

Primary Care Perspective on Bariatric Surgery

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The role of primary care physicians in identifying potential candidates for bariatric surgery and providing them with long-term postoperative care is gaining rapidly in importance. With the increased use of surgical procedures as treatment options for obesity, a knowledge of bariatric surgery is essential for providing optimal care. During the past decade, the number of bariatric procedures has increased, and refinements of these procedures have made them safer and more effective. Primary care physicians should know how to identify appropriate surgical candidates and be familiar with available procedures, aware of potential complications and benefits, and able to provide lifelong monitoring and follow-up care. Thus, the primary care physician must be informed about surgical criteria, types of procedures, outcomes, complications, and the long-term monitoring needs of these patients.

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BMI = body mass index; RNYGB = Roux-en-Y gastric bypass; VBG = vertical-banded gastroplasty

Primary care physicians frequently play a key role in assisting overweight or obese patients in their efforts to control excess weight. Both dietary and exercise counseling, along with occasional medication use, have been the primary treatments available to health care providers. However, these approaches are not successful for most patients.

Obesity continues to grow at epidemic proportions in the United States and other developed nations.¹ More than 50% of the US population is overweight, and at least 22% of the population is obese.^{2,3} Obesity is now the second most common cause of death in the United States.⁴ The estimated cost of obesity in 1995 exceeded \$99 billion, \$50 billion of which was for medication and medical care; the rest was for indirect losses such as decreased work productivity.² Citizens in the United States spend an additional \$30 billion annually for diet programs and supplements.⁵ However, the safety, efficacy, and long-term results of these programs remain questionable.⁶

Bariatric surgery to restrict the reservoir size of the stomach or to cause purposeful malabsorption resulting in weight loss was introduced in the 1960s. Although the

early procedures produced suboptimal results, improved procedures continue to be developed. In the past decade, bariatric procedures as a treatment of obesity have elicited increasing interest. As more obese patients seek bariatric surgery, the role of primary care physicians has increased and is more likely to include identifying possible surgical candidates, screening patients, and providing long-term follow-up.

Physicians unfamiliar with newer data may be unaware that significant refinements of bariatric surgical procedures have made these procedures safer and more effective, reducing morbidity and mortality and resulting in beneficial weight loss and more predictable long-term outcomes.^{4,7,8}

OBESITY

DEFINITION

Body mass index (BMI) is one of the most reliable methods used to report the relationship between body weight and frame size or height. The optimal BMI for a healthy person is between 18.5 and 25 kg/m². Persons considered overweight have a BMI of 25 to 30 kg/m². Persons with a BMI of more than 30 kg/m² are considered obese; those with a BMI of 40 to 50 kg/m² are considered morbidly obese; and those with a BMI of more than 50 kg/m² are considered superobese.^{3,9}

HEALTH RISKS

Many diseases and conditions treated by primary care physicians are directly related to obesity. As BMI increases, so does the incidence of morbid conditions related to obesity³ (Table 1^{3,10,11}). For example, evidence⁹ shows that the age-related lifetime risk of hypertension in men and women aged 45 to 54 years will double as their average BMI increases from 25 to 35 kg/m². Other disease processes that increase in obese patients include type 2 diabetes mellitus, sleep apnea, steatohepatitis (fatty liver), degenerative joint disease, and infertility.³

NONSURGICAL VS SURGICAL RESULTS

The usual obesity treatments (diet, exercise, and medication) have not slowed the increase in obesity. Studies show a nearly 100% failure rate during a 5-year period for persons who diet for weight control.^{2,6,12} Although all groups have difficulty controlling adult obesity, persons who were obese in childhood have the poorest record of

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A question-and-answer section appears at the end of this article.

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controlling obesity as adults. In contrast, at least two thirds of patients who undergo gastric bypass surgery are able to keep off at least 50% of their excess weight for 10 years or longer.^{4,13}

EARLY BARIATRIC SURGERY

The first commonly used bariatric procedure in the 1960s was the jejunioileal bypass. In this procedure, the proximal jejunum was connected directly to the distal ileum, leaving more than 90% of the small intestine out of the intestinal stream of ingested nutrients (blind loop). This bypass created substantial global malabsorption, which led to predictable weight loss but often unacceptable adverse effects (eg, steatorrhea, diarrhea, vitamin deficiencies, oxalosis). Blind-loop problems also could develop. Many patients have required a reversal of this procedure. Since the late 1970s, the jejunioileal bypass has been abandoned.¹⁴

CURRENT INDICATIONS

In 1998, the National Heart, Lung, and Blood Institute Consensus Panel recommended surgery for weight loss as “an option for carefully selected patients with clinically severe obesity (BMI ≥ 40 or ≥ 35 with comorbid conditions) when less invasive methods of weight loss have failed and the patient is at high risk for obesity-associated morbidity or mortality.”²

Comorbid conditions commonly considered indications for bariatric surgery in patients with a BMI between 35 and 40 kg/m² include diabetes mellitus, poorly controlled hypertension or hyperlipidemia, steatohepatitis, coronary artery disease, and obstructive sleep apnea.

Other requirements for surgery include the absence of substance abuse, major psychosis, or untreated depression; a full understanding of the risks, benefits, and uncertainties of the procedure; and a willingness to comply with the preoperative and postoperative evaluation.

TYPES OF BARIATRIC SURGERY

Modifications in the original procedures and the development of new techniques have led to 3 basic concepts for bariatric surgery: gastric restriction by gastric banding (vertical-banded gastroplasty [VBG] and adjustable banding), gastric restriction with bypass (Roux-en-Y gastric bypass [RNYGB]), and a combination of gastric restriction and selective malabsorption (duodenal switch).^{15,16}

GASTRIC RESTRICTION

Gastric restriction procedures decrease the volume capacity of the stomach. Food distends the small proximal

TABLE 1. Morbid Conditions Commonly Related to Obesity*

Chronic venous stasis
Coronary heart disease
Diabetes mellitus
Dysmenorrhea
Gallbladder disease
Gastroesophageal reflux disease
Hirsutism
Hypertension
Infertility
Osteoarthritis
Peripheral vascular disease
Pulmonary insufficiency
Skin infections
Sleep apnea
Urinary incontinence
Increased prevalence of endometrial, colon, prostate, and breast cancer
Increased prevalence of depression and other psychiatric disorders

*Data from references 3, 10, and 11.

pouch, providing satiety. After the proximal pouch has emptied into the distal stomach, the food is digested and absorbed. Originally known as gastroplasty, gastric partitioning, or stomach stapling, the procedure was developed after weight loss was observed in patients who required a subtotal gastrectomy for other diagnoses. Today, 2 widely accepted techniques are used for gastric restriction. The first technique, VBG (Figure 1), involves the creation of a pouch in the proximal stomach with a volume of 10 to 20 mL using a polymeric silicone ring or mesh band (Silastic; Dow Corning, Midland, Mich) affixed to the surrounding

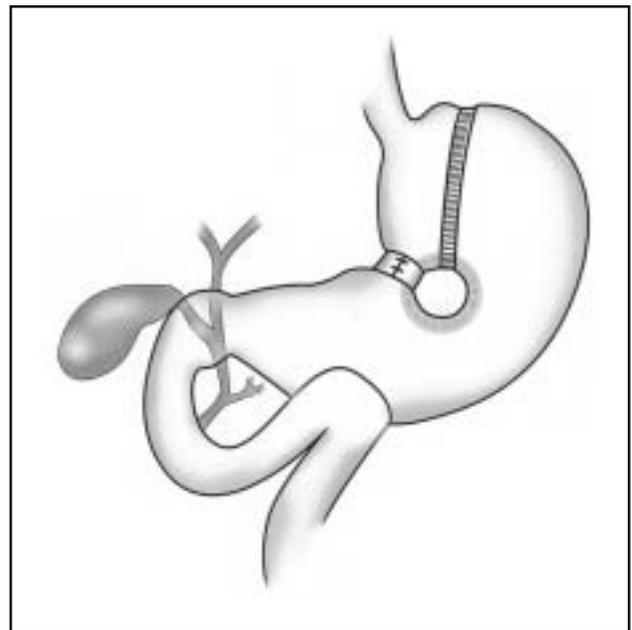


FIGURE 1. Vertical-banded gastroplasty. Redrawn with permission from JAMA.¹⁵

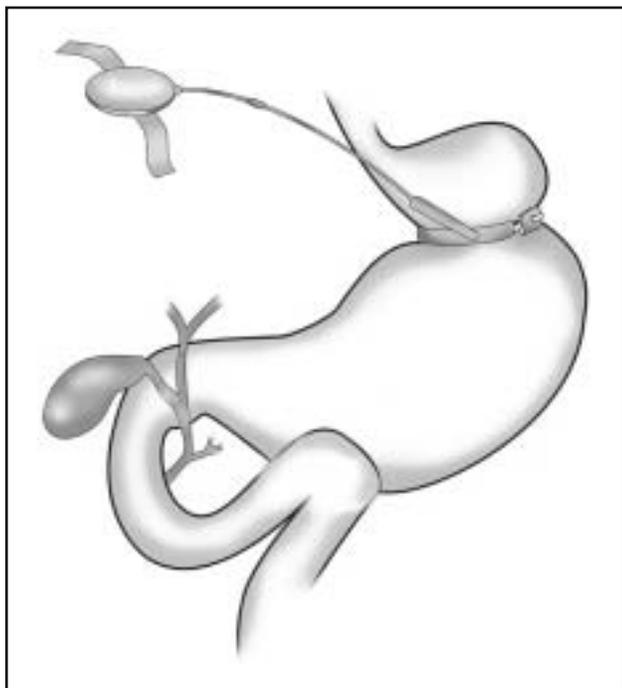


FIGURE 2. Adjustable silicone gastric banding. Redrawn with permission from *JAMA*.¹⁵

tissue. This band provides stability by not allowing the pouch outlet to expand. This, in turn, slows the emptying of the proximal pouch and theoretically increases the duration of satiety.

Another method is adjustable silicone gastric banding (Figure 2) with a silicone band that encircles the very proximal stomach, creating a 10- to 20-mL proximal pouch above the band. To accommodate the caloric needs of the patient, this band is adjustable by inflation through a subcutaneous reservoir. Patients may require multiple adjustments to the band after surgery. The reversibility of an adjustable gastric band is theoretically an additional advantage for some patients.¹⁷ However, repetitive surgical procedures of any type increase risks and should not be approached lightly.

Whether adjustable banding is better than traditional gastric restriction procedures is unknown. There are no well-done, side-by-side, long-term studies comparing the 2 procedures. Also, weight loss appears to be more gradual in patients who have an adjustable band. This slower weight loss may be caused by the less aggressive inflation of the adjustable band, which does not restrict intake as much as VBG. Therefore, early follow-up data may not be representative of long-term outcomes. Patients in 1 small US study (N=36) had a high rate of conversion to gastric bypass surgery after unsuccessful

weight loss with a gastric band.¹⁷ However, in Europe, Australia, and other countries, the gastric band remains the preferred bariatric procedure.^{3,16-18}

GASTRIC RESTRICTION WITH BYPASS

First reported in 1967,¹⁹ RNYGB has become the most common bariatric procedure in the United States.¹³ It involves transection of the stomach that results in a pouch of the proximal stomach with a capacity of 10 to 20 mL. The surgical procedure is completed with a Roux-en-Y gastrojejunostomy that allows the stomach contents to drain directly into the jejunum, bypassing the distal stomach, duodenum, and proximal jejunum³ (Figure 3). The bypass is important because it produces mild malabsorption, which contributes to weight loss. The length of the Roux limb usually varies between 75 and 150 cm. In patients with a BMI greater than 60 kg/m², the Roux limb is sometimes lengthened to 150 cm proximal to the ileocecal valve, creating substantially increased malabsorption. Weight loss and nutritional deficiencies tend to be directly proportional to the Roux limb length. The RNYGB procedure predictably results in more weight loss than does gastric banding or gastroplasty alone.

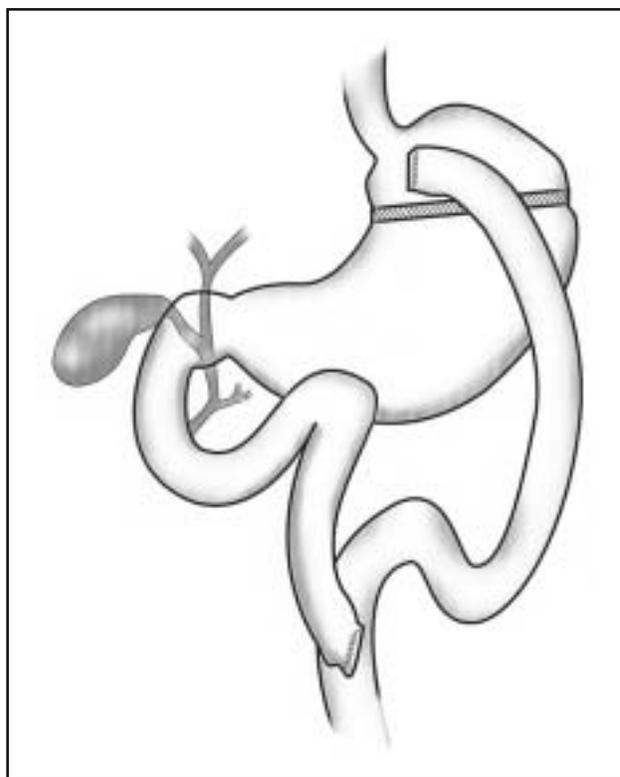


FIGURE 3. Roux-en-Y gastric bypass. Redrawn with permission from *JAMA*.¹⁵

Some patients who undergo RNYGB experience a temporary loss of appetite or a change in their sense of taste.¹³ Although the exact mechanism of such changes has not been elucidated, the changes themselves are probably a contributing factor to the greater weight loss after RNYGB.

GASTRIC RESTRICTION WITH MALABSORPTION

An alternative approach to RNYGB is biliopancreatic bypass. It combines some of the characteristics of gastric bypass with an intentional effort to promote selective malabsorption. In this procedure, after a hemigastrectomy, the biliopancreatic limb of the bypass is anastomosed with the small intestine 50 cm or more from the ileocecal valve. The resulting limited length of intestine for both digestion and absorption results in malabsorption and weight loss. Unfortunately, the original procedure increases the incidences of malnutrition and deficiencies of fat-soluble vitamins. A modification of this surgery, the biliopancreatic bypass with duodenal switch (Figure 4), results in fewer adverse effects (eg, abdominal bloating, steatorrhea, malnutrition) by increasing the length of the common intestinal limb to 100 cm and preserving the pylorus. However, calcium deficiency is a major concern and requires close surveillance.²⁰

RESULTS OF BARIATRIC SURGERY

WEIGHT LOSS

The ultimate objective of any bariatric surgical procedure is satisfactory reversal of weight-related morbidity by weight loss. Large studies of gastric bypass surgery show that the usual expected first-year weight loss is about 60% of excess weight. The excess weight loss in the second year is about 70%, followed by 60% through the fifth year. Approximately 60% of patients remain at this plateau, but about 30% ultimately regain some weight. Gastric bypass procedures not only reduce overall weight but also convincingly reduce body fat.²¹

SURGICAL FAILURE

The surgical failure rate for restrictive surgery or restrictive surgery with gastric bypass depends in part on the experience of the surgeon and the surgical center and on the type of operation. Long-term studies at the Mayo Clinic have shown that VBG has unacceptable success rates of 39% at 3 years and only 20% at 10 years.^{8,22} The major reasons for poor outcome are failure of the staple lines, resulting in disruption of the gastric partitioning, stenosis of the gastric outlet, distention of the gastric pouch, or a maladaptive eating disorder in which the patient “defeats” the operation with calorie-dense food and frequent meals throughout the day.

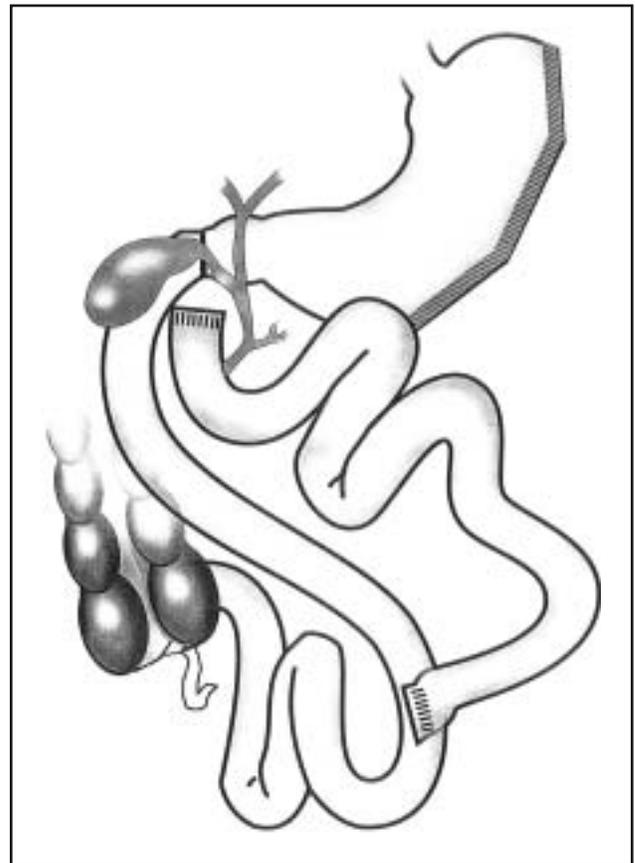


FIGURE 4. Biliopancreatic bypass with duodenal switch. Redrawn with permission from *JAMA*.¹⁵

POTENTIAL HEALTH BENEFITS

QUALITY OF LIFE

Using the SF-36 questionnaire, which assesses quality of life in the areas of physical activities, social functioning, physical role activities, emotional factors, bodily pain, general mental health, vitality, and general health perceptions, Chohan et al¹⁰ found improvement after bariatric surgery. In 7 of the 8 categories, improvement was considerable in patients whose intervention was gastric bypass surgery. These data were most impressive when patients had reached their weight loss plateau. Other authors report a decrease in sick leave and disability after gastric bypass surgery in patients aged 47 to 60 years.²³

DIABETES MELLITUS

The association of obesity with type 2 diabetes mellitus is almost universal. The increasing prevalence of type 2 diabetes mellitus in the United States and other developed countries has been linked directly to the increasing weight of the populace. Several studies of gastric bypass procedures show

TABLE 2. Comparison of Bariatric Procedures*

Study	Procedure	Mean age (y)	No. of patients†	LOS	BMI (kg/m ²)		Mean duration of FU	No. of complications‡		Mortality
					Initial	Final		Early	Late	
Marceau et al ²⁰	BPD-DG	37	233	NA	46	32	100 mo	16.7	NA	1.6
	BPD-DS	37	457	NA	47	30	51 mo	16.3	NA	1.9
MacLean et al ⁴	IGB	NA	274	NA	48.7§	31.4§	5.5 y	NA	NA	0.3
Abu-Abeid & Szold ³²	LAGB	38.1	391	1.2	43.1	29.8	13 mo	1	3.1	0
Bakr & Fahim ⁷	LAGB	31.3	39	2.7	44.2	36.6	6.7 mo	15.32	NA	0
Dargent ¹⁸	LAGB	39.4	500	4.2	43	NA	3 y	2.2	4.6	NA
Doldi et al ³³	LASGB	37.9	172	3.8	46.3	32.6	3 y	NA	NA	0
Gambinotti et al ³⁴	LASGB	43	162	2	42.6	32.2	15 mo	1.9	4.9	0
Olbers et al ³⁵	LVBG	40	139	3	41	33.2	5 y	NA	8	1.4//
Balsiger et al ⁸	RNYGB	42	191	8	49	34	¶	11.5	6.8#	0.5

*BMI = body mass index; BPD-DG = biliopancreatic diversion with distal gastrectomy; BPD-DS = biliopancreatic diversion with duodenal switch; FU = follow-up; IGB = isolated gastric bypass; LAGB = laparoscopic adjustable gastric banding; LASGB = laparoscopic adjustable silicone gastric banding; LOS = length of hospital stay; LVBG = laparoscopic vertical-banded gastroplasty; NA = not available; RNYGB = Roux-en-Y gastric bypass.

†Reported at the beginning of the study.

‡Complication rates varied in their definitions for reporting.

§Approximate, based on reported data.

//Represents 2 patients: 1 died 5 weeks postoperatively of a pulmonary embolism, and 1 died 1 year postoperatively of a myocardial infarction.

¶Approximate median, 2 years; mean not available.

#Does not include ventral hernias in 17% of patients.

rapid improvement in type 2 diabetes mellitus; glucose intolerance resolves in most patients. Such patients also have some mitigation in their risk of diabetic complications.²⁴

HYPERTENSION

Half of patients with hypertension will have resolution of their elevated blood pressure level after substantial weight loss induced by bariatric surgery. Patients who do not achieve normalization of blood pressure level may nevertheless be able to reduce their intake of antihypertensive medication.^{8,10}

CARDIOVASCULAR HEALTH

Studies show that weight reduction improves cardiovascular health.²⁵ Weight loss not only lowers lipid levels but also improves ventricular function.²⁶

SLEEP APNEA

Convincing evidence links sleep-disordered breathing and sleep apnea to obesity, especially of the upper body. Symptoms related to sleep apnea may improve after weight loss, including weight loss after bariatric surgery.²⁷ One large study (N=313) illustrated this finding with patients who had undergone placement of an adjustable gastric band.²⁸ Many obese patients will improve sufficiently after weight loss to no longer require use of an oral airway device or continuous positive airway pressure treatment; however, patients should consult their physicians about having a repeated sleep study before discontinuing treatment for sleep apnea.

PSEUDOTUMOR CEREBRI

Another well-known complication of obesity is pseudotumor cerebri, believed to result from increased abdominal pressure in obese persons that leads to increased intracranial pressure. Initial results of several small studies of bariatric procedures for patients with pseudotumor cerebri indicate substantial improvement and resolution of symptoms in almost all patients, but follow-up data are lacking.²⁹

MORTALITY AND SHORT-TERM MORBIDITY

Livingston and Ko³⁰ identified 4 specific influential predictors of major complications with RNYGB: male sex, revisional surgery, increasing age, or increasing weight before surgery.

A recent meta-analysis of more than 3000 patients reported a combined mortality of 0.14% for restrictive procedures and of 0.3% for combination procedures (restriction and Roux-en-Y).²¹ Other studies suggest a mortality rate of 1% to 1.5%.³¹ Morbidity varies considerably by procedure and treatment center. Immediate postoperative complications include wound problems in almost 15% of patients. The introduction of minimally invasive laparoscopic techniques to the field of bariatric surgery has led to a substantial decrease in the risk of wound-related complications. Wound problems include infections, seromas, dehiscence, or hernias.⁶ Table 2^{4,7,8,18,20,32-35} summarizes selected studies of several types of bariatric surgery and illustrates the variability among procedures. Venous thromboembolism should be expected in 1% of patients, even with appropriate

TABLE 3. Common Complications of Bariatric Surgery*

	Any surgery	LASGB	RNYGB	
Early complications	Bleeding	Band infection	Anastomotic leak	
	Bowel perforation	Band malfunction		
	Death	Band slippage		
	Deep venous thrombosis/ pulmonary embolism			
	Dehydration			
	Dysphagia			
	Peritonitis			
	Pneumonia			
	Pulmonary embolism			
	SBO			
	Wound infection			
	Late complications	Cholecystitis	Anorexia	Internal hernia (SBO)
		Cholelithiasis	Band erosion	Marginal ulcers
Dilated pouch		Band infection	Pancreatitis	
Dysphagia		Band malfunction	Stricture	
GERD		Band slippage		
Incisional hernia		Reservoir leakage		
Malnutrition		(adjustable gastric band only)		
Vitamin B ₁₂ deficiency				

*Data from references 2, 3, 7, 8, 13, 18, and 32-36. GERD = gastroesophageal reflux disease; LASGB = laparoscopic adjustable silicone gastric banding; RNYGB = Roux-en-Y gastric bypass; SBO = small bowel obstruction.

preventive measures. Fatal pulmonary embolism can occur in as many as 0.2% of patients and may occur several weeks postoperatively. Anastomotic leaks occur in about 1% of patients and are a serious complication, even if detected early. As might be anticipated, frequent vomiting is more common after restrictive procedures, occurring in as many as 30% of patients^{21,22} (Table 3^{2,3,7,8,13,18,32-36}).

POTENTIAL LONG-TERM COMPLICATIONS

DUMPING SYNDROME

Dumping syndrome occurs because patients who undergo bariatric procedures are unable to eat foods high in concentrated sugar or fat. Dumping symptoms (eg, postprandial sweating, weakness, hypoglycemia, and generalized malaise) help condition patients to avoid high-energy, high-osmolar junk foods that worsen the syndrome.³ This somewhat desirable complication is rarely severe except for a small group of patients (<1%); it leads to problems after even minimal nutritional intake and occurs only in patients who undergo a combination procedure involving a bypass.²¹ Dumping symptoms are usually short-lived and disappear in almost all patients as they adapt to their bypass anatomy.

NUTRITIONAL DEFICIENCIES

All bariatric procedures have some risk of nutritional deficiency because of the resulting restriction of oral intake of nutrients. Vitamin deficiency occurs in about 11% of patients who have a combination procedure of gastric restric-

tion and bypass.²¹ Roux-en-Y procedures in particular increase the risk of deficiencies in iron, vitamin B₁₂, or calcium.³⁷ Also, biliopancreatic bypass procedures, by inducing selective malabsorption, can result in protein-energy malnutrition and deficiencies in the fat-soluble vitamins A, D, E, and K or in calcium. Hyperhomocystinemia has been reported in as many as two thirds of patients who undergo bariatric surgery. The mechanism of this condition may be folate deficiency.³⁸ Because elevated homocystinemia is an independent risk factor for cardiac disease, cardiovascular risk improvement from weight loss may be negated somewhat by an increased homocysteine level. Daily vitamin and mineral replacement therapy is essential for every bariatric patient. In general, 60 g of protein is recommended for patients with a malabsorptive component to their bariatric procedure.

GASTROESOPHAGEAL REFLUX DISEASE

Although originally proposed as a treatment for gastroesophageal reflux disease, VBG may actually increase gastroesophageal reflux.³⁹ Studies report conflicting findings about the gastric banding procedure and the treatment of gastroesophageal reflux disease. One study reported a 5-fold increase in subsequent reflux symptoms.⁴⁰ Differences in banding techniques and lack of uniform study parameters, such as inconsistent use of 24-hour pH monitoring, impede a clear-cut interpretation of comparative data. Gastric bypass has been shown to be effective in the treatment of gastroesophageal reflux disease⁴¹ and to correct reflux symptoms after VBG.⁴⁰

OSTEOPOROSIS OR METABOLIC BONE DISEASE

Baseline bone density can be challenging to measure in the obese patient because of varying absorptiometry techniques and the effects of more soft tissue around bones.⁴² However, even with technical variations, bone loss and weight loss seem to be related, especially in patients who have considerable weight loss. This bone loss appears to result not from hyperparathyroidism but from transient bone resorption of an unknown mechanism. Because most obese people have a higher-than-average bone density before weight loss, the clinical importance of a reduction in bone density has not been determined fully. Additional studies are required to explain the mechanism and importance of bone resorption. In addition, the possibility of long-term calcium malabsorption leading to calcium deficiency may play a greater role in the eventual development of osteoporosis. Patients undergoing malabsorptive procedures are especially at risk because of altered absorption of vitamin D.

GALLSTONES

Rapid reductions in weight, surgically induced or otherwise, are associated with the increased formation of gallstones. This complication occurs in as many as 30% of patients who have undergone a gastric bypass procedure. Reports indicate that cholecystitis that requires surgery occurs in about 27% of patients within 3 years after a bypass procedure.³⁷ Approaches to this problem include a prophylactic cholecystectomy at the time of the bariatric procedure or prophylactic use of ursodiol (ursodeoxycholic acid) to decrease the formation of gallstones. Ursodiol increases cholesterol solubility and reduces the saturation of cholesterol in bile. Sugerma et al³⁷ reported a reduction in gallstone formation to only 2% with use of 600 mg of ursodiol for 6 months after a gastric bypass. They suggested that the cost and the risk to patients of this medication are less than those for a routine or emergent cholecystectomy.

GASTROGASTRIC FISTULA

A gastrogastric fistula (along the staple lines of the proximal stomach pouch) may occur but is much less common today because of changes in surgical techniques that protect and isolate the staple lines. Leakage of ingested food through the fistula may allow the proximal pouch to empty faster, leading to increased volume of meals and increased appetite. Patients stop losing weight or begin regaining weight.⁴³ Surgical intervention may be necessary to correct the fistula.

ULCER OR STRICTURE

Some patients may experience symptoms (stricture, bleeding, epigastric pain) related to a marginal or stomal ulcer, often due to the use of nonsteroidal anti-inflammatory drugs.

Thus, the newer cyclooxygenase 2 inhibitors and all nonsteroidal anti-inflammatory drugs are contraindicated after the patient undergoes gastric bypass procedures. Primary care physicians may first identify this complication. Upper endoscopy can be helpful with diagnosis and treatment.

EXCESS SKIN

After rapid, substantial weight loss, patients who have undergone bariatric surgery may experience unsightly excess skin and skin folds. Removal of excess abdominal skin, referred to as an apron, is a frequent request. Other areas of excess skin may occur on the back, arms, buttocks, and lower extremities. In most circumstances, such excess skin is a cosmetic problem. However, in rare cases, skin ulceration and infection can lead to more serious medical problems. In another extreme situation, excess leg skin can interfere with ambulation. Before undergoing a bariatric procedure, patients should be aware of these long-term sequelae of rapid weight loss. Removal of excess skin usually is considered cosmetic; therefore, associated expenses typically are not covered by insurance plans. However, treatment for severe recurrent stasis dermatitis in susceptible areas (groin, beneath breasts) may be covered by insurance. Most cosmetic surgeons will refrain from removing excess skin unless the patient has reached and maintained goal weight for at least 1 year.

BARIATRIC SURGERY AND PREGNANCY

Primary care physicians may be asked about the advisability of pregnancy after bariatric surgery. This question is of particular concern for women who have had any procedure that bypasses the pylorus or disrupts gastroduodenal continuity. The stomach is important for production of hydrochloric acid essential for proper iron absorption and intrinsic factor, a requirement for vitamin B₁₂ absorption. In addition, the duodenum is the major site of iron absorption.⁴⁴ However, 2 studies involving 111 pregnancies after gastric bypass surgery found minimal adverse effects with close medical supervision and proper vitamin and mineral supplementation.^{45,46} Severe iron deficiency anemia was noted in only 2 patients, and 1 mother produced low-fat breast milk, possibly due to malabsorption.

Because obesity is not linked with poor pregnancy outcomes except in women with diabetes mellitus or hypertension, obese women who are contemplating pregnancy after bariatric surgery need to evaluate their options carefully. It is recommended that fertile bariatric patients delay pregnancy for at least the first 1 or 2 years after surgery.

FOLLOW-UP CARE

The decision to undergo bariatric surgery involves a life-long commitment for the patient and the physician. Patients

should see their surgeon for immediate postoperative care, but the primary care physician should become involved soon after the procedure. After release from postoperative care, the patient should be seen by either the surgeon or the primary care physician every 3 months. This follow-up will allow for early diagnosis of the more common long-term complications such as iron and vitamin B₁₂ deficiency, incisional hernias, staple-line failure, gastritis, cholecystitis, and anastomotic problems. Also, primary care physicians may be in the best position to identify psychosocial problems such as depression. Psychological counseling is extremely important preoperatively and postoperatively. Counselors with an interest in eating disorders are an essential part of the bariatric team. Routine laboratory studies should include a complete blood cell count and iron studies every 3 months for the first year and annually thereafter. Also, vitamin B₁₂ levels should be monitored periodically. Depending on the nutritional status of the patient, other studies may be indicated. Every patient should be monitored annually by the bariatric center for collection of long-term data. In addition to visiting their physician, patients should be encouraged to participate in support groups, which may improve outcomes and patient satisfaction.

CONCLUSIONS

Bariatric surgery is a safe, appropriate, and accepted treatment for morbid obesity when other methods have failed. Primary care providers should be aware of the indications for the procedure so that they can both counsel patients and make appropriate referrals. Although pharmacological agents to treat obesity are being developed, bariatric procedures will continue to be used at least in the near future as a treatment of morbid obesity. Because such patients require lifetime follow-up, primary care physicians play an integral part in the bariatric team.

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Questions About Bariatric Surgery

- Which one of the following is not an obesity-related condition?
 - Cancer
 - Hypertension
 - Infertility
 - Irritable bowel syndrome
 - Diabetes mellitus

- Which one of the following is correct regarding the percentage of excess weight loss the average patient maintains for 10 years after gastric restriction and bypass?
 - 20%
 - 30%
 - 50%
 - 70%
 - 80%
- Which one of the following is not a benefit of adjustable gastric banding compared with gastric restriction and bypass?
 - Greater ease of reversing the procedure
 - Less likelihood of iron deficiency
 - Less likelihood of vitamin B₁₂ deficiency
 - Less likelihood of gastroesophageal reflux
 - Less likelihood of dumping syndrome
- Which one of the following is not a symptom of dumping syndrome?
 - Postprandial sweating
 - Chronic abdominal pain
 - Postprandial weakness
 - Generalized postprandial malaise
 - Postprandial hypoglycemia
- Which one of the following is the most popular bariatric procedure performed currently in the United States?
 - Gastric partitioning
 - Adjustable gastric banding
 - Gastric restriction and bypass
 - Jejunioileal bypass
 - Biliopancreatic bypass

Correct answers:

1. *d*, 2. *c*, 3. *d*, 4. *b*, 5. *c*