

Original article

Outcomes of bariatric surgery in patients ≥ 65 years

Lana G. Nelson, D.O., M.S.P.H.^a, Peter P. Lopez, M.D.^b, Krista Haines, B.A., M.A.^a,
Bianca Stefan, B.S.^a, Taylor Martin, B.S.^a, Rodrigo Gonzalez, M.D.^a,
Patricia Byers, M.D., F.A.C.S.^b, Michel M. Murr, M.D., F.A.C.S.^{a,*}

^aDepartment of Surgery, Interdisciplinary Obesity Treatment Group, University of South Florida Health Sciences Center, Tampa, Florida

^bDeWitt Daughtry Family Department of Surgery, University of Miami Miller School of Medicine, Miami, Florida

Received September 16, 2005; revised February 14, 2006; accepted February 23, 2006

Abstract

Background: Although the Medicare Coverage Advisory Committee found that significant evidence supports the safety and effectiveness of bariatric surgery, few data are available on the outcomes of bariatric procedures in patients ≥ 65 years. The aim of this study was to report on contemporary outcomes of Roux-en-Y gastric bypass (RYGB) in patients ≥ 65 years.

Methods: We reviewed prospectively collected data from all patients ≥ 65 years who underwent RYGB at two Florida university-based programs from 1999 to 2005. Similarly, the Florida Discharge Database was queried for patients ≥ 65 years who had undergone RYGB from 1999 to 2005. The data are presented as the mean \pm SEM.

Results: A total of 25 patients ≥ 65 years had undergone RYGB at our institutions (age 68 ± 1 years, body mass index 50 ± 3 kg/m²). The overall complication rate was 20%, and the length of stay was 7 ± 3 days. One patient (4%) died 5 weeks postoperatively of septic complications. For the 13 patients with a median follow-up of 21 months (range 9–61), the percentage of excess body weight loss was $51\% \pm 7\%$; medication use for co-morbidities decreased from 9 ± 1 to 4 ± 1 medications/day ($P < .01$). The Florida Discharge Database reported 231 patients ≥ 65 years who had undergone RYGB. In that group of patients, the mean age was 67 ± 0.2 years, the length of stay was 6 ± 1 days, in-hospital mortality rate was 1.3%, and the overall complication rate was 15%.

Conclusion: In a small cohort of patients ≥ 65 years, RYGB resulted in significant weight loss and resolution of obesity-related co-morbidities. The findings from the mandatory reported Florida Discharge Database strongly confirmed the safety of RYGB in patients ≥ 65 years. © 2006 American Society for Bariatric Surgery. All rights reserved.

Keywords:

Clinically significant obesity; Bariatric surgery; Roux-en-Y gastric bypass; Age; Elderly; Medicare

Although it has been well established that bariatric surgery is safe and effective for sustained weight loss in patients with clinically significant obesity, few data are available to evaluate the safety of bariatric surgery in patients ≥ 65 years. The recent acknowledgment by Medicare that obesity is a disease, and the ever-growing population of Americans ≥ 65 years has fueled interest in the role of

bariatric surgery in the treatment of older patients with clinically significant obesity. At its November 2004 meeting, the Medicare Coverage Advisory Committee expressed its concern that existing evidence on the safety and efficacy of bariatric surgery is insufficient to generalize to all age groups in the Medicare population, especially patients ≥ 65 years [1]. In its November 2005 decision memo, the Centers for Medicare and Medicaid Services indicated that they were interested in comments on the potential to cover bariatric surgery in patients ≥ 65 years.

Although multiple studies to date have documented the safety and efficacy of bariatric surgery in patients >50 years, interest has developed more recently in examining the

*Reprint requests: Michel M. Murr, M.D., F.A.C.S., Department of Surgery, Interdisciplinary Obesity Treatment Group, University of South Florida College of Medicine, c/o Tampa General Hospital, P.O. Box 1289, Room F-145, Tampa, FL 33601.

E-mail: mmurr@hsc.usf.edu

outcomes of bariatric surgery in patients ≥ 65 years. This is related to many different factors, including the interest of Medicare in this specific population.

As the North American population experiences a simultaneous increase in life expectancy and obesity, it is imperative to evaluate the safety and effectiveness of weight loss surgery in Americans ≥ 65 years. The purpose of this study was to evaluate the outcomes of Roux-en-Y gastric bypass (RYGB) in the treatment of clinically significant obesity in patients ≥ 65 years by reporting the intermediate-term outcomes and resolution of co-morbidities in a two-center cohort of patients and by determining the statewide outcomes of a larger cohort as abstracted from an administrative database.

Methods

We reviewed prospectively collected data from all consecutive patients ≥ 65 years who underwent RYGB for clinically significant obesity at two university-based programs from January 1999 to April 2005. All patients qualified for weight loss surgery using the 1991 National Institutes of Health criteria [2]. Four patients undergoing revision of previous weight loss procedures and one who underwent vertical banded gastroplasty were excluded. The preoperative data regarding patient demographics, co-morbidities, medication use, length of hospital stay, morbidity, and mortality were reviewed.

The follow-up data regarding medication use, weight loss, and improvement in co-morbidities were taken from the office visit records for most patients. In some cases, patients were interviewed by telephone to verify their current weight and medication use.

Improvement in hypertension, diabetes, gastroesophageal reflux, and mechanical arthropathy was determined by subjective symptomatic relief and assessment of the reduction or cessation of medication use. For patients with obstructive sleep apnea, improvement was verified by cessation of the use of continuous positive airway pressure or by postoperative sleep study findings.

The mandatory reported Florida Discharge Database was queried to identify all patients with clinically significant obesity who had undergone RYGB in Florida. The database was queried to identify all patients ≥ 65 years who had been diagnosed with morbid obesity (International Classification of Diseases, Ninth Revision [ICD-9] code 278.01) and had undergone high RYGB (ICD-9 code 44.31) or gastroenterostomy (ICD-9 code 44.39) from 1999 to 2003. The evaluated data included age, length of hospital stay, inpatient complications, and in-hospital mortality.

Statistical analysis

Continuous parametric data were compared using the two-tailed Student *t* test. Continuous nonparametric data were compared using the Mann-Whitney *U* test. Categorical

Table 1
Patient characteristics

Body mass index (kg/m ²)	50 \pm 3
Age (yr)	68 \pm 1
Gender (n)	
Men	7
Women	18

data were compared using either the two-tailed chi-square test or Fisher's exact test, as appropriate. Data are presented as mean \pm SEM.

Results

A total of 25 patients (18 women and 7 men) ≥ 65 years underwent RYGB for clinically significant obesity from January 1998 to April 2005 at our institutions. These patients constituted 1.3% of all patients undergoing RYGB for clinically significant obesity. Of the 25 patients, 12 had only 6 months of follow-up; therefore, long-term follow-up data were not yet available. These 12 patients were considered in the evaluation of early complications, hospital stay, and mortality, but excluded from the analysis of weight loss and resolution of co-morbidities.

Patient characteristics

The mean age of this cohort was 68 \pm 1 years, and the mean BMI was 50 \pm 3 kg/m² (Table 1). Of the 25 patients, 17 underwent open and 8 underwent laparoscopic RYGB. The obesity-related co-morbidities were hypertension in 12 patients, diabetes in 11, mechanical arthropathy in 11, obstructive sleep apnea in 9, and gastroesophageal reflux disease in 7.

Hospital course

The mean length of hospital stay was 7 \pm 3 days. Four patients developed surgical wound infections. One patient developed acute small bowel obstruction from a stricture at the jejunojunostomy that required operative revision 1 week postoperatively. Another patient with cirrhosis and chronic obstructive pulmonary disease developed anastomotic bleeding 3 days postoperatively that required blood transfusions. She was discharged home 7 days postoperatively only to return to the hospital in septic shock from urosepsis 2 weeks later. She later developed acute renal failure, liver insufficiency, and right-sided heart failure and died at 5 weeks postoperatively (Table 2).

Weight loss

The follow-up data were complete to date for all 25 patients. The median follow-up was 9 months (range 2–61). The overall mean percentage of excess body weight loss (%EBWL) was 45% \pm 7%. Intermediate follow-up (>6 months) was available for 13 patients. The median fol-

Table 2
Morbidity and mortality

Length of stay (days)	7 ± 3
Complication rate (%)	20%
90-Day mortality (%)	4

low-up for this subgroup was 26 months (range 9–61). Their %EBWL was 51% ± 7%, and their BMI decreased from 52 ± 3 kg/m² preoperatively to 35 ± 3 kg/m² postoperatively ($P = .001$; Table 3). Five patients had a >50% EBWL, and 7 patients had 25–50% EBWL. The 1 patient who lost 16% EBWL had a motor vehicle accident that rendered her paraplegic and hindered her weight loss.

Resolution of co-morbidities and medication use

The obesity-related co-morbidities improved dramatically in 13 patients with intermediate follow-up. Diabetes and gastroesophageal reflux disease resolved completely, 91% of patients reported improvement of mechanical arthropathy, 77% of patients reported improvement or resolution of obstructive sleep apnea, and 67% reported improvement or resolution of hypertension (Table 4). Similarly, the use of medications for co-morbidities decreased significantly from 9 ± 1 to 4 ± 1 medication/patient/day at the last follow-up visit ($P < .001$).

State-wide outcomes

Query of the Florida Hospital Discharge Database showed that 231 patients ≥65 years had reportedly undergone RYGB from 1999 to 2003. Similar to our own patient population, these patients accounted for 1.2% of all patients who had undergone RYGB in Florida during the same period. Their mean age was 67 ± 0.1 years, and 83% were women. The length of hospital stay was 6 ± 1 days. The overall complication and in-hospital mortality rate was 15% and 1.3%, respectively.

We also compared the outcomes of RYGB in 231 patients ≥65 years with those of 19,043 patients <65 years as reported to the Florida Discharge Database. Patients ≥65 years had a significantly longer hospital stay (6 ± 1 versus 4 ± 0.1 days, $P = .01$), a greater complication rate (15% versus 9.4%, $P < 0.01$), and greater in-hospital mortality (1.3% versus 0.3%, $P = .03$; Table 5).

Table 3
Intermediate follow-up data for 13 patients (median 21 months, range 9–61)

	Preoperatively	Postoperatively
BMI (kg/m ²)	51 ± 2	37 ± 3*
EBWL (%)	—	51 ± 7

BMI = body mass index; EBWL = excess body weight loss.

* $P = .001$.

Table 4
Resolution of obesity-related co-morbidities and reduction of medication use in 13 patients at median follow-up of 21 months

Co-morbidity	Preoperatively	Postoperatively	Resolution (%)
Diabetes mellitus	11	0	100
Gastroesophageal reflux disease	7	0	100
Mechanical arthropathy	11	1	91
Obstructive sleep apnea	9	7	77
Hypertension	12	4	67
Medication/patient/day	9 ± 1	4 ± 1	$P < .001$

Discussion

General agreement has been reached that bariatric surgery is a safe and effective treatment for clinically significant obesity; however, few data related to the safety of bariatric surgery in patients ≥65 years are available. When the National Institutes of Health established the health risk of obesity in 1985, its consensus statement regarded age >50 years a potential contraindication for bariatric surgery [3]. These recommendations were based on earlier clinical experience that suggested that older patients (>50 years) had greater mortality and suboptimal weight loss compared with younger patients [4]. We have since re-evaluated this criterion and demonstrated that patient age >50 years should not be a contraindication to bariatric surgery, because it is safe and effective in inducing sustainable weight loss, accompanied by resolution of obesity-related co-morbidities [5,6].

Increasing age compounds the affect of obesity-related co-morbidities. Health-related quality of life is diminished in obese (BMI >30 kg/m²) compared with nonobese individuals, especially in those ≥65 years, even after adjustment for co-existing medical conditions [7,8]. In general, RYGB for obesity improves the quality-of-life scores for patients with clinically significant obesity to levels comparable to normal weight individuals [9,10].

The mushrooming increase in the use of bariatric surgery that was precipitated by the development of laparoscopic bariatric surgery has further challenged the arbitrary age limit criteria as set by the National Institutes of Health. As

Table 5
Summary of Florida Discharge Database of 231 patients ≥65 years and 19,043 patients <65 years who underwent bariatric surgery, 1999–2003

Variable	Age (yr)		P Value
	≥65	<65	
Patients (n)	231	19,043	
Mean age (yr)	67 ± .2	41 ± .1	<.01
Length of stay (days)	6 ± 1	4 ± .1	.01
Complication rate (%)	15	9.4	<.01
In-hospital mortality (%)	1.3	0.3	.03

we expanded our bariatric practice, we could not justify withholding treatment from older patients with good functional status who were experiencing poor quality of life because of obesity and its related co-morbidities. In broader terms, chronologic age is no longer considered a contraindication to operative intervention for a variety of diseases, such as coronary atherosclerosis, joint replacement, and pancreatic cancer; thus, why should age be considered a contraindication for bariatric surgery?

Our data have clearly demonstrated that RYGB can be undertaken in patients ≥ 65 years with low morbidity and mortality. The intermediate follow-up data from a small cohort have demonstrated that RYGB induced satisfactory weight loss and ameliorated obesity-related co-morbidities similar to the outcomes in younger patients.

Our data were from a small cohort that underwent rigorous preoperative evaluation by an interdisciplinary team of bariatric specialists. This cohort had a similar BMI and prevalence of co-morbidities as the remainder of our patient population. The length of hospital stay was longer because of the greater need for immediate rehabilitative services in the elderly patients. Nevertheless, the incidence of complications was similar. The only mortality in our cohort was precipitated by urosepsis within 3 weeks postoperatively; the ensuing liver insufficiency and failure were not anticipated by this patient who was known to have Childs A cirrhosis and was medically stable before surgery. The unfortunate events that led to this patient's demise are not unique to elderly patients.

The resolution of obesity-related co-morbidities accompanied the weight loss and was similar to that reported in younger adult patient populations [11]. Additionally, the use of medications decreased significantly with the weight loss. These findings have important implications for healthcare cost savings and parallel the findings from larger clinical series in younger patients from our Veterans Affairs study [12] and the Canadian Health System [13].

Few studies have addressed the affect of patient age on the resolution of co-morbidities and weight loss after RYGB. Sugerma et al. [14] found that patients >60 years had achieved 57% EBWL at 1 year and maintained a mean of 49% EBWL at 5 years. Similarly, St. Peter et al. [15] reported the resolution of co-morbidities and weight loss in a smaller cohort. More recently, Quebbemann et al. [16] observed significant improvement in quality of life and a reduction in medication use in 13 patients ≥ 65 years who underwent RYGB.

To confirm the rate of use of bariatric surgery in patients ≥ 65 years and its safety, we abstracted data from the mandatory reported Florida Hospital Discharge Database. During the study period, 1.2% of the patients who underwent RYGB for clinically significant obesity in Florida were ≥ 65 years. This administrative database yielded important information on the hospital length of stay, complications, and in-hospital mortality. Compared with the $>19,000$ patients

who were <65 years, patients ≥ 65 years had a significant increase in the hospital length of stay, complications, and in-hospital mortality. Although this database is not risk stratified, the increased morbidity and mortality in patients ≥ 65 years of age remain acceptable.

These data are in keeping with the reported outcomes for patients >60 years who underwent RYGB, as reported in the Nationwide Inpatient Sample Database. The morbidity and mortality rate of 164 patients was 13.4% and 0.6%, respectively [17]. However, in a recent study of Medicare beneficiaries who underwent RYGB, the mortality rates were greater for those ≥ 65 years than for younger patients (4.8% versus 1.7% at 30 days, 6.9% versus 2.3% at 90 days, and 11.1% versus 3.9% at 1 year) [18]. The wide range of reported mortality in this age group underscores the need for larger, clinically based, outcomes studies.

Moreover, these outcomes of RYGB compare favorably with the outcomes of colon resection in patients >70 years. We had reported that the overall complication rate was 22–29% and the in-hospital morbidity rate was 6–10% in a cohort of $>31,000$ patients [19]. To put these data in perspective, the in-hospital mortality of RYGB is less than the in-hospital mortality of coronary artery bypass grafting or total hip replacement in Medicare patients (3.4% and 1–2.6%, respectively) [20, 21].

Increasing age has been recognized as a risk factor for perioperative complications; therefore, multiple attempts have been made to stratify patients undergoing RYGB for obesity according to known risk factors. Livingston et al. [22,23] analyzed >1000 patients and demonstrated that male gender and increased weight were predictive of severe life-threatening outcomes after RYGB. They also found that patients >55 years had similar complication rates as those of younger adult patients but were more likely to die as a consequence of these complications [22, 23]. In a smaller study of 150 consecutive patients, the operative experience of the surgeon, patient age >50 years, and male gender were, in decreasing order, associated with a greater risk of postoperative complications [24].

Conclusion

We have demonstrated the safety and efficacy of RYGB in the treatment of clinically significant obesity in patients ≥ 65 years as borne out by the sustained weight loss, resolution of co-morbidities, and reduction in medication use. Age alone should not be a contraindication to RYGB, because patients in their “golden years” have the opportunity to improve their overall health and quality of life through bariatric surgery. These data support the benefits of RYGB in patients ≥ 65 years and may have important implications for Medicare.

References

- [1] Kral JG, Christou NV, Flum DR, et al. Medicare and bariatric surgery. *Surg Obes Relat Dis* 2005;1:35–63.
- [2] National Institutes of Health Consensus Development Conference Panel. National Institutes of Health conference: gastrointestinal surgery for severe obesity. *Ann Intern Med* 1991;171:74–9.
- [3] National Institutes of Health Consensus Development Conference Panel. Health implications of obesity: National Institutes of Health Consensus Development Conference statement. *Ann Intern Med* 1985;103:147–51.
- [4] Printen KJ, Mason EE. Gastric bypass for morbid obesity in patients more than 50 years of age. *Surg Gynecol Obstet* 1977;144:192–4.
- [5] Murr MM, Siadati MR, Sarr MG. Results of bariatric surgery for morbid obesity in patients older than 50 years. *Obes Surg* 1995;5:399–402.
- [6] Gonzalez R, Lin E, Mattar SG, Venkatesh KR, Smith CD. Gastric bypass for morbid obesity in patients 50 years or older: is laparoscopic technique safer? *Am Surg* 2003;69:547–53.
- [7] Groessl EJ, Kaplan RM, Barrett-Connor E, Ganiats TG. Body mass index and quality of well-being in a community of older adults. *Am J Prev Med* 2004;26:126–9.
- [8] Yan LL, Daviglius ML, Lui K, et al. BMI and health-related quality of life in adults 65 years and older. *Obes Res* 2004;12:69–76.
- [9] Choban PS, Onyejekwe J, Burge JC, Flancbaum L. A health status assessment of the impact of weight loss following Roux-en-Y gastric bypass for clinically severe obesity. *J Am Coll Surg* 1999;188:491–7.
- [10] Nguyen NT, Goldman C, Rosenquist J, et al. Laparoscopic versus open gastric bypass: a randomized study of outcomes, quality of life, and costs. *Ann Surg* 2001;234:279–91.
- [11] Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *JAMA* 2004;292:1724–37.
- [12] Gallagher SF, Banasiak M, Gonzalvo JP, et al. The impact of bariatric surgery on the Veterans Administration healthcare system: a cost analysis. *Obes Surg* 2003;13:245–8.
- [13] Christou NV, Sampalis JS, Liberman M, et al. Surgery decreases long-term mortality, morbidity, and health care use in morbidly obese patients. *Ann Surg* 2004;240:416–23.
- [14] Sugeran HJ, DeMaria EJ, Kellum JM, Sugarman EL, Meador JG, Wolfe LG. Effects of bariatric surgery in older patients. *Ann Surg* 2004;240:243–7.
- [15] St. Peter SD, Craft RO, Tiede JL, Swain JM. Impact of advanced age on weight loss and health benefits after laparoscopic gastric bypass. *Arch Surg* 2005;140:165–8.
- [16] Quebbemann BB, Engstrom DR, Siegfried T, Garner K, Dallal RM. Bariatric surgery in patients older than 65 years is safe and effective. *Surg Obes Relat Dis* 2005;1:389–93.
- [17] Carbonell AM, Lincourt AE, Matthews BD, Kercher KW, Sing RF, Heniford BT. National study of the effect of patient and hospital characteristics on bariatric surgery outcomes. *Am Surg* 2005;71:308–14.
- [18] Flum DR, Salem L, Elrod JA, Dellinger EP, Cheadle A, Chan L. Early mortality among medicare beneficiaries undergoing bariatric surgical procedures. *JAMA* 2005;294:1903–8.
- [19] Sung J, Wessel M, Gallagher SF, Marcet J, Murr MM. Failure of medicare health maintenance organizations to control the cost of colon resections in elderly patients. *Arch Surg* 2004;139:1366–70.
- [20] Welke KF, Ferguson B, Coombs LP, et al. Validity of the Society of Thoracic Surgeons National Adult Cardiac Surgery Database. *Ann Thorac Surg* 2004;77:1137–9.
- [21] Mahomed NN, Barrett JA, Katz JN, et al. Rates and outcomes of primary and revision total hip replacement in the United States Medicare population. *J Bone Joint Surg Am* 2003;85:27–32.
- [22] Livingston EH, Huerta S, Arthur D, Lee S, De Shields S, Heber D. Male gender is a predictor of morbidity and age is a predictor of mortality for patients undergoing gastric bypass surgery. *Ann Surg* 2002;236:576–82.
- [23] Livingston EH, Ko CY. Assessing the relative contribution of individual risk factors on surgical outcome for gastric bypass surgery: a baseline probability analysis. *J Surg Res* 2002;105:48–52.
- [24] Nguyen NT, Rivers R, Wolfe BM. Factors associated with operative outcomes in laparoscopic gastric bypass. *J Am Coll Surg* 2003;197:548–55.