



# BARIATRIC SURGERY— WHERE DO WE STAND?

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## INTRODUCTION

The management of a patient with extreme obesity is a challenging task for most health care givers. Unfortunately, there are no effective non-surgical options for treating the most severe forms of obesity. Standard non-surgical therapy for this patient population does not result in meaningful and sustained weight loss. For the illness of severe obesity, bariatric—i.e. weight loss-surgery has proven to be the most effective treatment modality.<sup>1</sup>

Although public and professional concerns over the safety of bariatric surgery have grown with the increased public demand for these procedures, recent prospective studies have demonstrated a low overall risk of death related to surgery. Other adverse outcomes vary with the degree or number of co-morbid conditions.<sup>2</sup> Patient characteristics (Table 1), the choice of surgery, and the experience of the surgeon are some of the factors that determine the safety and the outcome of bariatric surgery.<sup>3,5</sup>

Most practitioners, according to their patients, offer little or no guidance for weight management, and many physicians avoid the treatment of obesity.<sup>5,6</sup> Currently, many patients considering weight loss surgery do not discuss it with their primary care giver as a treatment option. Often, a physician learns that one of his or her patient has undergone a weight loss surgery procedure only after the fact.

## WHO IS A CANDIDATE FOR WEIGHT LOSS SURGERY?

Any patient with extreme obesity is a potential candidate for weight loss surgery and should be considered, though not all will prove suitable. Unfortunately, only 1% of eligible candidates either seek or are referred for bariatric surgery.

Contraindications to weight loss surgery include a history of cancer undergoing active treatment, a history of severe psychiatric illness or instability, alcohol or drug addiction, severe heart or lung problems, chronic steroid

Table 1

MORTALITY RISK FACTORS IN PATIENTS UNDERGOING GASTRIC BYPASS SURGERY	
Body mass index 50 kg/m <sup>2</sup> or greater	
Male gender	
Hypertension	
Known risk factors for pulmonary embolism (Previous thromboembolism, preoperative vena cava filter, hypoventilation, pulmonary hypertension)	
Age 45 years or more	
The Obesity Surgery Mortality Risk Score (OS-MRS) assigns 1 point to each of these 5 preoperative variables.	
Class A (lowest risk): total	score = 0 – 1
Class B (intermediate risk):	score = 2 – 3
Class C (high risk):	score = 4 – 5

Table 2

GUIDELINES FOR PATIENTS WHO QUALIFY FOR WEIGHT LOSS SURGERY
BMI .40 or greater
BMI 35 or greater with significant co-morbidities
Demonstrated dietary attempts at weight loss that have been ineffective
Psychologically stable who are willing to commit to long-term follow-up

usage, active inflammatory bowel disease, pregnancy, and noncompliance with previous medical care.

Referring a patient of extreme weight for a surgical opinion should no longer be considered an option but a best care practice for a primary caregiver.<sup>7</sup> Table 2 outlines the current BMI guidelines for patients that qualify for weight loss surgery according to the 1991 NIH Consensus Statement on Obesity.

#### OPTIONS FOR WEIGHT LOSS SURGERY

Health professionals need to have an understanding of the current weight loss procedures to help their patients make informed decisions about all possible treatment options for their illness. For a severely obese individual, surgical therapies currently offer the greatest likelihood for the highest degree of weight loss.

Between 1998 and 2002, there was a 4.5 fold increase in the total number of bariatric operations performed in the United States,<sup>8</sup> and the percentage done laparoscopically increased from 2.1% to 17.9% of all cases. During that same 5-year period, the annual rate of open procedures increased only 3 fold. Interestingly, despite the continued rise in the incidence of obesity, the number of total bariatric surgical procedures has now actually decreased slightly from a peak in 2003.

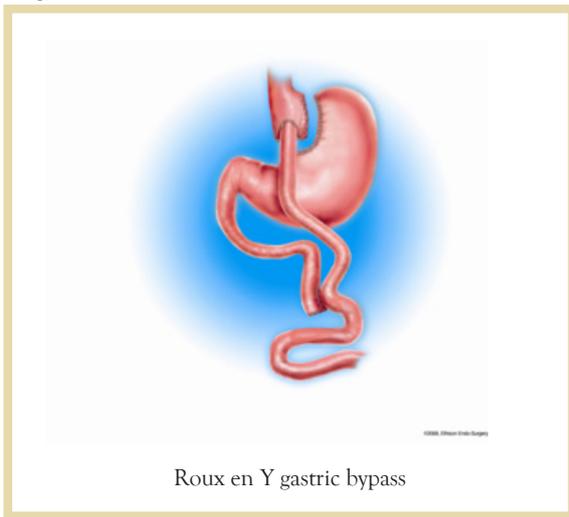
Operations for obesity can be divided into restrictive and malabsorptive procedures. (Table 3) Operations currently being used are: Roux-en-Y gastric bypass, adjustable gastric band, sleeve gastrectomy, and the duodenal switch in the United States.

Roux-en-Y gastric bypass (Fig.1a) accounts for 90% of all weight loss procedures being done in the

Table 3

OPERATIONS FOR OBESITY*
<b>Restriction</b>
Adjustable gastric band
Roux en Y gastric bypass
Sleeve gastrectomy
<b>Malabsorption</b>
Biliopancreatic diversion
Duodenal switch
<b>Investigative</b>
Gastric balloon
Gastric pacing
*Vertical banded gastroplasty and mini-gastric bypass are not considered currently acceptable weight loss procedures

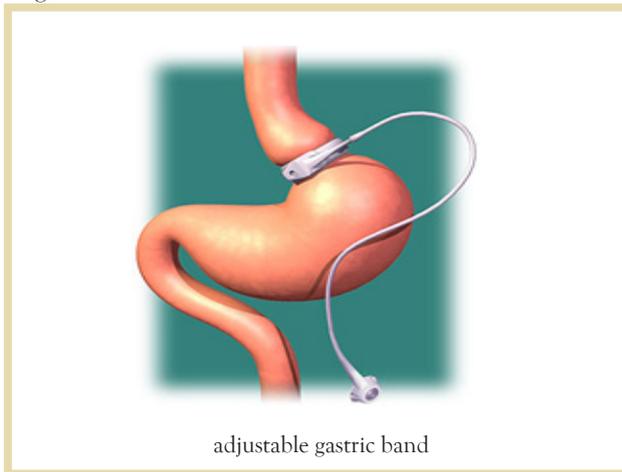
Figure 1a



United States. A pouch is made from the top portion of the stomach to reduce the amount of food that can be eaten and intestines are rerouted to reduce the absorption of calories.

The adjustable gastric band (Fig. 1b) was developed for bariatric patients who wanted a less complex alternative to gastric bypass surgery. During laparoscopic adjustable gastric banding surgery, two medical devices are implanted into the body. A silicone band is placed around the upper stomach and an injection port is attached to the abdominal wall under the skin. The port is connected to the gastric band with tubing. The silicone band is lined with an inflatable balloon that can be filled with saline via the access port in order to adjust the size of the stomach opening. Adding fluid tightens the band and limits food passage, while removing liquid loosens the band and allows easier food passage.

Figure 1b



The vertical sleeve gastrectomy (Fig.1c) is a restrictive type of weight loss operation that permanently reduces the size of the stomach. In recent years, many bariatric surgeons have begun to perform gastric sleeve surgery as a stand-alone weight loss procedure. During vertical sleeve gastrectomy surgery, approximately 60 to 80% of the stomach along the greater curvature is removed, leaving only a small tube, or “sleeve” for the new stomach pouch that extends from the gastroesophageal junction to the pylorus. The resected stomach is removed and not left in place as with gastric bypass surgery. Therefore the stomach reduction is permanent and the gastric sleeve procedure is not reversible.

The duodenal switch (Figure 2) includes a restrictive component but is primarily a malabsorptive weight loss procedure. With duodenal switch weight loss surgery, the size of the stomach is reduced to limit food intake similar to the vertical sleeve gastrectomy. In addition, the small intestine is “switched” around to alter the digestion process and limit food (calorie) absorption.

**RESULTS OF SURGICAL THERAPY FOR OBESITY**

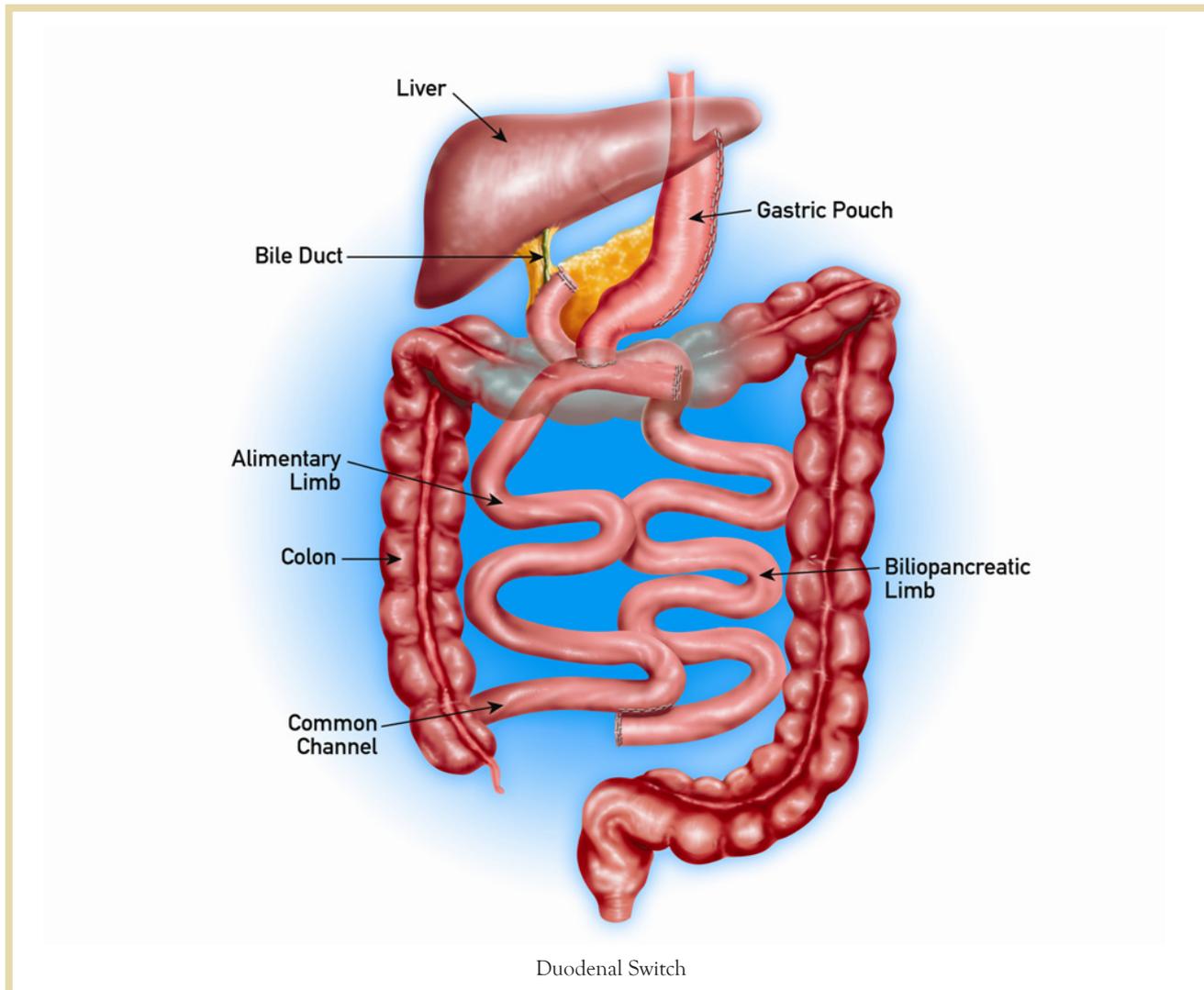
Following weight loss surgery, there are documented reductions in premature death, co-morbidities, and the medical costs of caring for a patient with severe obesity. Two papers published in the New England Journal of Medicine in 2007 demonstrated the beneficial effects of weight loss surgery on mortality.

The Swedish Obesity Study (SOS) was a long-term prospective controlled study of more than 4,000 patients, half of whom had weight loss surgery and the other half of whom had conventional medical therapy. The surgically treated group had a 30% reduction in mortality. Not only was this due to an expected reduction in mortality related

Figure 1c



Figure 2



to diabetes, but there was also a dramatic decrease in deaths due to cardiovascular disease and cancer.<sup>9</sup>

The second study was a retrospective analysis of 9,949 patients divided equally between surgical and non-surgical weight loss therapy. The surgical group had a 40% reduction in mortality compared with the non-surgical control group. As in the SOS study, there was a 60% reduction in mortality due to cancer and a 92% reduction in death due to diabetes.<sup>10</sup>

There are over 35 medical conditions linked to severe or morbid obesity. Multiple studies have demonstrated resolution or improvement of associated co-morbidities following weight loss surgery such as type II diabetes mellitus, obstructive sleep apnea, and hypertension.<sup>11,12</sup>

Since 2001, complication rates associated with weight

loss surgery have steadily declined.<sup>13</sup> The number of weight loss operations, surgeon experience, and Centers of Excellence have all contributed to better outcomes. In addition, the use of laparoscopy has drastically reduced complication rates compared to similar open procedures.

The ninety day mortality rate for bariatric surgery at Centers of Excellence throughout the United States stands at 0.35%, similar to cholecystectomy.<sup>14</sup> A prospective study of the perioperative safety of bariatric surgery at ten clinical sites was recently reported in the *New England Journal of Medicine*.<sup>2</sup> The thirty day mortality rate in 4,776 consecutive patients was 0.3%, and a total of 4.7% patients had at least one adverse outcome. Again, patient characteristics such as extremes of BMI, a history of deep vein thrombosis or pulmonary embolus, obstructive sleep apnea, or impaired

functional status correlated with an increased risk of death or complications.

#### THE METABOLIC EFFECTS OF WEIGHT LOSS SURGERY

Until recently, white adipose tissue (WAT) was thought to be simply an inert storage depot of fat that lacked any significant metabolic activity. Over the past decade, numerous studies of adipose tissue metabolism have revealed that WAT is actually a major endocrine and secretory organ, responsible for energy homeostasis, immunity function, and many whole body inflammatory conditions.<sup>14</sup>

Adipocytes secrete cytokines, termed adipokines, which both regulate incretins (gut hormones) and stimulate many inflammatory mediators in the body. Adipokine secretion can create a chronic sub-inflammatory state in obese individuals which can lead to conditions such as insulin resistance, type II diabetes, non-alcoholic fatty liver disease (NAFLD), dyslipidemia, polycystic ovarian syndrome, hypertension, and metabolic syndrome.<sup>15</sup> Details about many of these associated conditions in obese patients are discussed in other articles in this symposium.

Perhaps the most dramatic benefit of weight loss surgery besides weight loss is the resolution of type II diabetes mellitus, which is present in nearly 30% of patients who undergo weight loss surgery. Diabetes resolves in 84% to 98% of patients following Roux-en-Y gastric bypass procedures and 48% to 68% after other restrictive procedures.<sup>16</sup>

Following a Roux-en-Y gastric bypass, the enteroinsular axis is altered between incretins (gut peptides) and insulin, which results in enhanced insulin sensitivity and secretion. It appears that the exclusion of the upper intestinal tract is the primary mediator of diabetes resolution after Roux-en-Y gastric bypass.<sup>17</sup> Because of the body's improvement in insulin response and activity, a physician must adjust a patient's diabetic regimen significantly to avoid postoperative hypoglycemia.

Bariatric surgery has become an important therapy for patients with BMIs greater than 35 with metabolic syndrome.<sup>18</sup> In one study of such women who underwent laparoscopic gastric bypass, 89% of patients experienced a resolution of their metabolic syndrome.<sup>19</sup> A similar study reported a 64% reduction in metabolic syndrome following Roux-en-Y gastric bypass.<sup>20</sup>

Surgically-induced weight loss also improves nonalcoholic fatty liver disease (NAFLD). A University of Pittsburgh study using pre and post-op liver biopsies in weight loss surgery patients found a reduction in the prevalence of metabolic syndrome from 70% to 14%; in liver steatosis from 88% to 8%; in liver inflammation from

23% to 2%; and in liver fibrosis from 31% to 13%.<sup>21</sup> This study demonstrated the relationship between NAFLD and metabolic syndrome in obesity as well as the simultaneous regression of both processes following weight loss surgery.

Lipid profiles also change significantly following Roux-en-Y gastric bypass.<sup>22,23</sup> Two separate studies of patients following laparoscopic Roux-en-Y gastric bypass surgery showed a reduction in the mean total cholesterol, triglyceride, LDL cholesterol, and VLDL cholesterol levels. The total cholesterol/HDL cholesterol risk ratio also dropped and the HDL cholesterol levels rose after surgery. Since obesity and hyperlipidemia are independent risk factors for the development of coronary artery disease, the risk of coronary artery disease can be reduced through weight loss surgery.

#### THE LANCASTER GENERAL HEALTHY WEIGHT MANAGEMENT PROGRAM

In 2008, the CDC reported a 27.7% prevalence of adult obesity in Pennsylvania. Compared with whites, blacks had a 51% higher prevalence of obesity, and Hispanics had a 21% higher prevalence.

Obesity is currently rampant in Lancaster County. In 2007, the Lancaster General Healthy Weight Management Program was established to help obese patients meet their weight management goals. Surgical and non-surgical options are offered at the 12,500 square foot Healthy Weight Management Center located at 2150 Harrisburg Pike on the Suburban Health Campus.

To date, our comprehensive laparoscopic weight loss surgery program has surgically cared for over 250 patients. The overall program mortality rate is 0.38% (one patient died 16 hours postoperatively from a massive pulmonary embolus). Conversely, over 10% of our patients now enjoy a normal body mass index (BMI 20-25) and 97% of our 12 month gastric bypass patients have lost more than 50% of their excess body weight.

#### CONCLUSION

Weight loss surgery has established itself as a proven therapy for the long-term treatment of both severe obesity and its associated co-morbidities. Surgical treatment of severe obesity should be considered by all physicians as a primary mode of therapy for these patients. The physiologic changes associated with severe obesity can be ameliorated or improved after successful weight loss surgery. Potential complications or side effects of weight loss surgery can be minimized at an experienced facility equipped for the care of the severely obese.

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