

Laparoscopic Roux-en-Y gastric bypass in the elderly: feasibility, short-term safety, and impact on comorbidity and weight in 250 cases

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Abstract

Introduction In the elderly obese population, frequently suffering from multiple comorbidities, laparoscopic Roux-en-Y gastric bypass (LRYGB) is considered a high-risk procedure. The aim of this study was to evaluate short-term safety (30-day hospital morbidity and mortality) of this procedure and its impact on weight and associated comorbidities in the medium term (type-two diabetes, hypertension, sleep apnea, hypercholesterolemia, and joint pain).

Methods This study represents a retrospective analysis of all our Belgian patients older than 60 years of age who underwent a LRYGB between October 2004 and October 2012. Patient files were reviewed and patients were contacted by formal consultation or by phone for an update of their clinical status. Demographics, operative details, postoperative course, and the evolution of weight and associated comorbidities were registered.

Results A total of 280 patients were included. A complete follow-up was available for 250 patients (89 %), of whom 161 were female and 89 male. Mean age, BMI, and

hospital stay were 64.1 years (60–78 years), 41.9 kg/m² (27.4–68 kg/m²), and 4.3 days (2–19 days), respectively. There was no in-hospital mortality, 27 (10.8 %) patients suffered from early postoperative complications and 5 (2 %) patients needed to be readmitted. After a mean follow-up of 31.5 months, the mean excess weight loss was 59.3 % (range 21.9–120.1 %). Resolution or improvement of diabetes, hypertension, sleep apnea, hypercholesterolemia, and joint pain was seen in 94.6, 77.6, 88.0, 77.1 and 57.6 % respectively.

Conclusion LRYGB has an acceptable complication rate in the elderly. Since all obesity-related comorbidities improved during follow-up, there is a plea not to exclude this subgroup of patients from the well-known benefits of gastric bypass surgery.

Keywords Laparoscopic gastric bypass · Elderly · Comorbidities · Safety

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In the last few decades, obesity has become a major health concern, reaching pandemic proportions worldwide and affecting children, adolescents, and adults. In 2050, the number of Americans aged 65 and older is projected to be 88.5 million, more than double its projected population of 40.2 million in 2010. By the year 2030–2035 it is estimated that over 20 % of the adult US population and over 25 % of the Europeans will be aged 65 years and older. The predicted prevalence of obesity in Europe in 2015 varies between 20 and 30 % dependent on the model used. This represents 32 million obese elders in 2015 in the EU.

Medical complications of obesity in the elderly are most often related to the clinical presentations of the metabolic syndrome (with glucose intolerance, hypertension, dyslipidaemia, and cardiovascular disease). Besides that, obesity

Table 1 BAROS criteria

Disease	Diagnostic criteria	Resolution	Improvement
Hypertension	Systolic > 140 mmHg, diastolic > 90 mmHg	Diet/diuretic only	Controlled by medication
Hypercholesterolemia	Total cholesterol > 200 mg/dL	No medication	Normalized by medication
Type 2 diabetes	Symptoms + causal: blood sugar > 200 mg/dL or fasting blood sugar > 126 mg/dl or 2-hr blood sugar > 200 mg/dL on glucose tolerance test	Diet/exercise only	Controlled by oral hypoglycemic medication (no insulin needed)
Sleep apnea	Formal sleep study pCO ₂ > 45 mmHg, hemoglobin > 15 mg/dl	Normalized	5-15 apneas/hr
Osteoarthritis	Imaging evaluation	No medication	Controlled by medication

Oria HE, Moorehead MK (2009) Updated Bariatric Analysis and Reporting Outcome System (BAROS). *Surg Obes Relat Dis*;5 [1]:60–66

in the elderly is characterized by functional limitations, osteoarthritis, reduced cognitive skills, decreased visual function, dementia, and impaired pulmonary function.

The current therapeutic tools available for weight management in the elderly do not differ from those for weight management in general and include life-style intervention involving diet, physical activity and behavioral modification, pharmacotherapy, and surgery [1].

The role of bariatric surgery in the elderly is largely unknown as in most studies people aged 65 years and older have been excluded. Previous clinical studies suggested that bariatric surgical outcomes may be less optimal in older patients, and some surgeons even suggested to exclude patients >65 years old from bariatric surgery [2–4]. Given the increase in life expectancy and the morbidity associated with aging, the potential health benefits of bariatric surgery for the elderly have been reconsidered. A significant body of literature shows that bariatric surgery is not only safe, but it is also the most efficient treatment modality with long-lasting effects that result in remission or improvement of associated disease processes, quality of life, and longevity [5]. In Belgium, the increasing beneficial evidence of those procedures has led to a change in health care legislation in 2010, no longer excluding the >65-patient of reimbursement for bariatric surgery. The aim of the present study was to report our experience with laparoscopic gastric bypass surgery in a population aged >60 years old and to compare our results with recent literature.

Materials and methods

The data from all laparoscopic Roux-en-Y gastric bypass procedures performed at a single high-volume teaching institution from October 2004 to October 2012 were collected from a prospectively kept database. The

preoperative data recorded for each patient included sex, age, body mass index (BMI), previous surgery, comorbidities, and the use of medications. The comorbidities assessed were type 2 diabetes (T2D), hypertension (HTN), obstructive sleep apnea syndrome (OSAS), hypercholesterolemia, and joint pain. The presence of each condition and its improvement or resolution after surgery was defined using the diagnostic criteria according to the ‘Updated Bariatric Analysis and Reporting Outcome System’ [6] (Table 1). Additionally, other preoperative surgical details and postoperative data including length of stay were recorded. The number of primary LRYGB procedures and the number of revisional cases were also recorded.

All patients were included in a bariatric protocol consisting of preoperative surgical and dietary consultations, and psychological and endocrinological evaluations. All patients underwent a complete blood analysis and a preoperative endoscopy or urea breath test to check *Helicobacter pylori* presence, and preoperative eradication was started when indicated. Additional specialist consultations and tests were asked when deemed necessary. When BMI exceeded 45 kg/m², a protein diet for 2 weeks was proposed to decrease liver volume and increase laparoscopic workspace. The surgical procedure was completely standardized and fully stapled as described by Dillemans et al. [7].

The postoperative surgical outcomes evaluated in the short term were length of hospital stay, 30-day complications, readmission rate, reoperation rate, and mortality. In the medium term, we evaluated the resolution or improvement of the comorbidities, BMI reduction, mean percentage of excess weight loss (%EWL), complications, and mortality.

The resolution or improvement of comorbidities was defined according to the definitions of Oria et al. (Table 1). The mean %EWL was calculated using the formula as published by Deitel et al. in 2003 [8]. The %EWL was recorded at 6, 12 months and yearly thereafter.

Table 2 Pre- and postoperative comorbidities

Comorbidity	Preoperative x/250 pts	Postoperative			
		Improvement	Resolution	R and I	Worse
Diabetes	74 (29,6 %)	42 (56,8 %)	28 (37,8 %)	70 (94,6 %)	1 (1,4 %)
AHT	165 (66,0 %)	58 (35,2 %)	69 (41,8 %)	127 (77,6 %)	
Joint pain	165 (66,0 %)	55 (33,3 %)	40 (24,2 %)	95 (57,6 %)	11 (6,7 %)
OSAS	75 (30,0 %)	25 (33,3 %)	41 (54,7 %)	66 (88,0 %)	
Hypercholesterolemia	140 (56,0 %)	42 (30,0 %)	66 (47,1 %)	108 (77,1 %)	

R resolution, I improvement, AHT arterial hypertension, OSAS obstructive sleep apnea syndrome, pts patients

Results

Of 6690 patients in the database, 280 (4.2 %) were aged ≥ 60 years and underwent a LRYGB. In 250 (89 %) cases, the dataset could be completed after a formal consultation or telephonic survey. Six patients died of unrelated causes in the late postoperative course (cardiac event in 4 and metastasized melanoma in 2 cases). Twenty-four patients (8.6 %) were lost to follow-up and excluded from further analysis. Two-hundred and seven (82.8 %) patients underwent a primary LRYGB procedure. Forty-three (17.2 %) were revisional cases and all were laparoscopic conversions of laparoscopic adjustable gastric banding ($n = 28$), open or laparoscopic vertical banded gastroplasty ($n = 14$), or sleeve gastrectomy ($n = 1$).

Mean age was 64.1 (60–78) years. There were 161 (64.4 %) women and 89 (35.6 %) men. Mean body mass index (BMI) at surgery was 41.9 kg/m² (range 27.4–68 kg/m²).

Seventy-four (29.6 %) patients suffered from T2D, 165 (66.0 %) from HTN, 75 (30.0 %) from OSAS, 140 (56.0 %) from hypercholesterolemia, and 165 (66.0 %) from joint pain. There was a mean of 2.5 comorbidities per patient.

The 30-day perioperative mortality rate was 0 %. As mentioned before, six patients died of unrelated causes in the late postoperative course.

In the early postoperative course, 27 (10.8 %) patients experienced 28 complications. There were 13 bleeding events. Six bleedings were intra-luminal. Two patients underwent endoscopic clipping of a distinct bleeding at the gastro-enterostomy, and 4 only needed transfusion and careful monitoring to control the bleeding. Four patients had an intra-abdominal bleeding. Three were treated conservatively, and one patient underwent relaparoscopy. Three patients experienced a combination of intra- and extra-luminal bleeding, diagnosed by the presence of melena and a higher and more concentrated drain output than normal. To treat the extra-luminal bleeding, one patient needed a formal laparoscopy and one needed an exploration under local anesthesia of the left lateral trocar site. All other bleeding was treated conservatively with transfusion and careful monitoring.

Ten patients experienced cardiorespiratory problems. Five patients had postoperative hypercapnia necessitating intensive care unit admission. Two patients with important desaturation needed oxygen therapy. There was one patient with atrial fibrillation, treated medically, one with an acute coronary syndrome (medical treatment), and one patient needed to be reintubated because of respiratory failure and an acute coronary syndrome due to atrial flutter. The atrial flutter was treated by ablation 2 weeks after discharge (Table 2).

There was one intra-abdominal abscess, successfully treated by percutaneous drainage and antibiotics. There were 2 wound infections at the left lateral trocar site. One patient needed dilation of the gastro-enterostomy because of dysphagia 1 month postoperative. Finally, one patient experienced a port site hernia for which surgical repair was performed 23 days postoperative (Table 3).

Mean length of hospital stay was 4.3 days (range 2–19 days).

A total of 5 (2 %) patients needed to be readmitted in the early postoperative period. Four (1.6 %) needed some

Table 3 Postoperative complications

Postoperative complications ($n = 28$)	n	
Bleeding ($n = 13$)	Intra-luminal	6
	Extra-luminal	4
	Combined	3 ^a
Cardiorespiratory ($n = 10$)	Hypercapnia	5
	Desaturation	2
	Atrial flutter/respiratory failure	1 ^a
	Atrial fibrillation	1
Infection ($n = 3$)	Acute coronary syndrome	1
	Wound	2
	Intra-abdominal	1 ^a
Others ($n = 2$)	Port site hernia	1 ^a
	Stenosis gastro-enterostomy	1 ^a

n number of patients

^a readmission ($n = 5$)

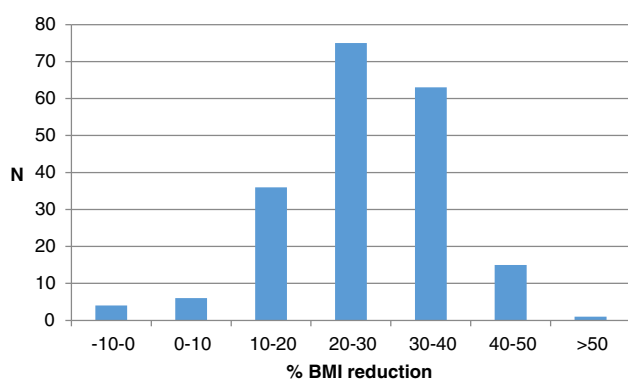


Fig. 1 BMI reduction in the subpopulation with a follow-up of more than 1 year ($n = 200$). X-axis: % BMI reduction cohort, Y-axis: n number of patients

type of intervention (abscess drainage, flutter ablation, dilation of the gastro-enterostomy, and incisional hernia repair), and 1 needed transfusion only. The 30-day reoperation rate under general anesthesia was 1.2 % (3/250 patients: 2 due to a bleeding event, 1 incisional hernia repair).

After a mean follow-up of 2.6 years (range 3 months–7.9 years), mean BMI was reduced to 30.8 kg/m² (20.8–45) corresponding to a mean excess weight loss (EWL) of 59.3 % (21.9–120.1 %). In the subpopulation with a follow-up of less than 6 months ($n = 13$), mean BMI dropped with 9.2 kg/m². In the 6–12 month subpopulation ($n = 37$), mean BMI declined with 10.5 kg/m². In the group with a follow-up of more than 1 year ($n = 196$), mean BMI dropped with 11.6 kg/m². A more detailed BMI reduction of this subpopulation is illustrated in Fig. 1. Four patients (3 redo and 1 primary bypass) experienced weight gain, all after a follow-up of more than 3 years.

Diabetes improved in 42 of the 74 cases (56.8 %), and complete resolution was seen in 28 patients (37.8 %). In one (1.4 %) patient, diabetes control was worse postoperative. Hypertension improved in 58 of the 165 patients (35.2 %) and resolved in 69 patients (41.8 %). In 25 of 75 patients (33.3 %), we noticed improvement of OSAS and 41 (54.7 %) patients reported resolution of sleep apnea complaints. Hypercholesterolemia improved in 42 of the 140 patients (30.0 %) and resolved in 66 patients (47.1 %). Joint pain was worse in 11 of the 165 patients (6.7 %), improved in 55 patients (33.3 %), and resolved in 40 patients (24.2 %) (Table 2).

Discussion

The treatment of morbid obesity has shifted from diet and exercise to surgery. With increasing experience and the surge of the laparoscopic access, morbidity and mortality

of gastric bypass surgery have been reduced. Thirty-day mortality rates dropped from 8 % as reported by Printen and Mason [9] in 1977 to 0.14 % as reported in 2013 by Khan et al. [10] in 44,408 patients of which 54 % underwent a laparoscopic gastric bypass. Its beneficial effects on comorbidities have been documented in large studies. Buchwald et al. [11] performed a systematic review and meta-analysis in 2004. They reported on a total population of 22,094 patients with mean age of 39 (range 16–64) years after reviewing 136 studies between 1990 and 2002. When focusing on the subpopulation of gastric bypass patients, 44 studies including 7074 patients were evaluated. They noted a mean EWL of 61.56 % and reported 83.8 % resolution of diabetes and resolution or improvement in 90.6 %. Arterial hypertension resolved in 75.4 % and resolved or improved in 87.1 %. OSAS resolved in 86.6 % and resolved or improved in 94.9 %. Improvement of hypercholesterolemia was reported in 95 %. Even though literature has shown that younger patients have a greater EWL and more improvement or remission of their comorbidities after bariatric surgery, good EWL as well as beneficial effects on comorbidities has been reported in elderly populations [12–14].

More specifically, when reviewing literature for laparoscopic Roux-en-Y gastric bypass surgery in a >60 population in accordance to our study, we found four articles reporting short- and long-term outcomes (Table 4). Sosa et al. [15] reported on 23 patients with a mean age of 64.4 years. They had 1 (4.3 %) mortality at 30 days postoperative and 1 (4.3 %) complication. Resolution of diabetes, hypertension, OSAS, and hypercholesterolemia was seen in 75, 91, 67, and 60 %, respectively after 1 year of follow-up. Trieu et al. [16] reported on 92 patients with a mean age of 62.2 years. There was no 30-day mortality and 53.9 % excess weight loss after 1 year. They did not report on improvement of comorbidities. Wittgrove et al. [17] reported on 120 patients with mean age of 63.4 (range 60–74) years. A resolution of diabetes, hypertension, OSAS, hypercholesterolemia, and hypertriglyceridemia was seen in 75, 88, 94, 83, and 92 %, respectively after 1 year with 85 % follow-up rate. Willkomm et al. [18] reported on 100 patients with a mean age of 68 (range 65–77) years. Mean length of stay was 1.97 days; 30-day readmission rate was 6 %. They reported an overall postoperative complication ratio of 7 % (1 % bleeding, 3 % pulmonary, 1 % wound, and 2 % cardiac events) and no 30-day mortality. The authors noticed an excess weight loss of 74.8 % at 1 year, 63 % resolution of diabetes, and 23 % resolution of hypertension.

Our results are consistent with the current literature. We had no in-hospital mortality and an acceptable morbidity (10.8 %) in the early postoperative period with a 2.0 % readmission rate and a 1.6 % re-intervention rate. Mean

Table 4 Overview of literature

Author	n	Age (mean)	30-day ^a	Morbidity	LOS (d)	EWL	Comorbidity			
							Diabetes	AHT	OSAS	Dyslipidemia
Buchwald 2004 [11]						61.56 %	83.8 % R/90.6 % R or I	75.4 % R/87.1 % R or I	86.6 % R/94.9 % R or I	95 % I
Sosa 2004 [15]	23	≥60 (64.4)	4.3 %	Early 4.3 %	nm	65.0 %	75 % R and I	91 % R and I	67 % R and I	60 % R and I
Trieu 2007 [16]	92	≥60 (62.2)	0	Early 6.5 % late 15.2 %	nm	53.9 %	nm	nm	nm	nm
Wittgrove 2009 [17]	120	≥60 (62)	0	Early and late 21.7 %	nm	nm	75 % R	88.4 % R	93.8 % R	83.3 % R
Willkomm 2010 [18]	100	≥65	0	Early 7 %	1.97	74.8 %	63 % R	23 % R	nm	nm
Vanommelaeghe 2014	250	≥60 (64.1)	0	Early 10.8 %	4.3	59.5 %	56.8 % I/37.8 % R	35.2 % I/41.8 % R	33.3 % I/54.7 % R	30 % I/47.1 % R

n number of patients, LOS(d) length of stay (days), EWL excess weight loss, AHT arterial hypertension, OSAS obstructive sleep apnea syndrome, R resolution, I improvement, early <30 days postoperative, nm not mentioned
^a mortality

EWL was 59.3 % (range 21.9–120.1 %). The mean BMI loss was 11.1 kg/m². Those results can be considered as being very good, even though 50 patients had a follow-up of less than 1 year (Table 4). We saw comparable beneficial effects on comorbid conditions. Resolution or improvement of diabetes, hypertension, sleep apnea, hypercholesterolemia, and joint pain was seen in 94.6, 77.6, 88.0, 77.1, and 57.6 % respectively.

While these results are comparable to the results achieved in the younger population, the true value and importance of these results have to be interpreted differently. In a young population, the main goals are increasing life expectancy by reducing death due to diabetes, heart disease, and cancer [19] as well as the prevention of comorbid diseases as type 2 diabetes [20]. In an elderly population, achievements are less easily transferred into health care cost-efficiency tables and figures. Nevertheless, on an individual basis, very important improvement in quality of life and reduction of comorbidities can be achieved. To date, there is a shortage in studies on an elderly population. Our series with 250 patients could show no mortality and acceptable morbidity; therefore, there are no objective arguments to exclude an elderly patient for bariatric surgery.

Conclusion

This data analysis of 250 laparoscopic Roux-en-Y gastric bypass in the elderly population represents the largest study where the short- and medium-term results have been reported. There was no mortality and an acceptable 30-day morbidity rate. The medium-term results showed an EWL of 59.3 % and a significant reduction of associated diseases turning it into a safe and reliable weight loss procedure. We are convinced that the elderly obese patient cannot be withheld from the benefits of a bariatric procedure, more specifically the Roux-en-Y gastric bypass.

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