Return to Work After Gastric Bypass in Medicaid-Funded Morbidly Obese Patients

Amy J. Wagner, MD; Joseph M. Fabry Jr, DO; Richard C. Thirlby, MD

Objective: To determine whether medically disabled (Medicaid-funded) morbidly obese patients return to the workforce after Roux-en-Y gastric bypass (RYGB).

Design: Retrospective clinical data review.

Setting: A tertiary referral center.

Patients: From January 1, 1997, to December 31, 2002, 38 medically disabled patients underwent RYGB performed by a single surgeon. Sixteen medically disabled patients seen by the same surgeon did not undergo surgery and served as a control group.


Main Outcome Measure: Full-time employment.

Results: The patients who underwent RYGB were more likely to return to work, with 14 (37%) working, compared with 1 (6%) of the nonoperative control patients (P = .02). Elimination of comorbidities was associated with a greater likelihood of return to work. Patients who had greater than the mean decrease in comorbid conditions at the time of follow-up were statistically more likely to return to work than those who did not have a reversal in comorbid conditions (P = .001). Health-related quality of life was very poor preoperatively and improved in all domains after surgery.

Conclusions: Morbid obesity is associated with many medical conditions that often render patients disabled. We found that 37% of morbidly obese patients with Medicaid coverage returned to work after RYGB, compared with 6% of patients in the nonoperative control group. This study suggests that RYGB, the most effective available means to achieve durable weight loss and reduction of comorbidities in morbidly obese patients, results in significant rehabilitation of Medicaid-funded morbidly obese individuals.

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The prevalence of obesity in the United States has increased dramatically over the past 2 decades; approximately 65% of US adults are overweight.\textsuperscript{1} Five percent of US adults are morbidly obese, with a body mass index (BMI) (calculated as weight in kilograms divided by height in meters squared) of greater than 40. Obesity is associated with a variety of diseases, including diabetes mellitus, hypertension, hyperlipidemia, degenerative arthritis, sleep apnea, and left ventricular hypertrophy. Depression, social isolation, and discrimination further compound the disability associated with morbid obesity. As a result, morbid obesity results in dramatic increases in health care costs. Recent studies suggest that about 17% of total medical spending in the United States is allocated to treat obese adults, resulting in annual costs of approximately $140 billion.\textsuperscript{2} Nonoperative treatment of morbid obesity is ineffective.\textsuperscript{3} In studies with longer than a 5-year follow-up, failure rates for nonoperative treatments such as low-calorie diets, exercise programs, behavior modification, and medication have been reported to be as high as 98%.\textsuperscript{4} Bariatric surgery is the only effective treatment for morbid obesity.\textsuperscript{5} Morbidly obese patients typically lose from 60% to 70% of excess body weight\textsuperscript{6,7} after undergoing Roux-en-Y gastric bypass (RYGB), the most commonly performed bariatric surgery in the United States.\textsuperscript{8} Furthermore, bariatric surgery has been shown to effectively treat obesity-related diabetes mellitus,\textsuperscript{9,10} hypertension,\textsuperscript{10,11} abnormal serum lipid levels,\textsuperscript{12-14} and obstructive sleep apnea.\textsuperscript{15-17} Surgical treatment has also led to substantial improvements in ventricular function with reductions in wall thickness\textsuperscript{18,19} and benign intracranial hypertension.\textsuperscript{20}

Obesity and obesity-related comorbid conditions are prevalent among disabled adults.\textsuperscript{21} We observed that a substantial percentage of patients undergoing evaluation for bariatric surgery at our institution had...
been deemed medically disabled and were supported by Medicaid. However, we were unaware of the effect of bariatric surgery on the rehabilitation of these patients. The aim of our study was to determine whether disabled morbidly obese patients who were supported by Medicaid returned to the workforce after undergoing RYGB.

## METHODS

### STUDY DESIGN

We conducted a retrospective review in a tertiary-referral academic medical center. The operative records and preoperative and postoperative data were obtained by review of the clinical charts. In addition, long-term follow-up was obtained from each patient individually by telephone using a standardized questionnaire. At the preoperative visit, each patient completed the 36-Item Short-Form Health Survey (SF-36). The patients also completed the survey postoperatively at 3 months and at the time of long-term follow-up.

Body mass index was calculated in all patients. Weight loss was quantified by calculating the percentage of excess BMI lost. Body mass index has replaced excess body weight as the standard measure of morbid obesity. Therefore, we elected to quantify weight loss by calculating the percentage of excess BMI lost in patients instead of the percentage of excess body weight lost. Our calculations show that the result is virtually identical to the percentage of excess body weight lost. Excess BMI was defined as a BMI of 23 or greater. The percentage of excess BMI lost was calculated as follows: (Preoperative Excess BMI – Follow-up Excess BMI)/Preoperative Excess BMI. The institutional review board of Virginia Mason Medical Center approved the protocol, and informed consent was obtained from all patients.

### PATIENTS

All medically disabled patients who were recipients of Medicaid at the time of initial evaluation for RYGB were included for review. Criteria for Medicaid eligibility in Washington State requires that the individual’s income be low (≤ 150% of the poverty level) and that the individual be in 1 of 4 eligibility groups. One of the qualifying groups includes patients who are medically disabled.

Patients in our study were divided into those who underwent RYGB (the surgery group) and those who underwent evaluation during the same period but did not have surgery (the control group). The control group consisted of patients who were funded by Medicaid and were eligible for RYGB but did not have the procedure. These patients were all deemed surgical candidates funded by Medicaid and were eligible for RYGB but did not have surgery (the control group). The control group consisted of patients who were medically disabled and were supported by Medicaid. However, we were unaware of the effect of bariatric surgery on the rehabilitation of these patients. The aim of our study was to determine whether disabled morbidly obese patients who were supported by Medicaid returned to the workforce after undergoing RYGB.

### Table 1. Patient Demographics

<table>
<thead>
<tr>
<th>Group</th>
<th>Surgery (n = 38)</th>
<th>Control (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, No. (%)</td>
<td>31 (82)</td>
<td>11 (69)</td>
</tr>
<tr>
<td>Age, y</td>
<td>48 (27-63)</td>
<td>51 (33-63)</td>
</tr>
<tr>
<td>BMI at presentation</td>
<td>58 (38-113)</td>
<td>54 (34-91)</td>
</tr>
<tr>
<td>No. of comorbid conditions</td>
<td>4.0 (0-7)</td>
<td>3.1 (0-8)</td>
</tr>
</tbody>
</table>

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

*Unless otherwise indicated, data are expressed as mean (range).

### Figure 1

The incidence of comorbid conditions before and after Roux-en-Y gastric bypass (RYGB) in the surgical group (n=38). Degenerative joint disease (DJD), gastroesophageal reflux disease (GERD), sleep apnea, psychiatric disorders (eg, depression or bipolar disorder) (Psych), hypertension (HTN), diabetes mellitus (DM), and asthma were the most common obesity-related comorbid conditions.

**Surgery Group**

Thirty-eight medically disabled patients (31 women and 7 men; mean age, 48 years; range, 27-63 years) with a mean preoperative BMI of 58 (range, 38-113) underwent open RYGB performed by a single general surgeon (R.C.T.) from January 1, 1997, through December 31, 2002. Open RYGB was performed with creation of a 13-mL pouch and a 75-cm Roux limb in each patient. Preoperatively, the mean number of obesity-related comorbidities was 4.0 (Table 1). The mean follow-up was 44 (range, 14-97) months and was obtained by telephone in all 38 patients. Seventeen patients (45%) also completed preoperative and postoperative SF-36 forms.

### Control Group

The control group consisted of 16 medically disabled patients (11 women and 5 men; mean age, 51 years; range, 33-63 years) with a mean BMI of 54 (range, 34-91) who did not have surgery. Fourteen patients elected not to have surgery; the other 2 cases were not approved by Medicaid. The mean number of comorbidities at the initial evaluation was 3.1. As summarized in Table 1, Figure 1, and Figure 2, the control group had fewer comorbid conditions than the surgery group and included more men. The mean length of follow-up in this cohort was 32 (range, 15-62) months (Table 2). Again, all 16 patients (100%) were followed up with letters of medical necessity submitted. We excluded patients 65 years or older, because return to work was not relevant. Obesity-related comorbid conditions (hypertension, hyperlipidemia, gastroesophageal reflux disease, diabetes mellitus, cardiac disease, pulmonary disease, obstructive sleep apnea, and psychological disorders) were recorded before and after surgery and obtained using clinical chart review and telephone interviews. Patients were candidates for surgery if they had a BMI of 40 or greater. Patients with a BMI of 35 or greater with significant comorbid conditions were also candidates for surgery. All patients in the surgery group failed to lose weight in a medically supervised weight loss program. All surgical candidates received counseling from a dietician before and after surgery. Patients were defined as working if they had full-time employment and were no longer Medicaid recipients.

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Results at Follow-up in Patients Who Did and Did Not Undergo RYGB

<table>
<thead>
<tr>
<th>Group</th>
<th>Surgery</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of follow-up, mo</td>
<td>44 (14 to 97)</td>
<td>32 (15 to 62)</td>
</tr>
<tr>
<td>BMI at follow-up</td>
<td>36 (21 to 59)</td>
<td>52 (26 to 99)</td>
</tr>
<tr>
<td>Change in No. of comorbid conditions</td>
<td>−1.3 (−5 to 3)</td>
<td>1.6 (−1 to 3)</td>
</tr>
<tr>
<td>Patients who are working, No. (%)</td>
<td>14 (37)</td>
<td>1 (6)</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); RYGB, Roux-en-Y gastric bypass.

Table 2. Weight Loss and Return to Work After RYGB

<table>
<thead>
<tr>
<th>No. (%) of Patients</th>
<th>Working</th>
<th>Not Working</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than mean excess BMI lost&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6 (30)</td>
<td>14 (58)</td>
</tr>
<tr>
<td>Less than mean excess BMI lost&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8 (70)</td>
<td>10 (42)</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); RYGB, Roux-en-Y gastric bypass.

<sup>a</sup>Differences between working and nonworking patients were nonsignificant (P = .56; χ² analysis).

Table 3. Results at Follow-up in Patients Who Did and Did Not Undergo RYGB

In the RYGB study group, the mean ± SD preoperative and follow-up BMIs were 58.3 ± 9.9 and 36.2 ± 16.7 (follow-up BMI range, 21-59), respectively. The mean ± SD percentage of excess BMI lost was 62.6% ± 26.4%. In the nonoperative control group, the mean initial BMI and the BMI at the last follow-up were 54 (range, 34-91) and 52 (range, 26-99), respectively. In the control group, the mean percentage of excess BMI lost was 13.4% (data not shown). The numbers of comorbidities improved in every category in the operative group, with the most profound improvements in gastroesophageal reflux disease, sleep apnea, and diabetes mellitus (Figure 1). For unclear reasons, the improvements were less than those previously cited in the literature.<sup>a,b</sup>

As summarized in Table 2, 14 of 38 patients who underwent RYGB (37%) were working and no longer required Medicaid funding at the time of follow-up. On the other hand, only 1 of 16 patients in the control group (6%) was found to be working (P = .02). The amount of weight loss was not associated with return to work.

Figure 2. The incidence of comorbid conditions at presentation and at follow-up in the nonoperative control group (n = 16). The incidence of comorbid conditions increased in all but 1 category, gastroesophageal reflux disease (GERD), which remained the same. Remaining abbreviations are given in the legend to Figure 1.

Health-Related Quality of Life

All patients were asked to complete a generic measure of health-related quality of life (HRQOL), the SF-36, at the initial visit and at all postoperative visits. In addition, patients were asked to complete the SF-36 form again at the time of long-term follow-up.

Statistical Analysis

We analyzed the data using the Fisher exact test and χ² analysis of contingency as appropriate, with P < .05 considered significant. Transformed scale scores on the SF-36 were compared using Wilcoxon rank sum tests.

Results

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As summarized in Table 2, 14 of 38 patients who underwent RYGB (37%) were working and no longer required Medicaid funding at the time of follow-up. On the other hand, only 1 of 16 patients in the control group (6%) was found to be working (P = .02). The amount of weight loss was not associated with return to work.

Because reversal of comorbidities was found to be associated with return to work, we further investigated the predictive value of preoperative obesity-related comorbid conditions and return to work after RYGB. Although there was not a statistically significant relationship between the number of preoperative comorbid conditions and the patients’ Medicaid status on follow-up,
up, the data suggest that reversible comorbidities are associated with return to work. For example, the frequencies of return to work in groups of patients with 0 to 2 and 3 to 6 preoperative comorbidities were 13% (1 of 8) and 48% (13 of 27), respectively (Fischer exact test, \( P = .11 \)). On the other hand, the data suggest that too many preoperative comorbid conditions are associated with not returning to work. None of the 3 patients with more than 6 comorbid conditions returned to work.

At the time of follow-up, the patients in the nonoperative control group gained a mean of 1.7 comorbidities. Also, at the time of follow-up, there was an increase in the incidence of every comorbid condition, except gastroesophageal reflux disease, which was unchanged (Figure 2). The only patient who returned to work in the control group had a decrease of 1.0 comorbid conditions. Her initial BMI was 51 and her BMI at follow-up was 49.

The changes in HRQOL after surgery, as measured by the SF-36, are illustrated in Figure 3. Despite telephone interviews and mailings with self-addressed, postage-paid envelopes, we were able to obtain long-term follow-up forms in only 17 (45%) of the patients in the surgery group. We were unable to collect meaningful data in the nonoperative control group. The median time between the initial and most current SF-36 data was 31.5 months (range, 7.2–61.8 months).

As shown, the preoperative values in all 8 domains were very low. The 8 categories examined were physical functioning, role-physical (RP), bodily pain, general health, vitality, social functioning, role-emotional (RE), and mental health. Consistent with the patients’ medically disabled status, the RE and RP scores were extremely low, at 8.3 and 5.2, respectively. These domains measure the effects of health status on the ability to function emotionally or physically (eg, at work). Postoperative RE and RP scores were 16.2 and 15.8, respectively, still well below national norms.

There were statistically significant improvements in 6 of the 8 domains: physical functioning, RP, bodily pain, general health, vitality, and social functioning. The greatest improvements after surgery occurred in the domains of vitality (\( P = .006 \)) (mean difference, 31 points) and social functioning (\( P = .001 \)) (mean difference, 29 points).

Normalized data were used to assess the effects of surgery on overall mental and physical health. The 4 domains relating to physical health are summarized by the physical component summary score; the 4 domains relating to mental health are summarized by the mental component summary score. Norm-based scoring of the SF-36 adjusts general population scores to 50, with an SD of 10. In our study, the mean physical component summary score increased from a preoperative value of 28.8 to a postoperative value of 37.5, a change of 8.7 points, or nearly 1 SD. The mental component summary scores increased from a mean preoperative value of 28.1 to a postoperative value of 33.8, a change of only 5.7 points. In summary, our patients had very poor HRQOL on presentation; this improved after surgery but was still well below national norms (−1.3 to 1.7 SDs). Physical health improved more than mental health did.

**COMMENT**

This study supports our hypothesis that many medically disabled, Medicaid-funded, morbidly obese patients return to the workforce after RYGB. We found that 37% of morbidly obese Medicaid-funded patients returned to work after RYGB, compared with 6% of patients in the nonoperative control group. Our return-to-work rate of 37% after RYGB reinforces the value of bariatric surgery. Reduction of comorbidities is more reliable than the amount of weight lost as a predictor of patients’ ability to return to work. Despite the increased rate of return to work after RYGB, at least 57% of patients in the RYGB group remained Medicaid recipients, despite their weight loss and the reversal of comorbidities. Our study is unable to determine the reasons for these patients’ ongoing disabilities.

Medicaid provides federal financial assistance to states enacting government-approved medical assistance plans. In 1999, more than 15% of national health care expenditures were spent on Medicaid.\(^2\) In 1998, 10% of all people younger than 65 years were insured through Medicaid.\(^2\) Therefore, 40.4 million American people younger than 65 years are insured through Medicaid, including 11 million people with disabilities.\(^4\) Patients with disabilities account for a disproportionate amount of the total program expenditures. Disabled recipients of Medicaid constitute only 17.3% of all enrollees, but consume 39.4% of total Medicaid expenditures.\(^5\) Nondisabled recipients of Medicaid qualify by having a low income and being younger than 19 years, blind, or a parent. Payments for...
services for disabled patients exceed those for nondisabled enrollees secondary to the increased cost of physicians’ services, prescription drugs, and inpatient and outpatient care.

Despite the significant proportion of Medicaid dollars allocated to those with disabilities, the definition of disability under the Social Security Act is highly restrictive; it limits coverage to those persons who are essentially incapacitated. Therefore, children and adults with mild-to-moderate disabilities must meet other criteria for enrollment, such as poverty or qualification for welfare. Patients with serious conditions that could be disabling in the absence of medical care are excluded from coverage.

As stringent as the eligibility requirements are for those with disabilities to receive Medicaid funding, once enrolled, recipients are unlikely to leave the system. In 2001, only 7% of all medically disabled Medicaid recipients in the state of Washington became employed and were able to transition from Medicaid funding. This speaks further to the marked life improvement patients experience after undergoing gastric bypass because 37% of our patients were able to return to the workforce and no longer required Medicaid. Furthermore, successfully maintained weight loss leads to decreased long-term health care costs to society as a whole. The cost of obesity is estimated to be about $140 billion per year, which constitutes 17% of total health care costs. Several studies have concluded that surgery for morbid obesity is cost-effective. However, recent studies have identified weaknesses in cost analysis studies of bariatric surgery and have concluded that there is a paucity of good data addressing this question. For example, Encinosa et al at the Agency for Healthcare Research and Quality reported that nearly 40% of patients undergoing bariatric surgery had complications requiring health care services in the 180 days after surgery. These and other authors suggested that health care utilization costs are higher than previously acknowledged. Given the small size of our study and the complexities of cost analysis, we do not believe it is appropriate for us to make conclusions about the cost-effectiveness of bariatric surgery in our patient population. However, our study supports the conclusion that successful long-term weight loss leads to improved employability.

This improved employability is further supported by studies examining biases that have a negative effect on the availability of opportunities to the morbidly obese. Obese individuals with simulated resumes and interviews were rated as less qualified for jobs, viewed as having poorer work habits and increased interpersonal problems, and seen as being more emotional than their normal-weight controls. In addition, children as young as 6 years are victims of prejudice against obesity, and discrimination against the obese has been documented in educational and work settings. Discrimination is also demonstrated by health care professionals toward their obese patients. We are unable to determine the relative importance of these factors in our patients’ ability to return to work.

Patients are able to overcome this discrimination by sustaining long-term weight loss after RYGB, which leads to overall improved quality of life. Improvement in patients’ quality of life is suggested not only in their ability to return to the workforce and by the abatement of Medicaid requirements but also by improvements in objective measurements of HRQOL. The field of medical outcomes research evaluates the efficacy, cost-effectiveness, and net benefit of therapeutic strategies to determine whether they are justified. The effects of treatments on quality of life from the perspective of the patient are emphasized. Quality of life is determined by measurement of physical, psychological, social, and economic well-being. The primary goal of health care for these patients with chronic conditions or disabilities is to maximize function and to achieve the highest level of well-being.

Numerous studies have consistently shown that obesity affects important aspects of HRQOL such as physical health, emotional well-being, and psychosocial functioning; gastric bypass results in a dramatic improvement in HRQOL. We obtained preoperative SF-36 forms in all patients but were able to collect postoperative forms in only 17 (45%) of our surgical patients. Recognizing that this decreases the validity of our conclusions, we found that HRQOL improved after surgery, with statistically significant improvements in 6 of 8 domains of the SF-36. Scores in the domains of vitality and general health approached normal. Social functioning improved markedly. However, with a mean follow-up of nearly 3 years, our patients still had scores well below national norms in most domains. With regard to the focus of our study, return to work, one would predict that the RP and RE domains would best correlate with outcome. The preoperative scores in these domains were very low, more than 3 SDs below the norm. After surgery, scores in the RP and RE domains were still well below national norms, consistent with only about one-third of our patients returning to work.

CONCLUSIONS

Morbid obesity is a chronic disease that often results in disability. This contributes to obese patients’ inability to work, dependency on Medicaid, and general dissatisfaction with their overall health status. Roux-en-Y gastric bypass has been shown to be not only an effective means of weight loss in the morbidly obese but also an effective means of reversing obesity-related comorbid conditions. We have shown that RYGB enables medically disabled, Medicaid-funded morbidly obese patients to resume work and to transition from Medicaid coverage.

Our study suggests that the degree of reduction in obesity-related comorbidities may predict which surgical patients are most likely to return to work. Patients without obesity-related comorbidities tended not to return to work after surgically induced weight loss, whereas those with several preoperative reversible comorbidities were more likely to return to work. On the other hand, patients in our series with more than 6 comorbidities did not return to work, suggesting that this subset of patients is perhaps too severely disabled to benefit from rehabilitation.

Health-related quality of life is extremely low in morbidly obese patients when they present to the surgeon. Although HRQOL improved after surgery, the changes were not as great as reported in some other series and did not...
approach national norms in most domains of the SF-36.\textsuperscript{60} The practical implication of these findings is that the presence of reversible obesity-related comorbidities may be an appropriate prerequisite for approval of bariatric surgery in this population. Surgical treatment of morbid obesity has a profound effect on patients’ quality of life as evidenced by the sustained long-term weight loss, reversal of comorbidities, improved rating of quality of life, and the patients’ ability to return to the workforce.

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Author Contributions: The authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Thirlby. Acquisition of data: Wagner and Fabry. Analysis and interpretation of data: Wagner and Thirlby. Drafting of the manuscript: Wagner, Fabry, and Thirlby. Critical revision of the manuscript for important intellectual content: Wagner and Thirlby. Statistical analysis: Wagner. Administrative, technical, and material support: Wagner and Thirlby. Study supervision: Financial Disclosure: None reported.

REFERENCES