

Obesity surgery: A word of neurologic caution

Neeraj Kumar, MD

The incidence of obesity is rising at an alarming rate. Obesity increases the risk of death. Medical treatment of obesity is often disappointing. Weight-reduction surgery, involving either open or laparoscopic techniques, is associated with longer lasting results and is becoming more popular.¹ The most common type of weight reduction surgery is called the Roux-en-Y gastric bypass (figure). The size of the stomach is significantly reduced, the small intestine is cut, and the lower part of the intestine is attached to the small stomach pouch that receives food. Serious complications may result from weight-reduction surgery including some that involve the nervous system. Many of these are related to deficiencies of key nutrients including certain vitamins and minerals.

In this issue of *Neurology*, Juhasz-Pocsine and colleagues describe 26 patients who had major neurologic complications related to weight reduction surgery.² They also review the available literature on the subject.

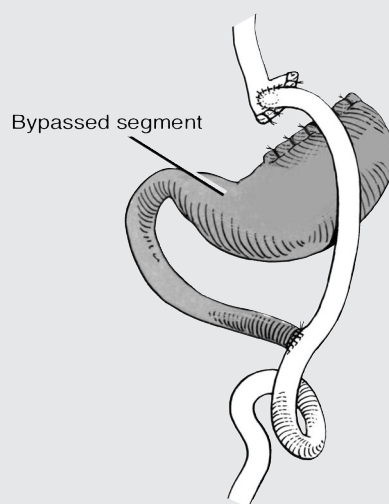
The neurologic complications in the patients reported in this study involved various parts of the nervous system. A common delayed complication was walking difficulty and loss of sensation in the legs due to spinal cord involvement. This complication was seen in 12 of the 26 patients. Five of these

12 patients also had involvement of the nerves to the legs (peripheral nerves). Two patients developed confusion and walking difficulty a few weeks after the surgery. These patients were thought to have involvement of the brain and the nerves leaving the spinal cord. In 10 additional patients just the peripheral nerves were involved, without associated confusion or spinal cord involvement. In 5 of these 10 patients the nerve problem appeared rapidly, usually within a few months, and looked like another common nerve problem not related to weight loss surgery called Guillain-Barré syndrome. The remaining 5 of these 10 patients developed gradual onset weakness and numbness of the limbs many years after the surgery. Two patients developed difficulty with vision a few years after the surgery.

WHAT DID WE LEARN FROM THIS STUDY? Neurologic complications due to weight-reduction surgery can involve any part of the nervous system: the brain, the spinal cord, the nerves leaving the spinal cord, or the peripheral nerves. Often more than one part of the nervous system can be involved. At times complications can be seen within a few weeks after the surgery. These patients develop confusion with or without involvement of the peripheral nerves. This complication may be associated with rapid weight loss and could be due to a deficiency of a vitamin called thiamine. More common is the delayed presentation of neurologic complications. The delayed complications are generally due to involvement of the spinal cord or peripheral nerves or both. The commonly identified deficiencies include vitamin B₁₂ and copper. Correction of nutritional deficiencies results in stabilization or improvement of symptoms.

WHY IS THIS IMPORTANT FOR PEOPLE WITH OBESITY CONSIDERING WEIGHT-REDUCTION SURGERY? Weight-reduction surgery is not without risks. The neurologic complications of weight-reduction surgery may be associated with permanent damage. They are often due to nutrient deficiencies. These complications can be prevented by paying close attention to vitamin and mineral supplementation. Patients should be aware of the symptoms that can indicate a neurologic complication and seek prompt medical attention.

Figure Gastric bypass surgery



Gastric bypass, a commonly performed weight-reduction surgery (Roux-en-Y). By permission of Mayo Foundation for Medical Education and Research. All rights reserved.

About weight-reduction surgery

WHAT IS WEIGHT-REDUCTION SURGERY? HOW DOES IT WORK?

During the process of digestion food particles are broken down and nutrients are absorbed. Unabsorbed and undigested food particles are eliminated from the body as waste. Weight-reduction surgery is designed to limit food intake by decreasing the amount of food the stomach can hold and reduces the nutrients absorbed by the small intestines. The stomach acts as a reservoir for food. It relaxes and expands when food is eaten. In gastric bypass surgery, the size of the stomach is reduced, and a small pouch is created at the top of the stomach. A small segment of intestine is attached to this pouch. As a result, only a small amount of food can be eaten comfortably. If large amounts of food are eaten, problems such as nausea, vomiting, and abdominal pain can result. The surgery also redirects the food so that it bypasses most of the stomach and the initial part of the small intestine. As a result, the body's ability to absorb key nutrients is also reduced.

WHAT ARE THE RISKS OF OBESITY? Being overweight is associated with a variety of medical, physical, and psychological problems. Obesity-related medical illnesses include high blood pressure, diabetes, heart disease, stroke, sleep apnea, high cholesterol, gallstones, nonalcoholic fatty liver, and arthritis.

WHO SHOULD CONSIDER WEIGHT-REDUCTION SURGERY? Weight-reduction surgery is for individuals who are severely obese, have obesity-related health problems, or are at risk of developing obesity-related health problems. The body mass index (BMI) is used in defining obesity. It is a measurement of body fat based on height and weight. Individuals with a BMI over 40 kg/m² may be candidates for weight-reduction surgery. A BMI over 40 kg/m² alone is not sufficient to recommend weight-reduction surgery. In some situations individuals with a BMI between 35 kg/m² and 40 kg/m² could also be considered for weight-reduction surgery. It is important that potential candidates be committed to lifelong changes in eating and exercise habits. Weight-reduction surgery is not for everyone who is overweight. It should not be viewed as cosmetic surgery. Nor is it, by itself, the solution to being overweight.

WHAT ARE THE BENEFITS OF GASTRIC BYPASS SURGERY?

Following gastric bypass surgery, most patients lose at least half of their excess weight. The weight loss is maintained for at least the first several years after surgery. The shortened life span associated with obesity can return to normal following successful weight loss surgery. Weight reduction surgery has been reported to improve several conditions such as diabetes mellitus, sleep apnea, high blood pressure, high cholesterol, and heart function. Patients may note improved mobility and stamina.

WHAT ARE THE RISKS OF WEIGHT-REDUCTION SURGERY THAT ARE UNRELATED TO THE NERVOUS SYSTEM?

Complications immediately after surgery may include wound infections, leaks from staple breakdown, pneumonia, gallstones, or blood clots. Later complications may include development of a narrowing of the opening between the stomach and the intestines, ulcers, hernia at the site of surgery, and loose stools. After weight-reduction surgery the body may not properly absorb vitamins and minerals. This may result in anemia, calcium or vitamin D deficiency with bone disease, and protein deficiency.

WHAT NEUROLOGIC COMPLICATIONS CAN RESULT FROM GASTRIC BYPASS SURGERY?

Neurologic complications following weight-reduction surgery can involve most parts of the nervous system (Berger JR. The neurologic complications of bariatric surgery. *Arch Neurol* 2004;61:1185–1189). A disorder due to thiamine deficiency called Wernicke encephalopathy may occur. This is associated with confusion, memory complaints, and coordination difficulty. Weight-reduction surgery can also cause walking difficulty due to involvement of the spinal cord or peripheral nerves. Some patients may report numbness and tingling of the limbs, at times with loss of sensation.

WHO IS MOST AT RISK FOR NEUROLOGIC COMPLICATIONS? Rapid weight loss, recurrent vomiting, and inadequate supplementation of key nutrients predispose to development of neurologic complications.

WHAT IS THE CAUSE OF NEUROLOGIC PROBLEMS AFTER WEIGHT-REDUCTION SURGERY? WHICH NUTRIENTS CAN BE DEFICIENT AFTER WEIGHT-REDUCTION SURGERY?

Neurologic complications following bariatric surgery are generally due to deficiency of key nutrients. Specific nutrient deficiencies may not be identified despite the presence of neurologic complications. The early complications of confusion or peripheral neuropathy may be due to deficiency of thiamine, especially in patients with recurrent nausea and vomiting after surgery. The later complications are due to involvement of the spinal cord with or without involvement of the peripheral nerves. This may be due to deficiency of vitamin B12 or copper. Vitamin B12 deficiency can also cause involvement of the peripheral nerves without spinal cord involvement. Also well recognized are deficiencies of iron, folate, calcium, phosphate, and vitamin D. Other reported deficiencies include riboflavin, and vitamins A, E, and K. Not infrequently, multiple nutrient deficiencies may coexist.

HOW CAN THE NEUROLOGIC PROBLEMS RELATED TO WEIGHT-REDUCTION SURGERY BE PREVENTED?

Since the quantity of food that can be eaten after surgery is limited, the quality becomes important. A nutritious diet containing the required vitamins and minerals is important to maintain good health while losing weight. Severe and rapid weight loss should be avoided. This can prevent the neurologic complications related to weight-reduction surgery. Lifelong supplements of multivitamins/multiminerals, vitamin B₁₂, iron, and calcium are mandatory following this procedure.

For more information American Society for Bariatric Surgery (www.asbs.org)

1. Buchwald H. Consensus Conference Statement. Bariatric surgery for morbid obesity: health implications for patients, health professionals, and third-party payers. *Surg Obes Relat Dis* 2005;200:593–604.
2. Juhasz-Pocsine K, Rudnicki SA, Archer RL, Harik SI. Neurologic complications of gastric bypass surgery for morbid obesity. *Neurology* 2007;68:1843–1850.

Neurology[®]

Obesity surgery: A word of neurologic caution

Neeraj Kumar

Neurology 2007;68;E36-E38

DOI 10.1212/01.wnl.0000266868.07399.8b

This information is current as of May 21, 2007

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/68/21/E36.full
Supplementary Material	Supplementary material can be found at: http://n.neurology.org/content/suppl/2007/11/08/68.21.E36.DC1
References	This article cites 2 articles, 1 of which you can access for free at: http://n.neurology.org/content/68/21/E36.full#ref-list-1
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright . All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

