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Bariatric surgery in Medicare patients: greater risks but substantial benefits

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Abstract

Background: Recent reports have documented greater mortality for bariatric surgery in Medicare (MC) patients compared with patients from other payors.

Methods: We reviewed our database for the mortality and outcomes of 282 MC and 3169 non-Medicare (NMC) patients undergoing bariatric surgery.

Results: Of the MC patients, 27 were >65 years of age, and 255 were receiving disability. The average age was 48.45 ± 11.8 years, and the average BMI was 52.4 ± 10.0 kg/m^2. NMC patients had average age of 40.0 ± 10.1 years and a BMI of 50.6 ± 9.1 kg/m^2. The co-morbidities were greater in the MC patients than in the NMC patients (hypertension 71.9% versus 48.4%, diabetes mellitus 39.72% versus 19.4%, obstructive sleep apnea 46.45% versus 28.46%, and obesity hypoventilation syndrome 9.93% versus 2.71%). The mortality rate was 2.48% in the MC patients and .76% in the NMC patients. Mortality was absent in MC patients >65 years old. The percentage of excess weight lost was less in the MC patients (60.8%) than in the NMC patients (66.5%, $P < .0001$). The resolution of diabetes mellitus also differed (64.86% for the MC patients and 77.18% for the NMC patients; $P = .0329$). The male MC patients had more prevalent co-morbidities than did the male NMC patients (hypertension 79.17% versus 58.85%; diabetes mellitus 36.11% versus 24.83%; obstructive sleep apnea 79.17% versus 54.51%; and obesity hypoventilation syndrome 26.39% versus 7.64%). The operative mortality rate was 5.6% for the male MC patients and 1.5% for the female MC patients. The weight loss was similar for the male MC and male NMC patients. The male MC patients had slightly better resolution of both hypertension (MC patients 54.8% versus NMC patients 26.7%, $P = .0025$) and diabetes mellitus (MC patients 30% versus NMC patients 22.5%, $P = .745$). When the patients were stratified into low-, intermediate-, and high-risk groups using a previously validated risk scale, patients with similar risk factors had similar mortality in both groups.

Conclusion: The results of our study have shown that disabled MC patients have greater operative mortality than NMC patients that appears to be associated with more prevalent risk factors. However, the risk was counterbalanced by a substantial improvement in health. (Surg Obes Relat Dis 2009;5:299–304.)

Keywords: Medicare; Bariatric surgery; Mortality; Risk factors

In the United States, >30% of adults had a body mass index (BMI) >30 kg/m^2, and 5% of adults had a BMI >40 kg/m^2 [1,2]. Many medical conditions are directly or indirectly related to obesity [3,4]. Obesity has a large effect on premature mortality and quality of life [5–7]. Intentional weight loss can dramatically decrease the incidence of premature mortality. Bariatric surgery is the only way to achieve durable long-term weight loss at present. It has been shown that in younger patients, the incidence of mortality from diabetes, heart disease, and cancer decreased after 7

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years of follow-up [8]. A nationwide study has shown that the short-term and long-term mortality from surgery are very low. The in-hospital and 30-day mortality rate has been .1–.5%. As a result, a rapid increase of bariatric surgery has occurred during the past decade [9–11]. The trend has also extended to elderly patients [9]. One study suggested that there might be a similar mortality rate if surgery were done in selected elderly patients and high-volume hospitals [12]. Nevertheless, a recent study using the Medicare (MC) database revealed that the risk of early death after bariatric surgery in this particular group of patients was considerably greater than previously reported [13]. The data from individual institutions that have reported good results in selected MC patients has been contradictory [14,15]. To further delineate this issue, we conducted a retrospective study of our institutional bariatric database to study the outcome of our MC patients.

Methods

The institutional review board at the Virginia Commonwealth University Health System approved this study. We conducted a retrospective review of our institutional bariatric database of patients who underwent primary bariatric surgery from 1981 to 2006. The database was prospectively designed to collect information on age, gender, preoperative and postoperative BMI, payor information, and co-morbidities from the history, physical examination, and laboratory studies evaluated in the preoperative period. All the information was updated each time the patient returned for follow-up. We divided the patients into 2 groups determined by their payor status. Group 1 consisted of MC patients and group 2 of NMC patients. The types of procedures performed during the studied interval varied according to our contemporary knowledge and the evolution of techniques for weight loss surgery. Before 1999, most of the patients underwent open gastric bypass or gastroplasty. Since 1999, most patients have undergone laparoscopic gastric bypass, unless their condition precluded a laparoscopic approach or the surgery was converted to open. No LapBands were included in our study. Patients with a history of cardiac disease or chronic obstructive pulmonary disease were evaluated by appropriate specialists to minimize the operative risk to these patients.

The 30-day mortality was defined as death from any cause within 30 days after gastric bypass surgery. Pulmonary embolism was diagnosed using the standard tests appropriate at that point in time. Anastomotic leakage was diagnosed when a routine or selective radiologic study demonstrated extravasation of contrast material or exploratory laparotomy documented disruption of the anastomosis. Wound infection was defined as any incision that showed signs of infection or cellulitis after surgery. An incisional hernia was defined as any hernia through the open or laparoscopic gastric bypass surgical incision sites until the last follow-up visit. An internal hernia was diagnosed when exploratory laparotomy confirmed its existence.

Co-morbidities were recorded at the preoperative visit and at each follow-up visit after surgery. Hypertension was defined as a systolic pressure >140 mm Hg, a diastolic pressure >90 mm Hg, or if the patient was taking antihypertensive medication. Diabetes mellitus was defined as a fasting glucose level >124 mg/dL or if the patient required oral medication or insulin.

The risk of bariatric surgery was categorized as A, B, or C according to a previously validated study [16]. This scheme uses the patient characteristics of a BMI of ≥50 kg/m^2, male gender, hypertension, known risk factors for pulmonary embolism (previous thromboembolism, preoperative vena cava filter placement, obesity hypoventilation syndrome, and pulmonary hypertension), and age ≥45 years. A total score of 0–1 is classified as group A (lowest risk), a score of 2–3 as group B (intermediate risk), and a score of 4–5 as group C (high risk).

Statistical analysis

The continuous data are presented as the mean ± standard deviation. The 1-year weight loss data were compared using analysis of covariance, adjusting for preoperative weight. Other comparisons of continuous data were done using the *t* test. Frequency data were compared using the chi-square test. $P < .05$ was used for all significance determinations. All analyses were performed using Statistical Analysis Systems, version 9.1 (SAS Institute, Cary, NC).

Results

During the study period, the data from 3650 patients were entered into our database. Of these patients, 58 had undergone open vertical banded gastroplasty (4 MC patients and 54 NMC patients). The remainder had undergone some form of gastric bypass. The payor sources could be identified for 3451 patients. Of these patients, 282 were in MC group and 3169 in the NMC group (Table 1). Open gastric bypass was performed in 2093 patients (175 MC patients and 1918 NMC patients). Laparoscopic gastric bypass was performed in 1225 patients (99 MC patients and 1126 NMC patients). The 1-year follow-up rate was 77% for both

Table 1
Patient demographics

Demographic	Group		*P* value
	MC	NMC	
Patients (n)	282	3169	
Age (y)	48.5 ± 11.78	40.0 ± 10.1	.0001
Preoperative BMI (kg/m^2)	52.4 ± 10.0	50.6 ± 9.1	.0053
Male (%)	25.53	18.18	.0032
Female (%)	74.47	81.82	

MC = Medicare; NMC = non-Medicare; BMI = body mass index.

Table 2
Preoperative co-morbidities for MC and NMC

Co-morbidity	Group (%)		*P* value
	MC	NMC	
Hypertension	71.99	48.37	<.0001
Diabetes mellitus	39.72	19.34	<.0001
Obstructive sleep apnea	46.45	28.46	<.0001
Venous stasis ulcers	7.80	2.81	<.0001
Obesity hypoventilation syndrome	9.93	2.71	<.0001

Abbreviations as in Table 1.

groups. The MC patients accounted for 7.9% of our studied cases.

Table 1 summarizes the patient demographic information. The MC patients were older than the NMC patients (P <.0001). The average body weight and BMI were greater for the MC patients (P = .0052 and P = .0053), and the number of men in the MC group was larger (25.53% of MC patients versus 18.18% of NMC patients). The MC patients had a greater incidence of hypertension (71.99% of MC patients and 48.37% of NMC patients, P <.0001), diabetes mellitus (39.72% of MC patients and 19.34% of NMC patients, P < .0001), sleep apnea (46.45% of MC patients and 28.46% of NMC patients, P <.0001), venous stasis disease (7.80% of MC patients and 2.81% of NMC patients, P < .0001), and obesity hypoventilation syndrome (also known as pickwickian syndrome; 9.93% of MC patients and 2.71% of NMC patients, P <.0001; Table 2).

The average actual weight loss for the 2 groups was comparable (P = .4081). The percentage of excess weight lost was slightly lower for MC patients, probably because of the greater preoperative body weight. The resolution of hypertension and diabetes mellitus at 1 year of follow-up was significantly improved clinically in both groups but was somewhat better in the NMC patients than in the MC patients (Table 3). It was not possible to calculate the length of stay for the group as a whole, because this information was only recorded in the database for the past 10 years.

The 30-day, 90-day and 1-year postoperative mortality rates were greater in the MC group at 2.48% and .76% (P = .0090), 3.19% and 1.04% (P = .0041), and 3.90% and 1.45% (P = .0044) for MC and NMC patients, respectively (Table 4). No MC patients >65 years old died.

Table 3
Resolution of co-morbidities, weight loss, and percentage of excess weight loss at 1 year postoperatively

Variable	Group		*P* value
	MC	NMC	
Hypertension resolution (%)	48.67	64.82	.0002
Diabetes mellitus resolution (%)	64.86	77.18	.0329
Weight loss (lb)	107.5 ± 39.2	109.8 ± 33.7	.4081
Excess weight loss (%)	60.8 ± 17.2	66.5 ± 16.7	<.0001

Abbreviations as in Table 1.

Table 4
Mortality rates at 30 days, 90 days, and 1 year

Interval	Group (%)		*P* value
	MC	NMC	
30 d	2.48	.76	.0090
90 d	3.19	1.04	.0041
1 y	3.90	1.45	.0044

Abbreviations as in Table 1.

The postoperative leak rate was significantly greater in the MC group (Table 5). The incidence of pulmonary embolism, wound infections, incisional hernia, and small bowel obstruction did not exhibit significant differences. The MC patients did have greater rates of preoperative or intraoperative placement of an inferior vena cava filter (11.35% of MC patients and 3.31% of NMC patients, P <.0001), because more patients in the MC group were deemed to be at high risk of developing pulmonary embolism.

We also compared the data from the male patients between the 2 groups because male sex was an independent predictor in the scoring system we used [16]. A total of 72 and 576 patients in the MC and NMC groups were men, respectively. They were older (46.3 ± 11.6 y for male MC patients and 41.4 ± 10.9 y for male NMC patients, P = .004) and weighed more (BMI 55.6 ± 11.7 kg/m^2 for male MC patients and BMI 52.5 ± 10.3 kg/m^2 for male NMC patients, P = .0174; Table 6). The male MC patients also had greater rates of co-morbidities compared with the male NMC patients (hypertension, 79.17% of male MC patients versus 58.85% of male NMC patients, P = .0013; diabetes, 36.11% of male MC patients versus 24.83% of male NMC patients, P = .0557; sleep apnea, 79.17% of male MC patients versus 54.51% male NMC patients, P <.0001; obesity hypoventilation syndrome, 26.39% of male MC patients versus 7.64% of male NMC patients, P <.0001; and venous stasis disease, 18.06% of male MC patients versus 8.33% of male NMC patients, P = .0143; Table 7). The 30-day mortality rate of male patients was greater for the MC patients than for the NMC patients (5.56% versus 2.60%, respectively), but the difference was not statistically

Table 5
Postoperative complications

Complication	Group (%)		*P* value
	MC	NMC	
Anastomosis leak	5.67	3.19	.0414
Pulmonary embolism	.35	1.10	.3779
Wound infection	4.96	2.75	.0531
Incisional hernia	24.82	19.91	.0592
Internal hernia	.35	.70	.6908
Small bowel obstruction	4.26	3.25	.4666

Abbreviations as in Table 1.

Table 6
Demographic data for male patients

Demographic	Group		*P* value
	Male MC	Male NMC	
Patients (n)	72	576	
Age (y)	46.3 ± 11.6	41.4 ± 10.9	.0004
Preoperative BMI (kg/m^2)	55.6 ± 11.7	52.5 ± 10.3	.0174

Abbreviations as in Table 1.

Table 8
Mortality rates at 30 days, 90 days, and 1 year for male patients

Interval	Group (%)		*P* value
	Male MC	Male NMC	
30 d	5.56	2.60	.3034
90 d	5.56	2.95	.4102
1 y	5.56	3.47	.5812

Abbreviations as in Table 1.

significant ($P = .3034$; Table 8). The 1-year average weight loss and the percentage of excess weight loss were comparable between the 2 groups ($P = .3668$ and $P = .153$, respectively). The male MC patients had slightly better resolution than the NMC patients of both hypertension (56.82% versus 30.57%, respectively, $P = .0015$) and diabetes mellitus (31.25% versus 22.68%, respectively, $P = .6684$).

When we stratified the patients using the previously noted risk scoring scheme, we found that more than twice as many NMC patients as MC patients were in the lowest risk category (53.27% versus 25.89%, respectively; Table 9). The intermediate- and high-risk groups comprised 74.12% of the MC patients but only 46.73% of the NMC patients. The 73 MC patients in the low-risk group had no mortality at 30 days, 90 days, or 1 year postoperatively. In contrast, of the 1685 NMC patients in the low-risk group, 3 had died (.18%). The MC patients in the intermediate- and high-risk groups had 30-day, 90-day, and 1-year mortality rates that did not differ significantly from each other (Table 10).

Finally, we attempted to quantitate the effect on 30-day mortality of the procedures performed laparoscopically versus using an open approach in the various risk categories. The 30-day mortality was 0 (0%) of 24 of the low-risk group of MC patients who underwent laparoscopic surgery compared with 1 (.16%) of 633 of the low-risk group of in NMC patients ($P = 1.000$). The 30-day mortality for the group A patients who underwent open surgery was 0 (0%) of 49 MC patients versus 2 (.19%) of 1053 NMC patients ($P = 1.000$). The 30-day mortality for the group B patients who underwent laparoscopic surgery was 2 (2.86%) of 68 MC patients versus 3 (.59%) of 505 NMC patients ($P = .1135$). The 30-day mortality for the group B patients who underwent open surgery was 2 (2.08%) of 94 patients versus 13 (1.54%) of NMC 830 patients ($P = .6599$). The 30-day mortality of the group C patients who underwent laparoscopic surgery was 0 (0%) of 8 MC patients versus 1 of 30 NMC patients ($P = 1.000$). The 30-day mortality of the group C patients who underwent open surgery was 3 (8.57%) of 32 MC patients versus 4 (4.04%) of 95 NMC patients ($P = .3770$).

Discussion

Studies using statewide and nationwide databases have indicated that bariatric procedures are safe, with average mortality rate for gastric bypass of ≤.5% at high-volume centers [17]. This mortality rate is close to our mortality rate for the entire NMC group at .7%. The results of our study have confirmed the finding that MC patients, as a group, have greater mortality than the NMC group if considering this as the only criterion. This result supports the conclusion made by Flum et al. [13]. However, MC patients comprise only a small percentage of the bariatric procedures performed in the United States. The National Hospital Discharge Survey data from 2002 to 2004 showed that MC patients comprise 5.7% of all bariatric surgery cases [18]. In our study, the proportion was 7.9% of all procedures. The greater mortality rate among MC patients only slightly affected the mortality rate for the whole group because of their relatively small numbers; however, as a group with greater risks, it is crucially important to determine what factors contribute to that risk to be able to put the risk into perspective and allow for improved management, if feasible.

Our MC patients had a number of characteristics that largely explain the differences in mortality between the 2

Table 7
Prevalence of co-morbidities among male MC and NMC patients

Co-morbidity	Group (%)		*P* value
	Male MC	Male NMC	
Hypertension	79.17	58.8	.0013
Diabetes mellitus	36.11	24.83	.0557
Sleep apnea	79.17	54.51	<.001
Obesity hypoventilation syndrome	26.39	7.64	<.001
Venous stasis disease	18.06	8.33	.0143

Abbreviations as in Table 1.

Table 9
Preoperative risk scores for MC and NMC groups

Risk group	Patient group	
	MC (n = 282)	NMC (n = 3169)
A (0–1 point)	25.89 (n = 73)	53.27 (n = 1688)
B (2–3 points)	58.87 (n = 166)	42.63 (n = 1351)
C (4–5 points)	15.25 (n = 43)	4.10 (n = 130)

Abbreviations as in Table 1.

Table 10
Stratified 30-day, 90-day, and 1-year mortality rate by preoperative risk group

Risk group*	30-d			90-d			1-y		
	MC	NMC	*P* value	MC	NMC	*P* value	MC	NMC	*P* value
A (n = 1761)	0	.18	1.0	0	.30	1.0	0	.53	1.0
B (n = 1517)	2.41	1.18	.264	3.61	1.55	.109	4.8228	2.15	.055
C (n = 173)	6.98	3.854	.412	6.98	5.38	.711	6.98	6.15	1.0

Abbreviations as in Table 1.
Data presented as percentages.
* Group A, 0–1 point; group B, 2–3 points; and group C, 4–5 points.

groups. Our MC patients were older, weighed more, and had many more co-morbidities than their NMC counterparts. Also the percentage of male MC patients was greater. Livingston and Langert [19] reported that MC patients are older than their counterparts. Furthermore, these patients tend to have a greater co-morbidity burden than patients <65 years, as judged by the co-morbidity index. Several other recent studies have found that age is an independent predictor of greater morbidity and mortality [19–21]. However, none of our 27 patients >65 years of age died. This could represent a selection bias such that bariatric surgeons consider the opinion of their colleagues if they perform gastric bypass on a 73-year-old patient with fatal results. We have confirmed the findings of Livingston [21] of a greater percentage of men among our MC patients. Male gender has been associated with greater mortality and greater rates of complications [22]. The BMI is not an independent predictor for high morbidity and mortality when controlling for other variables [21,22]. Nevertheless, a greater BMI does pose technical challenges that could increase the leak rate. Schwartz et al. [23] found that an increased BMI correlated with longer operative times and greater conversion rates. Also, patients with more preoperative co-morbidities tend to have more postoperative complications and deaths [23]. Also, unrealized differences could have been present between the MC and NMC patients that we did not account for in this study, such as degree of mobility (e.g., wheelchair bound); such parameters were not tracked until recently.

The differences in mortality between the MC and NMC patients in our patients can be explained by the greater prevalence of advanced, severe, co-morbidities of obesity, especially the criteria that have independently been shown to increase the risk of mortality. These criteria (i.e., hypertension, obesity hypoventilation syndrome, venous stasis disease, pulmonary emboli) are markers for patients who are at high risk. Their risk of mortality must be carefully balanced against what weight loss can do to eradicate their disability. Our current practice is to pursue an aggressive program of preoperative weight loss in the hopes of potentially decreasing the high risk from surgery for patients in groups B and C. One study conducted at a single institution did not show any difference in mortality between MC and NMC patients when strict preoperative selection criteria were used [16]. Our results have demonstrated that patients in the lower risk groups have lower mortality regardless of their MC status. MC patients experience excellent weight loss and resolution of co-morbidities.

Conclusion

MC patients constitute a unique group of patients with multiple co-morbidities that increase their risk of bariatric surgery. Nevertheless, they experience excellent weight loss, as well as comparable relief of their co-morbidities.

Disclosures

The authors claim no commercial associations that might be a conflict of interest in relation to this article.

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