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RESEARCH BRIEF

A Comparison of Functional Recovery Outcomes Among Bariatric Surgery Patients

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ABSTRACT

INTRODUCTION. Obesity is a growing public health problem and is associated with significant morbidity and mortality risk for affected individuals. Bariatric surgery is recommended for severely obese patients when conservative treatments fail.

OBJECTIVE. The purpose of this study is to compare the surgical trends over time, complication rates, disability durations, and medical costs between the Roux-en-Y gastric bypass (RYGB), adjustable gastric band (lap-band), sleeve gastrectomy, and duodenal switch bariatric surgical procedures.

METHODS. Using a nationwide dataset of short-term disability (STD) cases linked to detailed medical claims data, we evaluated 9,301 STD cases with a primary diagnosis of morbid obesity that had one of the four surgeries evaluated in this study (n=7,908). We evaluated trends in bariatric surgery procedures through time and compared complication rates, disability duration, and medical costs between four common procedures.

RESULTS. The prevalence of RYGB and lap band procedures declined, while the prevalence of sleeve gastrectomy procedures increased over this timeframe. By surgery, the complication rates, disability durations, and medical costs ranked as follows (lowest to highest): lap-band, sleeve gastrectomy, RYGB, and duodenal switch.

CONCLUSION. The sleeve gastrectomy procedure resulted in fewer complications, faster healing times, and reduced medical costs. These trends may be driving the increasing percentage of obese patients receiving the sleeve gastrectomy procedure compared to the lap band, RYGB, or duodenal switch procedures.

INTRODUCTION

Over the past 30 years, obesity has become one of the most important public health issues in the U.S. Obesity rates have more than doubled and more than one in three adult Americans are now obese (BMI>30.0).[1,2] Obesity is the second leading cause of preventable death in the U.S., with approximately 300,000 premature deaths attributed to obesity every year.[3] Additionally, the estimated annual cost of obesity in the U.S. exceeds $140 billion USD.[4] Even the military has been affected, as almost half of Americans are too overweight to enlist.[5]

Previous research has shown that obesity is a complex disease influenced by many factors and the solution to the obesity epidemic is not straightforward. Approximately 40-70% of obese individuals have a genetic basis that influences their eating habits and metabolic rates[6]. As a result, even severe lifestyle changes do not always prompt weight loss. Some studies even suggest that only 1% of obese people ever return to normal body weight.[7] Consequently, doctors increasingly use bariatric surgery to facilitate long-term weight loss,[8] as it is the most effective long-term treatment for patients affected by severe obesity.[9]

Most bariatric surgeries work by shortening the digestive tract, thus reducing the size of the stomach and/or limiting absorption of nutrients. Further, the hormonal and metabolic changes that accompany bariatric surgery improves weight loss compared to conservative treatments. Bariatric surgery is only approved for the morbidly obese (BMI≥40.0) or those with severe obesity-related comorbidities and a BMI≥35.0.

Despite the long-term effectiveness of bariatric surgery in reducing a patient's weight, little is known about the short-term function recovery of these patients. This study will evaluate the short-term functional recovery of four common bariatric surgeries by comparing disability durations and complication rates to previously reported weight loss efficacy measures.

For more information on "Obesity" and "Gastric Bypass" topics, see MDGuidelines clinical content at www.mdguidelines.com.

STUDY DATA AND METHODS

DATA. Truven Health Analytics' MarketScan Health and Productivity Management (HPM) and Commercial Claims and Encounters (CCAE) databases were used for this study. The HPM database contains de-identified, employee level disability absence information (STD, WC, LTD), including dates of absence and the primary diagnosis for the leave. The CCAE database includes de-identified, patient-level health care utilization data from claims submitted to employer-sponsored health insurance. We used a unique identifier to connect an employees' STD and medical records.

DISABILITY CASES AND TIMEFRAME. We considered short-term disability cases with a primary diagnosis of morbid obesity (ICD-9-CM: 278.01) whose absence started on or after January 1, 2007 and ended before July 2014. To maximize the capture of medical information for each patient, we included only individuals who were continuously covered by employer-sponsored health insurance from six months before to six months after their absence (n=9,301). Cases with a concurrent worker's compensation claim were excluded. For each STD case, we identified patients that received a bariatric procedure during the "disability period", which was defined as the time between the date of surgery through the return to work date. The following four bariatric procedures were identified: Roux-en-Y gastric bypass (RYGB) (current procedural terminology® (CPT)=43644), lap-band (CPT=43770), sleeve gastrectomy CPT=43775), and duodenal switch (CPT=43845). Details on each of these procedures is provided in the Appendix.

DISABILITY DURATIONS, COMPLICATIONS, AND MEDICAL COST OUTCOMES. We calculated the disability duration as the number of calendar days during the disability period. Bariatric surgery complications defined by the American Society for Metabolic and Bariatric Surgery were identified from diagnosis codes in the CCAE database.[10] Medical costs from the CCAE database represent the total gross, eligible payments after applying pricing guidelines, such as fee schedules or discounts negotiated by health plans, but before the total payment was allocated to the health plan or employee in the form of deductibles, copayments, and coordination of benefits. All costs were adjusted for inflation and equalized to 2016 United States Dollars ($) and summed over the disability period.

ANALYSES. Chi-square tests were used to evaluate differences in the complication and prescription percentages between patients from each surgical group. All statistical tests were considered significant at a p-value threshold of 0.05. SQL Server 2012 and MS Excel 2016 were used for data management and analysis, respectively.

RESULTS

DEMOGRAPHICS. We identified 9,301 STD cases from 2007-2014 that listed morbid obesity as the primary reason for disability. 8,703 of these patients had bariatric surgery, and 7,908 had either a RYGB, lap-band, sleeve gastrectomy, or duodenal switch procedure. The vast majority (84%) of cases were women and all patients were between 18 and 65 years old with the largest percentage of cases between 36 and 45 years old (Figure 1).

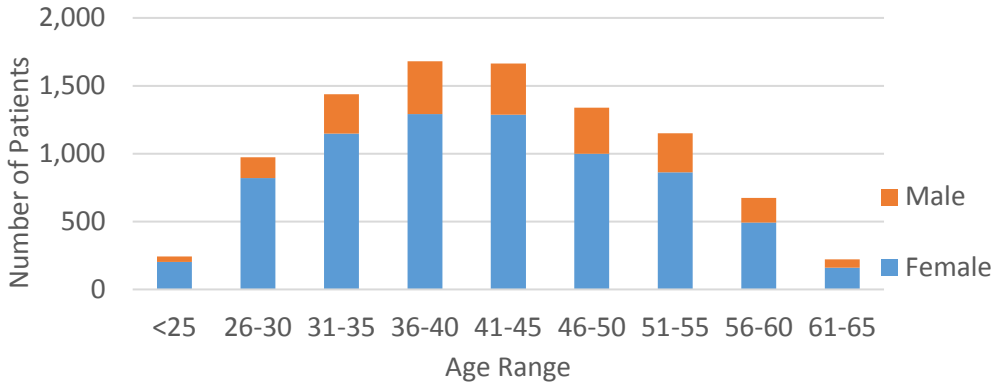

Figure 1. Distribution of bariatric surgery patients by age and gender.

FREQUENCY OF SURGICAL PROCEDURES. In total, RYGB was the most common surgery (n=3,222) followed by sleeve gastrectomy (n=2,897), lap band (n=1,629), then duodenal switch (n=60).

We evaluated the annual number of cases that underwent each bariatric surgery from 2007 to 2014 (Figure 2). We observed a steady increase in the overall number of bariatric surgery cases from 2008 to 2013; however, this was not the case for the larger U.S. population, and demonstrates that our sample is not representative of the broader U.S. population.

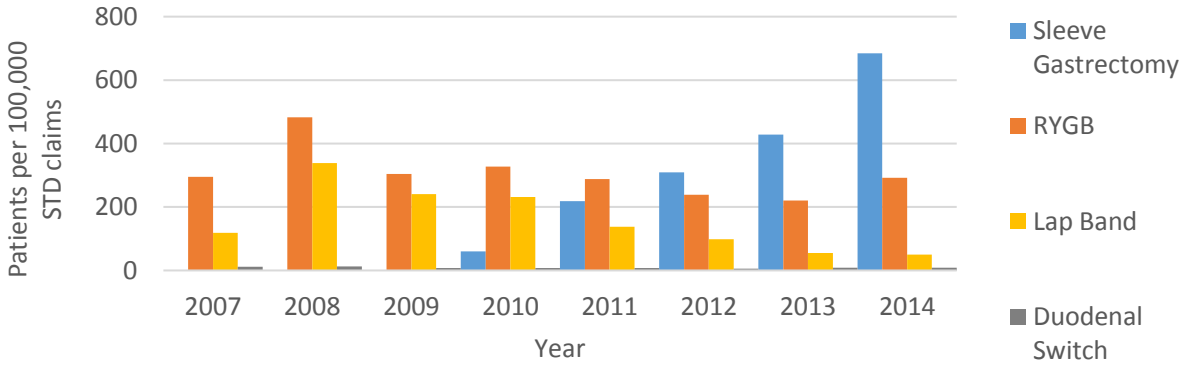

Figure 2. Distribution of bariatric surgery patients by age and gender.

To evaluate the trends in bariatric surgery through time, each surgery was plotted by percentage of total bariatric procedures per year between 2009 and 2014. Although RYGB was the most common procedure overall, the proportion of cases receiving this procedure declined consistently during the study period, from 60.5% in 2007 to 26.1% in 2015. The proportion of cases receiving a lap-band also declined consistently, from 24.4% in 2007 to 4.5% in 2014. In 2010, the first sleeve gastrectomies were performed on 8.8% of this population and the proportion of cases receiving this procedure increased consistently to 61.2% in 2014. With only 60 cases performed over the 8-year study period, the percentages of cases receiving the rare duodenal switch procedure was negligible.

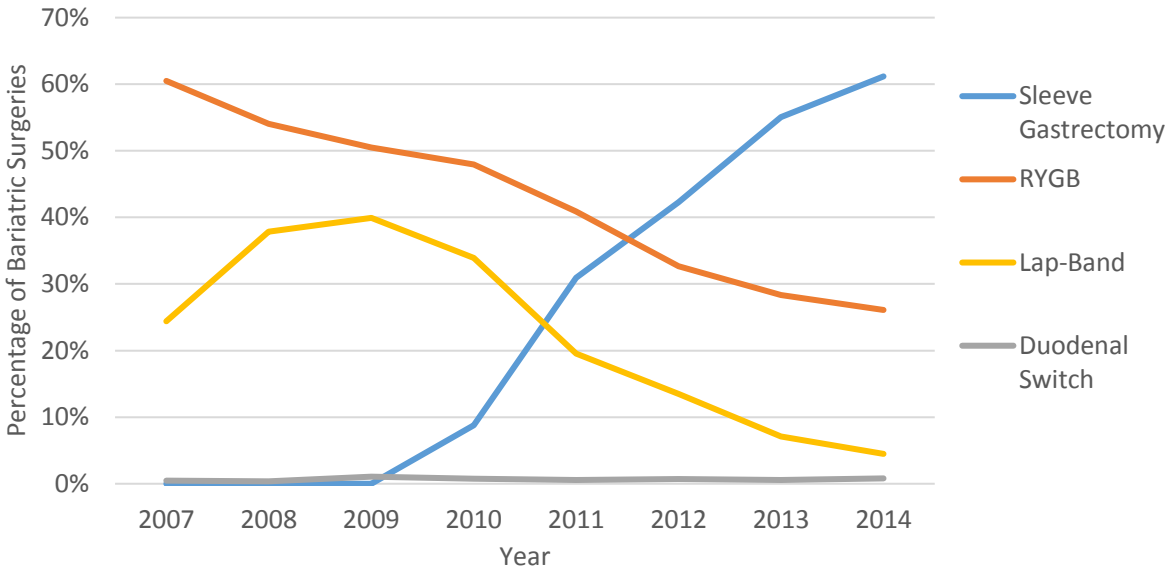

Figure 3. Percentage of bariatric surgeries by procedure over time.

DISABILITY DURATIONS AND MEDICAL COSTS. The longest median disability duration was observed for the duodenal switch procedure (42 days), followed in descending order by RYGB (34 days), sleeve gastrectomy (31 days), and lap-band (23 days) procedures (Figure 4).

Medical costs followed the same trend observed for disability durations. The most expensive median medical costs during the disability period was observed for the duodenal switch procedure (~$34,500), followed in descending order by RYGB ($28,500), sleeve gastrectomy ($27,000), and lap-band ($21,500).

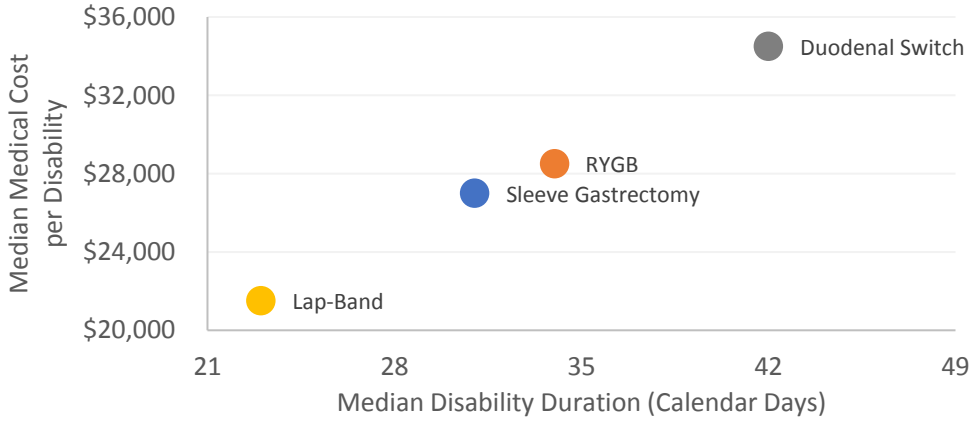

Figure 4. Comparison of median medical costs and median disability durations by surgical procedure.

SURGICAL OUTCOMES. RYGB patients experienced significantly higher complication than sleeve gastrectomy and lap-band, but not duodenal switch patients. However, the small number of duodenal switch patients limited our ability to detect a significant difference. A comparison of sleeve gastrectomy and lap-band patients demonstrated that sleeve gastrectomy patients experienced significantly higher complication rates.

DISCUSSION

We compared the short-term recovery outcomes between four common bariatric surgeries over an eight-year period regarding disability durations, medical costs, and complication rates. The shortest durations and lowest complication rates were observed among lap-band patients, followed in order from least to most complications by sleeve gastrectomy, RYGB, and duodenal switch procedures.

We found that the lap-band procedure was associated with significantly fewer complications. However, improved short-term recovery is likely due to lap-band procedures being used in patients for minor weight loss.[11]

The longest durations and highest medical costs were associated with the duodenal switch procedure. This procedure is indicated for super-morbidly obese patients since prior studies have found that it provides far superior weight loss.[14] It is likely that the higher medical costs and longer durations are a reflection of the selection bias with the sickest patients receiving the duodenal switch.

Patients undergoing the relatively new sleeve gastrectomy procedure had fewer complications, shorter disability durations, and reduced medical costs compared to RYGB patients. Previous studies have also shown that the sleeve gastrectomy and RYGB procedures result in comparable weight loss. The improved outcomes with similar effectiveness likely explains our observation that the rates of sleeve gastrectomies increased over the study period, while the rates of RYGB procedures declined.

CONCLUSION

By utilizing a large, nationwide, longitudinal sample of bariatric surgery cases with demographic and disability information as well as diagnoses and procedures for multiple components of care, our study indicates that the newer sleeve gastrectomy procedure resulted in fewer complications, faster healing times, and reduced medical costs. These trends may be driving the increasing percentage of patients receiving the sleeve gastrectomy procedure compared to the lap band, RYGB, and duodenal switch procedures. This study highlights the value of continuously evaluating the short-term complication rates and effectiveness of new bariatric surgical procedures.

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APPENDIX

Types of Bariatric Surgeries

ROUX-EN-Y GASTRIC BYPASS (RYGB). For the past few decades, the Roux-en-Y gastric bypass (RYGB), or "gastric bypass," has been the most common weight loss surgery in the world.[12] The procedure is usually conducted laparoscopically. This procedure consists of two main steps: (1) the stomach is trimmed down in size to create a small pouch; (2) the small intestine is rerouted to bypass the duodenum. This operation effectively limits both the amount of food a patient can consume and the digestive tract's ability to absorb nutrients from the food. As a result, weight loss is significant - averaging around 65% of excess body weight two years after the operation. Like most bariatric procedures, the RYGB leaves patients vulnerable to vitamin deficiencies.[13] However, because the operation severely alters the digestive tract, complications are quite common. Patients often struggle to digest food, and this can lead to dumping syndrome.[14] This is a very effective procedure, but it is far from ideal because of the severe consequences on the digestive tract.

SLEEVE GASTRECTOMY. The sleeve gastrectomy is a new and relatively simple procedure that cuts out about 75% of the stomach. Almost all sleeve gastrectomies are laparoscopic. This procedure is the fastest growing in terms of prevalence across the U.S.[15] Because most of the stomach is completely removed from the body, some hormones that contribute to hunger are eliminated. Combining this with the fact that the stomach is simply smaller after the surgery, the patient is much less hungry after the surgery, which facilitates weight loss.[16] The surgery is very effective and the average patient loses 60% of excess body weight.[17] Like most bariatric surgeries, the operation leaves patients susceptible to long-term vitamin deficiencies. Because the small intestine remains undisturbed, dumping syndrome is much less common and complications are generally less prevalent.

LAP-BAND. The lap-band, or adjustable gastric band, procedure is the least invasive of the four being investigated in this study. It involves placing an inflatable band around the upper portion of the stomach. This leaves a small pouch above the band. Both in theory and in practice, this surgery is quite uncomplicated. Patients feel much fuller after eating much less because the band prevents food from moving through the stomach as quickly. As a result, patients eat much less. This procedure is minimally invasive, so it often allows patients to leave the hospital in under one day (compared to at least two for the other procedures). The band is altered using injections of sterile saline. Because there is no cutting of the stomach, the procedure is totally reversible.[16] However, the procedure is not always effective, patients often lose less than 30% of excess body weight, and the average is 40%.[11]

BILIOPANCREATIC DIVERSION WITH DUODENAL SWITCH GASTRIC BYPASS. This is the most invasive procedure of the four. It too is performed laparoscopically, and it involves the excision of a large of the stomach as well as severe rerouting of the intestines. Roughly three-fourths of the small intestine is bypassed. This procedure is very uncommon because of its difficulty to perform and the high risks associated with it. Like the RYGB, this allows for decreased absorption of food as well as decreased consumption by limiting the stomach size. Additionally, the procedure impacts gut hormones in a way that reduces hunger in patients.[16] Although it is the most dangerous of the listed procedures, it is also the most effective especially in the super obese (BMI>=50.0) and super-super obese (BMI >=60.0).[13] In fact, the average patient loses 75% of excess body weight.[18]