

Operative Experience and Follow-Up in a Cohort of Patients with a BMI ≥ 70 kg/m²

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Background: Roux-en-Y gastric bypass (RYGBP) has been found to be a safe and effective operation for the morbidly obese whether performed open or laparoscopically. Weight loss has been substantial and sustained. Less is known about those at the extremes of obesity, with BMI ≥ 70 kg/m² with regard to safety and efficacy. This study is a retrospective review of a cohort of such patients, to examine operative experience and response to surgical treatment.

Methods: A cohort of 34 patients who underwent open RYGBP at one institution was retrospectively reviewed. All operations were performed by a single surgeon. Operative outcome was examined, including early mortality, morbidity, need for intensive (ICU) care and hospital length of stay (LOS). Percent of excess weight lost (EWL) and percent reduction of BMI after at least 1 year of follow-up were determined. Late mortality was assessed.

Results: There were 22 females and 12 males with mean age 42.0 + 8.1 years and mean BMI 78.3 + 8.5 kg/m². Obstructive sleep apnea (OSA) was found in 19/34 (58%) and hypoventilation syndrome of obesity (HSO) in 11/34 (32%). There was 1 early death (3 months) from renal failure. 7 patients (21%) developed complications, 3 major (pulmonary embolus, wound dehiscence) and 4 minor (wound infection). 16 patients (47%) required ICU, and 12 (35%) required extended mechanical ventilation. Hospital LOS was 10.3 ± 10.4 days for all patients. There were 4 late deaths (12%) from 7 to 36 months after RYGBP. Mean percent EWL was 61 ± 17 and mean percent reduction in BMI was 44 ± 11. For those followed at least 36 months, weight loss was sustained in 12/14 patients.

Conclusions: RYGBP can be performed safely, even at the extremes of weight. While technically challenging, there were no instances of intra-abdominal sepsis. Postoperative complications were few. Need for ICU and hospital LOS is greater, reflecting the incidence of pre-existing pulmonary problems. Weight loss is significant and appears to be sustained in most patients. Late deaths have been noted and deserve careful scrutiny.

Key words: Morbid obesity, gastric bypass, complications, BMI ≥ 70

Introduction

Morbid obesity is generally defined as a body mass index (BMI) ≥ 40 kg/m². Those with a BMI > 50 kg/m² are referred to as “super-obese”, and those with a BMI > 60 kg/m² as “super-super-obese”. Heavier patients, those with a BMI in excess of 70 kg/m², have not been given a name but are clearly at the extremes of human obesity. In addition to co-morbid conditions usually associated with morbid obesity, these individuals are severely limited by their weight in mobility and their ability to socially interact. Some are literally confined to their home. Substantial weight loss in this patient population could have profound effects not only on co-morbid conditions but also on psychological well-being and social worth. While the technical aspects of operating at the extremes of weight have been worked out,^{1,2} there is concern that heavier patients face a higher postoperative mortality and morbidity.³ Nevertheless, provided hospital resources are in place to accommodate the extremes of weight, these people, while technically challenging, could potentially benefit more than any other class of obese patients. Since beginning the bariatric program in 1995, we have considered all patients, regardless of extreme weight, as candidates for Roux-en-Y gastric bypass. In fact, we have attracted such patients, referred from other programs, because of our willingness to operate at the extremes of weight. In this retrospective review we have examined our experience with those patients with a BMI ≥ 70 kg/m².

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Materials and Methods

From 1995 to the present, 624 patients have undergone either open ($n = 438$) or laparoscopic ($n = 186$) Roux-en-Y gastric bypass (RYGBP) in the hospitals of the University of Missouri-Kansas City School of Medicine. From this patient population, 34 patients with BMI ≥ 70 kg/m² were examined. All these patients underwent open RYGBP because of the technical challenges in patients this size. All were operated on by one surgeon (TSH). All patients underwent preoperative evaluation consisting of a thorough history and physical examination, blood chemistry evaluation, sleep studies and pulmonary function tests when indicated, and specialty consultation where appropriate. Letters of referral from primary care physicians were required. All patients received a preoperative psychological evaluation, and most attended bariatric support group meetings in advance of their operation. Operating tables designed to support the extremes of weight were used, although two patients, early in our experience, were operated upon in their hospital beds. Biliopancreatic limbs were measured from 40-70 cm, and Roux-en-Y limbs were measured from 90-250 cm (generally one-third to one-half the length of the small intestine). At least 100 cm of distal common channel was confirmed at operation. Postoperatively most, but not all patients, were kept in the surgical intensive care unit until they could be safely transferred to a surgical floor. Patients were seen at 1 week, 1 month, and then every 3 months thereafter. After 1 year, follow-up visits were scheduled every 6 months. Parameters examined included age, gender, preoperative BMI and weight, pulmonary co-morbidity, postoperative mortality and morbidity, need for ICU care and prolonged mechanical ventilation, and length of hospital stay (LOS). Weight loss is expressed as percent excess weight lost (EWL) and percent reduction in BMI as suggested by Deitel.⁴ Values are expressed as mean \pm standard deviation.

Results

Of the 34 patients with a BMI ≥ 70 kg/m², there were 22 females and 12 males. Mean age was 42.0 ± 8.1 years (range 28-63 years). Mean BMI was $78.3 \pm$

8.5 kg/m² (range 70-106 kg/m²). Mean weight was 223 ± 33 kg. Two patients had previous gastroplasty procedures, and one patient had an ileal conduit. Five patients had a tracheostomy in place prior to operation, and two were ventilator-dependent. Nineteen patients (58%) carried a diagnosis of obstructive sleep apnea (OSA), and 11 patients (32%) were thought to have the hypoventilation syndrome of obesity (HSO).

There were a total of five deaths (15%) in the follow-up period. There was one in-hospital death. This patient died of renal failure 3 months after his operation. The patient was ventilator-dependent, indigent, and could not be placed in an extended care facility. The renal failure was insidious, appearing 6 weeks following the operation. The patient refused dialysis. No other patient died in the early postoperative period. There were four late deaths (12%). One patient died 7 months following RYGBP of undetermined causes. One patient died following an elective cholecystectomy at an outside institution 9 months following her RYGBP, cause undetermined. One patient died 33 months after RYGBP of complications from acute pancreatitis (alcohol related). One patient died 36 months after RYGBP of metastatic bladder carcinoma. Ages ranged from 41 to 47 years.

A total of seven patients (21%) developed surgical complications postoperatively. There were three major complications: one patient suffered a pulmonary embolus and two developed wound dehiscences. Four patients developed minor complications, all with wound infections. Two patients were re-explored on postoperative days 10 and 15 for fear of intra-abdominal sepsis. One exploration was negative, and in the second, necrotizing fasciitis was discovered. There were no instances of intra-abdominal sepsis or gastrointestinal anastomotic leaks. Three patients required tracheostomies for prolonged endotracheal intubation. In a program where patients are not automatically admitted to the ICU, 16 of 34 patients (47%) required ICU care. Twelve patients (35%) required mechanical ventilation >24 hours. Mean hospital LOS for all patients except the one individual who died in the intermediate postoperative period was 10.3 ± 10.4 days. Four patients required ≥ 30 days of hospitalization. Excluding these "outliers", the hospital LOS would be 7.1 ± 2.8 days.

Of the 29 patients available for at least 12 months of follow-up, five were lost to follow-up and could not be contacted. Twenty-four patients (82%) were followed for at least 12 months (range 12-48 months). Fourteen patients were followed for at least 36 months. In those patients followed at least 12 months, percent EWL was 61 ± 17 , and percent reduction in BMI was 44 ± 11 . In eight of 24 patients (33%) the BMI was reduced to $<40 \text{ kg/m}^2$. In the 14 patients followed at least 36 months, 12 had a stable or lower weight, two had gained 3 and 7 kg, from their weight at 12 months.

Discussion

There has been demonstrated a clear association between morbid obesity (BMI $\geq 40 \text{ kg/m}^2$) and premature death from all causes.⁵ In this report by Calle and associates, there is an exponential component to the graphs, more so for men than women, from a study of 1,046,154 individuals, which leads one to believe that the risk of deaths climbs rapidly as the BMI rises beyond 40 kg/m^2 . However, there have been no studies of individuals at the extremes of obesity, above a BMI of 70 kg/m^2 , to substantiate this impression. Nevertheless, it is reasonable to assume that these patients, at the extremes of human weight, are at least as susceptible to premature death as their "lighter" counterparts. Additionally, one only has to witness the profound immobility that extreme weight produces to be impressed by the limitations of activity and social interaction that results. Bariatric surgery, specifically RYGBP, has been shown to positively impact co-morbid conditions and quality of life^{6,7} by production of significant and sustained weight loss, including individuals whose BMI exceeded 70 kg/m^2 . It therefore seems advantageous for those at the extremes of weight to undergo bariatric surgery if the mortality and morbidity is acceptable and if significant weight loss occurs.

This study has demonstrated that RYGBP in patients with BMIs $\geq 70 \text{ kg/m}^2$ can be performed safely. As might be expected, these patients had a significant incidence of pulmonary disorders with over one-half suffering from OSA and one-third afflicted with HSO. An open, rather than laparoscopic, approach was chosen for ease of technique

and because of evidence that open procedures produce more consistent weight loss.^{8,9} There were no postoperative deaths within 30 days and only one early death from unexplained renal failure. Complications affected one in five and were generally not life-threatening. There were no anastomotic leaks and no instances of intra-abdominal sepsis. Not surprisingly, with the high incidence of pulmonary disorders, almost one-half required ICU and over one-third required mechanical ventilation beyond 24 hours. This, no doubt, is responsible for the longer hospital LOS. We have previously shown that the need for ICU and mechanical ventilation is linked to BMI, which, in turn, is linked to hospital LOS.¹⁰

Follow-up information showed a significant and sustained weight loss in the majority of subjects. Percent EWL ranged from 25% to 90%, averaging 61%, and was comparable to results reported in the literature for patients at lower weights.¹¹ This was maintained for up to 3 years after operation in all but two of 14 patients. Despite the observed EWL, only one in three patients realized a reduction of BMI $<40 \text{ kg/m}^2$, presumably where a significant lowering of risk from premature death should occur. There were a notable number of late deaths, four in 29 evaluable patients (14%), occurring within 3 years of follow-up. It is not known whether any of the five patients lost to follow-up suffered the same fate. In a longer follow-up period, 15 years, Flum and Dellinger,¹² studying 3,328 bariatric surgery patients, found a late mortality rate of 11.8% compared to 16.3% in non-operated obese patients. Whether extreme obesity results in a higher late death rate is unknown, but our study raises some concern.

Our experience mirrors those reported by Shuhaiber and Vitello¹³ and Raftopoulos and colleagues.¹⁴ In the three series, including the present study, comprising 138 patients, almost all of whom had an open RYGBP, there were a total of three postoperative deaths – 2.1%. Hospital LOS in our series was longer than reported by the others, and was, to a large extent, influenced by four "outliers" who required extended periods of mechanical ventilation due to preoperative pulmonary problems. Without these four patients, the average LOS was a more reasonable 7 days. Even so, this is still longer than encountered in our population of patients undergoing open RYGBP (5 days) and reflects the greater need for ICU care and ventilatory support.

In summary, there is ample evidence that RYGBP can be safely performed even at the extremes of weight. Hospitals should assess their resources to accommodate these patients, including proper equipment and stress on health-care providers. These patients will likely require critical care support because of the co-morbid pulmonary problems that are often present. At present, the open method of RYGBP is advisable for all but the most experienced laparoscopic surgeons. Even then, appropriate technology to safely perform proximal gastric stapling laparoscopically may be lacking. Results are gratifying, weight loss appears sustained, and some patients may return to a healthy BMI. Of concern is the occasional report of late premature death which awaits further evaluation.

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(Received January 18, 2005; accepted February 20, 2005)