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ORIGINAL ARTICLE

Learning curve of laparoscopic Roux-en-Y gastric bypass in an Asian low-volume bariatric unit

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Summary *Background:* Obesity has become a healthcare burden in Taiwan and the rest of Asia. Laparoscopic Roux-en-Y gastric bypass (LRYGB) provides good weight loss outcome, and improves comorbidity as well as quality of life. We present our experience of the learning curve for LRYGB in a low-volume bariatric unit.
Methods: From March 2009 to August 2011, 60 consecutive patients who underwent LRYGB were included. They were separated into two groups, with the first 30 cases in Group 1 and the remaining 30 cases in Group 2. Indicators for evaluating the learning curve for LRYGB included surgical time, rate of conversion to open surgery, surgical and total complication rates, length of hospital stay, mortality, and postoperative weight loss.
Results: There were no significant differences in demographic measurements between the two groups. In Group 1, the median surgical time was 120 minutes and in Group 2 it was 80 minutes ($p < 0.01$). Two cases were converted to laparotomy in Group 1, but none in Group 2. There was no surgical mortality and the total complication rate of all patients was 16.7%. The complication rate significantly decreased from Group 1 (26.7%) to Group 2 (6.7%). Three patients needed further surgical procedures in Group 1, with no patients needing them in Group 2. There was no significant difference in hospital stay and percentage excess weight loss between the two groups.
Conclusion: The learning curve for LRYGB has no mortality and an acceptable complication rate. The operating time and morbidity rate are the indicators for overcoming the learning curve.

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1. Introduction

Obesity has become a global healthcare burden. In 2014, the World Health Organization described up to 39% of the global adult population as overweight or obese.[1] A similar trend can be observed in Asia. In 2013, 40.1% of the Taiwanese adult population were overweight and 15.7 % were obese.[2] Currently, bariatric surgery is the most effective modality to treat morbidly obese patients with mid- and long-term weight control.[3]

Laparoscopic Roux-en-Y gastric bypass (LRYGB) was first described by Wittgrove et al[4] in 1994, and it has become the gold standard operation for the treatment of morbid obesity over the past two decades.[5] LRYGB provides good weight loss outcome, and improves comorbidity as well as quality of life.[3,6]

Although laparoscopic sleeve gastrectomy has become the mainstay of bariatric surgery worldwide,[7] LRYGB has still played an important role in the treatment of obese patients,[8] especially those associated with type 2 diabetes and gastroesophageal reflux disease (GERD).[9–12] In Asia, bariatric surgery is not as frequently performed as in Western countries. The learning curve for LRYGB has been a challenge for Asian surgeons. Since there has been no previous study focusing on the learning curve of LRYGB in a low-volume Asian bariatric unit, we present our experience with the learning curve for LRYGB and analyze the outcomes.

2. Methods

2.1. Study population

All procedures performed in studies involving human participants were in accordance with the ethical standards of our Institutional Research Committee (No. 104-7573B) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study formal consent was not required.

From March 2009 to August 2011, we included 60 consecutive patients who met the recommendations for bariatric surgery according to the Asia–Pacific Bariatric Surgery Group Consensus Meeting in 2005.[13] The indication includes: (1) body mass index (BMI) $\geq$ 37kg/m^2; (2) BMI $>$ 32 kg/m^2 with diabetes or two other obesity-related comorbidities; (3) inability to lose weight or maintain weight loss by dietary or medical measures; and (4) age $>$ 18 years and $<$ 65 years. Patients who met the above criteria and underwent LRYGB were included in this study. We divided the patients into two groups for the learning curve analysis. Group 1 included the first 30 cases and Group 2 included the second 30 cases.

2.2. Experience in laparoscopy and bariatric surgery

Before this study, our institute had experience only with open bariatric surgery. All the operations in this study were performed by a single surgeon as first operator. This surgeon had 5 years' experience in laparoscopic gastrointestinal surgery, including laparoscopic appendectomy, cholecystectomy, and gastrectomy for benign and malignant disease. Before starting the first LRYGB, the surgeon received a 1-month mini-fellowship training in a laparoscopic bariatric surgery center. During the study period, there was no other surgeon practicing laparoscopic bariatric surgery.

The 1-month mini-fellowship program was done in an overseas bariatric center. The bariatric center performed on average two or three bariatric procedures daily. The program included observation of LRYGB, sleeve gastrectomy, and adjustable bands surgery during the 1st week of the program. During Weeks 2–4 of the program, fellows were able to perform duties as a first or second assistant during surgery, which allowed them to perform part of the RYGB procedure such as gastric pouch creation or anastomosis with their mentor's direct supervision. Moreover, the program included outpatient clinics once weekly for preoperative evaluation and postoperative follow-up.

2.3. Surgical technique and perioperative management

Before surgery, preoperative evaluation included esophagogastroduodenoscopy, complete blood count, and endocrine, biochemical, and psychiatric survey. In the operating room, the patients were placed in the supine position and the operator was standing on the right side of the patient and the assistant was standing on the left side. Pneumoperitoneum was established by introducing a Veress needle. Four ports were created, including one 11-mm optic trocar, two 12-mm operative trocars, and one 5-mm assisted trocar. The liver was lifted through the left subcostal 5-mm trocar by a grasper with gauze. No additional subxyphoid trocar was placed. We started the procedure by creating the gastric pouch below the first branch vessel of the lesser curvature side using a 45-mm linear stapler (Endo GIA, Tyco, CT, USA) and continued upward to the angle of His. For the Roux-en-Y reconstruction, the jejunum was transected first, followed by side-to-side jejunojejunostomy with a 45-mm linear stapler and 3-cm gastrojejunostomy using a 45-mm linear stapler. The common entry wounds of jejunojejunostomy and gastrojejunostomy were closed by hand-sewn sutures (2-0 Vicryl; Ethicon US, LLC) in the first five patients. From Patient 6 onward, the order of the reconstruction procedure was changed to gastrojejunostomy followed by jejunojejunostomy and finally jejunum transection. The mesenteric defects were not closed routinely and a Jackson–Pratt drain was placed in the left subphrenic space.

2.4. Learning curve evaluation

Our indicators for evaluating the learning curve for LRYGB included surgical time, rate of conversion to open surgery, complication rates, length of hospital stay, mortality, and postoperative weight loss.

2.5. Data management

The statistical analyses were performed using SPSS for Windows version 17.0 (SPSS Inc., Chicago, IL, USA). The LOWESS

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