

Prevention and management of complications after bariatric surgery

Patients undergoing sleeve gastrectomy or gastric bypass should be prepared to recognize complications such as anastomotic leak and dumping syndrome, and to follow instructions regarding dietary progression, nutritional supplementation, and exercise.

ABSTRACT: Patients undergoing sleeve gastrectomy and gastric bypass require support from health care professionals so that they can recognize complications and make appropriate postsurgical lifestyle adjustments. After surgery, patients must follow a postoperative dietary progression that begins with liquids for 3 weeks and continues with pureed and then soft solids before concluding at 10 weeks with a transition to very small amounts of regular food. Possible complications after surgery include anastomotic leak, internal hernia, ulcer, dumping syndrome, and gallstone formation.

As well as watching for such complications after surgery, patients must make adjustments regarding constipation management, medication use, alcohol consumption, nutritional supplementation, contraception, and lifestyle behaviors. Failure to follow dietary guidelines and a lack of exercise can be reasons for regaining weight or not losing enough weight after surgery. With a change in lifestyle and successful weight loss after surgery, patients can reduce obesity-related comorbidities and increase their overall energy and confidence.

Patients who have undergone sleeve gastrectomy or gastric bypass are typically discharged from hospital 1 to 2 days after surgery and followed closely by a multidisciplinary team of health care professionals. Before surgery, patients will have been counseled extensively on recognizing complications such as anastomotic leak, internal hernia, ulcer, dumping syndrome, and gallstone formation. They will have received information about constipation management, medication use, alcohol consumption, nutritional supplementation, contraception, and lifestyle behaviors. As well, patients will have been prepared for the following postoperative dietary progression:

1. Liquid diet (no caffeinated, carbonated, or alcoholic drinks) for 3

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weeks; hydrate first before adding protein.

2. Pureed diet for 2 weeks.
3. Soft and moist solids for 4 weeks.
4. Transition to regular food in very small amounts at week 10.

For the long term, patients are advised to use a small plate and to separate their intake of solids and liquids by 30 minutes.

Possible complications

Patients need to be aware of complications that can occur after bariatric surgery.

Anastomotic leak

If an anastomotic leak occurs, it usually happens within the first few days of surgery and rarely after 2 weeks. Symptoms include tachycardia, worsening abdominal pain, leukocytosis, fever, and oliguria. Anastomotic leaks occur after sleeve gastrectomy with a reported incidence rate of 1.06%¹ and after Roux-en-Y gastric bypass (RYGB) with a reported incidence rate of 1.10%.² The most common site for a leak is the proximal end of the stapler line near the gastroesophageal junction. A CT scan with oral contrast or an upper gastrointestinal series can be used to investigate an anastomotic leak.

Internal hernia

Internal hernia occurs when the bowel protrudes through one of the surgically created mesenteric defects. The creation of space with weight loss may contribute to internal hernia, which often presents in a delayed fashion and can result in small bowel obstruction, ischemia, or infarction. With presenting features that include abdominal pain, nausea, vomiting, and nonspecific gastrointestinal symptoms, diagnosis can be difficult. While abdominal X-ray (three views) may not show the classic air fluid lev-

els because the obstruction is proximal, CT can reveal the subtle rotation of mesenteric vessels (whirl sign) that suggests an internal hernia. Although internal hernia occurs after RYGB with a reported incidence rate of 4.5%,³ the risk can be reduced if the mesenteric defects are closed with running sutures.⁴ Treatment for internal hernia is laparoscopic surgery with hernia reduction and defect closure.

Ulcer

Ulcers are common after bariatric surgery. To minimize the risk of ulcer formation and gastroesophageal reflux symptoms, a proton pump inhibitor (PPI) is prescribed at the time of discharge. Typically, sleeve gastrectomy patients use a PPI for 6 weeks and gastric bypass patients use a PPI for 6 months. If a patient has persistent reflux symptoms, a PPI may be used on a long-term basis. NSAID use is contraindicated after RYGB because of the increased risk of marginal ulcers between the stomach pouch and the Roux limb. NSAID use is also discouraged after sleeve gastrectomy because of ulceration risk and the limited opportunity for surgical intervention with the smaller gastric pouch.

Dumping syndrome

Dumping syndrome occurs when a meal is ingested and a hypertonic carbohydrate load empties rapidly into the small intestine. Symptoms include abdominal pain, cramping, vomiting, diarrhea, flushing, palpitations, tachycardia, and hypotension. These gastrointestinal and vasomotor symptoms result when excess insulin is produced in response to the rapid entry of food and fluids into the small

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intestine. Early dumping syndrome occurs less than 1 hour after eating with distention of the small bowel. Late dumping syndrome occurs 1 to 3 hours after eating with symptoms similar to those of low blood glucose levels. Dumping syndrome can usually be prevented and treated by avoiding simple carbohydrates and eating protein-based meals.

Gallstone formation

Gallstone formation can occur with rapid weight loss. A Swedish population-based study noted the increased incidence of cholecystectomy after bariatric surgery. While 8.5% of the study cohort underwent cholecystectomy with a standardized incidence ratio of 5.5, 3.2% of the cohort

underwent emergency cholecystectomy with a standardized incidence ratio of 5.2.⁵ The study authors suggest that the increased incidence may be due to detection bias rather than an elevated risk of symptomatic gallstones. Nonetheless, biliary complications are more common after RYGB. Endoscopic retrograde cholangiopancreatography for common bile duct stones is a very difficult procedure after RYGB because access to the duodenum through the mouth is not easy with the partition in the stomach. Concurrent cholecystectomy may be recommended for select patients.

Postsurgery adjustments

As well as recognizing and addressing any postoperative complications, patients must be prepared to make other adjustments.

Constipation management

Constipation is experienced by many patients after bariatric surgery. Ideally, patients will drink small amounts of water frequently to ensure adequate hydration, which requires more than 1.5 L/day PO. Prune juice, docusate, and polyethylene glycol (PEG) laxative are recommended to treat and prevent constipation.

Medication use

Postsurgical weight loss will alter water and fat body composition and change the absorption and distribution of drugs in the patient's system. In addition, a restrictive procedure such as sleeve gastrectomy may change gastric emptying time, pH, and mucosal exposure.⁶ Patients who undergo a procedure such as Roux-en-Y gastric bypass, which has both restrictive and malabsorptive effects, may experience a reduction in drug absorption with the decreased functional length of the intestine and decreased absorptive surface.⁶ Higher or

lower absorption rates for orally administered drugs may occur, although empirical evidence on this is limited.

Many patients will experience rapid resolution of obesity-related comorbidities such as diabetes, hypertension, and dyslipidemia, and will require less insulin and reduced doses of oral hypoglycemic, antihypertensive, and lipid-lowering agents. Patients will require regular follow-up to monitor medication adjustments.

Alcohol consumption

Weight loss following bariatric surgery and the rapid emptying of alcohol from a gastric pouch contribute to faster absorption of alcohol, lower metabolic clearance, and higher blood alcohol content for each alcoholic drink consumed.⁷ Patients should be strongly discouraged from drinking alcohol during the rapid weight loss period after surgery. In the long term, increased sensitivity to alcohol has ramifications for operating a motor vehicle and heavy equipment; doing so after drinking even a small amount of alcohol is not recommended. Furthermore, alcohol is a source of empty calories and can contribute to the development of marginal ulcers.

Nutritional supplementation

After bariatric surgery nutritional supplementation is required indefinitely to address deficiencies in iron, vitamin D and other fat-soluble vitamins A, E, and K (most common after RYGB), vitamin B12, folate, calcium, and other micronutrients. Reduced gastric acid production affects the absorption of calcium and this in turn increases a patient's risk of osteoporosis. Reduced gastric acid production also affects the absorption of iron. Ascorbic acid (vitamin C) can be taken to acidify the stomach and increase absorption of iron and vitamin B12, although absorption of B12 depends

not only on acidity but on intrinsic factor, a glycoprotein produced in the bypassed part of the stomach.

Recommended supplementation includes:

- Multivitamin with minerals (containing iron, folate, thiamine), 1 to 2 tablets daily (minimal requirement).
- Elemental calcium, 1200 to 1500 mg daily, in diet and in citrated supplement in divided doses (calcium citrate does not require acid for absorption).
- Vitamin D, at least 3000 IU daily (titrate to > 30 ng/mL).
- Vitamin B12 (as needed for normal range levels).
- Iron, 45 to 60 mg via multivitamins and additional supplements (needed most commonly after gastric bypass procedures).⁷

Contraception

Contraception is recommended for female patients of childbearing age for 2 years after surgery. This gives sufficient time to ensure nutritional adequacy before patients embark on pregnancy.

Lifestyle behaviors

Bariatric surgery in itself does not guarantee success. The window of opportunity for establishing beneficial lifestyle behaviors is the first 12 months after surgery, when peak weight loss occurs. Some of the reasons for regaining weight or losing insufficient weight (defined as less than 40% to 50% of excess body weight) include:

- Failure to follow dietary guidelines (e.g., consuming high-calorie liquid meals or snacks; "grazing"; eating starches and carbohydrates; drinking liquids with meals or drinking liquids right after eating, which flushes food out of the gastric pouch before it can stretch and send satiety signals).

- Lack of exercise.
- Psychiatric issues (e.g., depression, anxiety, binge eating).
- Postsurgical issues (e.g., large or dilated gastric pouch, dilated gastrojejeunal anastomosis).

According to the National Heart, Lung, and Blood Institute website,⁸ people who want to maintain their weight loss, as well as people who want to lose a large amount of weight (more than 5% of their body weight), may need to be physically active for more than 300 minutes a week (e.g., 1 hour of moderately intense activity for 5 days a week). While not everyone has the time or the financial resources to work out at a gym, adding steps to each day whenever and wherever possible may be enough to initiate change. Encouragement and support from health care professionals can go a long way toward helping patients lose weight and improve their metabolic abnormalities, reduce obesity-related comorbidities, and increase their overall energy and confidence.

Summary

After a sleeve gastrectomy or gastric bypass, patients must follow a postoperative dietary progression that begins with liquids and concludes with a transition to very small amounts of regular food. Possible complications after surgery include anastomotic leak, internal hernia, ulcer, dumping syndrome, and gallstone formation. Patients must be prepared for adjustments that involve constipation management, medication use, alcohol consumption, nutritional supplementation, contraception, and modification of lifestyle behaviors. Inadequate weight loss and weight regain will occur if patients fail to make lifestyle changes regarding diet and physical activity or if patients have psychiatric comorbidity. Patients' determination

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to initiate and maintain lifestyle changes coupled with support from health care professionals will ensure successful weight loss after surgery. **BBM**

Competing interests

None declared.

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