# A Cause for Concern

After major surgery, you should not resume diving until you can exercise safely. Warm weather is here in the Northern Hemisphere, and many of us are diving, hiking and biking to our hearts' content, literally. And we're not as worried about unwanted pounds since the warm weather encourages more activity. For many divers, the winter season means less diving and exercise, heartier meals and a tendency to pack on extra pounds, usually in the form of unwanted fat.

If the winter scenario sounds too familiar, you have plenty of company. Nearly two-thirds of adults in the United States are categorized as overweight, and 30.5 percent are obese, according to data from the 1999-2000 National Health and Nutrition Examination Survey (NHANES). Thirty-five percent of adults and 14 percent of children weigh considerably more than they should. The universal culprit seems to be overeating and lack of exercise.

**Overweight Versus Obese**

It is important to distinguish between "overweight" and "obese." A person is simply overweight if they are no more than 20 percent heavier than their ideal weight according to actuarial height-weight charts, such as the Metropolitan Life Insurance Company charts.

A common definition of "obese" refers to people whose percentage of body fat is greater than 20 percent of their total body weight. This percentage of body fat is usually measured as skin-fold fat thickness (although not all of the thickness measured is fat) by caliper in specific locations, such as just beneath the scapula (shoulder blade), and over the thigh, triceps and abdomen.

Another way of measuring obesity predicting body composition is using the body mass index (BMI) calculator. Developed by the National Institutes of Health, BMI uses a mathematical formula that takes into account both a person's based on the relationship between height and weight. BMI equals a person's weight in kilograms divided by height in meters squared. (BMI=kg/m2). A BMI between 18.5 and 24.9, for example, is considered normal, while a BMI of 30.0-39 indicates obesity.

While being overweight is a problem, obesity can multiply your health concerns such as high blood pressure (hypertension), diabetes and accelerated atherosclerosis (plaque formation that reduces the flexibility of arteries). As a result, obese people have an increased risk for heart attack and stroke, and shortened life expectancy.

**Overweight and obesity are known risk factors for:**

- diabetes;
- heart disease;
- stroke;
- hypertension;
- gallbladder disease;
- osteoarthritis (degeneration of cartilage and bone around joints);
- sleep apnea and other breathing problems;
- some forms of cancer (uterine, breast, colorectal, kidney and gall bladder).

Obesity is also associated with:

- high blood cholesterol;
- complications of pregnancy;
- menstrual irregularities;
- hirsutism (presence of excess body and facial hair);
- stress incontinence (urine leakage caused by weak pelvic-floor muscles);
- psychological disorders such as depression;
- increased surgical risk.

Obesity and its health risks can also make diving less safe for both the obese diver and the buddy.

**Surgery for Weight Loss**

While medical practitioners and organizations such as the CDC and the American Heart Association encourage a regimen of healthy diet and exercise, the fact remains that obesity is a concern. And while it is far more advisable to not become obese, some individuals have opted for measures that move beyond the realm of diet for a quicker resolution. Those who have serious weight problems that cannot be adequately managed by diet and exercise program may become candidates for more extreme interventions.

In recent years, more people have chosen surgeries like gastric bypass or bariatric surgery for weight loss and control. According to the American Society of Bariatric Surgery, in the late 1990s approximately 16,000 individuals underwent such surgeries. In 2003, more than 103,000 patients had some form of bariatric surgery. Surgical weight reductions, which are considered major operations, have inherent risks and long-term implications. Because of this, divers should know how these procedures relate to diving.

**Several different procedures are recommended.**

Specific information about them is available through various sources, preferably from medical professionals or from a surgeon. Briefly, there are two types of procedures; both reduce the size of the stomach.

**The Roux-en-Y Gastric Bypass Procedure**

The first procedure functions through "malabsorption," actually bypassing a significant length of small intestine and shortening the overall digestive tract. (Note: most digestion takes place in the intestines and not the stomach.) Shortening the intestines reduces the amount of calories, sugars and fat that would normally be absorbed. This procedure allows patients to eat more normal-sized meals and enjoy a greater variety of foods. Because less food is absorbed, the patient loses weight. However, some important nutrients, vitamins and other essentials may not be absorbed either, particularly protein, fat, fat-soluble vitamins (vitamins A, D, E and K), iron, calcium and vitamin B12.

Patients can prevent deficiencies by taking appropriate supplements. This surgery produces an aftereffect, a condition known as the "dumping syndrome." The stomach and intestines move food along by a series of wave-like contractions known as peristalsis. Dumping syndrome occurs when stomach contents are rapidly emptied into the jejunum, which is a part of the small intestine between the duodenum and the ileum. Resulting symptoms include rapid heart rate, profuse sweating, decreased attention span, abdominal pain / cramping, dizziness, diarrhea and flushing. These can occur from 30 minutes to three hours after one eats. When someone underwater suffers these symptoms, the consequences can be dangerous.

Doctors recommend that any patient prone to "dumping syndrome" not dive sooner than three hours after eating. A variation of the malabsorption procedure is the "duodenal switch," in which a portion of the bypassed small intestine reconnects to the digestive tract at a different location. This still produces the same malabsorption type results. While it eliminates the dumping syndrome, it requires the same

nutritional supplements and medical monitoring.

**Stomach Reduction**

**Vertical Banded Gastroplasty (or Adjustable Banded Gastroplasty)**

Another more restrictive procedure reduces the size of the stomach. Following the surgery, the patient's stomach may only hold 1-2 tablespoons in volume. This method drastically reduces the amount of food the patient can consume at any one time; digestion continues normally; and nutritional problems such as anemia and osteoporosis are almost nonexistent. The patient does not require as much ongoing medical supervision or dietary supplements. Patients choosing this procedure must be very selective about the food they eat: since absorption is not altered, any foods high in calories, sugars and fat will have the same affect on the body as they did before the surgery. If a patient consumes too much food or large pieces of food, vomiting can result.

**Post-Surgery Issues**

After surgery, some patients experience chronic acid reflux. Reflux and regurgitation of fluid and gastric liquid can present problems for a diver in the "head down" position, such as during descent. Divers can manage problems of regurgitation or vomiting through proper dietary considerations and possibly medications.

**Gastrointestinal barotrauma presents more dive-specific issues.** During ascent, gas pockets within the gastrointestinal tract expand. If the gas is trapped due to obstructed bowel, rupture could occur. Dive physicians say divers who have had uncomplicated bariatric surgery should not be at any increased risk for gastrointestinal barotrauma.

**Back to Diving**

So, how soon after having bariatric surgery can you dive? Physicians recommend a four- to six-week wait after major surgery before you resume strenuous activity. After bariatric surgery, it is probably best to wait longer, until you've made some appropriate eating adjustments, dealt with problems such as reflux and vomiting, and you've achieved your maximum weight loss. Usually this happens more than a year after surgery.

Divers should not resume diving until they can exercise safely. During any period of convalescence and inactivity, you can lose a significant amount of muscle mass and strength. You should base your A safe return to diving on requires recovery from any therapy and a tolerance for all physical activity that exceeds the reasonable demands of diving – including the exceptional effort that may be required when things do not go quite as planned. and a resumption of exercise that builds the appropriate response to the cardiac and pulmonary exertion you need to dive.

Because obesity is commonly associated with atherosclerosis, diabetes and hypertension, prospective divers who are obese or who have had bariatric surgery should be tested for these conditions and undergo specific exercise testing. Health maintenance and disease prevention is a primary goal for individuals who may have tendencies to become overweight. A regimen of proper diet, exercise and regular visits to a physician can head off these problems for the knowledgeable diver.

**Sources of Information**

American Diabetes Association www.diabetes.org.
American Society for Bariatric Surgery http://asmbs.org/.
Health Talk www.healthtalk.com.
Your Surgery www.yoursurgery.com.
Web MD. www.webmd.com.

Sleisenger & Fortran's Gastrointestinal and Liver Disease, 7th Edition National Institutes of Health http://win.niddk.nih.gov/statistics/index.htm