Surgical Endoscopy (2021) 35:1579–1583
https://doi.org/10.1007/s00464-020-07535-2

Travel distance reduces follow-up compliance but has no effect on long-term weight loss success in bariatric patients

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Received: 30 September 2019 / Accepted: 31 March 2020 / Published online: 15 April 2020

Abstract

Background Patients seeking bariatric surgery are traveling longer distances to reach Bariatric Centers. The purpose of this study was to evaluate the impact of travel distance on adherence to follow-up and outcomes after bariatric surgery.

Methods A retrospective review of all consecutive patients who had undergone bariatric surgery from June 2013 to May 2014 was performed, and the patients were divided into two groups: those who traveled 50 miles or less and those who traveled more than 50 miles. Primary outcome assessed was the influence of distance on post-operative follow-up attrition over 4-year period. Secondary outcomes assessed were excess weight loss, length of stay (LOS), complications and readmission rates.

Results A total of 228 patients underwent bariatric surgery with 4 years of follow-up available. Of these, 145 patients traveled 50 miles or less and 83 patients traveled greater than 50 miles. Patient demographics were similar between the two groups. Those who traveled more had statistically higher probability of attrition up to 3-year follow-up mark. There was no difference in percent excess weight loss at each follow-up visit between the two cohorts. Furthermore, there was no difference in readmission rates (2% vs 5%), minor complications (14% vs 10%), major complications (3% vs 2%) and LOS (2.6 days vs 2.6).

Conclusion The distance patients traveled for bariatric surgery did not affect their weight loss success, length of stay, post-surgical complications or readmission rate. Despite the lack of influence on postoperative outcomes, follow-up compliance was statistically affected by distance.

Keywords Bariatric surgery · Follow-up · Travel distance

As more patients seek weight loss surgery, they are often faced with greater travel distances to high volume centers. The American Society for Metabolic and Bariatric Surgery (ASMBS) formed a joint task force with American College of Surgeons (ACS) and Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) that strongly recommended all facilities in which a surgeon performs bariatric surgery participate in multidisciplinary comprehensive care to receive accreditation from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) [1].

Given that MBSAQIP accredited centers (MAC) concentrate on patient education and coordinated care in accordance with mandatory reporting of clinical outcomes and quality improvement, it comes as little surprise the program has contributed to improved complication and reoperation rates [2, 3]. Patients are better served at MAC given findings of decreased perioperative morbidity and mortality after implementation of accreditation and between accredited versus unaccredited hospitals [3]. Tertiary referral centers' catchment areas can span a wide region and require patients to travel long distances to receive care [4] with one study showing that Medicare patients travel increased by 76% after Medicare and Medicaid required that bariatric procedures be performed at specialized centers [5].

Despite the significant change in distance, very few studies have looked at its effects on the obese population seeking bariatric surgery. Some have illustrated that shorter travel distance has been associated with higher level of attendance [6, 7] while other studies showed conflicting results where compliance was not correlated to distance [8, 9]. Only

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one paper has described travel distance effects on long-term outcomes after Roux-en-Y gastric bypass [4] and none have looked at patients who underwent sleeve gastrectomy.

The purpose of this study was to evaluate the impact of travel distance on adherence to follow-up and long-term outcomes after bariatric surgery.

Materials and methods

After Institutional Review Board approval, a retrospective review of all consecutive patients who had undergone bariatric surgery from June 1, 2013 to May 30, 2014 was performed. Patient information was obtained from a prospectively kept bariatric database and an electronic chart review was performed to obtain data for patients lost to follow-up. Patients primarily underwent Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) and Laparoscopic Sleeve Gastrectomy (LSG) by 4 minimally invasive trained surgeons. All patients were treated at a MBSAQIP accredited center (MAC) where they underwent a standardized preoperative education program with a multidisciplinary team including surgeon, advance practice provider, dietitian, and psychologist. Our MAC is a large tertiary referral center serving a variety of patients from the entire state with different socioeconomic background. We are part of a large academic healthcare system with access to electronic medical records of all institutions within our network.

Google Maps was used to calculate the distance in miles between patient's home and the hospital/clinic by road (Google Inc., Mountain View, CA, USA). The travel distance was then used to divide the patients into two cohorts: those within 50 miles of the hospital and those who lived greater than 50 miles away. Fifty miles roughly correlates to an hour drive, however, we chose to use miles as oppose to time given that it is a constant value and not affected by traffic and time of day.

Post-operative follow-up visits are required at 1–2 week, 6 weeks, 3, 6, 12, 18, and 24 months and then annually. A patient was considered noncompliant with a follow-up visit if he or she did not keep an appointment within 1 month of the scheduled date. The patient was sent a certified letter for a "no show" urging the patient to contact the practice for an appointment. In addition, the patient was contacted by telephone to schedule an appointment. Patients were contacted repeatedly until two consecutive visits were missed. At follow-ups, the patients are seen by a physician assistant or surgeon along with dietician.

The primary outcome was to assess whether distance traveled affected patient follow-up attrition postoperatively. We examined this outcome using generalized estimating equation (GEE) with logit link function to predict loss to follow-up using distance traveled as the predictor after adjusting for the follow-up days at each visit. Adjusted cell means were computed using margins command post GEE for the follow-up time periods from baseline through 4 years. These adjusted cell means were then plotted using marginsplot in Stata/SE 14.2 (Fig. 1).

Secondary outcomes investigated the effect of distance on postoperative outcomes including excess weight loss over 4 years, hospital length of stay, readmission and complication rates. The weight loss outcome was obtained at the clinic visit and therefore the data collected is dependent on the patient follow-up compliance. Percent excess weight loss (%EWL) was calculated using the ideal body weight corresponding to BMI of 25. In our statistical analysis, we used Student's t test and X^2 test as appropriate to compare demographics including age, initial BMI, gender, type of surgery and type of insurance. Student's t test and Fisher's Exact Test were used to compare outcomes after bariatric surgery between our two cohorts. The level of significance was $\alpha = 0.05$, will all p values < 0.05 considered statistically significant.

Results

A total of 228 patients underwent bariatric surgery between June of 2013 and May of 2014 at our institution and up to 4 years of follow-up was available. Median travel distance for the patients was 33 miles with lowest travel distance of 5 miles and highest travel distance of 257 miles. Of these, 145 patients traveled 50 miles or less and 83 patients traveled greater than 50 miles. Patient demographics are shown in Table 1 with no baseline difference between the two groups. Specifically, there was no difference in percentage of patients who were privately or publically insured between those who traveled more or less than 50 miles.

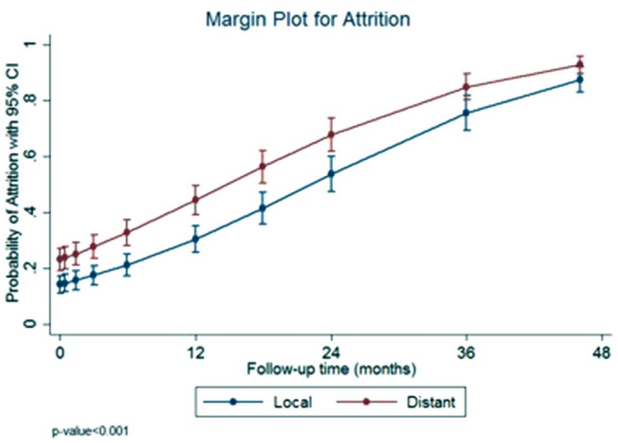

Fig. 1 Margin plot for patient's follow-up attrition in the postoperative period

Table 1 Patient demographics

Variables	Distance (miles)		*P*-value
Groups	≤ 50	> 50	
N	145 (64%)	83 (36%)	
Age, Mean ± SD	45.3 ± 11.7	46.4 ± 13.6	0.52
Female gender	118 (81%)	73 (88%)	0.19
Type of surgery			
LRYGB	92 (63%)	60 (72%)	0.17
LSG	53 (37%)	23 (28%)	
Insurance type			
Private	59 (41%)	35 (42%)	0.96
Public	67 (46%)	38 (46%)	
Employee health	19 (13%)	10 (12%)	
Initial BMI, Mean ± SD	46.8 ± 7.3	46.8 ± 7.7	0.99

BMI body mass index, *LRYGB* laparoscopic roux-en-y gastric bypass, *LSG* laparoscopic sleeve gastrectomy

Figure 1 shows the margin plot for patient attrition postoperatively. This graph predicts the probability of attrition at each visit after adjusting for number of visits and distance. Those who traveled greater than 50 miles (distant group) had statistically higher probability of attrition from baseline to 3 years compared to those who traveled 50 miles or less (local group). Post 3 years the probability of attrition was not significantly different (as the 95% CI crosses post 36 months) between local and distant groups. In addition, when analyzing the margin plot, the probability of attrition increases at similar rates for each group over time. Finally, our unadjusted overall attrition rates range from 3.5% (8/228) at 1–2 weeks to 41% (93/228) at 1 year to 82% (187/228) at 4 years.

The average %EWL for the two groups can be seen at each follow-up visit in Fig. 2. Those who travel 50 miles or less and those who travel greater than 50 miles have very similar weight loss outcomes from first week to 4 years post-surgery. Assumption for normality was assessed for the excess weight loss particularly past 18 months given high attrition. The assumption for normality was valid for the outcome variable and therefore a two-sample independent t test was sufficient.

Table 2 shows comparisons for other postoperative outcomes. Length of stay in the hospital after surgery was the same and readmission rates were not statistically different. Similarly, there was no difference in the proportion of complications between the two cohorts. Minor complications included surgical site infections, urinary tract infections and anemia requiring transfusion. Major complications included postoperative events that required surgical intervention.

We did not look at mortality outcomes as there was only one death in this cohort.

Discussion

Our study shows that those who lived locally were more likely to follow-up over the first 3 years than those who lived farther. After 3 years postoperatively, probability of follow-up compliance was not statistically different between our two cohorts. This time frame may be reflective of reasons

Table 2 Postoperative outcomes

Variables	Distance (miles)		*P*-value
Groups	≤ 50	> 50	
N	145	83	
Length of stay (d), Mean ± SD	2.6 ± 1.8	2.7 ± 2.8	0.87
30 day complication rate			
None	121 (83%)	73 (88%)	
Minor[a]	20 (14%)	8 (10%)	0.64*
Major[b]	4 (3%)	2 (2%)	
Readmission rate	7 (5%)	2 (2%)	0.49*

[a]Minor includes surgical site infection, urinary tract infection, blood loss requiring transfusion

[b]Major includes complications that required operative intervention

*Fishers exact

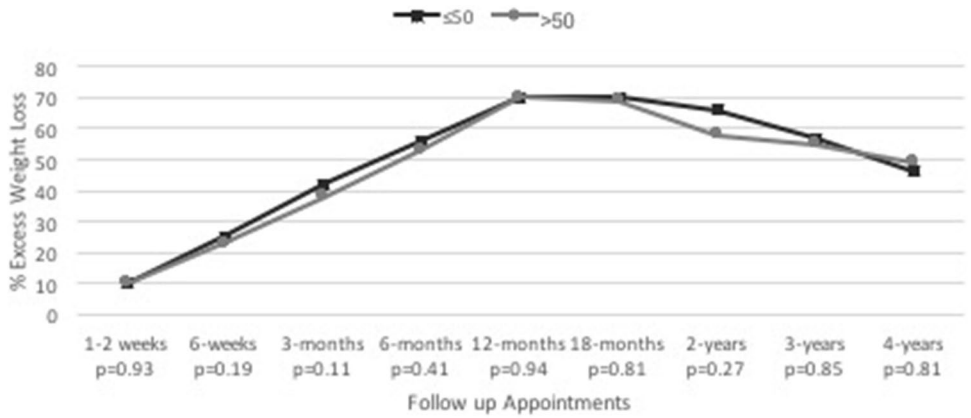

Fig. 2 Mean percentage of excess weight loss at each follow-up visit per group

patients choose to follow-up in clinic, such as new symptoms of weight regain, reflux, or hernia as oppose to an annual check-in, meaning that roughly the 20% of patients who continued to follow-up may have been more motivated. While the local group started at lower attrition and after 4 years stayed lower, the rate at which attrition increases over time is comparable to the distant group. Other factors such as insurance coverage, age, gender and preoperative BMI can influence attrition postoperatively [7]. The similar demographics between our cohorts is one possible explanation for comparable attrition trends over this time period. Finally, our institutional unadjusted attrition numbers are comparable to rates summarized in other literature by Moroshko et al. systematic review where 1 year attrition was as high as 37% [7].

Our primary outcome findings are agreeable with some studies showing a correlation with distance and follow-up compliance [6, 10]. Sivagnanam et al. looked at attendance after Laparoscopic Adjustable Gastric Banding (LAGB) with findings of decrease number of follow-up as distance increased. Much like our patient population, McVay et al. looked at patients after LRYGB showing a correlation with shorter distance and higher level of attendance at their postoperative behavioral health appointments [6].

Other studies have found that distance was not associated with retention or follow-up compliance [8, 9]. However, in the paper by Gould, when 51 patients in the less compliant groups were asked to provide a reason for not showing up to visits, 4 stated that travel distance was the issue and 2 found a bariatric program near home [8]. While no statistical test was run for these findings, 12% reported a reason related to distance. Therefore, it appears that distance is a significant contributing factor to postoperative attrition in our study and in the bariatric literature.

Despite the statistical significance seen with distance and follow-up attrition, we did not find a difference in postoperative outcomes between these two patient cohorts. Our study shows that the distance patients' travel for bariatric surgery did not affect their weight loss success up to 4 years, length of stay, postsurgical complications or readmission rate. Mehaffey et al. also looked at a large cohort of post RYGB patients and found that postoperative complications, comorbidity rates and long-term reduction of excess BMI were similar between those who had to travel less than 1 h and those who had to travel more [4]. However, they found that travel time and diabetes were the only independent predictors for worse long-term survival. We could not evaluate the association with survival given only one death among the cohort.

In contrast, some literature suggests a correlation with shorter travel distance and better weight loss. Jennings et al. found that those who had perfect attendance after RYGB surgery lived closer to their clinic and lost more weight at 1 year but no difference in rate of success of %EWL at 2 years [11]. In addition, they showed a significant negative correlation between distance from bariatric center and weight loss at 1 year which was not seen in our study. However, this study was conducted in the United Kingdom where the travel distance is already on a smaller scale than the Unites States and patients' use of public transit and access to cars is likely different than in the US. Shen et al. observed a difference in weight loss after LAGB and can expect patients who do not follow-up regularly to lose less weight. Adjustable gastric banding is no longer offered at our institution but stringent follow-up with these patients is recommended at centers that offer this procedure as weight loss can be contingent upon band adjustments [12, 13]. However, like our study, they did not see a difference in %EWL at 1 year after LRYGB between patients who followed up greater than 3 times vs 3 or less visits [12].

The results in our paper and other literature lead to the role of future telecommunication in bariatric surgery. Videoconferencing technology can be considered as a possible method of pre- and post-bariatric surgery follow-up [14, 15]. This method can fill the gap of travel distance to reduce attrition without compromising weight loss results [15]. In addition, our study shows that face-to-face visits do not necessarily correlate to improved weight loss. These articles by Sudan et al. [15] and Morrow et al. [14] are early observational studies and a large-scale prospective trial with telecommunication in bariatric surgery is warranted.

As patients' postoperative follow-up compliance is influenced by travel distance, we recommend that institutions tailor these clinic visits based on specific reasons and outcome assessments. Perhaps frequent assessments merely for weight loss after LSG and LRYGB, within the first 18 months, are not necessary or can be performed via telecommunication to reduce the burden of travel. Due to weight recidivism typically occurring around the 18 to 24-month mark [16, 17] and the high attrition rate of bariatric patients, we believe further studies are needed to evaluate the necessity of long-term follow-ups.

There are implicit limitations in studies seeking to assess clinic visit compliance, namely that a significant number of patients are lost to follow-up and so their weight loss and potential complication outcomes are unknown. For this reason, extrapolating meaning from the data compiled must be done with care, but we do recommend that institutions base each clinic visit with specific goals to decrease patient burden. Another limitation to this study was its retrospective nature with information about patients limited to manual chart review and an updated bariatric database. An interesting follow-up study would include phone interviews of patients lost to follow-up to assess for reasons patients stopped coming to clinic and their weight measurements. Furthermore, studies should be conducted to show if new technological advances have virtually decreased the

physical distance gap between bariatric surgery providers and patients.

In conclusion, while long travel distance may influence postoperative follow-up compliance, surgical outcomes are not different between those who live over an hour and those who live closer. Therefore, the necessity of each visit should be considered.

Funding There was no funding for this project.

Compliance with ethical standards

Disclosures Drs. Monfared, Selzer, Butler and Ms. Martin have no conflicts of interest or financial ties to disclose.

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