International Surgery Journal
Mejia J et al. Int Surg J. 2026 Jun;13(6):1004-1008
https://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20261573

Original Research Article

Bariatric surgery in the elderly: findings from a community hospital

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Received: 31 March 2026
Revised: 06 May 2026
Accepted: 11 May 2026

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ABSTRACT

Background: Obesity is a significant problem among elderly patients. While bariatric surgery has been shown to be safe and effective for elderly patients in clinical trials, it remains underutilized in this population. The current study examined the safety and efficacy of this bariatric surgery among elderly patients in a real-world hospital setting.
Methods: This retrospective study examined complication rates and percentage weight loss (%WL) up to 12 months following bariatric surgery among patients (n=115) seen at a general medical hospital between 2016-2021. Differences in complications and %WL were compared between elderly (65+ years.) and non-elderly (50-64 years.) patients.
Results: Compared to non-elderly patients, elderly patients had significantly higher rates of specific comorbidities and significantly greater overall disease severity. Nevertheless, similar trends in complication rates and %WL were found between elderly and non-elderly patients. High rates of treatment compliance were observed for the sample overall.
Conclusions: The findings of this study provide support for evidence of clinical trials demonstrating the safety and efficacy of bariatric surgery among elderly patients. Clinical implications and directions for future research are discussed.

Keywords: Geriatrics, Bariatric surgery, Effectiveness study, Community hospitals

INTRODUCTION

Obesity is a worldwide problem with significant public health implications. In the United States, this disease affects over 70 million individuals.[1] Due to advances in medical technology and intervention, the life expectancy for individuals has increased substantially, rising over the past 40 years from 68 to 78 years of age on average. By 2030, 20% of the US population is projected to be over 65 years old.[2]

The elderly are also affected by obesity and concerns about the use of weight reduction surgery in this growing population have been raised. In the United States, among people 60-69 years old, 42.5% of women and 38.1% of men are obese; between 70-79 years, 31.9% of women and 28.9% of men are obese Since the development of the first bariatric procedure in the 1950s, improvement in techniques, specifically minimally invasive approaches and perioperative care have resulted in lower

complication rates, making bariatric surgical procedures the most effective and durable treatment for obesity.[3]

However, despite the resolution of co-morbidities and quality of life improvement they offer, less than 1% of individuals with severe obesity (BMI >35 kg/m^2) undergo these bariatric procedures.[4] Initial studies showed increased morbidity and mortality in the elderly compared to younger individuals, primary care physicians are less likely to refer their older patients (>55 years) contributing to the underutilization of weight loss surgical procedures in the elderly.[5,6] The number of bariatric surgery procedures performed in elderly is slowly increasing, making up 10.1% of all bariatric operations.[7] More than 10% of bariatric surgery patients are older than 60 in the USA.[8] As researchers have been focusing on strategies to bridge the gaps in elderly surgical care, we present an observational retrospective study of bariatric procedures in the elderly (≥50 years). We aim to assess the efficacy and safety of this procedure among elderly patients, compared to younger patients.

METHODS

Design and sample

This study is a retrospective chart review of older patients who underwent bariatric surgery at Flushing Hospital Medical Center, a community hospital in Queens, between the years 2016 and 2021. All patients 50 years or older who underwent sleeve gastrectomy or roux en y gastric bypass. This study was approved by the hospital's Institutional Review Board. This study adheres to STROBE guidelines.

Data

Baseline sociodemographic and clinical variables, including weight and body mass index (BMI) were selected based on clinical relevance and prior studies. Clinical characteristics included Charleston Comorbidity Scores (CCI) and clinically informed comorbidities: hypertension (HTN), obstructive sleep apnea (OSA), diabetes (DM), gastroesophageal reflux disease (GERD), and hyperlipidemia (HLD). Procedural characteristics included the type of surgery and pain medications used. Medications were grouped as: opioids (e.g., codeine), non-opioids (e.g., toradol, gabapentin), and opioid/non-opioid (e.g., Tylenol/codeine) Weight and BMI were recorded at initial evaluation (referred to as baseline), pre-operatively, and at four follow up time points (1 month, 3 months, 6 months, 12 months).

The primary aim of the study is the efficacy and safety of bariatric surgery in patients 65 and older, compared to patients aged 50-64. Efficacy outcomes included total weight lost, change in BMI, and proportion of weight lost from baseline weight (% WL). %WL between initial evaluation and pre-operative assessment was also examined. Safety outcomes included complications, hospital length of stay (LOS), readmission and mortality. Treatment compliance was based on attendance at follow-up; patients were considered compliant if they attended 80% of follow-ups within a 12-month window post procedure.

Analytic plan

The sample was divided in two groups elderly patients defined as 65 and older and the 50-64 y, defined for the purpose of this study as "non-elderly." Descriptive statistics are reported for the sample overall and by age group (50-64, 65+ years;). Bivariate analyses were used to compare age groups across baseline demographic, clinical, and procedure characteristics. Chi-square and t tests were used, or their nonparametric equivalents depending on the shape of the data distribution. %WL was examined using mixed effects models with time point (1 month, 3 months, 6 months, 12 months) included as a fixed effect and with a random intercept term for patient. Unadjusted models included time and age group, while adjusted models included the subset of clinically relevant baseline characteristics found to be significant in bivariate analyses. Sensitivity analyses were conducted treating age as a continuous variable.

RESULTS

Baseline characteristics

The final sample consisted of 115 patients. The average age in the sample was 57.6 years (SD=6.6) and 81% of the sample were women. The most common comorbidities were HTN (83%, n=95), OSA (57%, n=66), and diabetes (45%, n=52). Laparoscopic sleeve gastrectomy (LSG) was the most common type of procedure performed (67 patients, 58% of the sample). In terms of pain medication, 2% percent of patients received only opioids for pain management, 17% received nonopioids only for pain management, while the remaining 82% received a combination of opioid and non-opioid medication. The median LOS of the sample was 2 days (IQR=2-3) and median ICU LOS was 1 day (IQR=0-1).

Twenty-one patients were aged 65 or older (18% of the sample). These elderly patients had a significantly higher CCI at baseline ($p<0.0001$). Elderly patients were more likely to be diagnosed with hypertension ($p=0.02$) and diabetes ($p=0.05$), compared to younger patients. No other differences were found between groups. See Tables 1-2 for full set of comparisons between elderly and non-elderly patients across demographics, clinical and treatment characteristics, along with descriptive statistics for the sample overall.

Weight loss

At their initial visit, patients weighed 259lbs (SD=47) on average and weighed 252 lbs (SD=43) at their pre-op visit, corresponding to a sample-wide decrease of 3% in weight between initial assessment and surgery. The average weight of patients at their final follow up was 205 lbs (SD=45), which corresponds to an average of

19% body weight lost over 12 months. See Table 3 for full set of comparisons between elderly and non-elderly patients across weighing, along with descriptive statistics for the sample overall.

Table 1: Demographic and clinical characteristics.

	Overall (n=115)	50-64 (n=94)	65+ (n=21)	P value
Average Age (SD)	58 (7)	55 (4)	69 (4)	<0.001
Male (%)	22 (19)	15 (16)	7 (33)	0.12
Comorbidities				
Hypertension (%)	95 (83)	74 (79)	21 (100)	0.02
Diabetes (%)	52 (45)	38 (40)	14 (67)	0.05
GERD (%)	36 (31)	33 (35)	3 (14)	0.07
OSA (%)	66 (57)	51 (54)	15 (71)	0.22
Median CCI (IQR)	2 (1-3)	2 (1-3)	4 (3-4)	<0.001
Average Age (SD)	58 (7)	55 (4)	69 (4)	<0.001
Male (%)	22 (19)	15 (16)	7 (33)	0.12
Comorbidities				
Hypertension (%)	95 (83)	74 (79)	21 (100)	0.02
Diabetes (%)	52 (45)	38 (40)	14 (67)	0.05
GERD (%)	36 (31)	33 (35)	3 (14)	0.07
OSA (%)	66 (57)	51 (54)	15 (71)	0.22
Median CCI (IQR)	2 (1-3)	2 (1-3)	4 (3-4)	<0.001

Table 2: Treatment characteristics.

	Overall (n=115)	50-64 (n=94)	65+(n=21)	P value
Hospital LOS in days (IQR)	2 (2-2.5)	2 (2-3)	2 (2-2)	0.8
ICU LOS in days (IQR)	1 (0.3-1)	1 (0-1)	1 (1-1)	0.6
Length of surgery in minutes (IQR)	95 (83-121)	95 (84-120)	96 (77-136)	1.0
Pain management				
Opioids only (%)	2 (2)	81 (86)	15 (74)	0.11
Non-opioid only (%)	19 (17)	13 (14)	6 (29)	1.0
Opioid/Non-opioid mix (%)	94 (82)	79 (84)	15 (74)	0.21
Surgical approach				
Laparoscopic (%)	67 (58)	54 (57)	13 (62)	0.81
Robotic (%)	48 (42)	40 (43)	8 (38)	
Type of Procedure				
Sleeve (%)	102 (89)	85 (90)	17 (81)	0.25
Bypass (%)	13 (11)	9 (10)	4 (19)	
Treatment compliance (%)	95 (83)	78 (83)	17 (81)	0.8

Table 3: Weight loss.

	Overall (n=115)	50-64 (n=94)	65+ (n=21)	P value
Initial weight in lbs. (SD)	259 (47)	264 (48)	238 (34)	0.03
Initial BMI (SD)	44 (6)	44 (7)	41 (4)	0.02
Pre-op weight in lbs. (SD)	252 (43)	257 (45)	232 (29)	0.02
Pre-op BMI (IQR)	41 (38-47)	42 (39-48)	40 (38-42)	0.03
Final weight in lbs. (SD)	205 (45)	209 (46)	190 (37)	0.06
Final BMI (SD)	35 (7)	35 (7)	33 (5)	0.14

At baseline, non-elderly patients weighed significantly more than elderly patients (p=0.03) and had significantly higher BMI compared to elderly patients (p=0.02). At their final weighing, non-elderly patients weighed 209 lbs. (SD=46), compared to elderly patients, who weight 190lbs (SD=37) on average. This corresponded to a total weight loss of 48lbs (SD=27), or 19% WL, for non-elderly patients and a total weight loss of 41 lbs. (SD=24), or 18% WL, for elderly patients.

In mixed effects models comparing %WL over time was found to be significantly associated with increased % WL, with the coefficients indicating a linear effect (1 month β=-0.07, 95% CI=[-0.08,-0.05]; 3 month β=-0.12, 95% CI=[-0.13- -0.10]); 6 month β= -0.16, 95% CI=[-0.17, -0.15]); 12 month β=-0.18, 95% CI=[-0.19, -0.17]) in models which also included age (50-64, 65+ years). This effect remained even after adjusting for sex, OSA, and CCI. Age (50-64, 65+ years) was not significant in either unadjusted or adjusted models. Age was also used as a continuous variable in models, but no significant effects were found.

Safety and treatment efficacy

Clavien Dindo classification complications >III occurred only in those non-elderly: 5 (4.7%) patients experienced bleeding, 3 (2.8%) experienced severe hypertensive crisis

and 1 (0.9%) patient expired. The patient population ⩾65 experienced Clavien-Dindo complications 1 and 2: one episode of nausea, one episode of desaturation secondary to refusal of use of CPAP for OSA and one episode of atrial fibrillation. Overall, 82% of patients were compliant with treatment follow-up.

DISCUSSION

The current study aimed to address gaps in the literature on the safety and efficacy of bariatric surgery among elderly patients, using comparison data with non-elderly population. An older population 50-64 was chosen as likely to be not as drastically different as the younger population would be. Differences in baseline weight and rates of weight loss following bariatric surgery in both groups were addressed. Despite significant differences in initial and preop BMI between 65 and older and non-elderly patients (50-64 years), there was no statistical significance at final weighing one year later. Among elderly patients, there were notable reductions in comorbidities. Furthermore, we did not find any differences in rates of complication, readmission, or mortality between these groups, suggesting the safety of this procedure within an elderly population.

The number of bariatric surgery procedures performed in elderly has increased. In a study between 2009-2013, 6,105 bariatric operations were performed in elderly making up 10.1% of all bariatric operations.[3] In the United States, people between 60-69 years old, 42.5% of women and 38.1% of men are obese; between 70-79 years, 31.9% of women and 28.9% of men are obese.[7] More than 10% of bariatric surgery patients are older than 60 in the USA.[8] Age is commonly used as a risk predictor but considering the inability to accurately predict outcomes, frailty may be a more appropriate measure.[12] The American College of Surgeons (ACS) included 13 geriatric specific risk factors (GSRF) and 26 ACS NSQIP variables based on 6,039 general surgery patients aged 65 years and older. Standard NSQIP variables, including 30-day composite morbidity, reoperation and steroid use were associated with readmission. GSRF variables, included but were not limited to functional dependency, fall risk at discharge, use of mobility aid and discharged home with skilled care associated with readmission.[13] Impacts on patients' activities of daily living have been reported elsewhere.[14]

In terms of weight loss, Sugerman et al showed that Bariatric surgery was effective in weight loss and remission of comorbidities amongst the elderly, with a BMI reduction of 12.25±5.42.[6] In our study, patients underwent SG, and were seen at 1 month, 3 months, 6 months to a year. Results indicate that significant weight loss among the elderly occurred, although at not as fast a rate as the non-elderly. This result is unsurprising, given the difficulties elderly patients may face for incorporating the lifestyle changes needed to maintain reductions post-procedure.

Surgical approach

Gebhart et al reported that bariatric procedures in the elderly were open or lap RYGB (68.8%), lap adjustable gastric banding (17.3%) or lap SG (13.9%).[3] More recently, sleeve gastrectomy has steadily been increasing in all age groups. Among the elderly (n=8510), sleeve was associated with lower 3-year complications (20.1% vs 24.7%), lower re-interventions (14.0% vs 21.9%), lower ED utilization (51.7% vs 57.2%), decreased rehospitalizations (41.8% vs 45.8%), lower expenditures $38,632 vs $39,270 after bypass.[10] Chao et al found, sleeve gastrectomy in the elderly to have a survival advantage at 1 year.[2] Rates of acute renal failure, myocardial infarction and deep venous thrombosis (DVT) were increased in patients older than 70 years undergoing RYGB thus, SG may be the preferred procedure for elderly.[1] In our study, all the patients >65 years underwent a sleeve gastrectomy, 8 were done by laparoscopy and 3 had a robotic approach and patients were all safely discharged home. In terms of pain management, multimodal analgesia is standard in our institution, 20 of 21 elderly patients received Tylenol and Toradol per protocol, while rescue opioids were used more sparingly. There was no difference in terms of pain medication use between the 50-64 y and the 65 and older age groups.

Resolution of comorbidities

In a systematic review with data collected with 8,149 patients aged 60 and above, it was demonstrated that post bariatric surgery, diabetes resolution was 54.5% and HTN resolution was 42.5%.[9] A retrospective analysis between January 2013 and December 2015 of 11 bariatric elderly patients undergoing bariatric surgery demonstrated that 70% of elderly had diabetes, HLD and HTN. In the following 9 to 45 months post-surgery, comorbidities resolved in 34.74%, improved in 49.67% and remained unchanged in 15.59%. In comparison, in our study of 21 elderly patients, two had resolution of diabetes and one patient with HTN had reduction of antihypertensive medications. Fifteen patients (71%) had sleep apnea (OSA) with 7 of these patients (63.6%) continuing CPAP use post op. Four elderly patients were non-compliant and only 1 had discontinuation due to weight loss.

Hospital length of stay, morbidity and mortality

Gastrointestinal surgery in elderly individuals may present unexpected postoperative complications. Mabeza et al found that geriatrics patients had higher unadjusted rates of in-hospital mortality following bariatric surgery (0.3 vs 0.04%, $p<0.001$) and 0.3% died during hospitalization.[15] Yokozuka et al in a prospective cohort study of 189 patients (age ≥65 years) undergoing elective gastrointestinal surgery between April 2017 and March 2019 reported Clavien-Dindo grade ≥III postoperative complications in 28 patients (14.8%).[16] Male sex, low skeletal muscle mass, and arteriosclerosis (cardio-ankle

vascular>10) were considered significant risk factors of postoperative complications.

In a study of 172,017 patients undergoing bariatric surgery identified from the MBSAQIP, the event rate for myocardial infarction (MI) within 30 days of the operation was 0.03% with a mortality rate of 17.3% in patients with a preoperative MI. The four variables identified as significant included: history of a previous MI, preoperative renal insufficiency, hyperlipidemia and age >50. Impaired functional status was also associated with increased rates of morbidity and mortality.[1]

Susmallian et al reported an average hospital stay of 4.35 days in patients under 70 years old with complications staying an average of 3.33 days over 70 years.[5] Mabeza et al noted that elderly patients experienced a 0.19-day increment in the length of stay and $620 in attributable hospitalizations costs.[16] Our length of stay of 2 days was similar in both groups 50-64y and 65 and older. Clavien Dindo classification complications >III occurred only in those non-elderly. All elderly patients were discharged home, and over 80% of elderly patients were treatment compliant. These findings together illustrate the safety of this procedure among this population, in line with evidence from controlled trials.

Limitations and future directions

A primary limitation of the study is the relatively small proportion of elderly patients. However, given surgeon hesitancy to perform bariatric surgery on elderly patients, it is unsurprising that there would be few appropriate cases for analysis. The results of this study provide some support for the effectiveness and safety of these procedures in a community sample; mirroring results of the efficacy and safety observed in clinical trials. These findings warrant investigation within a more rigorous study design and larger sample of elderly patients.

CONCLUSION

Obesity is a worldwide problem which does not spare the elderly. Although increased co-morbidity burden has been linked to increased surgical complications. However, bariatric procedures, especially sleeve gastrectomy can be performed safely in the elderly, with lower rate of complications, hospital length of stay and readmission, with similar results in terms of weight loss. Primary care physicians should be encouraged to refer their patients to bariatric surgeons as the weight reduction leading to significant resolution of chronic diseases such as diabetes and hypertension, can translate into meaningful increase in life expectancy and decreased health care costs.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee Flushing Hospital Medical Center (18117228-1, 10/19/2021).

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Cite this article as: Mejia J, Singh A, Liguori T, Baeck I, Gratsiansky D, Schaal A, et al. Bariatric surgery in the elderly: findings from a community hospital. Int Surg J 2026;13:1004-8.