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SURGICAL MANAGEMENT OF MORBID OBESITY

Part of "CHAPTER 23 - MORBID OBESITY"

Surgical Eligibility

According to a 1991 NIH Consensus Panel, patients are considered eligible if they have a BMI of 40 or over without comorbidity or a BMI of 35 or over with comorbidity (e.g., diabetes, respiratory insufficiency, pseudotumor cerebri).

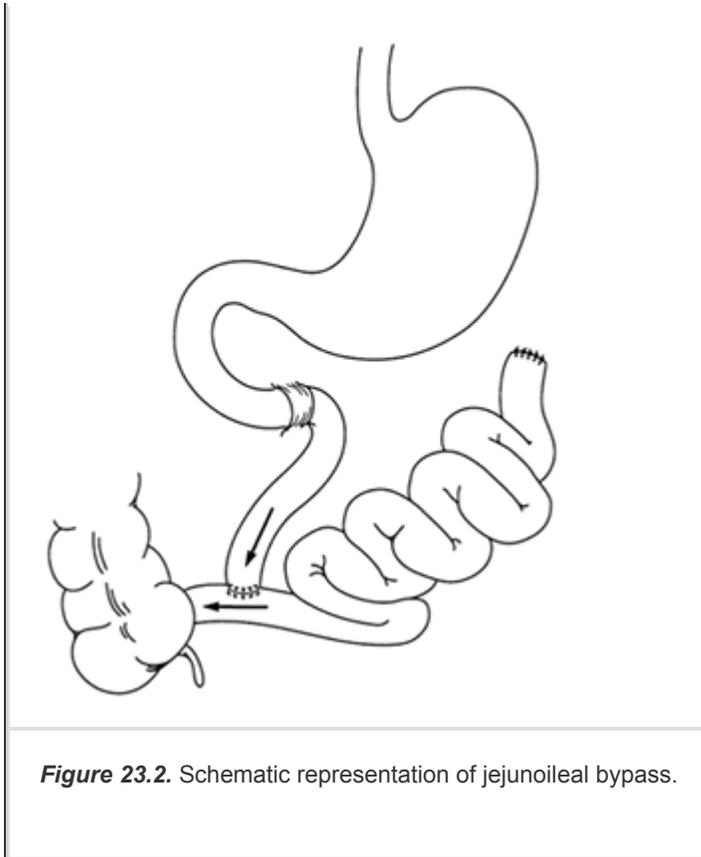
Jejunioleal Bypass

The first popular surgical procedure for morbid obesity was the jejunioleal bypass. This operation produced an obligatory malabsorption state through bypass of a major portion of the absorptive surface of the small intestine. The procedure connected a short length of proximal jejunum (8 to 14 inches) to the distal ileum (4 to 12 inches) as an end-to-end or end-to-side anastomosis. The end-to-end procedures, which were associated with a better weight loss, required decompression of the bypassed small intestine into the colon (Fig. 23-2). The jejunioleal bypass was associated with a number of early and late complications (20). The most serious postoperative complication was cirrhosis due to either protein-calorie malnutrition or absorption of degradation products from bacterial overgrowth in the bypassed intestine. A rheumatoid-like arthritis also occurred as a result of absorption of bacterial products from the bypassed intestine; antigen-antibody complexes to bacterial antigens can be found in the joint fluid of affected people. Rapid weight loss, as well as malabsorption of bile salts, increased the risk of cholelithiasis because of the decrease in cholesterol solubility. Hypocalcemia was frequent because of chelation of calcium with bile salts, leading to severe osteoporosis. Multiple kidney stones were seen as a result of increased oxalate absorption from the colon, where it is normally bound to calcium.

Intractable, malodorous diarrhea with associated potassium and magnesium depletion, metabolic acidosis, and severe malnutrition were common, as was vitamin B₁₂ deficiency.

Bacterial overgrowth in the bypassed intestine also led to vitamin K deficiency, interstitial nephritis with renal failure, pneumatosis intestinalis and bypass enteritis associated with occult blood in the stools, and iron-deficiency anemia. Many of these problems, which are associated with bacterial overgrowth in the bypassed intestine, can be treated, at least temporarily, with metronidazole.





Some surgeons believe that all jejunioleal bypass procedures should be reversed because cirrhosis can develop insidiously in the absence of abnormal liver function test results. If the medical problems are severe (i.e., progressive liver or renal dysfunction), the jejunioleal bypass can be reversed. Because these patients invariably regain their lost weight, conversion to a gastric procedure for obesity

P.770

can be considered unless the patient is too ill (i.e., severe cirrhosis with portal hypertension). Mechanical complications of the jejunioleal bypass include small bowel obstruction and intussusception of the bypassed intestine. Randomized, prospective studies have shown that the gastric bypass operation is associated with a comparable weight loss and a significantly lower complication rate than jejunioleal bypass (21). Because of the significant complication rate, standard jejunioleal bypass should no longer be performed.

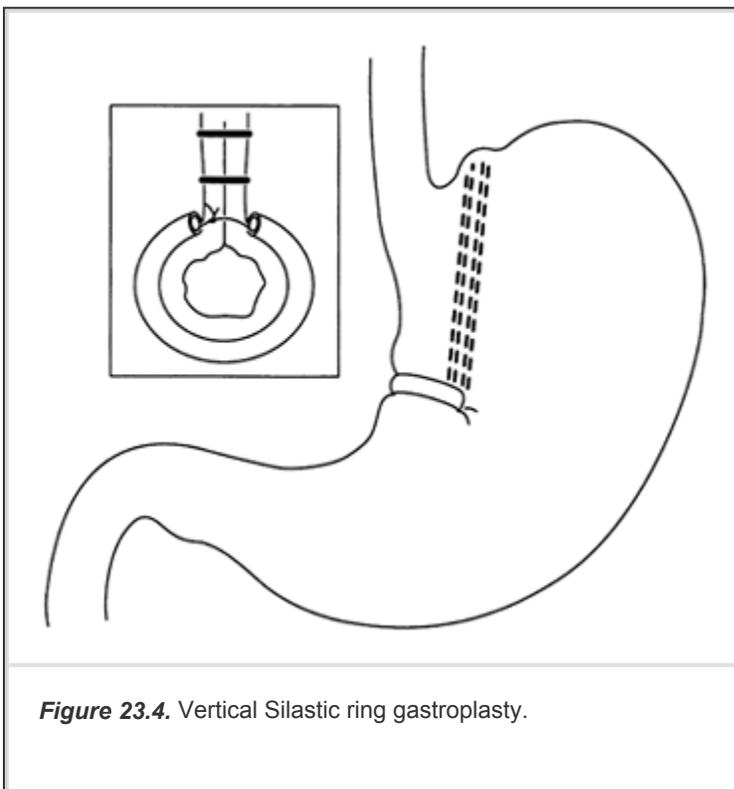
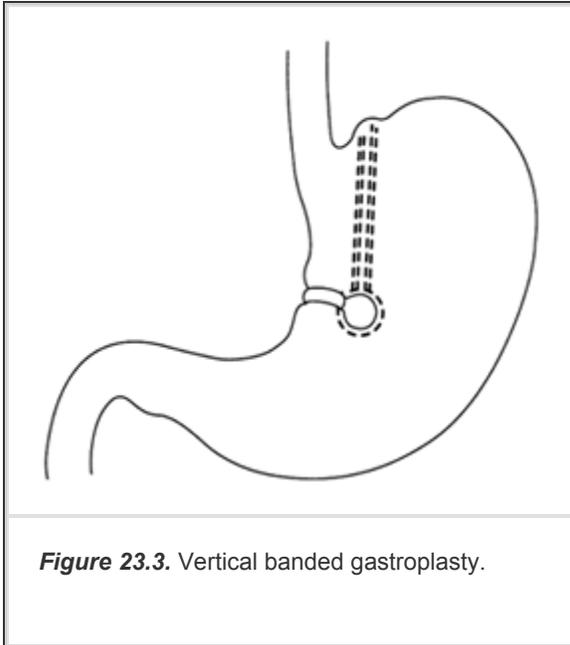
Gastric Procedures for Morbid Obesity

In 1969, investigators reported the results of weight loss after division of the stomach into a small upper pouch connected to a loop gastroenterostomy (22). The concept for this procedure was based on the observation of weight loss that sometimes followed subtotal gastrectomy for duodenal ulcer disease. There was initial concern that peptic ulcers would develop in the bypassed stomach or duodenum, and although these have occurred, the incidence is low. The technique for gastric bypass was simplified with the use of stapling

instruments. The concept of gastroplasty was then proposed as a safer, easier method for restricting food intake. In gastroplasty, the stomach is only stapled and not divided, leaving a small opening to permit the normal passage of food into the distal stomach and duodenum.

Gastroplasty

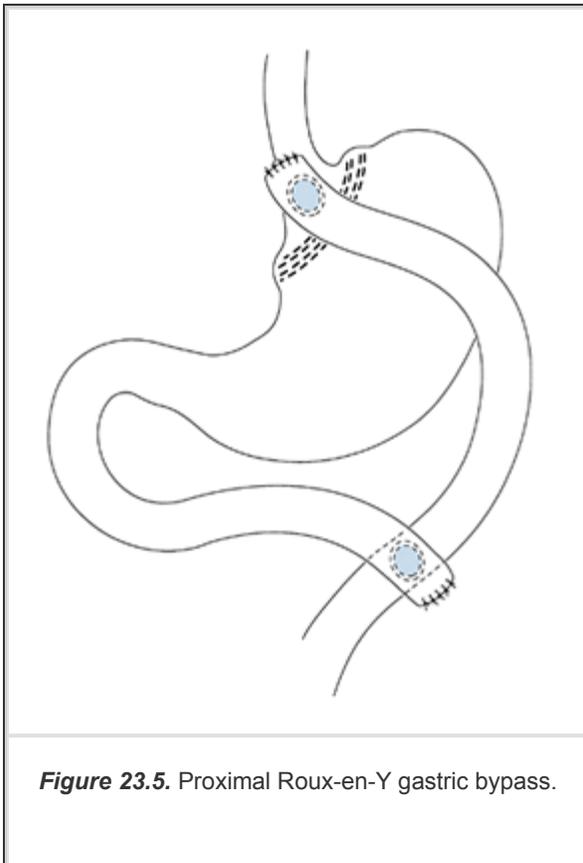
Gastroplasties have been performed with either horizontal or vertical placement of the staples. Horizontal gastroplasty usually requires ligation and division of the short gastric vessels between the stomach and spleen, and it carries the risk of devascularization of the gastric pouch or splenic injury. Horizontal gastroplasties included a single application of a 90-mm stapling device without suture reinforcement of the stoma between upper and lower gastric pouches, or a double application of staples with either a central or lateral Prolene-reinforced stoma. In one study, the failure rates (loss of less than 40% excess weight) for these three horizontal gastroplasty procedures were 71%, 46%, and 42%, respectively (23). The vertical banded gastroplasty (VBGP) is a procedure in which a stapled opening is made in the stomach with the stapling device 5 cm from the cardioesophageal junction (Fig. 23-3). Two applications of a 90-mm stapling device are made between this opening and the angle of His, and a 1.5 × 5-cm strip of polypropylene mesh is wrapped around the stoma on the lesser curvature and sutured to itself, but not to the stomach. Erosion of the mesh into the stomach has been an unusual complication of this procedure. Pouch enlargement is much less likely to occur with a vertical staple line in the thicker, more muscular part of the stomach (as compared with the horizontal gastroplasties), and the stomal diameter is fixed with the mesh band. The Silastic ring gastroplasty is a similar procedure (Fig. 23-4) that uses a vertical staple line and a Silastic tubing-reinforced stoma. Weight loss with vertical Silastic ring gastroplasty appears to be similar to that with VBGP. Use of the four-row parallel bariatric stapler has been associated with a 35% rate of staple line disruption, leading to failure of the operative procedure. Some surgeons now recommend transecting the stomach.



Gastric Bypass

Gastric bypass can also be performed with placement of the staples in a vertical or horizontal direction; the vertical direction is preferred because there is less risk of gastric pouch devascularization or splenic injury. Because of the high incidence of staple line disruption, some surgeons also recommend transecting the stomach for gastric bypass

patients. However, with three to four superimposed applications of a 90-mm stapler, the incidence of staple line disruption has been less than 2%. The gastrojejunostomy used to drain the gastric pouch can be a loop, a loop with a jejunojejunostomy constructed below the gastrojejunostomy, or a Roux-en-Y limb. The latter two techniques prevent bile reflux into the gastric pouch. The length of the Roux-en-Y jejunal limb is usually 45 cm. However, superobese patients (BMI ≥ 50 kg/m²) achieve a significantly better weight loss with a 150-cm Roux limb (long-limb gastric bypass) (24). The gastric pouch should be small (15 mL) and the stoma restricted to 1 cm (Fig. 23-5). The small gastric pouch has a limited volume of acid secretion and is associated with a low incidence of marginal ulcer in the absence of vagotomy.

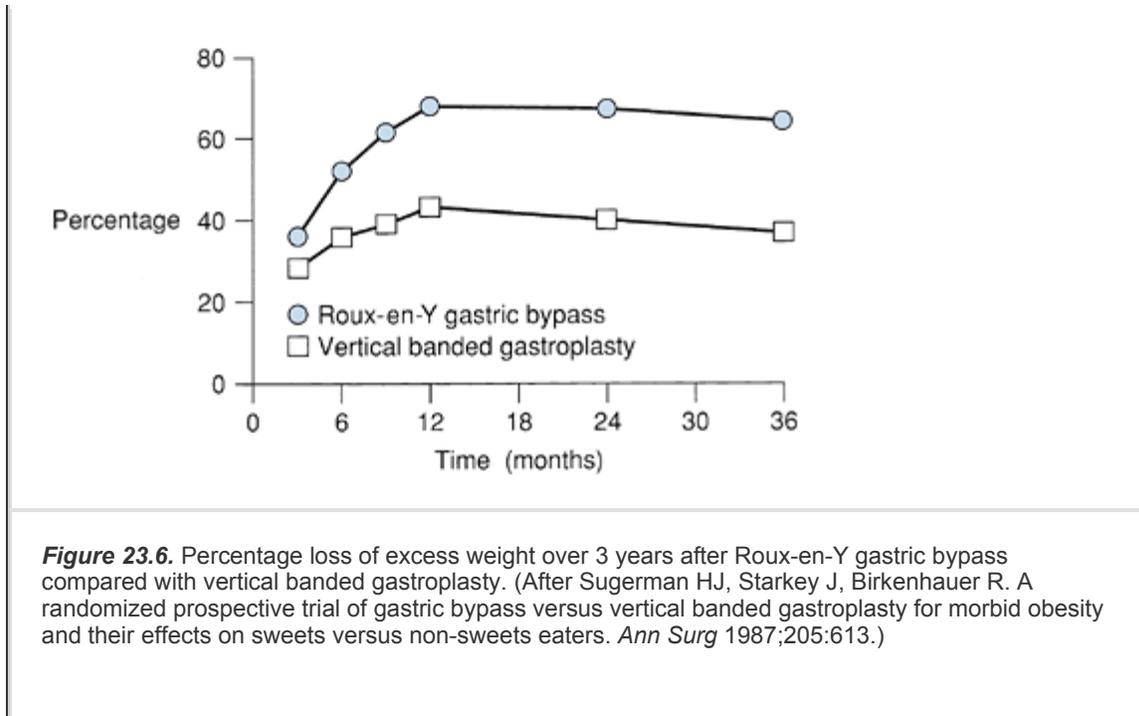


Gastroplasty versus Gastric Bypass

In a randomized, prospective trial (Fig. 23-6), the Roux-en-Y gastric bypass resulted in a weight loss that was significantly better than that achieved with VBGP (25). VBGP can be associated with severe gastroesophageal reflux that resolves after conversion to gastric bypass. Gastric bypass carries

P.771

a higher incidence of stomal ulcer, stomal stenosis, vitamin B₁₂ deficiency, and, in menstruating women, iron-deficiency anemia than does gastroplasty. Gastric bypass is, however, more effective than VBGP in correcting glucose intolerance in patients without overt type II diabetes mellitus.



Some patients can overcome the effect of a standard gastric bypass on weight loss. Although regained weight could be the result of expansion of either the stoma or pouch, this finding is not observed in most patients. Approximately 10% to 15% regain lost weight or fail to achieve an acceptable weight loss. The cause for this failure appears to be excessive, constant nibbling on foods with high caloric density. The average patient loses 66% of his or her excess weight within 2 years after gastric bypass. The percentage excess weight loss is 60% at 5 years, 50% at 10 years, and 47% at 14 years after surgery (26).

Partial Biliopancreatic Diversion

The partial biliopancreatic diversion was developed as both a gastric restrictive procedure and a malabsorptive procedure that does not have a blind intestinal limb for bacterial overgrowth (27). In this operation, a subtotal gastrectomy is performed and the distal 2.5 m of small intestine is anastomosed with a large (2- to 3-cm) stoma to the proximal gastric remnant. The proximal, bypassed small intestine is reanastomosed to the distal ileum 0.5 m from the ileocecal valve. In this manner, the quantity of food ingested is partially restricted and then passes down the intestine mostly undigested and unabsorbed until it reaches the bile and pancreatic juices, 0.5 m from the ileocecal valve, where digestion and absorption take place. Treated patients usually pass four to six stools per day, which are foul smelling and float, reflecting malabsorption of fat. If the distal stomach is not resected, the operation is called a *distal gastric bypass*.

As with the proximal or standard gastric bypass, patients with the distal gastric bypass or partial biliopancreatic diversion are at risk for iron-deficiency anemia and vitamin B₁₂ deficiency. In addition, they are also at risk for protein deficiency, osteoporosis secondary to calcium and vitamin D malabsorption, night blindness and skin eruptions secondary to vitamin A deficiency, and problems with the other fat-soluble vitamins, E and K (28). Italian

patients—the operation was developed in Italy—appear to have less malabsorption and nutritional deficiencies than American patients, probably because of a much lower fat content in the Italian diet. The duodenal switch operation is a modification of the partial biliopancreatic bypass but still may be associated with malnutrition and fat-soluble vitamin and calcium deficiencies (29).

Laparoscopic Obesity Surgery

The adjustable silicone gastric band has been developed to be placed laparoscopically. The device contains a balloon that is adjusted by injecting saline into a subcutaneously implanted port. This procedure has become very popular in Europe. However, there are no long-term studies validating its safety and efficacy. A U.S. Food and Drug Administration-approved trial is in progress in the United States. There have been problems with band slippage leading to gastric obstruction and the need to revise the position of the band, band erosion into the lumen of the stomach, port infections, and inadequate weight loss.

The gastric bypass procedure is being performed laparoscopically at a number of centers, either as a totally laparoscopic procedure or as a laparoscopically assisted procedure using a device that permits insertion of the surgeon's hand for manipulation of tissues without loss of the pneumoperitoneum. This offers a marginal decrease in hospital length of stay and requires use of expensive laparoscopic devices and a longer operating time. Advantages should include a decreased frequency of incisional hernia, which currently is approximately 20% after open obesity surgery, and a decreased severity of adhesions with the potential for fewer subsequent small bowel obstructions. However, the latter may increase if the potential places for internal hernias (at the Roux anastomosis, through the mesocolon) are not closed laparoscopically.

Complications of Gastric Surgery for Morbid Obesity

The most feared complication of gastric surgery for morbid obesity is a postoperative gastric leak with the development of peritonitis. After gastroplasty, this can occur at

P.772

the staple line, from the proximal gastric pouch, or from the distal stomach. Many leaks were secondary to ischemic necrosis that occurred with horizontal stapling procedures, either gastroplasty or gastric bypass, after ligation of the short gastric vessels. The distal stomach can be perforated because of marked dilatation that can occur after a gastric bypass operation as a result of afferent limb obstruction of a loop gastrojejunostomy or obstruction at the jejunajejunostomy of a Roux-en-Y procedure. This complication is usually heralded by frequent hiccups and can be diagnosed by noting a large gastric bubble on a plain abdominal roentgenogram. Impending gastric perforation requires urgent percutaneous or operative decompression. In patients converted from jejunioileal to gastric bypass or in patients with extensive adhesions from previous abdominal surgery, a gastrostomy tube should be inserted prophylactically for decompression. The gastrostomy tube also can be used for feeding until the patient's oral intake permits weight stabilization. A gastrostomy can also be used to feed patients in whom a leak develops from the proximal gastric pouch.

The most dangerous aspect of a gastric leak is the difficulty in recognizing the symptoms of

peritonitis. By the third day after surgery, patients should have little pain. If patients with postoperative gastric bypass or gastroplasty experience worsening pain and complain of pain in the back or the left shoulder (consistent with inflammation of the left hemidiaphragm), urinary frequency, or rectal tenesmus (implying pelvic irritation), the clinician must suspect a leak. Tachycardia, tachypnea, fever, and leukocytosis are usually also present. A leak can often be confirmed with an emergency upper gastrointestinal roentgenographic series using water-soluble contrast. If a leak is observed, or even if the study is negative but the suspicion is high, the patient's abdomen must be urgently reexplored. An attempt to repair the leak should be made, and a large sump drain should be placed nearby because the repair frequently breaks down. This leads to a controlled fistula, which usually heals with total parenteral nutrition therapy or a distal feeding jejunostomy.

A marginal ulcer develops in approximately 10% of patients with gastric bypass. This usually responds to acid suppression therapy (histamine-2 receptor blocker or omeprazole). Stomal stenosis can develop in patients after Roux-en-Y gastric bypass or VBGP. Outpatient endoscopic balloon stomal dilatation should be attempted. This is usually successful in patients with gastric bypass but is effective in less than half of stenoses in patients who have undergone VBGP.

Rapid weight loss after either VBGP or gastric bypass is associated with a high incidence (32% to 35%) of gallstone formation, with a 10% to 20% need for subsequent cholecystectomy for acute biliary colic or cholecystitis within 3 to 5 years of obesity surgery. Some surgeons recommend routine prophylactic cholecystectomy at the time of bariatric surgery; others perform cholecystectomy only with sonographic evidence of gallstones or biliary sludge. Prophylactic ursodeoxycholic acid, 300 mg orally twice daily, has been shown to reduce the risk of gallstone formation from 32% to 2% when given for 6 months after gastric bypass surgery, and there is a very low risk of subsequent gallstone formation for the 6 months after discontinuation of the medication (30).

A rare syndrome of polyneuropathy has occurred after gastric surgery for morbid obesity. This usually occurs in association with intractable vomiting and severe protein-calorie malnutrition. Acute thiamine deficiency has been thought to be responsible for this condition. Vitamin B₁₂ deficiency has been observed after gastric bypass, and this mandates long-term follow-up of these patients with annual measurement of the vitamin B₁₂ level. Deficiency of this vitamin is probably due to decreased acid digestion of vitamin B₁₂ from food with subsequent failure of coupling to intrinsic factor, so that these patients need to take 500 mg of oral vitamin B₁₂ daily or 1 mg intramuscular vitamin B₁₂ per month. Iron-deficiency anemia can occur in menstruating women after gastric bypass. This can be refractory to supplemental ferrous sulfate because iron absorption requires acid and takes place primarily in the duodenum and upper jejunum. Occasionally, iron-dextran injections may be necessary. All menstruating women should take two iron sulfate tablets (325 mg/d) after gastric bypass as long as they continue to menstruate. Magnesium deficiency may also occur and require supplementation. Patients with either a long-limb gastric or partial biliopancreatic bypass can have calcium and fat-soluble vitamin deficiencies that need to be monitored and treated.

Other complications, seen with any type of surgery in obese patients, include wound

infection, wound dehiscence, incisional hernia, venous thrombosis, and pulmonary embolism. The incidence of lower leg venous thrombosis and pulmonary embolism can be significantly reduced with the use of intermittent venous compression boots. Early ambulation is also important. In addition, subcutaneous heparin should be given 30 minutes before surgery and every 8 hours after surgery until the patient is fully ambulatory. Pulmonary embolism is a not infrequent fatal complication in patients with heart failure associated with hypoxemic pulmonary hypertension and mean pulmonary artery pressure greater than 40 mm Hg. It has been recommended that a vena caval filter be placed in these patients prophylactically at the time of obesity surgery. The operative mortality rate after gastric surgery for obesity is now approximately 0.5% in most series.

Failed Gastric Surgery for Obesity

Attempts to revise a failed gastroplasty are often unsuccessful because of recurrence of stomal dilation and problems with gastric emptying. Reoperation in these patients is extremely difficult because of extensive adhesions to the liver and spleen. Results appear to be significantly better when these patients are converted to a Roux-en-Y gastric bypass. Because of the technical difficulties, these patients must understand that the risks of serious complications are far higher after a secondary than after a primary gastric bypass. It is probably inappropriate and dangerous to convert a failed gastric bypass to vertical gastroplasty. Furthermore, revision of a dilated gastrojejunal stoma has not been effective. Most patients who fail a gastric bypass do so as a consequence of excessive fat ingestion. If the patient has significant obesity comorbidity that has failed to resolve or has returned with weight regain, conversion to a malabsorptive distal gastric bypass (modified partial biliopancreatic diversion) can be performed; however, this can be associated with steatorrhea, fat-soluble vitamin deficiencies, and osteoporosis.