

Improved Outcomes Using a Systematic and Evidence-Based Approach to the Laparoscopic Roux-En-Y Gastric Bypass in a Single Academic Institution

SOO HWA HAN, M.D., CARLOS GRACIA, M.D., AMIR MEHRAN, M.D., NICOLE BASA, M.D., JOE HINES, M.D.,
LUBNA SULEMAN, M.D., DARSHNI VIRA, M.D., ERIK DUTSON, M.D.

From the University of California at Los Angeles, David Geffen School of Medicine, Los Angeles, California

No standardized approach exists for laparoscopic Roux-en-Y gastric bypass (LRYGB). At a newly instituted bariatric surgery program, four experienced laparoscopic surgeons used the systematic and evidence-based approach consisting of multidisciplinary preoperative evaluation, screening, and education; standardized operative technique; inpatient clinical pathway; and close postoperative follow-up. The outcomes were subsequently analyzed to determine if this approach improved the morbidity and mortality. From January 2003 to June 2006, 835 consecutive LRYGBs were performed. The patient population was 85 per cent women with a mean body mass index (BMI) of 50.4 kg/m² (range 33–96 kg/m²). The mean age was 44 (range 15–67). Sixty-two per cent of the patients had previous abdominal or pelvic operations. The conversion rate to open surgery was 0.2 per cent. The average length of hospital stay was 2.6 days (range 2–13 days). There were no anastomotic leaks or deaths. The 30-day readmission and re-operation rates were 3.2 per cent and 1.8 per cent, respectively. The incidence of anastomotic stricture, marginal ulcer, bleeding, pulmonary embolism, and internal hernia was 0.8 per cent, 3.5 per cent, 4.2 per cent, 0.1 per cent, and 0.4 per cent, respectively. A systematic and evidence-based approach to the LRYGB by experienced laparoscopic surgeons resulted in a lower incidence of complications when compared with the published results from other comparable institutions.

OBESITY IS A GROWING epidemic in the United States affecting more than 10 million Americans.¹ Following the 1991 National Institutes of Health consensus statement guidelines for the surgical management for morbid obesity,² bariatric surgery has gained increasing acceptance and the Roux-en-Y gastric bypass has become the gold standard. This procedure itself has changed significantly from Mason's first account of gastric bypass in 1967.³

With the introduction of the laparoscopic Roux-en-Y gastric bypass (LRYGB) by Wittgrove et al. in 1994,⁴ an increasing number of operations have been performed each year. However, there is a lack of a standardized approach to LRYGB.

Methods

From January 2003 to June 2006, the laparoscopic surgeons at the new University of California Los Angeles (UCLA) Minimally Invasive Bariatric Surgery Program performed 835 LRYGB procedures. Patient selection criteria followed the National Institutes of Health consensus statement 1991 guidelines for surgical management of morbid obesity.² Four experienced laparoscopic surgeons used the same systematic approach including the following: 1) multidisciplinary approach focused on aggressive patient screening and careful patient selection, including surgeon and psychiatrist evaluations, thorough patient education and preparation, mandatory attendance to all preoperative classes and support group meetings, mandatory preoperative 5 to 10 per cent total body weight loss, and tight control of comorbidities, 2) modified operative techniques, 3) inpatient clinical pathways, and 4) close postoperative follow-ups at two weeks, quarterly, then yearly by the operating surgeons.

Our LRYGB technique consisted of the creation of a 30 cc calibrated gastric pouch, totally linear-stapled

Presented at the 18th Annual Scientific Meeting of the Southern California Chapter of the American College of Surgeons in Santa Barbara, CA, January 19–21, 2007.

Address correspondence and reprint requests to Erik Dutson, M.D., University of California Los Angeles, General Surgery, Box 956904, 72-239 CHS, Los Angeles, CA 90095-6904. E-mail: edutson@mednet.ucla.edu.

gastrojejunostomy and jejunojejunostomy using the endogastrointestinal anastomosis 45 mm blue load and 60 mm white load staplers respectively, 80 centimeter Roux-limb positioned retrocolic/retrogastric for the first 143 cases with closure of defects, and antecolic/antegastric for the latter 692 cases without defect closure and 30- to 40-cm biliopancreatic limb. The creation of the gastric pouch was performed via either a pars flaccida or a perigastric approach (Figs. 1 and 2). Routine cholecystectomy was not performed. The UCLA U-loop technique was developed in which all anastomoses are performed in the left upper quadrant of the abdomen for easy visuospatial orientation (Figs. 3 and 4). Routine placement of a single Jackson-Pratt drain around the gastrojejunostomy anastomosis was performed at the completion of the procedure.

A standardized inpatient clinical pathway was used postoperatively. On postoperative day 0, the patients were kept nothing per orum and were given aggressive intravenous fluid hydration at 200 cc/hour to keep urine output greater than 100 cc/hour or heart rate less than 100 beats/minute. On postoperative day 1, a clear liquid diet was initiated without an upper gastrointestinal imaging (UGI) study unless clinical indications suspicious for anastomotic leaks were present. Before November 2004, routine postoperative UGIs were performed. For deep vein thrombosis prophylaxis, aggressive and early ambulation, 5000 Units of subcutaneous heparin injections three times a day, and sequential pneumatic devices were used. The patients were discharged on postoperative day 2 or 3 unless postoperative complications occurred.

The operative surgeons followed-up with the postoperative patients at two weeks, quarterly for one year, and then annually at the bariatric clinic. They were discharged with multivitamin, iron supplements, and a 4-month supply of proton pump inhibitor medications.

An Institutional Review Board-approved bariatric



FIG. 1. Pars flaccida technique: Introducing a stapler through the pars flaccida opening toward the angle of His to divide the mesentery.

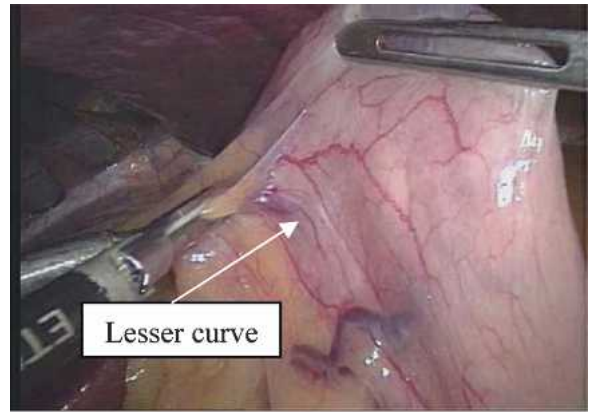


FIG. 2. Perigastric technique: Developing the plane between the lesser curve and the mesentery using harmonic scalpel.

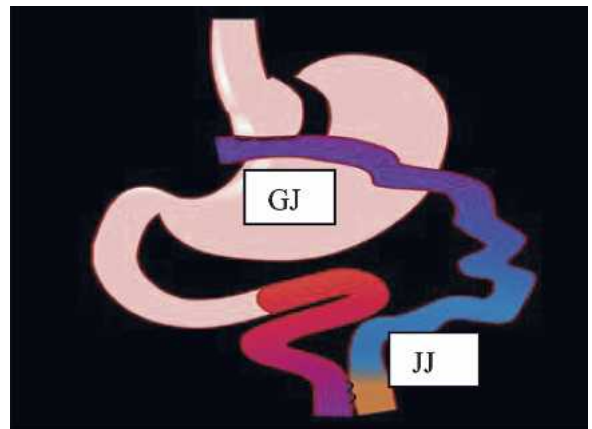


FIG. 3. Standard Roux-en-Y gastric bypass. GJ, Gastrojejunostomy anastomosis; JJ, Jejunojejunostomy anastomosis.

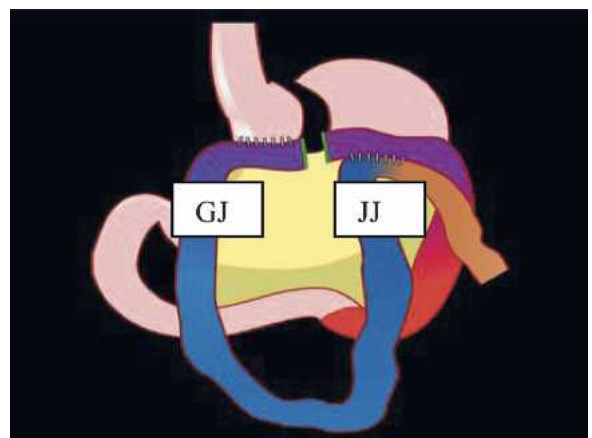


FIG. 4. UCLA U-loop configuration: Both GJ and JJ anastomoses are performed at the left upper quadrant of the abdomen. GJ, Gastrojejunostomy anastomosis; JJ, Jejunojejunostomy anastomosis.

database collection began from the inception of the new minimally invasive bariatric surgery program. The patients' demographic, BMI, morbidity, and mortality information was prospectively collected and ret-

respectively reviewed. The data were analyzed and the results were compared with the published results from other academic institutions.

Results

Between January 2003 and June 2006, 835 patients underwent LRYGBs. Revisional cases were excluded from this database. The patient population was 85 per cent women with a mean BMI of 50.4 kg/m² (range 33–96 kg/m²). The mean age was 44 (range 15–67). The patients' comorbidities are listed in Table 1. Sixty-two per cent had previous abdominal or pelvic operations (Table 2). The conversion rate to open Roux-en-Y gastric bypass was 0.2 per cent. The average length of hospital stay was 2.6 days (range 2–13 days). There were no anastomotic leaks or deaths. The 30-day readmission and re-operation rates were 3.2 per cent and 1.8 per cent, respectively. The incidence of anastomotic stricture, marginal ulcer, bleeding, pulmonary embolism, and internal hernia was 0.8 per cent, 3.5 per cent, 4.2 per cent, 0.1 per cent and 0.4 per cent, respectively. The follow-up period ranged from 1 month to 3 years.

The average excess body weight loss (EBWL) at one year was 69 per cent. The one-year follow-up data was available in 246 patients. There was a statistically significant difference in the average EBWL between the nonsuper obese group (BMI ≤ 50) with 76 per cent EBWL and superobese group (BMI > 50) with 54 per cent EBWL (*P* = 0.0075).

Conclusion

Since the inception of our minimally invasive bariatric surgery program, the surgeons, all of whom were experienced with advanced laparoscopy, universally adopted a systematic approach to the LRYGB. This systematic approach consisted of a multidisciplinary approach to patient evaluation and careful patient selection, preoperative education and preparation, tight control of comorbidities, an inpatient clinical pathway, and close postoperative follow-up by the operating surgeons. Prospective data collection and retrospective review led to evidence-based modifications, which were implemented and adopted by all surgeons.

TABLE 1. Incidence of Comorbidities

Comorbidities	Number of Affected Patients (%)
Musculoskeletal pain	768 (92%)
Hypertension	451 (54%)
Hyperlipidemia	384 (46%)
Gastroesophageal reflux disease	359 (43%)
Obstructive sleep apnea	217 (26%)
Diabetes mellitus	192 (23%)

TABLE 2. Incidence of Prior Surgery

Previous Abdominal or Pelvic Operations	Number of Patients (%)
Caesarean section	133 (16%)
Laparoscopic cholecystectomy	117 (14%)
Open hysterectomy	75 (9%)
Open appendectomy	50 (6%)
Open cholecystectomy	33 (4%)
Others	108 (13%)

The objective of this review was to determine if our systematic and evidence-based approach to the LRYGB resulted in improved morbidity and mortality when compared with the published results. As seen in Table 3, the incidence of postoperative complications were comparable or lower when measured up to the results from other academic institutions.⁵ The incidence of postoperative bleeding was the only exception to this statement. However, the literature was unclear as to how “bleeding” was defined. At our institution, bleeding was defined as more than a 10 per cent drop in hematocrit or a need for a blood transfusion due to hemodynamic instability.

The use of our systematic and evidence-based approach by experienced laparoscopic surgeons resulted in the development of a safe and effective minimally invasive bariatric surgery program at an academic institution. Through frequent analyses of the database, we implemented modifications to improve the surgical techniques and patient care. The Roux-limb was positioned retrocolic/retrogastric with closure of defects for the first 143 cases. Internal hernia complications occurred with this approach. Then, we modified to antecolic/antegastric Roux-limb position without defect closure for the latter 692 cases and did not observe any internal hernia complications. The creation of the gastric pouch has traditionally been performed via the perigastric approach. This dissection can often be difficult and result in excessive bleeding. We found the pars flaccida technique may provide an easier and safer approach. This approach, however, led to transection of one of the gastric branches of the anterior

TABLE 3. Incidence of Complications Compared to Prior Studies

Complications	UCLA	Bariatric Literature ⁵
Anastomotic stricture	0.8%	1.6–6.3%
Marginal ulcer	3.5%	1–16%
Internal hernia	0.4%	0.8–4.5%
Bleeding	4.2%	0–3.3%
Wound infection	0.1%	0–2%
Conversion to open surgery	0.2%	0–3%
Pulmonary embolism	0.1%	0–1.5%
Anastomotic leak	0%	0–5.8%
Death	0%	0–1%

nerve of Latarjet. Our retrospective analysis of all LRYGB cases performed via the pars flaccida approach failed to identify any gastric remnant dilatation, dysphagia, or lesser curve necrosis, which are known complications of a highly selective vagotomy. The pars flaccida technique offered a safe alternative to the perigastric approach. For easy visuospatial orientation, we developed the UCLA U-loop technique, (Figure 4) in which all anastomoses are created in the left upper quadrant of the abdomen. We abandoned the use of a routine postoperative UGI study after our retrospective analysis revealed that such routine studies did not contribute significantly to patient care.⁶ We found a statistically significant difference in the average EBWL at one-year follow-up between the superobese and nonsuperobese group of patients. Since this finding, we have transitioned to creating a longer, 150 centimeter Roux-limb for the superobese group with BMI greater than 50.

A minimally invasive bariatric surgery program was safely built in an academic institution with experienced laparoscopic surgeons using this systematic and

evidence-based approach. During the formalization of the structure of the program, it is important to collect and analyze the data and make evidence-based modifications to improve patient care.

REFERENCES

1. American Obesity Association Advocacy Updates. Statement of the American Obesity Association before the Committee on Government Reform, House of Representatives, Sept 15, 2004. <http://obesity1.tempdomainname.com/subs/advocacy/GovtReform2004.shtml>. Accessed Aug. 20, 2007.
2. Gastrointestinal Surgery for Severe Obesity. Consensus Development Conference Panel, National Institutes of Health. *Ann Intern Med* 1991;115:956-61.
3. Mason EE, Ito C. Gastric bypass in obesity. *Surg Clin North Am* 1967;47:1345-51.
4. Wittgrove AC, Clark GW, Tremblay LJ. Laparoscopic gastric bypass, Roux-en-Y: Preliminary report of five cases. *Obes Surg* 1994;4:353-7.
5. Schauer PR, Ikramuddin S. Laparoscopic surgery for morbid obesity. *Surg Clin North Am* 2001;81:1145-79.
6. Bertucci W, White S, Yadegar J, et al. Routine postoperative upper gastroesophageal imaging is unnecessary after laparoscopic Roux-en-Y gastric bypass. *Am Surg* 2006;72:862-4.