

Short-Term Outcomes of Two Laparoscopic Bariatric Procedures

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Objective: To compare the short term outcomes of laparoscopic Roux-Y gastric bypass (lap RYGB) and laparoscopic gastric banding (lap banding) for morbidly obese patients at a tertiary care hospital.

Material and Method: Medical records of patients who underwent laparoscopic bariatric surgery for morbid obesity between November 2003 and November 2008 were reviewed. Baseline data including demographics, anthropometric and biochemical measurements were recorded. Patients were followed postoperatively and the body weight was measured every three to six months. Follow-up biochemical measurements were also recorded. After approximately six months to one year after the initial operation, the Bariatric Analysis and Reporting Outcome System (BAROS) scores were obtained, and re-evaluated every six months.

Results: There were 65 patients in the series, 31 underwent lap banding and 34 lap RYGB. There were 28 men (43%) and 37 women (57%), with an average age of 31.7 years (SD, 10.5 years). Patients were followed postoperatively for a period between six months and three years. The expected weight loss was 6% greater on the average for the lap RYGB group during the first two years of follow-up. Biochemical outcomes tended to marginally favor the lap RYGB group. There was no clear difference between groups in terms of the BAROS scores.

Conclusion: Short-term differences between the two laparoscopic operations for morbid obesity tended to marginally favor lap RYGB. However, the BAROS scores were not clearly different between the two groups. These differences seemed to attenuate with time. The effects of the two operations were similar after two years.

Keywords: Morbid obesity, Laparoscopic, Bariatric surgery

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Laparoscopic bariatric surgery is an accepted and cost-effective short- and long-term treatment for morbid obesity⁽¹⁾. The most frequently used laparoscopic methods include laparoscopic gastric banding (lap banding) and laparoscopic Roux-en-Y gastric bypass (lap RYGB) procedures⁽²⁻⁴⁾. The objective of the present study was to compare the effectiveness of the two laparoscopic procedures in terms of weight reduction, biochemical profile and quality of life, within a 2-year follow-up period.

Material and Method

Medical records of patients who underwent laparoscopic surgery for morbid obesity in Ramathibodi Hospital between November 2003 and November 2008

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were reviewed. Patients were offered bariatric surgery if their body mass index (BMI) was over 40 kg/m² or, for those with BMI less than 40 kg/m², if they had weight-related comorbidity such as type 2 diabetes, and all failed non-surgical treatment. Baseline data including demographics, baseline anthropometric and biochemical measurements were recorded. Patients were followed and the body weight was measured every three to six months. Follow-up biochemical measurements were also recorded. After approximately six months to one year after the primary operation, the Bariatric Analysis and Reporting Outcome System (BAROS) scores⁽⁵⁾ were also obtained, and re-evaluated every six months.

The differences in the series of body weight measurement data between the two laparoscopic procedures were tested within the modeling framework where repeated measurements in an individual were assumed to have a multivariate Normal distribution with first order autoregressive correlation structure⁽⁶⁾.

The differences in the percent of excess body weight loss (EBWL) between the two groups were tested within a similar framework. The differences in the BAROS scores were tested using a population-averaged ordinal logistic regression model with clustering within individuals, and the Huber-White sandwich estimator was used to estimate the standard errors⁽⁷⁾.

The results were summarized using mean, median standard deviation, range and 95% confidence interval (CI). Comparisons between the outcomes of the two groups were done using unpaired t-test, sign ranksem test, Chi-square test or Fishers exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

Results

Sixty-five patients were included in the present series, 31 underwent lap banding and 34 lap RYGB. There were 28 men (43%) and 37 women (57%), with an average age of 31.7 years and standard deviation of 10.5 years. Characteristics and baseline status of patients in the two laparoscopic groups are presented in Table 1.

Except for differences due to the greater technical difficulty of the Lap RYGB operation, no clear differences can be seen between the two groups of patients at baseline. No patient died from complications of surgery in either group. Up to the last known follow-up visit, four patients, all from the lap banding group, had further surgery (for band removal or

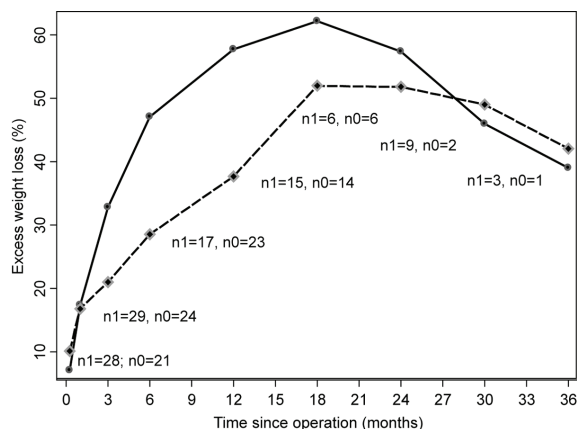


Fig. 1 Contrasting the average percent excess body weight loss between the laparoscopic Roux-en-Y gastric bypass (RYGB) group (solid line) and the laparoscopic gastric banding group (dashed line) at various follow-up times. Also shown are the numbers of patients at follow-up time points of 1 week, 1, 6, 12, 18, 24, and 30 months for both the laparoscopic RYGB group (n1) and the laparoscopic banding group (n0)

rebanding). Most patients were followed for a period between six months and three years.

The outcomes of treatment at various time points are compared between the two groups in Fig. 1, in terms of average excess body weight loss. There seemed to be significant differences in weight loss

Table 1. Characteristics of patients in the two laparoscopic surgery groups

Characteristic	Lap banding (n = 31)	Lap RYGB (n = 34)	p-value
Age (years): mean (SD)	32.0 (11.3)	31.4 (9.8)	0.823
Sex (male:female): number (%)	15:16 (48:52)	13:21 (38:62)	0.409
Operative time (min): mean (SD)	164 (88.1)	301.6 (58.3)	<0.001
Blood loss (ml.): median (range)	0 (0 to 200)	100 (0 to 400)	<0.001
ICU stay (yes): number (%)	6 (19)	23 (68)	<0.001
Length of hospital stay (days): median (range)	3 (2 to 11)	6 (3 to 11)	<0.001
Baseline body weight (kg): mean (SD)	128.4 (19.6)	134.1 (27.4)	0.340
BMI (kg/m ²): mean (SD)	44.7 (5.0)	47.4 (7.0)	0.091
Excess Body Weight (kg): mean (SD)	57.0 (15.3)	64.0 (22.9)	0.160
Baseline FBS (mg%): median (range)	107 (72 to 360); n = 26	94 (63 to 164); n = 31	0.091
Baseline cholesterol (mg%): median (range)	207 (146 to 270); n = 27	203 (112 to 388); n = 29	0.883
Baseline triglyceride (mg%): median (range)	146 (80 to 600); n = 26	140 (51 to 273); n = 26	0.062
Type 2 DM (yes): number (%)	7 (23)	4 (12)	0.245

p-values by unpaired t-test, ranksum test and Chi-square test as appropriate

RYGB = Roux-en-Y gastric bypass; ICU = intensive care unit; BMI = body mass index; FBS = fasting blood sugar; DM = diabetes mellitus

between the two groups (favoring the Lap RYGB group) at one year after operation, but the differences tended to decrease with time, becoming non-significant after two years. However, a considerable number of losses to follow-up occurred after one year.

To increase the sensitivity in detecting the differences between the two laparoscopic operations, model-based statistical methods were used to compare the outcomes taking into account follow-up as well as baseline data. Confounding effects of relevant factors were adjusted for in multivariable analyses.

Differences in the body weight

There was a statistically significant, but clinically small, difference in the body weight between the two operations (Table 2), after adjusting for the effect of baseline body weight and age. On the average,

patients lost 4 kg more in the lap RYGB group, after a follow-up of one to two years.

Differences in the percent excess weight loss

There was a marginally significant but clinically small difference in the proportion (percent) of excess body weight loss, reflecting similar findings as for the absolute body weight loss (Table 3). The average excess body weight loss was 6% more in the laparoscopic RYGB group. Adjustment was made only for age in this analysis, since the baseline body weight was not a significant covariate.

A more realistic model with a statistically significant time-treatment interaction is presented in Fig. 1, demonstrating a convergence of weight reduction for the two operations after two years. The data for Fig. 1 are explicitly shown in Table 4, where the

Table 2. Effect of operation on the body weight, after adjusting for age and baseline body weight

Variable	Average change in body weight (95% CI)	p-value
Age	0.25 kg / year increase (0.05 to 0.45)	0.013
Baseline body weight	0.87 kg / kg increase (0.79 to 0.96)	<0.001
Operation	-4.32 kg Lap RYGB vs. Lap Banding (-8.06 to -0.57)	0.024

Negative numbers refer to a decrease relative to the reference group
 RYGB = Roux-en-Y gastric bypass
 Estimated autocorrelation coefficient = 0.735

Table 3. Effect of operation on the percent excess body weight loss, after adjusting for age

Variable	Average change in body weight (95% CI)	p-value
Age	-0.37 kg / year increase (-0.68 to -0.06)	0.021
Operation	6.39 % Lap RYGB vs. Lap Banding (0.26 to 12.51)	0.041

Negative numbers refer to a decrease relative to the reference group
 RYGB = Roux-en-Y gastric bypass
 Estimated autocorrelation coefficient = 0.728

Table 4. Average differences in the % excess body weight loss at various times during follow-up (unadjusted analysis)

Follow-up time	Lap Banding group % excess weight loss	RYGB group % excess weight loss	p-value (unpaired t-test)
6 months	29.0 (18.5); n = 17	48.5 (16.6); n = 23	0.001
12 months	36.8 (22.5); n = 15	57.5 (22.3); n = 14	0.019
18 months	46.3 (18.8); n = 6	58.5 (15.8); n = 6	0.252
24 months	7.8 (30.6); n = 9	0.7 (32.9); n = 2	0.905

RYGB = Roux-en-Y gastric bypass

differences between the two groups after one year are shown to be statistically non-significant (unadjusted analysis).

Differences in the BAROS score & biochemical outcomes

There were no significant differences in the change of BAROS scores between the two laparoscopic procedures. Most patients were graded as “fair” and “good” at one to two years after surgery. Table 6 presents and compares the BAROS scores at various

times after the primary operation. Also presented are the available follow-up biochemical outcomes measured after operation (Table 5). There seemed to be minor differences between the two groups in terms of blood sugar, serum albumin, serum cholesterol and serum triglyceride levels. Some of these differences decreased with time.

Discussion

Laparoscopic surgery is an accepted treatment for morbid obesity and is more cost-effective

Table 5. Outcomes of laparoscopic bariatric surgery: biochemical measurements (unadjusted analyses)

Outcomes	Lap banding	Lap RYGB	p-value
Fasting blood sugar (mg%) at 6 months: median (range)	92 (81 to 133); n = 12	88 (77 to 101); n = 18	0.538
Fasting blood sugar (mg%) at 1 year: median (range)	92 (79 to 114); n = 81	87 (81 to 128); n = 10	0.447
Serum cholesterol (mg%) at 6 months: median (range)	84 (153 to 243); n = 12	191 (132 to 271); n = 18	0.999
Serum cholesterol (mg%) at 1 year: median (range)	232 (148 to 269); n = 10	175 (156 to 217); n = 10	0.041
Serum triglyceride (mg%) at 6 months: median (range)	111 (76 to 183); n = 12	87 (40 to 233); n = 17	0.016
Serum triglyceride (mg%) at 1 year: median (range)	109 (75 to 128); n = 9	80 (44 to 273); n = 9	0.144

p-values by rank test or chi-square test, when appropriate
RYGB = Roux-en-Y gastric bypass

Table 6. Outcomes of laparoscopic bariatric surgery: BAROS score and reoperation (unadjusted analyses)

Outcomes	Lap banding	Lap RYGB	p-value
Timing of 1 st BAROS after operation (months)			
Median (range)	21.1 (5.6 to 47.7); n = 22	10.2 (6.1 to 27.3); n = 27	0.001
BAROS score, first occasion			
Failure	5 (23)	3 (11)	0.183
Fair	11 (50)	21 (78)	
Good	6 (27)	7 (7)	
Very good	0	1 (4)	
Timing of 2 nd BAROS, after op (months)	25.5 (11 to 27.7); n = 10	15.5 (11 to 27.1); n = 11	0.057
BAROS score, second occasion			
Failure	2 (20)	0	0.284
Fair	5 (50)	6 (55)	
Good	3 (30)	5 (45)	
Very good			
Timing of 3 rd BAROS, after op (months)	24.2; n = 1	23.85 (23 to 24.7); n = 2	-
BAROS score, third occasion			
Failure	0	0	-
Fair	0	0	
Good	1	2	
Very good	0	0	
Reoperation (yes)	5 (16)	2 (6)	0.103

p-values by rank test or chi-square test, when appropriate
RYGB = Roux-en-Y gastric bypass; BAROS = bariatric analysis reporting outcome system

than medical treatment in selected patients⁽¹⁾. Laparoscopic gastric banding (lap banding) and laparoscopic Roux-en-Y gastric bypass (lap RYGB) are the two most common operations used to treat morbid obesity⁽²⁻⁴⁾. In the present study, lap RYGB was associated with greater excess weight loss than lap banding, but the differences were less clear after two years.

Similar findings have been reported in the literature⁽¹⁻⁴⁾. Generally, lap RYGB was associated with greater weight loss than lap banding. In some reports, as in the present study, the differences in the results between the two laparoscopic operations attenuated with time, usually within two to five years^(2-4,8). One report did not find significant differences between lap banding and lap RYGB at two years, a very similar result to the present study⁽⁹⁾.

Lap RYGB was also associated with lower blood sugar, serum triglycerides, serum cholesterol and serum albumin levels, consistent with the results of previous studies^(3,10,11). In the present study, some of these differences were not statistically significant and some differences tended to decrease with time.

The BAROS score, which included measuring the quality of life after laparoscopic surgery, was not clearly different between the two operations. However, there was a tendency for patients in the lap RYGB group to do better. For example, fewer patients in the lap RYGB group were considered to have experienced a failed operation. Similar findings were previously reported^(3,12).

The overall tendency for the effects of both laparoscopic operations was a rapid loss in the excess body weight, followed by a gradual reversal of that trend within two years, ending with an excess body weight loss of 40% at three years (Fig. 1). Very similar proportions of weight loss at one to three years were seen in some studies^(3,4,8) and an inversion point was seen in the Hong Kong study⁽⁸⁾. On the other hand, the BAROS score pointed to an increase in the quality of life and improvement in comorbidities with longer follow-up for both operations. The limitation of these observations, particularly in the present study, was the relatively large number of losses to follow-up (Fig. 1). Hence, the remaining patients in the present study might be those who were satisfied with the results of the operation, while those who were dissatisfied did not bother to return.

Finally, although there seemed to be a reversal of the effect of bariatric surgery with time, a sustained

effect is possible⁽⁴⁾, but only with disciplined dietary control^(2,3,9). Successful treatment of morbid obesity is truly multidisciplinary in character⁽⁹⁾.

Conclusion

Short-term differences between the two laparoscopic operations for morbid obesity tended to marginally favor lap RYGB. However, the BAROS scores were not clearly different between the two groups. These differences seemed to attenuate with time. The effects of the two operations were similar after two years.

Potential conflicts of interest

None.

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เปรียบเทียบผลในระยะสั้นระหว่างการผ่าตัดรักษาโรคอ้วนผ่านกล้องสองวิธี

ธีรพล อังกุลภักดีกุล, กษิติน วิฑูริญโญภาพ, ภาณุวัฒน์ เลิศสิทธิชัย

วัตถุประสงค์: เพื่อเปรียบเทียบผลการรักษาโรคอ้วนในระยะสั้น ระหว่างวิธีผ่าตัดอวัยวะกล้อง 2 วิธี คือวิธีรัดกระเพาะอาหาร และวิธีทางเลี้ยงกระเพาะอาหาร (gastric bypass) ณ โรงพยาบาลตติยภูมิแห่งหนึ่ง

วัสดุและวิธีการ: ทบทวนเวชระเบียนผู้ป่วยโรคอ้วนที่ได้รับการรักษาด้วยการผ่าตัดอวัยวะกล้อง ระหว่างเดือนพฤศจิกายน พ.ศ. 2546 ถึงเดือนพฤศจิกายน พ.ศ. 2551 ได้เก็บข้อมูลพื้นฐานทั่ว ๆ ไป รวมถึงข้อมูลวัดสัณฐานรูปร่าง และผลการตรวจ ทางชีวเคมีจากเลือด มีการติดตามผู้ป่วยหลังผ่าตัดโดยวัดน้ำหนักตัวและการตรวจทางชีวเคมี ทุก ๆ 3 ถึง 6 เดือน และวัดคะแนนคุณภาพชีวิตด้วยแบบสอบถาม Bariatric Analysis and Reporting Outcome System (BAROS) โดยเริ่มที่ 6 เดือน หลังผ่าตัด และประเมินซ้ำทุก 6 เดือน

ผลการศึกษา: มีผู้ป่วยในการศึกษา 65 คน ได้รับการผ่าตัดด้วยวิธีรัดกระเพาะอาหาร 31 คน และวิธีทางเลี้ยงกระเพาะอาหาร 34 คน ประกอบด้วยผู้ชาย 28 คน (43%) และหญิง 37 คน (57%) มีอายุเฉลี่ย 31.7 ปี (ค่าเบี่ยงเบนมาตรฐาน 10.5 ปี) ได้ติดตามผู้ป่วยเป็นระยะเวลาตั้งแต่ 6 เดือนถึง 3 ปี ผู้ป่วยที่ได้รับการผ่าตัดทางเลี้ยงกระเพาะอาหาร มีการสูญเสียน้ำหนักที่คาดหวังไว้ (expected weight loss) มากกว่าผู้ป่วยที่ได้รับการรัดกระเพาะอาหาร โดยเฉลี่ยร้อยละ 6 ในระยะเวลา 2 ปีแรก ผู้ป่วยที่ได้รับการผ่าตัดทางเลี้ยงกระเพาะอาหาร มีผลการตรวจทางชีวเคมีในเลือดดีกว่ากลุ่มที่ได้รับการรัดกระเพาะอาหารเพียงเล็กน้อย แต่ไม่พบความแตกต่างชัดเจน ระหว่างผู้ป่วยสองกลุ่มดังกล่าวในแง่ของคะแนนวัด BAROS

สรุป: การเปรียบเทียบผลการรักษาโรคอ้วนในระยะสั้นระหว่างการผ่าตัดผ่านกล้องสองวิธี แสดงให้เห็นว่าวิธีผ่าตัดทางเลี้ยงกระเพาะอาหาร มีความได้เปรียบเพียงเล็กน้อย แต่ไม่พบความแตกต่างชัดเจนในแง่ของคะแนน BAROS ความแตกต่างที่พบนั้นมีการลดลงตามเวลา โดยผลการรักษาของการผ่าตัดทั้งสองวิธีดูจะคล้ายคลึงกันหลัง 2 ปี