OBES SURG (2007) 17:1588–1591
DOI 10.1007/s11695-007-9296-7

Gender Differences in Early Outcomes Following Hand-Assisted Laparoscopic Roux-en-Y Gastric Bypass Surgery

Gender Differences in Bariatric Surgery

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Published online: 30 November 2007

Abstract
Background Male gender has been associated with a higher morbidity and mortality rate after bariatric surgery including laparoscopic and open procedures. This study focused on hand-assisted laparoscopic Roux-en-Y gastric bypass and morbidity and mortality among genders.
Methods Hand-assisted laparoscopic Roux-en-Y gastric bypass operations (N=319) were evaluated from October 2003 to March 2006. Comparison between males (N=54) and females (N=265) were conducted using t test or Fishers exact test and chi-square analysis.
Results Patients' average age was 42.3±10.3 and the average body mass index (BMI) was 49.2±7.9. There was no significant difference between males and females in age or BMI. Males had a significantly greater average weight than females (p<0.001) and were significantly more likely to experience sleep apnea (p=0.006) and have heart disease (p=0.017). For operative risk factors, males had a significantly longer anesthesia time (p=0.003), operative time (p=0.027), and length of roux limb (p=0.038). At 6 and 12 months postsurgery, there was no significant difference between males and females with complications. Although BMI did not differ significantly, males continued to weigh significantly more than females and lost significantly more pounds than did females at both 6 and 12 months postoperation.
Conclusion Given their larger size and tendency to accumulate fat in the abdominal compartment that increases the technical difficulty of the procedure, males are historically associated with a higher morbidity and mortality following bariatric surgery. Based on the current study, however, there is no difference in outcome among genders following hand-assisted laparoscopic Roux-en-Y gastric bypass.

Keywords Gastric bypass · Roux-en-Y · Gender outcomes

Abbreviations

BMI	body mass index
CHF	congestive heart failure
DVT	deep vein thrombosis
GI	gastrointestinal bleed
GJ	gastrojejunostomy
HALRGBP	hand-assisted laparoscopic Roux-en-Y gastric bypass
ICU	intensive care unit
JJ	jejunojejunostomy
PE	pulmonary embolism
RYBGP	Roux-en-Y gastric bypass

Introduction

Bariatric surgery is an increasingly popular treatment for the morbidly obese. Much research has been done exploring the complications that accompany bariatric surgery [1]. However, not much research exists on gender

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differences and respective complication rates. Whereas the rate of obesity is essentially equal among genders, more women undergo bariatric surgery. There is evidence that they are more depressed, diet more, and are more likely to allow their weight to interfere with feeling good about themselves [2]. Additionally, male gender has been associated with poorer outcomes following bariatric surgery, as well as a higher conversion rate from laparoscopic to open [3–7]. In an effort to determine if trends hold true, this current study looked at hand-assisted laparoscopic Roux-en-Y gastric bypass (HALRYBGP) and evaluates gender differences with respect to outcomes.

Materials and Methods

The HALRYBGP operative technique is described previously by Hassan et al. [8], but basically, it is a technique that involves working laparoscopically with one hand in the abdominal cavity while maintaining appropriate pneumoperitoneum [9]. A total of 326 hand-assisted laparoscopic Roux-en-Y gastric bypass (RYBGP) operations were performed at one institution by one surgeon from October 2003 to March 2006. Four procedures that were converted to open and three procedures that were aborted were excluded. Therefore, 319 patients (males $n=54$ and females $n=265$) undergoing RYBGP operations were included in the cohort. Each male ($n=53$) was matched to two females ($n=106$) on body mass index (BMI) (±2). One male was excluded from this analysis due to him not having appropriate matches, which then resulted in a total of 159 patients in the study.

Institutional Review Board approval for the study was obtained and data were then retrospectively examined. Potential risk factors included age, weight, BMI, diabetes, hypertension, asthma, gastroesophageal reflux disease (GERD), sleep apnea, arthritis, hyperlipidemia, and heart disease. Operative risk factors included anesthesia time, operative time, and blood loss. Hospital outcomes examined included length of hospital stay, intensive care unit (ICU) stay, leaks [anastomotic leak, gastrojejunostomy (GJ) leak, and jejunojejunostomy (JJ) leak], hemorrhage, bowel obstruction, internal hernia, gastrointestinal (GI) bleed, wound infection, dehiscence, pulmonary failure, stroke, deep vein thrombosis (DVT), pulmonary embolism (PE), nausea and vomiting, reoperation needed, and mortality. In addition, weight, BMI, weight loss since surgery, and complication information were also examined for both 6 and 12 months postoperation.

Comparison between males and females was conducted using Student's t test or Fishers exact test and chi-square analysis. SPSS 14.0 (SPSS, Chicago, IL, USA) statistical software was used to perform the analyses.

Results

Three hundred and nineteen patients, including 54 males and 265 females, undergoing hand-assisted laparoscopic RYBGP operations were included in the cohort. The overall average age was 42.3±10.3 years, and the average BMI was 49.2±7.9. Although males had a significantly greater average weight (357 lb) than females (294 lb) ($p<0.001$), there was no significant difference between males and females in age or BMI.

Statistical analyses were conducted using the cohort of 106 females and 53 males that were matched 2:1 on BMI (±2). The average BMI was 49.75±8.58, with the female group average at 49.75±8.58 and the male group at 49.77±8.66. Despite being matched on BMI, there was a significant difference between males and females with weight (355.49±66.50 lb and 298.95±53.11 lb, respectively, $p<0.001$). There was no significant difference between genders on many of the risk factors including age, diabetes, hypertension, asthma, GERD, sleep apnea, or arthritis (Table 1). Males were significantly more likely to experience hyperlipidemia (21 vs 9%) ($p=0.047$) and heart disease (17 vs 4%) ($p=0.010$) than females. For operative risk factors, there was a significant difference between males and females with anesthesia time (163.7 to 149.0 min, respectively, $p<0.001$) and operative time (113.2 to 103.3 min, respectively, $p=0.004$). There was no significant difference between genders with amount of blood loss.

There was no significant difference between males and females on any hospital outcomes including length of hospital stay, ICU stay, leak (anastomotic leak, GJ leak, JJ leak), hemorrhage, bowel obstruction, GI bleed, wound

Table 1 Risk factors

Risk factor	Male ($n=53$) *N* (%) Mean±SD	Female ($n=106$) *N* (%) Mean±SD	*p* value
Diabetes	20/53 (38%)	27/106 (26%)	0.11
Hypertension	33/53 (60%)	53/106 (50%)	0.22
Asthma	12/53 (23%)	19/106 (18%	0.48
GERD	10/53 (19%)	16/106 (15%)	0.54
Sleep apnea	25/53 (47%)	34/106 (32%)	0.06
Arthritis	22/53 (42%)	47/106 (44%)	0.73
Hyperlipidemia	11/53 (21%)	10/106 (9%)	0.05
Heart disease	9/53 (17%)	4/106 (4%)	0.01
Age	42.5±10.3	42.7±10.2	0.90
Weight (kg)	161.6±30.2	135.9±24.1	<0.001
Anesthesia time (minutes)	162.68±26.66	149.03±20.34	<0.001
Operative time (minutes)	113.15±24.49	103.29±17.87	0.01
Blood loss (cm^3)	72.17±31.83	79.38±60.90	0.42

Table 2 Hospital outcomes

Hospital outcomes	Male (n=53) N (%) Mean±SD	Female (n=106) N (%) Mean±SD	p value
ICU stay needed	6/53 (11%)	10/160 (9%)	0.70
Leak (anastomotic, GJ, JJ)	1/53 (2%)	3/106 (3%)	0.72
Hemorrhage	0/53 (0%)	1/106 (1%)	1.00
Bowel obstruction	0/53 (0%)	4/106 (4%)	0.30
Internal hernia	0/53 (0%)	0/106 (0%)	–
GI bleed	1/53 (2%)	3/106 (3%)	1.00
Wound infection	0/53 (0%)	3/106 (3%)	0.55
Dehiscence	0/53 (0%)	1/106 (1%)	1.00
Pulmonary failure	2/53 (4%)	0/106 (0%)	0.11
Stroke	0/53 (0%)	0/106 (0%)	–
DVT	0/53 (0%)	1/106 (0.9%)	1.00
PE	0/53 (0%)	0/106 (0%)	–
Reoperation	1/53 (2%)	7/106 (7%)	0.20
Mortality	0/53 (0%)	1/106 (1%)	1.00
Length of stay (days)	3.66±4.11	4.19±4.63	0.48

infection, dehiscence, pulmonary failure, DVT, PE, need for reoperation, or mortality (Table 2). No patients experienced an internal hernia or stroke.

There was no significant difference between males and females in the matched subcohort with any complication including marginal ulcer, incisional hernia, nausea/vomiting (Table 3). No patients experienced DVT or mortality. Males weighed significantly more than females (p<0.001) and had a greater weight loss at 6 months postoperation (p<0.001). However, there was no significant difference between genders with BMI 6 months postsurgery.

Twelve-month postsurgery findings were similar to the 6-month findings with no significant differences on any outcome (Table 4). Likewise, a significant difference remained between males and females on weight (p<0.001) and weight loss (p=0.003). At 12 months postoperation, there was still no significant BMI difference between genders.

Table 3 Six-month outcomes

6 Month outcomes	Male (n=42) N (%) Mean±SD	Female (n=90) N (%) Mean±SD	p value
Marginal ulcer	2/42 (5%)	1/90 (1%)	0.24
Incisional hernia	1/42 (2%)	7/90 (8%)	0.44
DVT	0/42 (0%)	0/90 (0%)	–
Nausea/vomiting	0/42 (0%)	1/90 (1%)	1.00
Mortality	0/42 (0%)	0/90 (0%)	–
Weight (kg)	120±28.4	99.9±20.6	<0.001
Weight loss at 6 months (kg)	46.7±13	35.5±9.5	<0.001
BMI at 6 months	36.7±8.1	36.6±7.3	0.96

Table 4 Twelve-month outcomes

12-Month outcomes	Male (n=23) N (%) Mean±SD	Female (n=49) N (%) Mean±SD	p value
Marginal ulcer	0/23 (0%)	2/49 (4%)	1.00
Incisional hernia	0/23 (0%)	2/49 (4%)	1.00
DVT	0/23 (0%)	0/49 (0%)	–
Nausea/vomiting	0/23 (0%)	0/49 (0%)	–
Mortality	0/23 (0%)	0/49 (0%)	–
Weight (kg)	109.4±27.6	86.5±22.1	<0.001
Weight loss at 12 months (kg)	60.7±17.7	48.2±8.6	0.01
BMI at 12 months	33.62±7.87	31.60±7.88	0.35

Discussion

Obesity has become a growing concern in this country. Obesity has surpassed tobacco as the number one cause of death and disease in the USA [10]. Diseases such as adult-onset diabetes mellitus, hypertension, cardiovascular disease, and sleep apnea, just to name a few, are all associated with obesity. Approximately 5% of the total health care costs in this country are spent on obesity-related illnesses [11]. An estimated 40 billion dollars are spent on obesity alone, with approximately 30 billion more spent on weight-reduction attempts [12].

Conservative treatment of morbid obesity, such as diet and exercise, has, for the most part, failed to maintain long-term weight loss. For this reason, the demand for gastric bypass has increased significantly over the past several years. The number of surgeries performed annually has increased from around 16,000 in the 1990s to 103,000 in 2003 [12].

Several different techniques have been developed for treating obesity, including vertical band gastroplasty, jejunoileal bypass, biliopancreatic diversion, and RYBGP. Of all the techniques, the Roux-en-Y remains the gold standard and is the most common operation performed for morbid obesity [13].

Historically, male gender has been associated with greater morbidity and mortality after bariatric surgery [3–7, 14]. However, this study found that there is no difference in males and females in outcomes. Although males tended to have more cardiovascular disease, weigh more, and undergo a longer anesthesia time, there were no differences seen in any of the measured outcomes at 6 or 12 months follow-up.

The conclusions drawn from this study may be biased due to the fact that a significantly greater number of female

patients were included in the study. However, more women undergo bariatric surgery every year. Studies have shown females to be more depressed, to diet more, and to be more likely to allow their weight to interfere with their self esteem [2]. In our study, males were matched to two females on BMI and still no differences between genders were found.

The gastric bypass database allowed an efficient assessment of patients undergoing HALRYBGP. However, a single surgeon at a single institution collected the data. Also, this study focused on early outcomes, observing patients postoperatively at 6 and 12 months. Additional research is warranted to evaluate outcomes in other populations in other facilities and a longer postoperative follow up.

To conclude, analysis of patients undergoing HALRYBGP at our institution shows no difference in outcomes among genders. This study suggests that the bariatric procedure is equally safe among genders. This is important information for the public, whose eyes are increasingly focused on safety and outcomes after bariatric surgery.

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