at the JJ anastomosis were then removed. A massive dark-colored blood clot (500 g) was found at the JJ anastomosis, blocking the Roux loop, the afferent limb, and the common limb. A site of active bleeding was discovered at the posterior wall of the

anastomosis (linear cutter stapling site). The bleeding stopped after suturing using silk sutures. Methylene blue solution administered through a gastric tube was able to successfully reach the JJ anastomosis, and bile was also observed to flow towards the anastomosis from the proximal duodenum. The divided jejunum was sutured using size 000 absorbable interrupted sutures, and the suture site was thoroughly reexamined. One depressurizing drainage tube was placed in the bypassed stomach cavity; the stomach cavity was then closed by interrupted sutures and the tube was placed so that it drained through the original insertion site. After confirming that no sites of active bleeding were present within the abdominal cavity, one abdominal cavity drainage tube was placed at the JJ anastomosis and another under the liver. The abdominal cavity was washed out repeatedly. During the surgery, the patient’s blood pressure gradually returned to 125/80 mm Hg by administering blood transfusions, and the heart rate decreased to 113 beats/minute.

The patient was transferred to the intensive care unit after surgery. He was mentally alert; blood pressure fluctuated between 110–130 and 65–85 mm Hg, heart rate was 108–118 beats/minute, respiratory rate was 28–40 times/minute, and blood oxygen saturation was 90–95% while the patient was on bilevel positive airway pressure respiratory support. Eighteen hours after the second surgery, the patient’s serum amylase was 1,556 U/L, and ceruloplasmin was 378 $\mu\text{mol/L}$. A diagnosis of severe acute pancreatitis was made, and treatment included inhibition of pancreatic secretion, infection prophylaxis, nutritional support, correction of electrolyte disturbances, and continuous renal replacement therapy (CRRT).

Two days later, the patient’s condition progressively deteriorated, and acute renal failure developed. Treatment was continued, including inhibition of pancreatic secretion, infection prophylaxis, nutritional support, correction of electrolyte disturbances, and CRRT. The patient’s condition was refractory to treatment, but he remained mentally alert. At 11 days after surgery, the patient became stuporous, blood pressure was 101/58 mm Hg, body temperature was 38°C, heart rate was 126 beats/minute, respiratory rate was 23 times/minute, and blood oxygen saturation was 95%. The abdomen was distended. Ceruloplasmin was 279 $\mu\text{mol/L}$ and blood and urinary amylase levels were both many times over normal values. Computed tomography suggested generalized pancreatic necrosis and revealed a large volume of exudative fluid in the abdominal cavity. The abdominal cavity drainage tubes were patent but did not drain significant volumes. Hemoserous fluid was suctioned from the gastric tube. The diagnosis was multiorgan failure and gastrointestinal hemorrhage. Conservative treatment was implemented, providing the patient with CRRT, respiratory support (via a ventilator), infection prophylaxis, and

symptomatic support. The patient expired 15 days after LRYGBP. Autopsy showed that the pancreas was enlarged to five times the normal size, with generalized necrosis.

Discussion

Since Mason and Ito [3] first applied RYGBP for the treatment of obesity, the operation has become accepted around the world due to its significant weight loss effect [4, 5]. In 1994, Wittgrove [6] became the first person to perform RYGBP using laparoscopic techniques. The laparoscopic procedure was minimally traumatic and less cosmetically disfiguring, important advantages that took RYGBP to the advanced stage. Since 2000, many surgeons have become proficient in LRYGBP techniques [7–11].

With the increase in the standard of living in China, the proportion of obese individuals has increased each year. We began performing this surgery in China on June 29, 2004, and to date, we have completed 10 cases. This case report details our fifth case.

The weight loss effect of LRYGBP is not the only topic of interest to bariatric surgeons; the complications of LRYGBP have also received widespread attention. The common surgical complications include incision site infection, anastomosis stricture, anastomosis fistulation, anastomosis hemorrhage, splenic rupture, subphrenic abscess, pneumothorax, bowel obstruction, pulmonary infection, vitamin deficiencies, anemia, gastritis, cholelithiasis, and bile reflux [12, 13]. Some studies have reported rarer complications, including postoperative gastrolithiasis [14], hyperoxaluric nephrolithiasis [15], abdominal actinomycosis [16], duodenal ulceration and perforation [17], internal abdominal herniation [18], intussusception [19], and afferent loop strangulation and perforation [20]. Some investigators believe that the complication rate of laparoscopic bariatric surgery in the hands of highly experienced surgeons is comparable to that of laparotomy [10, 11], and reports estimate that the surgical mortality is about 0.4% [7]. Few reports have been published of fulminant acute pancreatitis occurring after LRYGBP. The multicenter study by Edward [21] on the complications of bariatric surgery performed in the USA did not include fulminant pancreatitis as a major postoperative complication.

Results of the autopsy of our patient showed the main cause of death to be multiorgan insufficiency due to postoperative fulminant acute pancreatitis. A video of the operation was reviewed many times, but incorrect procedures, which would cause pancreatic injury, could not be found. For this rarely encountered complication, our analysis concluded that the main reason may have been small-vessel hemorrhage at the posterior wall of the JJ anastomosis. The blood clot obstructed the Roux limb and

the afferent loop, and large volumes of intestinal loop content were forced through the ampulla of Vater into the hepatopancreatic duct by retrograde high pressure, resulting in abnormal activation of pancreatic enzymes and precipitating fulminant acute pancreatitis. During the second laparoscopic examination, our observations of severe Roux limb and afferent loop distension and the presence of blood clot at the JJ anastomosis both support this analysis. Regarding the cause of hemorrhage, we believe that it was directly related to the TR45B 3.8-mm staple cartridges used in the operation. Because the TR45B 3.8-mm staple cartridge has four staple rows, the distance between the staples is large. Also, the tissue thickness after staple closure is 1.5 mm, which is thicker than the wall of the small intestine and cannot guarantee ideal closure of small subserosal vessels. In addition, the RYGBP creates a blind end in the Roux limb, which easily becomes a high-pressure environment under outlet obstruction conditions. Lastly, obese patients have a higher likelihood of developing postoperative pancreatitis compared with normal individuals. As surgeons in Asia, at the time of this case, our understanding of possible occult complications was still inadequate. Raum and Martin [22] believe that obese patients often cannot respond to stresses appropriately because of immunosuppression, and their low functional reserve means that the appearance of danger signs in these patients must be managed more promptly than in normal individuals.

Since this case, we have continuously tried to develop an operational protocol suitable for Asian patients. At present, we uniformly utilize the antecolic approach when performing LRYGBP, while taking care to minimize maneuvers that may damage other organs during surgery. For the JJ anastomosis, we select the six-row 6R45B 3.5-mm staple cartridge in division and anastomosis formation. The tissue thickness after stapling is 1.0 mm and, when necessary, 4–0 silk sutures or absorbable sutures can be used additionally to prevent delayed subserosal small-vessel hemorrhage due to inadequate closure. For the anterior wall of the JJ anastomosis, due to the general trend in China, this is anastomosed completely by hand using silk sutures under laparoscopy, and the abdominal cavity drain is placed next to the anastomosis site. After the surgery, patients are monitored in the intensive care unit for 24 h. In our subsequent cases, this operational protocol has been demonstrated to be maximally effective.

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