



Section 2

Overview of Obesity, Weight Loss, and Bariatric Surgery

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Overview of Obesity, Weight Loss, and Bariatric Surgery

Obesity in the United States

The understanding of obesity in the United States begins with an understanding of Body Mass Index. Body Mass Index (BMI) is a uniform means of determining an individual's weight classification and measuring obesity. BMI is calculated by dividing a person's weight (in kilograms) by the square of their height (in meters).

$$\text{BMI} = \frac{\text{Weight in Kilograms}}{(\text{Height in Meters})^2}$$

For those among us intimidated by the math, there are BMI calculators all over the internet that will assist in this computation. For the purposes of this discussion we will use the definitions of "overweight", "obese" and "extreme, (morbid), obesity" issued by the National Institute of Health:

Overweight	BMI 25-29.9
Obese	BMI 30-39.9
Extreme Obesity	BMI 40+

In the United States the epidemic of obesity is a major health concern. According to the National Institute of Health, (NIH), in 2012 68.8% of the US population was considered overweight. In the same report the NIH reported that 35.7% of the US population qualified as obese and 6.5% qualified as extremely or morbidly obese. In 2015 the Harvard School of Public Health estimated that the cost of obesity related conditions is 150% greater than that for individuals with normal body mass index.

% of U.S. population	Term	BMI
66 percent	Overweight	BMI 25 or higher
34 percent	Obese	BMI 30 or higher
5 percent	Morbidly obese	BMI 40 or higher

The reasons for obesity are very complex and not yet fully understood. Although diet and lifestyle choices contribute to obesity, there are some individuals with similar habits who are not morbidly obese, and there are some morbidly obese people who manage to change their lifestyle but lose very little weight. Thus, genetics, heredity, differences in metabolism, and the increased availability of high calorie foods all play a role in the development of obesity.

Being overweight or obese does NOT guarantee that someone will develop serious health problems. Some people can be obese and relatively healthy. But compared to a person of normal weight, the CHANCE of developing medical problems is higher in the presence of obesity. Some of these medical conditions include: diabetes mellitus, hypertension, coronary heart disease, stroke, congestive heart failure, restrictive lung disease, sleep apnea, degenerative arthritis, infertility, increased risk for cancer of the breast and uterus, psychological problems, and gastroesophageal reflux disease.

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In 1991, the National Institutes of Health (NIH) assembled a group of healthcare experts to make recommendations on treatment options for obesity. These recommendations ranged from dieting, to behavioral modification, to drug therapy, to surgery. According to the NIH proposals, surgery could be recommended for morbidly obese people who failed to maintain weight loss from other types of treatment. Sustainable weight loss (losing excess weight and keeping it off) is the goal of any treatment for obesity. Loss of excess weight is what results in the elimination of obesity related medical co-morbidities and improves overall health.

Patients may be considered for surgery when:

- They meet the established criteria issued by the National Institutes of Health
- Understand the possible complications of the procedure
- The patient agrees to comply with the post-operative regimen of dietary and physical lifestyle changes.

Unused energy from food is stored in fat

All living things require energy. Food is the source of that energy. We need energy for our bodies to do all the things we are aware of and all the things we are not aware of. The digestive system breaks food down for delivery into the blood stream where it is transferred to cells to be used as energy. This energy is measured in calories. The average recommended American diet should provide 2000 calories per day. Most Americans consume far more than this. If all the energy from food is not used by the body the extra energy is stored in the form of fat. Fat is a savings account for calories (energy). Although the body's ability to store energy is an important survival mechanism intended to protect us from starvation, when people consistently eat more calories than needed the body continues to build fat. This results in steady increases of BMI and the development of varying levels of obesity.

Therefore, someone trying to lose weight is actually trying to lose extra fat they don't need. The **ONLY** way to lose fat is to burn more calories than you take in. You must take in fewer calories and use more than the amount consumed through increased activity. This shifts the body away from fat production toward fat consumption. Every pound of fat contains about 3,500 calories. If you eat 2,500 calories a day but only use 2,000 calories, you will store 500 calories each day. At the end of 7 days you will **GAIN** 1 extra pound of fat. If you eat 1,500 calories a day and use 2,000 calories, you will burn 500 calories from fat each day. At the end of 7 days, you will **LOSE** 1 pound of fat.

Calories from food greater than calories used with activity = **WEIGHT GAIN**
Calories from food less than calories uses with activity = **WEIGHT LOSS**

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How does surgery help with weight loss?

Losing 10 to 20% of one's total weight by decreasing intake and exercising is a tremendous achievement, and is often enough to improve associated health problems. A 300 pound person who can lose 30 pounds should be proud of that success. Unfortunately, this weight loss may not be enough to completely eliminate the associated health problems. In addition, a 10% loss in weight may not be obvious enough for friends, family, and physicians to notice. This can be demoralizing in the presence of the extreme effort involved in any weight loss. Many cravings increase with weight loss, making it extremely hard to keep the weight off for a long time. Most people "rebound", gaining more weight than they lost. This can be very discouraging, making it even harder to sustain the lifestyle of mindful eating and activity needed to maintain any weight loss. Despite their best efforts, many people who are sincere about losing weight find themselves constantly losing and gaining weight.

Surgery is an option that helps one to eat less making weight loss more likely. It can work by either limiting the capacity of the stomach (restrictive effect), or by shortening the amount of bowel that can absorb food (malabsorption effect), or by a combination of both restriction and malabsorption. Weight loss procedures may also work by affecting the balance of several hormones related to eating, hunger, and taste. The operations seem to curb the feelings of hunger that seem to sabotage many other types of weight loss programs.

Note: Researchers and drug companies are just beginning to understand the hormones that control obesity, but are probably many years away from developing a medicine that could treat it.

What is the short term versus long term weight loss?

Short term weight loss is defined as sustained weight loss for 5 years or less. If weight loss is maintained over 5 years it is considered to be long term success. Because of the mechanisms described earlier, (restriction, malabsorption or both), most people experience weight loss immediately after weight loss surgery. Thus, most people are successful with short term weight loss. Unfortunately, the appetite suppression and restrictive effect may be pronounced in the first few years, but tend to diminish over time. It is the window of time between weight loss surgery and the decrease in appetite experienced post operatively that many patients manage to break the cycle of obesity and keep the weight off for the rest of their lives. These people realize that their weight loss surgery is a tool to help them stay on track for the long term. Even in the presence of weight loss surgery people need to actively monitor portion size, make healthy choices and maintain an active lifestyle. When all of these come together long term success with all of the health and well-being advantages is realized.

It is important to mention that there are MANY people who regain much or all of their weight within several years of weight loss surgery. This happens when they no longer assure that the calorie intake is equal to or less than calories burned. This is when the body will move back to the tendency of building fat and the weight gain begins. It is important to remember that it only takes a few extra calories per day to begin this process. By eating 100 extra calories a day, it is possible to gain 1 pound each month. If not corrected, this leads to 12 extra pounds in one year, 60 extra pounds in 5 years, and 120 extra pounds within 10 years.

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Weight Loss After Surgery

After weight loss surgery the vast majority of patients lose 50 to 80% of their excess weight in the first 12 months. With the lap band, the weight loss may take 3 to 4 years, and seems to be more variable. After the first 2 years, there can be a regain in weight if changes in eating habits and exercise have not been implemented. With the roux-en-y gastric bypass, most patients keep 50% to 70% of their excess weight off after 10 years.

Conditions Improved with Weight Loss

Many medical conditions seem to improve with significant weight loss. However complete improvement or “cure” cannot be predicted, because many of the conditions are also related to genetics and aging. In other words, there are many people of normal weight and size who may still develop these conditions.

Diabetes (Adult onset)

Over 50% of patients are able to reduce their diabetic medications with substantial weight loss. Diabetes seems to improve most dramatically with the roux-en-y gastric bypass. Although much of the improvement is related to the loss in weight, a significant portion of the improvement may be related to the operation itself and the way it reroutes the stomach and intestines. After a roux en y gastric bypass, 95% of younger patients (and 80% of all patients) are able to eliminate medications (oral and insulin) for diabetes. For the sleeve gastrectomy and the lap band, the improvement in diabetes is proportional to the amount of weight lost. Thus, for those patients who lose weight, there can be a 50 to 70% improvement in the need for diabetic medications.

Acid Reflux

Acid reflux and heartburn often improve with a change in diet and lower abdominal pressure with weight loss. It is important to realize that some operations such as the lap band and gastric sleeve may worsen heartburn, while others such as the roux en y gastric bypass reduce heartburn by bypassing the acid producing portion of the stomach.

Hypertension:

About 70% of patients will have significant improvement in blood pressure. (Only about 30% can eliminate all medications for blood pressure)

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Sleep Apnea:

About 70% to 80% of patients will have minimal symptoms of apnea after surgery. About 50% will eliminate the need for a CPAP machine.

Cardiopulmonary Failure:

Improvements in cardiac function and heart muscle function have been studied, and often seem to improve.

Elevated Cholesterol:

Lowering of previously high cholesterol and lipid levels are common, possibly resulting in a decreased risk of heart attack and cardiovascular disease.

Pseudo Tumor Cerebri:

Headaches and visual changes seem to improve in many.

Infertility:

Infertility seems to improve in many women with polycystic ovary disease or irregular periods.

Degenerative arthritis:

Young patients who do not require NSAIDs for pain control usually report significant improvement in joint stress and pain. However, patients who already have documented arthritis (inflammation and degeneration of the joints) may continue to progress with arthritis. In addition, patients who depend on NSAIDs for pain control may experience more pain after gastric bypass since NSAIDs are no longer allowed after the operation.

Asthma:

Most patients have mild to significant improvement, due to less restriction of the lungs (ability to take deeper breaths).

Restrictive lung disease

Decreased lung function can result from a combination of several factors. Lung function can be impaired by obstructive disease (COPD, asthma), destruction of lung tissue (emphysema, pulmonary fibrosis), and restriction (lung scarring, obesity). Obesity may limit one's ability to take a deep breath and expand the lungs. The extra weight also places more demand on the lungs and heart to supply oxygen. If this is a major reason for poor lung function, then weight loss can result in significant improvement. However, pulmonary function tests are required prior to the operation to help sort this out.

Stress incontinence

Incontinence is a complex problem that can be related to increased abdominal pressure and abnormal anatomy. Mild cases of incontinence or increased frequency related to increased abdominal pressure may improve with significant weight loss.

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Hernias:

Hernias (holes or tears in the abdominal wall allowing the bowels to bulge through) always require surgical correction. Sometimes these can be corrected at the same time as weight loss surgery. Once the hernia is fixed, the repair is probably more durable due to the lower weight and lower abdominal pressure.

Psychological Conditions:

Psychological conditions can be very complex. Depression may seem to improve for a short time with rapid weight loss, but usually persists in the long term. Some patients may face increased stress as their self perception and relationships change. Others will no longer be able to use food as a source of comfort during times of depression.

Medications for depression and other psychological conditions can still be taken immediately after the operation. Occasionally dosages may have to be adjusted as weight is lost.

Unknown:

Recent research has suggested that obesity may increase the risk of the conditions below. However, not enough research has been done to determine whether significant weight loss can reverse or reduce the risk of these conditions:

- Cancer risk (uterine and breast cancer)
- Deep venous thrombosis
- Pulmonary Emboli
- Heart Attack
- Stroke
- Immune Suppression

