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Bariatric Aftercare and Outcomes in the Medicaid Population Following Sleeve Gastrectomy

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ABSTRACT

Background: Medicaid patients tend to have poor access to care and suffer from more obesity and obesity-related co-morbidities compared to their privately insured counterparts. The impact of Medicaid status on outcomes after laparoscopic sleeve gastrectomy (LSG) is unknown. The aim of this study was to identify factors that influence outcomes following LSG in the adult Medicaid population of Louisiana with particular focus on adherence to bariatric aftercare attendance and access to care.

Methods: A retrospective review of 63 Medicaid patients undergoing LSG was performed. Demographic data, access to care, weight, co-morbidities morbidity, and mortality were analyzed. Changes in weight and obesity-related co-morbidities were analyzed for patients with ≥12 months of follow-up. Regression analyses were used for estimating the relationships among variables.

Results: The majority of patients were female and non-Caucasian. The mean age was 38.6 years. Morbidity was 16% and mortality was 0%. The average distance traveled to clinic was 71.9 miles. Within the first year only 10% of the patients attended all post-operative clinic visits. A multiple logistic model showed that the only predictor of clinic attendance was increased age. At a mean follow-up of 17.7 months, the mean percent excess body weight loss was 47.2%. Greater pre-surgical weight was the only variable associated with suboptimal weight loss. Improvement or resolution of all major co-morbidities was seen in 65% of patients.

Conclusion: Medicaid patients had a poor attendance at bariatric surgery follow up appointments. Since long-term follow-up is critical, we needed to develop strategies that will optimize follow-up in this patient population.

Key Words: Laparoscopic sleeve gastrectomy, Medicaid, Aftercare, Outcomes.

INTRODUCTION

Obesity is one of the most challenging public health problems, with approximately 1.7 billion persons being overweight and 500 million being obese.[1,2] However, the rate of obesity continues to increase especially among middle-aged, rural, economically disadvantaged, and racial/ethnic minority populations. Because obesity is associated with numerous comorbidities, such as hypertension, heart disease, diabetes, and stroke, it accounts for more health care expenditures than any other medical condition.[3–6] Currently, there are no nonsurgical options for obesity that show long-term effectiveness regarding weight reduction and amelioration of co-morbidities. Although bariatric surgical procedures provide the best cost-effective option for durable weight reduction, access remains restricted for many patients. In fact, studies have shown that there are substantial socioeconomic disparities for bariatric surgery.[7–9]

Medicaid patients tend to have poor access to care, a higher prevalence of obesity, and more severe obesity-related co-morbidities compared with patients who are insured privately or by Medicare.[7,8] Yet, it has been shown that this patient population has decreased odds of being selected for bariatric surgery compared with their privately insured counterparts.[10] This is, in part, because not all states provide bariatric coverage for Medicaid patients. Consequently, this population may need to travel great distances for surgery.[11] This can affect bariatric aftercare attendance,[12,13] and poor aftercare attendance has been linked to poor weight loss after gastric bypass surgery.[14] The impact of Medicaid status on outcomes after laparoscopic sleeve gastrectomy (LSG) is unknown, especially at the state level.

The aim of this study was to identify factors that influence outcomes after LSG in the adult Medicaid population of

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Louisiana with particular focus on adherence to bariatric aftercare attendance and access to care.

METHODS

The study was designed as a single-institution, observational study. A retrospective data analysis based on the patients' hospital records and prompted self-reported data collected over the telephone was performed. At our institution, the bariatric surgery program started in 2008, first with laparoscopic adjustable gastric banding. However, this surgery required more intensive follow-up care than most other bariatric surgeries, and weight loss outcomes with the band surgery were unsatisfactory; hence we shifted treatment away from the band and in favor of the LSG.

From April 2010 to June 2012, 63 patients with a body mass index (BMI) >40 kg/m^2 or >35 kg/m^2 with severe comorbidities underwent LSG as a primary procedure for morbid obesity. Patients were evaluated for previous attempts at weight loss using other modalities and studied preoperatively with a multidisciplinary workup including medical clearance, psychiatric and nutritional evaluation, preoperative imaging, gastrointestinal endoscopy, and standard laboratory examinations. Patients were well informed about the surgical procedure, including all potential advantages and possible complications and side effects. One surgeon (C.F.B.) performed all bariatric procedures with the assistance of a fellow using one standard technique and clinical pathway. For the surgery, the dissection was started 5 cm from the pylorus and proceeded to the left crus of the hiatus, with release of all attachments to completely mobilize the fundus. The gastric sleeve was created by use of sequential firings of an endoscopic linear stapling device (Endo GIA with Tri-staple; Covidien, Mansfield, Massachusetts). The staplers are applied alongside a 40-French calibrating bougie positioned in the stomach against the lesser curve to avoid stenosis and to obtain a narrow gastric tube. Patients had scheduled postoperative office visits at 3 weeks, 3 months, 6 months, and 12 months, with the intent to follow-up at 24 months. We specifically advised our patients about the necessity for regular follow-up visits at the time of initial therapy. Patients received a reminder phone call and a letter sent to their place of residence before each scheduled clinic visit.

Data collected included patient demographic characteristics, insurance coverage, medical history, comorbidities, estimated household income, preoperative weight and BMI, medication use, operative data (operative time, complications, and conversion), early (<30 days) and late postoperative complications, hospital stay, excess body weight loss (EBWL) (% EBWL = 100 × [Weight lost since surgery/Preoperative excess body weight]), and mortality rate. Excess body weight was defined as the weight in excess of each patient's ideal body weight (IBW) according to the Hamwi method (IBW for female patients = 100 lb + [height (in) – 60] × 5 lb, IBW for male patients = 106 lb + [height (in) – 60] × 6 lb). The travel distance, a general surrogate for access to care, was assessed for each patient using the driving distance between the patient's residential address and the hospital according to an online mapping service (MapQuest, http://www.mapquest.com).

For data analyses, participants were divided into 2 categories based on the frequency of their attendance at medical appointments. Individuals who attended 3 or 4 (>50%) of the 4 recommended first-year postoperative appointments were considered high attendees, and those who attended ≤2 (≤50%) of these appointments were considered low attendees. Changes in weight loss and medical conditions related to obesity were also analyzed according to the BAROS (Bariatric Analysis and Reporting Outcome System) criteria.[15] Suboptimal weight loss was defined as failure to lose ≥40% of excess body weight by 12 months postoperatively.[16] The major comorbid conditions taken into consideration were hypertension, cardiovascular disease, dyslipidemia, type 2 diabetes mellitus, and osteoarthritis. Postoperative changes in these comorbidities were grouped into 3 categories: no change, improvement, or resolution. Improvement in a comorbid condition was defined as better control of the disease state with the same dose of medication or reduced dosage/discontinuation of medication with a similar degree of morbidity. Resolution of a comorbid condition was defined as the disappearance of a condition after treatment was ceased, with no reappearance of the condition or treatment needed. However, hypertension was considered resolved when it became controlled with diet or the use of a diuretic only.[15]

Statistical Analysis

Data are presented as mean ± standard deviation. High and low attendees of medical appointments were first compared in unadjusted analyses on all variables of interest. We used *t* tests for continuous variables and χ^2 analysis and the Fisher exact test for categorical data. Univariately, for the continuous variables, a 2-sample *t* test was conducted to compare mean values of the variables by attendance category. Linear regression analysis was used to identify the relationships between appointment compliance and the distance traveled and between the amount of weight loss and resolution of major comorbidities and the distance traveled. Statistically significant variables in univariate analyses were included as predictors in a multivariate logistical regression analysis predicting attendance level (high, 1; low, 0). Statistical signifi-

cance was established at the $P < .05$ level for all analyses. Statistical analysis was performed with SAS software (version 9.3; SAS Institute, Cary, North Carolina).

RESULTS

Preoperative Findings

Sixty-three patients underwent an LSG as a primary operation for morbid obesity. There were 57 women and 6 men with a median age of 38.6 years (range, 18–64 years). Patient demographic characteristics are depicted in **Table 1**. African Americans comprised most of the group (56%), followed by white patients (43%). Most patients had an estimated annual household income of <$25 000 per year (31 of the 34 patients with a known household income). Interestingly, almost half of the patients had to travel >50 miles to the clinic.

Preoperatively, the patients had a mean BMI of 51.8 ± 8.5 kg/m^2 (range, 33.8–77.5 kg/m^2), and the mean excess body weight was 183.5 ± 52.7 lb (range, 75–306 lb). Of the patients, 5 (8%) were severely obese (BMI, 35–39 kg/m^2), 21 (33%) were morbidly obese (BMI, 40–49 kg/m^2), and 37 (59%) were super obese (BMI >50 kg/m^2). Ninety-seven percent (61/63) of the patients had at least one out of five co-morbidities examined. Among these, hypertension was the most prevalent (86%), followed by osteoarthritis (68%), type 2 diabetes mellitus (29%), dyslipidemia (29%), and cardiovascular disease (11%) (**Table 1**).

Table 1.
Demographic and Preoperative Characteristics of Bariatric Patients (N = 63)

Demographic and Preoperative Characteristics	Mean ± SD or No. of Patients (%)
Gender	
Female	57 (91)
Male	6 (9)
Age (y)	38.6 ± 9.1
Ethnicity	
African American	35 (56)
White	27 (43)
Asian	1 (1)
BMI (kg/m^2)	51.8 ± 8.5
Excess body weight (lb)	183.5 ± 52.7
Comorbidities	
Hypertension	54 (86)
Cardiovascular disease	7 (11)
Dyslipidemia	18 (29)
DMII[a]	18 (29)
Osteoarthritis	43 (68)
Annual household income	
<$25 000/y	31 (49)
$25 000/y–$50 000/y	3 (5)
Unknown	29 (46)
Marital status	
Married/partnered	19 (30)
Single/divorced/widowed	44 (70)
ASA[a] physical status classification	
2	8 (13)
3	47 (74)
4	8 (13)
Distance from medical center	
<10 miles	19 (30)
10–50 miles	13 (21)
51–100 miles	17 (27)
>100 miles	14 (22)

[a]ASA = American Society of Anesthesiologists; DMII = type 2 diabetes mellitus.

Operative Findings

All cases were completed laparoscopically. Blood loss was minimal (mean, 36.6 mL) except in 1 patient who had intraoperative bleeding from a small splenic capsular tear (blood loss of 500 mL). There were no intraoperative injuries to the bowel. The median operative time was 136 minutes (range, 80–388 minutes), with a median postoperative hospital stay of 1.5 days (range, 1–3 days). There were no perioperative deaths.

Postoperative Findings

No staple-line leaks or strictures were seen on an upper gastrointestinal study performed 24 hours after surgery. Complications occurring up to the 30th postoperative day were considered early complications. Only 7 minor early complications occurred in 63 patients (11%). They were distributed as follows: 5 patients (8%) presented with superficial wound infections at the port sites, all of which resolved with oral antibiotics with no need for reoperation, and 2 patients (3%) presented with asymptomatic seromas that resolved with conservative treatment under clinical supervision.

Table 2.
Comparisons of Low and High Attendees of Scheduled Bariatric Clinic Appointments in First Postoperative Year

Effect	Low Attendance (n = 49)	High Attendance (n = 13)	*P* Value
Age (mean ± SD) (y)	37.4 ± 9.5	43.5 ± 6.1	.03
Preoperative BMI (mean ± SD) (kg/m^2)	51.9 ± 7.9	52.2 ± 10.9	.90
Distance (mean ± SD) (miles)	81.5 ± 87.4	40.9 ± 53.3	.12
Gender (male/female) (n)	4:46	2:11	.60
Marital status (married/single) (n)	13:36	6:7	.19
Race (African American/white) (n)	25:24	10:3	.12

Rehospitalization was required in 3 patients (5%) for fever, nausea, and dehydration. Among these 3 patients, 1 was found to have left lower lobe pneumonia and was discharged after 2 days taking oral antibiotics. The 2 remaining patients were found to have a small intra-abdominal fluid collection on abdominal computed tomography scan along the lateral fundus of the stomach. No staple-line leak was observed on imaging, and these patients were treated conservatively with intravenous fluids and antibiotics and discharged after a mean hospital stay of 2 days. These complications were also resolved without sequelae.

Bariatric Surgery Clinic Attendance

Overall, 89% of patients returned to the clinic within their scheduled 3-week postoperative appointment. However, only 31 (49%) attended the 3-month follow-up visit, 19 (30%) attended the 6-month follow-up visit, and 7 (11%) attended the 12-month follow-up visit. Of the patients, 21% (13 of 63) were considered high attendees of medical appointments and 79% (50 of 63) were considered low attendees. In terms of the number of appointments attended, the percentage of persons who attended a total of 0 visits, 1 visit, 2 visits, 3 visits, and all 4 visits during the first year after surgery was 5%, 44%, 30%, 11%, and 10%, respectively. The mean follow-up period in the bariatric clinic was only 4.0 ± 4.6 months (range, 0–21 months). Three patients never returned to the bariatric clinic. Only two could be contacted: one reported that the distance to the clinic was too great, and the other reported a lack of time. The third patient had all of her contact numbers disconnected.

To further examine the reasons that the patient population had poor compliance with follow-up visits, the distance from the patient's residence to the medical center was studied. The mean distance was 71.9 miles (range, 1.1–285 miles). Low attendees lived further away from the clinic than high attendees (**Table 2**). Interestingly, >50% of the low attendees lived >50 miles away from the clinic.

The most common reasons cited for noncompliance with scheduled clinic follow-up visits were the cost and means of transportation associated with the distance from the clinic (9 of 37) and scheduling conflicts between the patient's work/school and scheduled clinic visits (11 of 37). Lack of time, misinformation regarding the clinic visit date, and difficulty in rescheduling appointments were also cited as reasons for lack of attendance to the clinic. Among the 26 patients who could not be contacted, 16 had all of their listed contact numbers disconnected; all of these were low attendees (≤2 follow-up visits).

Predictors of Bariatric Aftercare Attendance

Table 2 shows unadjusted differences between low and high medical appointment attendees regarding variables of interest. Age, BMI, and distance were treated as continuous variables, whereas gender, race, and marital status were each dichotomized into 2 categories. Univariate analysis showed that the differences were statistically significant only for age, with high-attendance individuals being older than low-attendance individuals. A multiple logistic model to include all of the predictor variables again showed that the only significant predictor of clinic attendance was age.

Examination of Weight Loss and Status of Comorbidities at Minimum of 1 Year Postoperatively

Data for patients who had LSG and a minimum of 12 months' follow-up were further analyzed. Of the 63 patients included and operated on initially, 23 could not be contacted (ie, lost to follow-up) 1 year after surgery and were not included in the analysis (attrition rate, 36.5%). Strategies for locating lost participants included sending registered letters, contacting by phone, and searching medical and public records.

Table 3.
Preoperative and Postoperative Obesity-Related Comorbidity Rates and Changes Among Patients Who Underwent LSG With Minimum of 1 Year of Follow-Up (n = 40)

Comorbidity	No. of Patients With Comorbidity Preoperatively (%)	Resolved	Improved	Unchanged
HTN[a]	33 (83)	16	11	6
CVD[a]	4 (10)	2	1	1
Dyslipidemia	13 (33)	9	0	4
DM[a]	10 (25)	5	2	3
OSA[a]	18 (45)	12	2	4

[a]CVD = cardiovascular disease; DM = diabetes mellitus; HTN = hypertension; OSA = obstructive sleep apnea.

Information was successfully obtained from 40 patients with ≥1 year follow-up. Of these, 85% (34 of 40) were tracked with phone calls or letters and 15% (6 of 40) were tracked through other hospital clinic visits. The mean age of this group was 39.3 years (range, 20–64 years), and the mean preoperative BMI was 50.3 kg/m^2 (range, 33.8–66.3 kg/m^2). After a mean follow-up period of 17.7 months (range, 12.1–34.5 months), the patients achieved a mean postoperative BMI of 37.6 kg/m^2 (range, 20.3–60.8 kg/m^2). The mean percent EBWL for this group was 47.2% (range, 12.2%–98.7%).

Suboptimal weight loss occurred in 14 patients (35%). Poor adherence to aftercare was not associated with suboptimal weight loss. Univariate analysis showed that the differences between the groups with suboptimal and optimal weight loss were statistically significant only for preoperative BMI, with a higher BMI being predictive of suboptimal weight loss. This difference was no longer detected in the multivariate analysis, likely because of the small sample size for 8 predictors.

All patients with ≥1 year of follow-up (n = 40) were noted to have a mean of 2 comorbidities before their operation. As shown in **Table 3**, the comorbidity with the highest rate of improvement or resolution was hypertension (48.5% resolved and 33.3% improved), followed by osteoarthritis (66.7% resolved and 11.1% improved). Type 2 diabetes mellitus was also shown to resolve or improve significantly (50% resolved and 20% improved), as did cardiovascular disease (50% resolved and 25% improved). The comorbidity with the highest rate of no change was dyslipidemia (30.8% unchanged), although many patients still had resolution of their dyslipidemia (69.2%). There was no significant difference in the rate of resolution or improvement of comorbidities in the high-attendee and low-attendee subgroups. Overall, in 65% of patients, all of their preoperative comorbidities resolved or improved.

DISCUSSION

Obesity is now being recognized as a disease. Consequently, this has elevated the importance of necessary interventions to not only prevent but also better manage this complex health issue. Because bariatric surgery is the only evidence-based approach to sustainable weight loss and improving comorbid disease in morbidly obese patients, restricting access in low-income patients in need who are unable to afford private insurance coverage or have poor access to care should not be tolerated. Currently, not all states will cover bariatric surgery for Medicaid patients, and there are many restrictions placed on most Medicaid programs that will cover bariatric surgery.[17] If disparities in access to care are a harbinger of outcomes, low-income populations could have worse outcomes after bariatric surgery. In our study we found that Medicaid patients who rely on this insurance program for bariatric surgery in Louisiana had poor access to care and typically had to travel significant distances. The travel distance has been shown to contribute to interruptions in patient follow-up. Indeed, 3 studies have shown that a greater distance to the clinic was associated with a higher attrition rate.[12,13,18] However, others could not link distance to attrition.[19] In our study we also could not statistically show an association between travel distance and aftercare attrition. However, we did note that there was a 40-mile travel difference between the low and high attendees. For individuals who live a significant distance from the clinic, we believe that emerging telemedicine options could be used to facilitate aftercare.

Improving aftercare attendance in bariatric surgery patients is one potential area that would likely increase the long-term health outcomes and the cost-effectiveness of this procedure. It may be that regular attendance is a characteristic of patients achieving good weight loss outcomes and a contributor to improvements in comorbidities. This study presents the first assessment of factors associated with attendance at follow-up care in the first year after bariatric surgery among Louisiana Medicaid patients and its impact on health outcomes. Analysis of our data showed that only 21% of the Medicaid beneficiaries who underwent bariatric surgery attended at least half of their requested follow-up visits. Furthermore, most of

these patients stopped attending the clinic after just the first postoperative visit. Consequently, the mean follow-up period in the bariatric clinic was only 4.0 ± 4.6 months (range, 0–21 months). Although this is a weakness of the study when one is looking at safely and weight loss outcomes, these data are consistent with other investigators who have also shown that many bariatric patients do not attend follow-up appointments.[20] Although it is difficult to determine causation or the direction of effect for this observation, a survey of the patients showed that the most common explanations for this effect were scheduling conflicts and cost and means of transportation associated with distance from the clinic. Harper et al[21] have shown that a significant number of bariatric surgery patients did not come to postoperative visits unless prompted by the clinic, which may explain why all 16 of our patients who had their phone numbers disconnected were low attendees (≤2 follow-up visits). Among potential demographic predictors of bariatric surgery follow-up care attrition, we found that younger age was associated with increased attrition in both univariate and multivariate analyses. Interestingly, a systematic review of the literature showed inconsistent associations between attrition and background demographic characteristics. Of three studies performed in the United States examining the patient's age as a potential predictor of attrition in the 12-month follow-up, one found that younger age was associated with increased attrition[22] whereas two did not find an association between age and attrition.[13,23]

LSG as a standalone weight loss operation is a relatively new procedure among the many other well-established bariatric operations. Nevertheless, there are several studies that have shown this procedure to be an effective standalone weight loss procedure with a mean EBWL of 45% to 62% after a median follow-up of 12 to 18 months.[24–26] However, in the available literature, the outcome data of patients with Medicaid insurance who underwent this procedure compared with other types of insurance are sparse. In our study we found that the degree of weight loss in the Medicaid beneficiaries was certainly consistent with other studies (EBWL of 47.2% after a mean follow-up period of 17.7 ± 0.84 months). However, there was a subset of patients who did not achieve expected weight loss at 18 months. The factors associated with the suboptimal weight loss have not been well defined. In a multivariate analysis of >500 patients who underwent Roux-en-Y gastric bypass, Melton et al[16] found that BMI, diabetes, and male gender were factors associated with suboptimal weight loss. In our study we found that suboptimal weight loss occurred in 35% of patients and was associated with increased BMI on unadjusted univariate analysis. This difference was no longer detected in the multivariate analysis (logistic regression), likely because of the small sample size. Failure to return for follow-up visits has been associated with postoperative physical complications and poor weight loss and weight loss maintenance.[14,21] In contrast, another study,[23] as well as our study, found that patient follow-up after bariatric surgery was not essential for significant weight loss.

It is generally recognized that weight loss alone is not an adequate measure of the success of a bariatric procedure.[27–31] Equally important is the resolution of comorbidities. In our study we found that LSG had a significant impact on the resolution of comorbidities independent of weight loss at 18 months after surgery. The comorbidities that appeared to be most affected by the surgery were hypertension (82% resolution or improvement) and osteoarthritis (78% resolution or improvement), whereas dyslipidemia had the smallest change (69.2% resolution or improvement). Type 2 diabetes mellitus also showed resolution or improvement in most patients (70%). Using the same criteria, Bobowicz et al[26] found that at 12 months, hypertension resolved or improved in 62% of patients and diabetes resolved or improved in 68.3% of patients.

Equal access to bariatric surgery irrespective of socioeconomic status must be ensured for every individual who is morbidly obese. Currently, many experts speculate that there will be expanded state Medicaid coverage of bariatric surgery. In our study we found poor attendance at bariatric surgery follow-up appointments for our Medicaid patients in Louisiana. Although we noted age as a factor influencing poor follow-up, the distance to the clinic did not play a statistically significant role in aftercare attendance. It is important to remember that the sleeve gastrectomy is not an innocuous procedure and has the potential for serious long-term complications. Consequently, we believe that long-term follow-up is important, and if a patient population is not able to attend a threshold number of clinic visits, we need to develop strategies that will optimize follow-up or such patients probably should not undergo surgery. These results suggest that further research is needed in samples with larger Medicaid populations in other states and other insurance populations to compare patterns of attendance and weight loss outcomes. It is possible that by improving surgical aftercare attendance, the effectiveness of this procedure will improve even further. However, more studies are needed allocating patients to specific aftercare regimens and comparing treatment outcomes.

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