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Attitudes About the Safety and Efficacy of Bariatric Surgery among Patients with Type 2 Diabetes and a Body Mass Index of 30-40 kg/m²

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Abstract

Background—Despite increasing awareness within the medical community about the benefits of bariatric surgery for type 2 diabetes, little is known about patients' attitudes towards bariatric surgery as a treatment for type 2 diabetes.

Objective—To investigate the attitudes of individuals with type 2 diabetes and a body mass index (BMI) of 30-40 kg/m² concerning bariatric surgery for the treatment of type 2 diabetes.

Setting—Patients of physicians in a university based health system.

Methods—Patients identified from the Pennsylvania Integrated Clinical and Administrative Research Database (PICARD) were surveyed about perceptions of the safety and efficacy of bariatric surgery as a treatment for obesity and type 2 diabetes, and their willingness to be randomized to a surgical procedure.

Results—One-hundred and thirty of 513 (25.3%) individuals responded. Respondents had a median (interquartile range) age of 58.0 (51.0, 63.0) years and self-reported BMI of 32.9 (30.9, 35.2) kg/m². Roughly half (66/130) were female. Overall, only 20.3% of respondents had positive views of bariatric surgery, with few reporting that it is a safe (14.3%) and effective (28.5%) treatment for type 2 diabetes. Less than 20% of respondents were willing to be randomized to a surgical procedure for the treatment of diabetes (16.1%) or obesity (17.5%).

Conclusions—Few obese individuals with type 2 diabetes who responded to the survey had positive views about bariatric surgery. Patients' concerns about safety and efficacy must be

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addressed to improve the acceptability of bariatric surgery as well as the feasibility of randomized controlled trials of bariatric surgery for these individuals.

Keywords

type 2 diabetes; patients' attitudes

Introduction

The health and livelihood of millions of Americans are affected by obesity and type 2 diabetes. Obesity afflicts 35.9% of U.S. adults,⁽¹⁾ and approximately 13% of adults have diabetes, with 90-95% having type 2 diabetes.⁽²⁾ Bariatric surgery is the most effective treatment for producing both sizable and durable weight losses (typically over 15% of initial body weight). These weight losses typically are associated with significant remission of type 2 diabetes.⁽³⁾ The Roux-en-Y gastric bypass (RYGB) and laparoscopic adjustable gastric banding (LAGB) procedures induce type 2 diabetes remission rates of up to 80% and 57%, respectively.^(4,5) Despite these impressive outcomes, in any given year, as few as 0.6% of those who meet current criteria for bariatric surgery undergo a bariatric surgical procedure.^(6,7)

Previous studies suggest that the reasons for this disparity between those who would benefit from bariatric surgery and those who undergo a bariatric surgical procedure include varied insurance coverage and a lack of knowledge about the surgeries.⁽⁸⁻¹⁰⁾ Our recent survey study of physicians' attitudes about referring their type 2 diabetes patients for bariatric surgery showed that physicians who treat type 2 diabetes patients had generally favorable impressions about bariatric surgery as a treatment for obesity and type 2 diabetes.⁽¹¹⁾ However, only a minority were willing to refer their type 2 diabetic patients with a body mass index (BMI) of 30-34.9 kg/m² to a randomized research trial of bariatric surgery.⁽¹¹⁾

While National Institutes of Health recommendations for bariatric surgery have not typically included those with a BMI of 30-34.9 kg/m², recent research and clinical advances make it important to study the beliefs of patients with type 2 diabetes and a BMI of 30-40 kg/m². At present, little is known about the attitudes of patients with type 2 diabetes and a BMI of 30-40 kg/m² regarding the safety and efficacy of bariatric surgery. To address this knowledge gap, and build on our survey of physicians, we undertook the present study to obtain information on patients' perceptions of the safety and efficacy of bariatric surgery, as well as their willingness to participate in randomized research trials that evaluate different interventions for obesity and type 2 diabetes.

Methods

Five-hundred thirteen individuals, 18-65 years of age, with type 2 diabetes and a BMI of 30-40 kg/m² were identified from the Pennsylvania Integrated Clinical and Administrative Research Database (PICARD), a database containing patient demographics, participating physicians, and diagnoses assigned during encounters.

Survey Design

The authors developed a survey for this study (Appendix A). Content validity was assessed by a primary care practitioner and an endocrinologist. The survey contained 40 questions in which patients with type 2 diabetes were asked to rate their impressions of bariatric surgery (i.e., RYGB and LAGB) and the likelihood that they would accept it as a treatment option for obesity and/or type 2 diabetes. Participants responded using 6-point Likert scales (e.g., 1 = very positive; 5 = very negative, 6 = no opinion). To simplify the analysis, Likert scales

were collapsed into 3 categories: positive, neutral, and negative (e.g., very positive (1) and positive (2), neutral (3) and no opinion (6), and negative (4) and very negative (5) were combined). Patients were also asked to identify: (i) perceived safety and effectiveness of current treatments for obesity and type 2 diabetes; (ii) willingness to participate in randomized research studies of various obesity and type 2 diabetes interventions; (iii) perceived likelihood of severe health problems and death as a result of obesity and type 2 diabetes interventions; and (iv) belief that RYGB, LAGB, weight loss medications, and diet and exercise would improve diabetes. Demographic data also were collected, including age, gender, race, BMI, education level, and marital status.

Survey Administration

Patients identified through the PICARD database were mailed the survey. Each survey recipient had been contacted previously via US mail as part of recruitment efforts for the randomized controlled clinical trial of the safety and efficacy of bariatric surgery. A pre-paid return envelope was enclosed, along with two \$1 bills as incentive to complete and return the survey. Surveys were completed anonymously and contained no personally identifiable information.

Statistical Analysis

Summary statistics (i.e., frequencies, means, standard deviations, medians, and interquartile ranges) for all variables were examined to assess integrity of survey responses. Frequencies, means, and standard deviations were reported for categorical and continuous variables. For all analyses, an alpha (α) level of 5% was established as statistically significant ($p < 0.05$). Chi-squared or Fisher's exact and analysis of variance (ANOVA) or Kruskal Wallis tests were used to determine statistical differences in responses between gender, BMI, age, racial groups, and education. Statistical tests were conducted using common statistical software (Statistical Package for the Social Sciences, SPSS, version 16.0, Chicago, IL; Statistical Analysis System, SAS, version 9.2, Cary, NC).

Results

Among the 513 survey recipients, 130 (25.3%) completed and returned the survey. There were no significant differences in gender, age or race between the survey responders and non-responders. However, a statistically significant difference was found between recipients and responders ($p < 0.0001$) across BMI categories, with 175/473 (37.0%) of non-responders and 25/128 (19.5%) of responders having a BMI of 35-39.9 kg/m².

Table 1 summarizes the demographic characteristics of the respondents. Fifty-eight (46.8%) were male and 66 were female (53.2%). Most were white (46.0%) or black (47.6%) and reported some college education (22%), a bachelor's degree (17%), or graduate or professional degrees (27%). The median (interquartile range) age was 58.0 (51.0, 63.0) years. The median (interquartile range) self-reported BMI was 32.9 (30.9, 35.2) kg/m².

Patients' Impressions of Bariatric Surgery as a Treatment for Obesity

Table 2 summarizes patient responses to survey questions on specific views of bariatric surgery (e.g., impressions, safety, and efficacy). Generally, a minority of respondents had favorable impressions of bariatric surgery, with 20.3% reporting "very positive" or "positive", 29.7% reporting "neutral" or "no opinion", and 50.0% reporting "negative" or "very negative" impressions. Similarly, a minority of respondents surveyed believed that bariatric surgery is safe for weight loss, with 14.5% considering it "very safe" or "safe", 46.8% reporting "neutral" or "no opinion", and 38.7% indicating it was "unsafe" or "very unsafe". Beliefs on the effectiveness of bariatric surgery for treating obesity were mixed.

Approximately one-third of respondents (34.7%) considered bariatric surgery “very effective” or “effective” at treating obesity, 55.6% reported being “neutral” or having “no opinion”, and 9.7% considered it “ineffective” or “very ineffective”.

Significant statistical differences were found between women and men ($p = 0.01$). Just less than 30% of women (19/64, 29.7%) and 8.5% (5/59) of men reported “positive” or “very positive” impression of bariatric surgery; 26.6% (17/64) of women and 32.2% (19/59) of men reported “neutral” or “no opinion”; and 43.8% (28/64) of women and 59.3% (35/59) of men reported “negative” or “very negative” impressions of bariatric surgery.

Table 3 summarizes responses to questions on perceived likelihood of complications (e.g., pneumonia, venous thrombosis, infection, staple leaks, ulcers, and hernia) and death from bariatric surgery. Two-thirds of respondents reported that they perceived the likelihood of complications from gastric bypass and banding surgeries to be either “moderate” or “high” (66.5%, 159/239). Similarly, most respondents perceived the likelihood of death from gastric bypass and banding surgeries to be either “moderate” or “high” (56.7%, 136/240).

Patients’ Impressions of Bariatric Surgery as a Treatment for Type 2 Diabetes

As shown in Table 2, respondents reported similar impressions of bariatric surgery as a treatment for type 2 diabetes. A minority indicated that they believed that bariatric surgery is a safe treatment for type 2 diabetes. Approximately 15% (14.3%) reported it “very safe” or “safe”, 49.2% indicated that they had “neutral” or “no opinion”, and 36.5% considered surgery “unsafe” or “very unsafe”. Beliefs on the effectiveness of bariatric surgery for treating type 2 diabetes were mixed with 28.5% reporting surgery to be “very effective” or “effective”, 63.4% reporting “neutral” or “no opinion”, and 8.1% reporting “ineffective” or “very ineffective”. No statistically significant differences in responses were found regarding safety, efficacy, and overall impressions of bariatric surgery between those who used insulin or other injections for diabetes either currently, in the past, or never. Similarly, no statistically significant differences in responses were found regarding safety, efficacy, and overall impressions of bariatric surgery between those who had coverage for both procedures and those who did not, or did not know about their coverage status.

A large proportion of respondents reported that they were “neutral” or had “no opinion” about how well gastric bypass (45.2%) or gastric banding (46.6%) would improve type 2 diabetes. A similar proportion of respondents reported that gastric bypass (45.2%) and gastric banding (43.1%) would improve type 2 diabetes “slightly” to “very well” (see Table 2).

Willingness of Patients with Type 2 Diabetes to Participate in Randomized Controlled Trials of Bariatric Surgery

A minority of those surveyed reported a willingness to participate in a randomized research study of bariatric surgery as an obesity treatment. Less than 20% of respondents (17.5%) indicated that they were “very willing” or “willing” to be in such a study; 20.2% reporting “neutral” or “no opinion”, and 62.3% reporting “unwilling” or “very unwilling”. Similarly, a minority reported a willingness to participate in a randomized research study of bariatric surgery as a type 2 diabetes treatment, with 16.1% reporting “very willing” or “willing”, 20.3% reporting “neutral” or “no opinion”, and 63.6% reporting “unwilling” or “very unwilling”.

This willingness to be randomized to a surgical procedure for type 2 diabetes treatment differed between gender ($p = 0.04$), with 23.7% (14/59) of females and 8.8% (5/57) of males reporting “very willing” or “willing”. This gender difference came in spite of beliefs that were not statistically different between gender about diabetes improvement with gastric

bypass ($p = 0.18$) and banding ($p = 0.30$) surgeries, with 50.8% (30/59) of females and 40.0% (22/55) of males reporting belief in significant diabetes improvement with gastric bypass, and 48.3% (29/60) of females and 38.2% (21/55) of males reporting belief in significant diabetes improvement with gastric banding.

Discussion

Overall, individuals with a BMI of 30-40 kg/m² and type 2 diabetes have negative impressions of bariatric surgery as treatments for both obesity and type 2 diabetes. Most thought that bariatric surgery complications, and death from the procedures, were likely. These findings did not differ by age, race, or education level, but did differ by gender with men having less favorable impressions. Thus, patients' attitudes toward bariatric surgery, in general, appear to be a significant barrier to surgery for individuals with BMIs of 30-40 kg/m².

These findings contrast with willingness to risk complications or death from weight loss intervention as found by Wee and colleagues. In that study, patients were willing to accept a high mortality risk (5%) to undergo bariatric surgery. However, persons in that investigation were significantly heavier (mean BMI of 47 kg/m²) and may have had greater health impairments than those with a BMI of 30-40 kg/m².⁽¹²⁾

These findings also contrast with a more recent survey study done by our group and which found that the physicians of the patients surveyed here held more positive attitudes towards bariatric surgery.⁽¹¹⁾ In that survey, we found that the physicians who treat these patients had favorable impressions about bariatric surgery as a treatment for both obesity and type 2 diabetes (79.6% and 67.4%, respectively).⁽¹¹⁾ Most physicians (79.4%) reported that they had recommended bariatric surgery as a treatment for obesity and most indicated that significant diabetes improvements among obese patients would be likely with gastric bypass (97.1%), gastric banding (82.9%), or sleeve gastrectomy (62.7%).⁽¹¹⁾ Thus, it appears that these physicians see the potential value of bariatric surgery, particularly the gastric bypass procedure. However, despite knowledge and favorable impressions about the potential benefits of the surgical procedures for their type 2 diabetes patients, the physicians appeared reluctant to refer their patients with lower BMIs to bariatric surgery research studies.

The generally unfavorable responses that were seen in the present study reflect a disconnection between people with type 2 diabetes and both the physicians who treat them and the medical community at large. In 2009, the American Diabetes Association (ADA) acknowledged that bariatric surgery should be considered in select patients with diabetes. While the ADA fell short of endorsing bariatric surgery as a treatment option, the International Diabetes Federation (IDF) recently released guidelines that include bariatric surgery in the treatment paradigm for obese individuals with type 2 diabetes.⁽¹³⁾ The American Association of Clinical Endocrinologists, The Obesity Society, and the American Society for Metabolic and Bariatric Surgery jointly released clinical practice guidelines on the management of patients after bariatric surgery (which are currently being revised).⁽⁶⁾ These and other efforts support the greater recognition among medical societies and professionals about the safety and efficacy of bariatric surgery. Unfortunately, the present results suggest that the "trickle-down" of information from physicians to patients regarding bariatric surgery as a safe and effective treatment option for certain individuals with type 2 diabetes has been slow. These findings suggest that further efforts to increasing patient awareness and knowledge about the management of type 2 diabetes with bariatric surgery may be necessary.

This need for increased patient awareness of bariatric surgery as a safe and effective treatment option for certain individuals with type 2 diabetes corresponds with other recent findings.⁽⁸⁾ As reported by Afonso and colleagues, greater than 50% of patients surveyed were simply not interested in bariatric surgery (these patients had a BMI ≥ 35 kg/m²) and only 30% considered themselves to be morbidly obese. Patients, particularly in the 30-40 kg/m² BMI range may not recognize that they are obese and therefore may not consider surgery necessary.⁽⁸⁾ This is consistent with previous work, done by Anderson and Wadden, which found that physicians are more likely to raise the issue of obesity and treatment with higher BMI patients.⁽¹⁴⁾

Patients in the present study were also unenthusiastic about their willingness to participate in randomized research studies for the treatment of type 2 diabetes. This was particularly clear for patients with BMIs between 30-35 kg/m², which is the main focus of several ongoing clinical trials as well as lobbying efforts of professional societies. The reluctance of these patients to consider bariatric surgery as a type 2 diabetes treatment represents an important barrier to the successful completion of studies of the efficacy of bariatric surgery for this subgroup of patients.

The primary limitation of this study was the low response rate (25.3%). Those who responded may have been biased towards more unfavorable views of bariatric surgery compared to all survey recipients. This interpretation is supported by the observation that a smaller percentage of respondents than non-respondents were in the 35-39.9 kg/m² BMI range. We received most of our responses before the Food and Drug Administration (FDA) expanded its approval for the LAP-BAND® to those with a lower BMI.⁽¹⁵⁾ It is possible that media coverage of the decision, and the FDA decision itself, may have influenced attitudes toward surgery. Thus, it is possible that the results do not represent the current beliefs of patients with type 2 diabetes. The demographics of this study population are also different from those who ordinarily seek weight loss surgery, which underscores clinical observations that some groups of individuals may be more likely to self-select for weight loss surgery. The decision to seek surgery is likely influenced by a number of variables, including knowledge of obesity and weight loss treatments, cultural acceptability of obesity in certain groups of individuals, and insurance coverage or affordability of surgery. Furthermore, the study did not include patient attitudes about the vertical sleeve gastrectomy, which is being performed more commonly. Understanding patient perceptions toward this procedure will be important for future research. A strength of this study is that respondents were the patients of physicians who treat type 2 diabetes, which makes this study unique to previous studies.

Conclusion

In summary, this study provides novel information on patients' attitudes toward bariatric surgery as treatment for type 2 diabetes. While our previous study suggested that the majority of physicians who treat type 2 diabetes patients appear to be reasonably well informed about the potential benefits to the surgical procedures, their patients with BMIs of 30-40 kg/m² appear to be less well informed about the safety and efficacy of bariatric surgery as a type 2 diabetes treatment. This study suggests that there is a tremendous amount of work needed to educate patients about the safety and efficacy of bariatric surgery as a treatment for obesity and type 2 diabetes and that improving patient education and awareness of bariatric surgery (e.g., by primary care physicians and endocrinologists) as a treatment for these diseases may improve its acceptability.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Demographic characteristics of survey respondents.

Characteristics	N = 130	
Age (years)	58 (51.0, 63.0)	
Gender (%) (n = 124)	Male	58 (46.8%)
	Female	66 (53.2%)
Race/ethnicity (%) (n = 124)	White	57 (46.0%)
	Black	59 (47.6%)
	Latino	4 (3.2%)
	Asian	4 (3.2%)
Body mass index (kg/m ²)	32.9 (30.9, 35.2)	

Values are reported as medians (interquartile range) or n (%).

Table 2
Patient responses to survey questions regarding bariatric surgery as a treatment method for obesity and type 2 diabetes.

Question	N = 130 n	Likert Scale (1 - 5)	Percent of Likert Scale Values								
			1	2	3*	4	5	1 & 2	3 & 6	4 & 5	
Obesity Treatments											
Positive impression of weight loss surgery (in general, as a weight loss method) ^a	26	Very positive ...	Very negative	7.8	12.5	29.7	25.0	25.0	20.3	29.7	50.0
Perception that bariatric surgery is safe for weight loss	18	Very safe ...	Very unsafe	2.4	12.1	46.8	23.4	15.3	14.5	46.8	38.7
Perception that bariatric surgery is effective for treating obesity ^d	43	Very effective ...	Very ineffective	13.7	21.0	55.6	4.0	5.6	34.7	55.6	9.7
Willingness to be randomized to a surgical procedure for treatment of obesity	20	Very willing ...	Very unwilling	6.1	11.4	20.2	25.4	36.8	17.5	20.2	62.3
Type 2 Diabetes Treatments											
Perception that bariatric surgery is safe for type 2 diabetes treatment	18	Very safe ...	Very unsafe	2.4	11.9	49.2	21.4	15.1	14.3	49.2	36.5
Perception that bariatric surgery is effective for treating type 2 diabetes	35	Very effective ...	Very ineffective	15.4	13.0	63.4	4.1	4.1	28.5	63.4	8.1
Belief that the following treatments would improve diabetes well:											
Gastric bypass surgery ^e	52	Very poorly ...	Very well	6.1	3.5	45.2	15.7	29.6	9.6	45.2	45.2
Lap Band® surgery ^e	50	Very poorly ...	Very well	6.0	4.3	46.6	14.7	28.4	10.3	46.6	43.1
Weight loss medications	61	Very poorly ...	Very well	3.4	4.3	40.2	28.2	23.9	7.7	40.2	52.1
Diet and exercise	105	Very poorly ...	Very well	0.8	1.6	12.2	16.3	69.1	2.4	12.2	85.4
Willing to be randomized to a surgical procedure for treatment of type 2 diabetes ^a	19	Very willing ...	Very unwilling	8.5	7.6	20.3	27.1	36.4	16.1	20.3	63.6

^a Chi-squared, Fisher's exact, analysis of variance (ANOVA), or Kruskal Wallis tests were used to determine statistically significant ($p < 0.05$) differences between gender (male/female),

^b body mass index (BMI) (< 35 , 35 kg/m^2),

^c age,

^d racial groups (white/non-white),

^e and education (high school diploma or less, some college or an associates degree, 4-year college degree, graduate or professional degree).

* Likert scale values were combined to simplify analysis. For example, "very positive" and "positive" (1 and 2 on the Likert Scale) responses were combined; "negative" and "very negative" (4 and 5 on the Likert Scale) responses were combined; neutral and no opinion (3 and 6 on the Likert Scale) were also combined in this analysis.

Table 3
Patient responses to survey questions regarding likelihood of complications and death from weight loss methods.

Question	N = 130					n	Likelihood of complications (not death) for:							
	1	2	3	4	5		None	Low	Moder.	High	No Opin.	None/Low	Mod/High	No Opin.
Gastric bypass surgery						84	2.5	14.2	27.5	42.5	13.3	16.7	70.0	13.3
Lap Band® surgery						75	2.5	17.6	31.1	31.9	16.8	20.2	63.0	16.8
Weight loss medications ^{a,d}						52	7.5	36.7	30.8	12.5	12.5	44.2	43.3	12.5
Diet and exercise ^d						7	44.2	41.7	3.3	2.5	8.3	85.8	5.8	8.3
Likelihood of death (as a complication) for:														
Gastric bypass surgery ^a						75	2.5	22.1	32.0	29.5	13.9	24.6	61.5	13.9
Lap Band® surgery						61	2.5	28.8	29.7	22.0	16.9	31.4	51.7	16.9
Weight loss medications ^e						35	9.4	46.2	23.9	6.0	14.5	55.6	29.9	14.5
Diet and exercise						5	54.2	32.2	3.4	0.8	9.3	86.4	4.2	9.3

^a Chi-squared, Fisher's exact, analysis of variance (ANOVA), or Kruskal Wallis tests were used to determine statistically significant ($p < 0.05$) differences between gender (male/female),

^b body mass index (BMI) (< 35 , 35 kg/m²),

^c age,

^d racial groups (white/non-white),

^e and education (high school diploma or less, some college or an associates degree, 4-year college degree, graduate or professional degree).

Likert scale values were combined to simplify analysis. "None" and "low" (1 and 2 on the Likert Scale) responses were combined; "moderate" and "high" (3 and 4 on the Likert Scale) responses were combined.