

Laparoscopic Bariatric Surgery Can Be Performed Safely in the Community Hospital Setting

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ABSTRACT

Background: Bariatric surgery is being performed commonly in various practice settings. To evaluate safety and efficacy, we reviewed the results of our first 516 laparoscopic bariatric operations performed in a community hospital setting.

Methods: We reviewed retrospectively the results of our first 516 consecutive laparoscopic bariatric procedures.

Results: Between December 2001 and December 2004, we performed 516 bariatric surgical procedures. Ninety-nine percent of these were accomplished laparoscopically. Thirty-day mortality in our series of 516 patients is 0%. Of these patients, 431 had laparoscopic gastric bypass. The mean BMI in these patients was 51. Mean percent excess weight loss in the laparoscopic gastric bypass patients was 71% at 1 year, 75% at 2 years and 79% at 3 years. Complications in the laparoscopic bypass group requiring reoperation included 11 bowel obstructions (2.5%), 5 episodes of bleeding (1.1%), and 2 laparoscopies for benign reasons. There were 8 anastomotic leaks (1.9%)—7 requiring reoperation, 1 managed nonoperatively. Eighty-five patients had adjustable gastric banding. Mean BMI was 45. Mean percent excess weight loss in the adjustable gastric banding patients was 39% at 1 year and 57% at 2 years. Complications in the adjustable gastric band patients requiring reoperation included 3 access port malfunctions (3.5%), 3 prolapsed bands (3.5%), 1 punctured band requiring replacement (1.2%) and 1 band causing complete obstruction requiring removal (1.2%).

Conclusion: Laparoscopic bariatric surgery can be performed safely in the community hospital setting with a very low operative morbidity and mortality. This requires an experienced team of bariatric surgeons leading a multidisciplinary team of other health care professionals. Surgeon experience and super obesity can influence the risks.

INTRODUCTION

Obesity has reached epidemic proportions in the United States.¹ Measured by calculating the body mass index (BMI) by dividing the weight in kilograms by the height in meters squared, obesity exists when the BMI is >30. Morbid obesity is defined as BMI >40 and Super obesity as BMI >50.²

In Wisconsin 21.9% of the residents are obese and approximately 6% (330,000 Wisconsin residents) are morbidly obese.³ Morbid obesity is associated with an increased risk of multiple comorbidities⁴ and markedly lessens life expectancy.⁵ Morbid obesity is generally unresponsive to nonsurgical forms of treatment,⁶ and when diet and exercise therapy are compared to laparoscopic gastric bypass surgery in a decision analysis model, the laparoscopic gastric bypass group experienced a substantially longer survival than diet and exercise therapy.⁷ The National Institute of Health therefore recommends that weight loss surgery should be considered for morbidly obese patients whose other attempts at weight loss have failed.⁸ Following successful weight loss surgery, most patients realize improvement or complete resolution of comorbidities including diabetes, hyperlipidemia, hypertension, and obstructive sleep apnea.⁹ Several recently published studies also document that weight loss surgery significantly decreases overall mortality and provides a marked survival advantage.^{10,11}

Many surgical procedures for weight control have been devised in the last several decades. Gastric bypass, which is a combined restrictive and malabsorptive op-

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eration, was first used in the 1960s and then modified and performed laparoscopically in the 1990s. Gastric bypass is currently the gold standard against which all other weight control operations are measured.¹² Purely restrictive operations were performed commonly in the 1970s, but many of these operations were plagued with recurrent weight gain. Adjustable gastric banding was introduced in the 1980s to address this issue, and many surgeons consider adjustable gastric banding the restrictive procedure of choice at this time.¹³ The advantages of laparoscopic surgery as compared to open surgery are well-known and include less postoperative pain, earlier mobilization, shorter hospital stay, and faster recovery.¹⁴ When laparoscopic techniques are applied in the field of bariatric surgery, recovery time and perioperative complications are reduced,¹⁵ most notably cardiopulmonary and wound-related complications.¹⁶ Several studies have shown equal weight loss when laparoscopic bariatric surgery is compared to traditional open bariatric surgery.^{12,17}

PATIENT SELECTION AND OPERATIVE TECHNIQUE

Patients were selected for surgery based on standard NIH criteria of BMI >40, or BMI >35 with significant comorbidities. In our practice, all procedures are performed laparoscopically regardless of preoperative BMI. We offer patients either laparoscopic gastric bypass or laparoscopic adjustable gastric banding. Most patients qualify for either operation. The choice of procedure is a joint decision made by the surgeon and the patient at the initial consultation.

The technique used for laparoscopic gastric bypass is similar to the technique used for open surgery. A small vertical gastric pouch is created by using the Endo-GIA stapler to divide the stomach. We use a 34-French dilator in the pouch to calibrate its size. The jejunojejunosotomy is performed in a side-to-side fashion, also using the Endo-GIA stapler. The mesenteric defect is completely closed with silk sutures. The standard length of the Roux limb is 150 cm and is brought up to the gastric pouch in an antecolic/antegastric position. The gastrojejunostomy is hand-sewn with an inner layer of running Vicryl and an outer layer of interrupted silk. This anastomosis is also done over the 34-French dilator to properly calibrate its size. The gastrojejunal anastomosis is evaluated intraoperatively either with endoscopy or air insufflation.

We use the LAP-BAND adjustable gastric banding system for those patients requesting a purely restrictive bariatric procedure. The pars flaccid approach is used

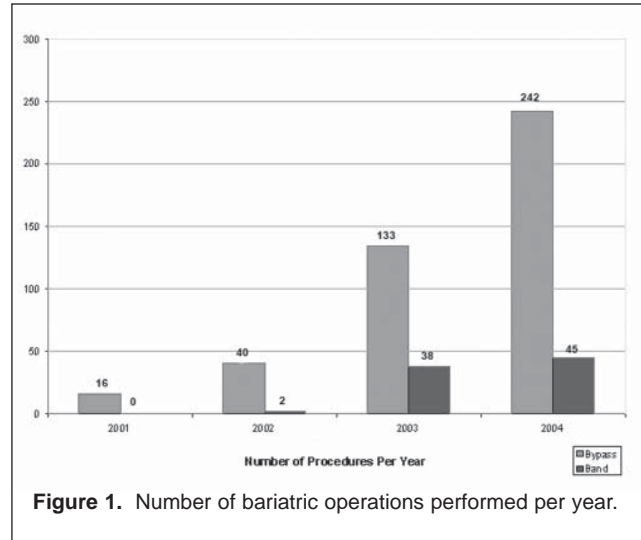


Figure 1. Number of bariatric operations performed per year.

for placing the band around the proximal stomach. The stomach above and below the band is approximated anteriorly with permanent sutures to prevent prolapse. The LAP-BAND access port is sutured to the abdominal wall fascia so that it can be accessed percutaneously for adjustments in the future.

The surgeons coordinate all preoperative and postoperative care in our patients. All patients receive extensive counseling preoperatively with a surgeon, including an individual consultation and a group information session and are required to pass a written quiz and sign a contract outlining their responsibilities before we will proceed with an operative procedure. All patients are counseled preoperatively by a dietitian and are evaluated by a psychologist and a physical therapist. Most patients undergo preoperative cardiac and pulmonary evaluation as well as other testing as indicated by associated comorbidities.

The majority of our bariatric procedures are performed at Elmbrook Memorial Hospital in Brookfield, Wis. The surgeons have personally trained the nursing staff in the care of our patients and have implemented clinical pathways to ensure uniform care. The hospital has provided appropriate operating room tables and laparoscopic equipment as well as hospital beds and hospital rooms for safe care of bariatric patients. Additionally, the x-ray department and our staff anesthesiologists have become very proficient in the special needs of bariatric surgical patients. All of our patients are followed postoperatively for 5 years at regular intervals with routine postoperative surveillance labs and nutritional counseling all coordinated through our office. All patients are encouraged to participate in our postoperative support groups. We believe that this prac-

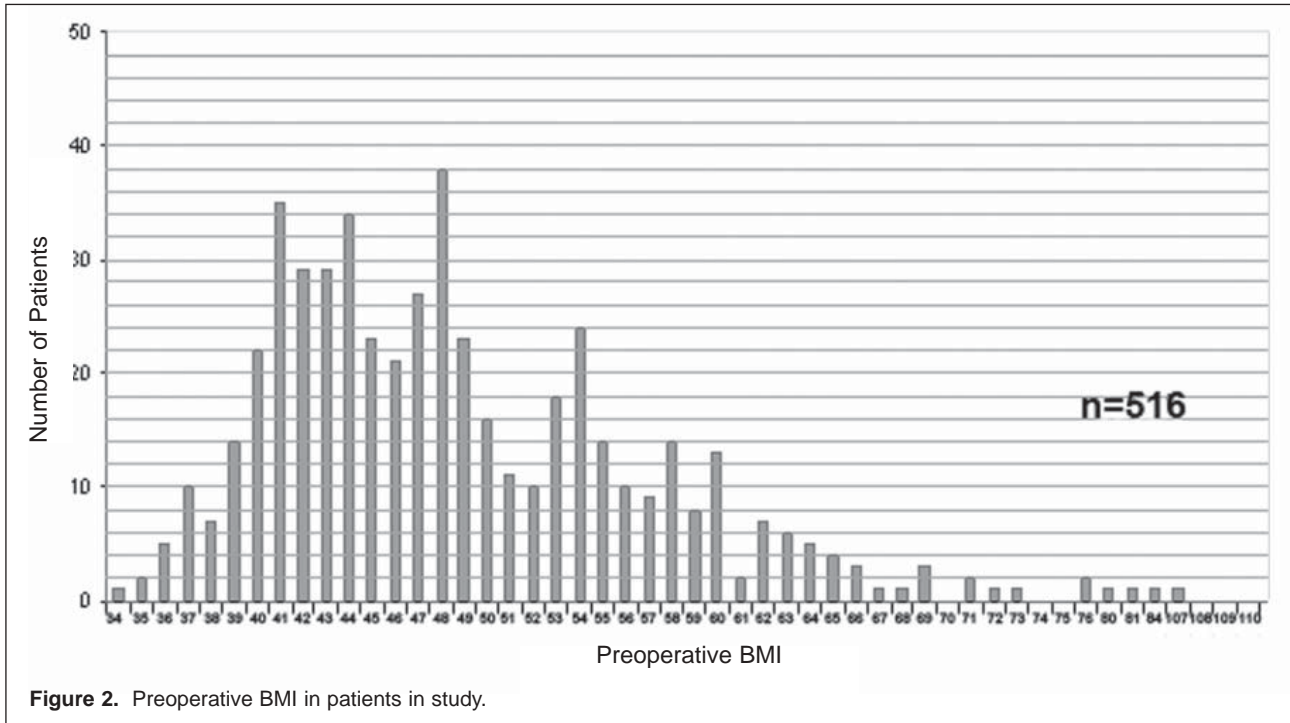


Figure 2. Preoperative BMI in patients in study.

tice model is essential for optimal bariatric surgical care and excellent outcomes.

RESULTS

Between December 2001 and December 2004, we performed 516 bariatric operations (Figure 1). Patients ages ranged from 18 to 71. Their preoperative BMI ranged from 35 to 107 with a mean BMI of 48 (Figure 2). The mean BMI in the gastric bypass patients was 51; 245 were <50 and 186 were >50. The mean BMI in the gastric banding patients was 45; 62 were <50 and 23 were >50. Of these, 506 were primary bariatric procedures and 10 were revisions of previous failed bariatric procedures. Four hundred thirty-one patients received gastric bypass, 99% of which were performed laparoscopically when the BMI was <50, 98% of which were performed laparoscopically when the BMI was >50. Eighty-five patients received gastric banding, 100% of which were performed laparoscopically.

Of the 6 gastric bypass patients requiring an open operation, 3 had previous bariatric procedures (2 bypasses and 1 vertical banded gastroplasty). The other 3 patients had preoperative BMIs of 41, 63, and 75. There were no complications in these 6 patients. Of the 10 revision operations, 7 were accomplished laparoscopically and 3 had open procedures. There was 1 complication in the laparoscopy group requiring surgery (a bowel obstruction from a trocar site hernia). The 30-day mortality in these 516 patients was 0%. Mean percent excess weight

loss in the gastric bypass patients was 71% at 1 year, 75% at 2 years and 79% at 3 years (Figure 3). In the gastric band patients, the mean percent excess weight loss was 39% at 1 year and 57% at 2 years (Figure 4).

Complications in the gastric bypass patients are summarized in Table 1. The most feared complication after laparoscopic gastric bypass surgery is anastomotic leak. Eight of 431 patients (1.9%) developed an anastomotic leak; 6 leaks were related to staple line failure, 1 patient on high-dose steroids for other medical reasons developed a leak from the sutured gastrojejunostomy, and 1 patient was found to have a small bowel perforation not related to an anastomosis or staple line. Seven patients were treated with early return to the operating room for laparoscopic irrigation, drain insertion, and closure of the leak when possible. One patient had a small staple line leak from the gastric pouch that was treated nonoperatively with percutaneous drainage. All 8 patients recovered fully. None of the leaks occurred in patients who had previous bariatric or other gastric operations. Four leaks occurred in 245 patients with BMI <50 (1.6%), 4 occurred in 186 patients with BMI >50 (2.1%). The incidence of leak in our first 2.5 years was 2.1% and in the last year was 1.7%.

Bowel obstruction was seen in 11 of 431 patients (2.5%). Causes of obstruction were trocar site hernia in 2, kinking of jejunojunction in 7, internal hernia in 1 and incarcerated umbilical hernia in 1. These obstructions were all managed laparoscopically. Six of the ob-

structions were in 245 patients with a BMI <50 (2.4%), and 5 were in 186 patients with a BMI >50 (2.6%). The incidence of obstruction in our first 2.5 years was 4.8% and in the last year was 0.8%.

Postoperative bleeding requiring reoperation was seen in 5 of 431 patients (1.1%). Two patients had bleeding from the gastric pouch, 2 patients had bleeding from the Roux-Y anastomosis, and 1 patient had bleeding from the omentum. Three bleeds were in 245 patients with BMI <50 (1.2%), 2 were in 186 patients with BMI >50 (1.1%). The incidence of bleeding in our first 2.5 years was 0% and in the last year was 2.1%.

Post-op laparoscopy was also performed on 2 occasions for benign reasons. A laparoscopy was performed to correct a complication related to laparoscopic equipment failure and a negative laparoscopy was performed in a patient who eventually was found to have rhabdomyolysis.

Complications of gastric banding requiring reoperation (Table 2) included 3 access ports problems (a rotated port that prevented cannulation and 2 port tubing disconnections) in 85 patients (3.5%). One leaking gastric band required replacement, which was performed laparoscopically, and another band that caused complete obstruction of the stomach was removed. This patient was later converted to laparoscopic gastric bypass. Three patients (3.5%) presented with band prolapse. All 3 patients were successfully treated with laparoscopic repositioning of the band. In 62 patients with BMI <50 we saw 2 prolapses (3.2%) and 2 access port problems (3.2%). In 23 patients with BMI >50 we saw 1 prolapse (4.3%) and 1 access port problem (4.3%).

All patients are treated prophylactically with Lovenox and sequential compression devices and we have not seen a DVT or a pulmonary embolus in any of the 516 patients. Patients received 40 milligrams of Lovenox SQ prior to surgery (50 milligrams if BMI was >50) and continued on that dose daily until discharged.

DISCUSSION

Unfortunately, the myth that laparoscopic bariatric surgery is risky and associated with high mortality persists. The results of this series of 516 patients would suggest that this is not true. The 30-day mortality rate in a combined study of 17,676 patients following gastric bypass surgery was 0.25%.¹⁸ We generally inform our patients that their risk of dying following laparoscopic gastric bypass surgery is around 1 in 200 or 1 in 2000 for laparoscopic gastric banding. Although in our practice, the actual mortality is 0% in our first 516 patients. Our patients are losing weight as expected, and weight loss

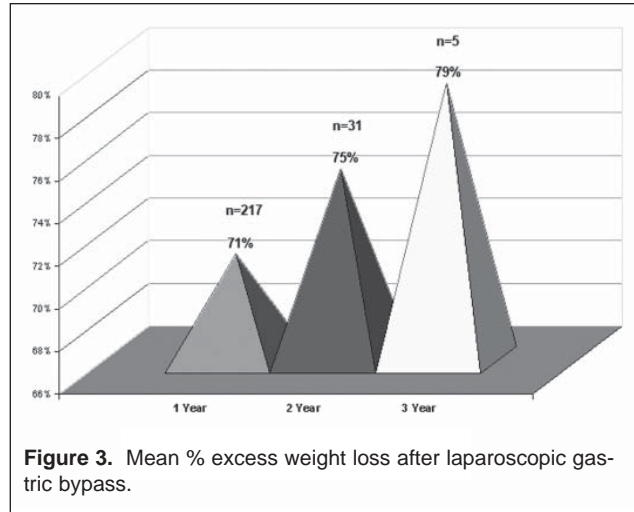


Figure 3. Mean % excess weight loss after laparoscopic gastric bypass.

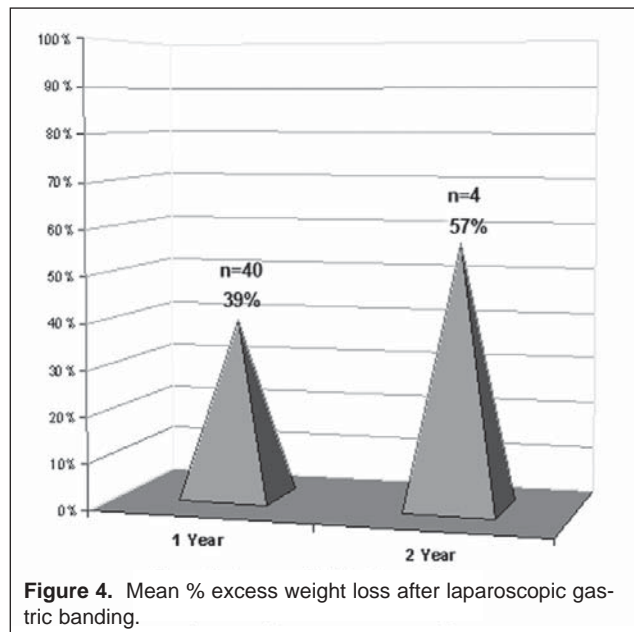


Figure 4. Mean % excess weight loss after laparoscopic gastric banding.

Table 1. Laparoscopic Bypass Complications

	Bowel Obstruction	Leak	Bleeding
Total (431)	11 (2.5%)	8 (1.9%)	5 (1.1%)
BMI <50 (245)	6 (2.4%)	4 (1.6%)	3 (1.2%)
BMI >50 (186)	5 (2.6%)	4 (2.1%)	2 (1.1%)
2001 - 2003 (189)	9 (4.8%)	4 (2.1%)	0
2004 (242)	2 (0.8%)	4 (1.7%)	5 (2.1%)

Table 2. Laparoscopic Band Complications

	Port			Obstruction
	Prolapse	Malfunction	Puncture	
Total (85)	3 (3.5%)	3 (3.5%)	1 (1.2%)	1 (1.2%)
BMI <50 (62)	2 (3.2%)	2 (3.2%)	1 (1.6%)	0
BMI >50 (23)	1 (4.3%)	1 (4.3%)	0	1 (4.3%)

in our series compares favorably to other published results.^{12,19}

We have demonstrated that laparoscopic gastric bypass can be successfully completed in patients with morbid obesity 99% of the time and in patients with super obesity 98% of the time. Additionally, we have shown that this can be done with a very low operative mortality and that good weight loss can be achieved. We have attempted to determine if the laparoscopic approach is safe for all patients and what other factors might influence risks.

The most common early complications of laparoscopic gastric bypass include anastomotic leak, bowel obstruction, and bleeding. Our incidence of gastrointestinal leak after laparoscopic gastric bypass is 1.9%. This compares favorably to the reported incidence of leak in various studies, which ranged between 1.5% and 5.8%.²⁰ Another recent review of anastomotic leak after laparoscopic gastric bypass surgery surveyed multiple groups including over 6000 patients with a leak rate that ranged from 0% to 4.3%.¹³ Our incidence of post-op bleeding requiring reoperation is 1.1%, compared to reported rates of 0%-3.3%.²¹ Our practice of completely closing the mesenteric defect and any trocar site larger than 12mm has resulted in a low incidence of postoperative bowel obstruction. Our rate of bowel obstruction is 2.5%, well within the reported ranges of 0%-3.5%¹² in 1 study and 1.5%-7.3%¹⁷ in another.

Complications following gastric banding generally do not occur in the immediate post-op period. The most common late complications requiring reoperation are band prolapse and access port problems. In a large series of 1120 patients treated with the LAP-BAND, the incidence of access port problems was 5.4%, and the incidence of band prolapse when the pars flaccida approach was used was 4.7%.²² Our incidence of access port problems is 3.5% and band prolapse is 3.5% at an early stage of follow-up.

The optimal treatment for patients with super obesity (BMI >50) remains controversial. Some have reported that the laparoscopic approach in larger patients is associated with higher risks.²³ In our series of patients we have been able to successfully complete laparoscopic gastric bypass and laparoscopic gastric banding in super obese patients and have also seen a slightly increased risk of leak, obstruction, band prolapse, access port problems, and a band causing complete obstruction. Our risk of leak in the super obese was 2.1% vs 1.6% in the morbidly obese. Super obesity slightly increased the risk of obstruction (2.6% versus 2.4%). Band prolapse and access port problems were also more frequent in

these patients (4.3% vs 3.2%). We did have 1 band that completely obstructed the stomach in a super obese patient, something that we have not seen in patients with BMI <50. Because of this case we recommend using the larger 11 cm LAP-BAND VG system in the super obese patients. The risk of bleeding was similar in the super obese (1.1% vs 1.2%). When these patients are cared for meticulously and complications are identified and corrected early, these increased rates of complications do not translate into increased mortality. Super obese patients who, by nature of their size, are at higher risk,²⁴ stand to benefit the most from minimally invasive techniques. We believe that the significant benefits of laparoscopic surgery^{14,17} offset the slightly elevated rates of complications in the super obese and therefore feel that the benefits of laparoscopic surgery should be offered to all bariatric patients regardless of pre-op BMI.

There is clearly a significant learning curve for laparoscopic bariatric surgery and an association between the number of bariatric procedures performed and the predicted probability of complications. It appears that after 100 operations have been performed the rate of complications decreases significantly.¹¹ We also observed that earlier in our series the risk of leak was somewhat higher, 2.1% vs. 1.7% in the last year. Most of the bowel obstructions were related to the jejunojejunostomy and occurred early in our series, 4.8% vs 0.8% in the last year. This prompted us to modify the technique used to create the Roux anastomosis, which has reduced the risk of obstruction. We have seen more bleeding in the last year than earlier in our series (2.1% vs 0%) even though we have not changed Lovenox doses or other variables. Follow-up of our band patients has not been long enough to identify any meaningful trends.

Since almost all of our leaks have been related to staple lines we have learned that all staple lines must be carefully inspected at the time they are applied and again at the end of the operation. Signs of a failed staple line include malformed or unformed staples or excessive bleeding. These questionable staple lines are immediately oversewn with silk sutures.

Our approach to postoperative complications includes early return to the operating room for laparoscopic evaluation when complications are suspected. We believe that with this approach we have been able to identify and treat complications at an early stage and avoid any perioperative deaths.

Based on our results we conclude that laparoscopic gastric bypass and banding can be performed safely in the community hospital setting when a complete bariatric program as described above is in place. Super obesity

is associated with a somewhat higher risk of complications, and these patients should be cared for by an experienced team of surgeons. When this level of care is provided, laparoscopic bariatric surgery is safe and effective compared to the higher risk of untreated morbid obesity.

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