BlueCross BlueShield Federal Employee Program.

FEP Medical Policy Manual

FEP 7.01.47 Bariatric Surgery

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Related Policies:

2.01.38 - Transesophageal Endoscopic Therapies for Gastroesophageal Reflux Disease
7.01.73 - Gastric Electrical Stimulation

Bariatric Surgery

Description

Description

Bariatric surgery is a treatment for obesity in patients who fail to lose weight with conservative measures. There are numerous gastric and intestinal surgical techniques available. While these techniques have heterogeneous mechanisms of action, the result is a smaller gastric pouch that leads to restricted eating. However, these surgeries may lead to malabsorption of nutrients or eventually to metabolic changes.

OBJECTIVE

The objective of this evidence review is to evaluate whether various bariatric surgery procedures improve the net health outcome in adults, adolescents, and preadolescent children with obesity.

POLICY STATEMENT

Bariatric Surgery in Adults With Class 3 Obesity (BMI ≥40 kg/m^2)

The following bariatric surgery procedures may be considered **medically necessary** for the treatment of class 3 obesity (BMI ≥40.0 kg/m^2) in adults (ages 18 and older) who have failed weight loss by conservative measures:

- Open or laparoscopic gastric bypass using a Roux-en-Y,
- Laparoscopic adjustable gastric banding,
- Open or laparoscopic sleeve gastrectomy (SG), and
- Open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch (DS).

Bariatric Surgery in Adults With Class 2 Obesity (BMI ≥35 to 39.9 kg/m^2)

The following bariatric surgery procedures may be considered **medically necessary** for the treatment of class 2 obesity in individuals with at least 1 obesity-related comorbid condition (see Policy Guidelines) who have failed weight loss by conservative measures:

- Open or laparoscopic gastric bypass using a Roux-en-Y,
- Laparoscopic adjustable gastric banding,
- Open or laparoscopic sleeve gastrectomy (SG), and
- Open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch (DS).

Bariatric surgery should be performed in appropriately selected individuals, by surgeons who are adequately trained and experienced in the specific techniques used, and in institutions that support a comprehensive bariatric surgery program, including long-term monitoring and follow-up postsurgery. (see Policy Guidelines for bariatric surgery selection criteria).

Bariatric Surgery in Individuals With Class 1 Obesity (BMI ≥30 to 34.9 kg/m^2) and Type 2 Diabetes

For individuals with Class 1 obesity (BMI ≥30 to 34.9 kg/m^2) and type 2 diabetes, the following bariatric surgery procedures may be considered **medically necessary** in adults who have failed weight loss by conservative measures:

- Open or laparoscopic gastric bypass using a Roux-en-Y,
- Laparoscopic adjustable gastric banding,
- Open or laparoscopic sleeve gastrectomy (SG), and
- Open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch (DS).

Bariatric surgery is considered **investigational** for individuals with Class 1 obesity who do not have type 2 diabetes.

Bariatric surgery is considered **investigational** for individuals with a BMI less than 30 kg/m^2.

The following bariatric surgery procedures are considered **investigational** for the treatment of obesity: s:

- Vertical-banded gastroplasty,
- Gastric bypass using a Billroth II type of (mini-gastric bypass),
- Biliopancreatic diversion (BPD) without DS,
- Long-limb gastric bypass procedure (ie, >150 cm),

- Two-stage bariatric surgery procedures (eg, SG as initial procedure followed by BPD at a later time),
- Laparoscopic gastric plication, and
- Single anastomosis duodeno-ileal bypass with SG.

Revision Bariatric Surgery

Revision surgery to address perioperative or late complications of a bariatric procedure is considered **medically necessary**. These include but are not limited to, staple line failure, obstruction, stricture, nonabsorption resulting in hypoglycemia or malnutrition, weight loss of 20% or more below ideal body weight, and band slippage that cannot be corrected with manipulation or adjustment (see Policy Guidelines section).

Revision of a primary bariatric procedure that has failed due to dilation of the gastric pouch or dilation proximal to an adjustable gastric band (documented by upper gastrointestinal examination or endoscopy) is considered **medically necessary** if the initial procedure was successful in inducing weight loss prior to pouch dilation, and the individual has been compliant with a prescribed nutrition and exercise program.

Revision surgery to address severe gastroesophageal reflux disease refractory to medical treatment is considered **medically necessary**.

Bariatric Surgery in Adolescents

Bariatric surgery in adolescents may be considered **medically necessary** according to similar weight-based criteria used for adults, but greater consideration should be given to psychosocial and informed consent issues (see Policy Guidelines section). In addition, any devices used for bariatric surgery must be used in accordance with the U.S. Food and Drug Administration approved indications.

Bariatric Surgery in Preadolescent Children

Bariatric surgery is considered **investigational** for the treatment of obesity in preadolescent children.

Concomitant Hiatal Hernia Repair With Bariatric Surgery

Repair of a hiatal hernia at the time of bariatric surgery may be considered **medically necessary** for individuals who have a preoperatively diagnosed hiatal hernia with indications for surgical repair (see Policy Guidelines section).

Repair of a hiatal hernia that is diagnosed at the time of bariatric surgery, or repair of a preoperatively diagnosed hiatal hernia in individuals who do not have indications for surgical repair is considered **investigational**.

Endoscopic Procedures

The following endoscopic procedures are **investigational** as a primary bariatric procedure or as a revision procedure (ie, to treat weight gain after bariatric surgery to remedy large gastric stoma or large gastric pouches):

- Insertion of the StomaphyX™ device,
- Endoscopic gastroplasty,
- Use of an endoscopically placed duodenojejunal sleeve,
- Intragastric balloons, and
- Aspiration therapy device.

POLICY GUIDELINES

Bariatric Surgery Selection Criteria

Patients should have documented failure to respond to conservative measures for weight reduction prior to consideration of bariatric surgery, and these attempts should be reviewed by the practitioner prior to seeking approval for the surgical procedure. As a result, some centers require active participation in a formal weight reduction program that includes frequent documentation of weight, dietary regimen, and exercise. However, there is a lack of evidence on the optimal timing, intensity, and duration of nonsurgical attempts at weight loss, and whether a medical weight loss program immediately preceding surgery improves outcomes.

Patients with a BMI of 50 kg/m^2 or more need a bariatric procedure to achieve greater weight loss. Thus, the use of adjustable gastric banding, which results in less weight loss, should be most useful as a procedure for patients with a BMI less than 50 kg/m^2. Malabsorptive procedures, although they produce more dramatic weight loss, potentially result in nutritional complications, and the risks and benefits of these procedures must be carefully weighed in light of the treatment goals for each patient. Patients who undergo adjustable gastric banding and fail to achieve adequate weight loss must show evidence of postoperative compliance with diet and regular bariatric visits prior to consideration of a second bariatric procedure.

Weight-Related Complications

Clinical Practice Guidelines list the following conditions weight-related complications, defined as conditions caused by or exacerbated by excess adiposity:[1,]

- Asthma
- Cardiovascular disease
- Certain types of cancer (eg, colorectal cancer)
- Type 2 diabetes
- Dyslipidemia
- Gastroesophageal reflux disease (GERD)
- Hypertension
- Infertility
- Male hypogonadism
- Mental health (depression)
- Metabolic syndrome
- Nonalcoholic fatty liver disease (nonalcoholic fatty liver and nonalcoholic steatohepatitis)
- Obstructive sleep apnea
- Osteoarthritis
- Polycystic ovarian syndrome
- Prediabetes
- Stroke
- Urinary stress incontinence

Recommendations specify that bariatric surgery may be considered in individuals with a body mass index (BMI) of ≥35 kg/m^2 and 1 or more severe obesity-related complications, including type 2 diabetes, hypertension, obstructive sleep apnea, obesity-hypoventilation syndrome, Pickwickian syndrome, nonalcoholic fatty liver disease or nonalcoholic steatohepatitis, pseudotumor cerebri, GERD, asthma, venous stasis disease, severe urinary incontinence, debilitating arthritis, or considerably impaired quality of life.[1,]Guidelines do not explicitly define thresholds for determining the clinical significance of obesity-related conditions that would qualify individuals for bariatric surgery, however.

Considerations for Bariatric Surgery in Adolescents

Guidelines for bariatric surgery in adolescents are not uniform, with variability in weight-based criteria, ranging from a BMI of 35 kg/m^2 with comorbidities to a BMI of 50 kg/m^2. Most guidelines use weight-based criteria that parallel those for adults.

In addition to the weight-based criteria, there is greater emphasis on issues of developmental maturity, psychosocial status, and informed consent for adolescent patients. All guidelines mention these issues, but recommendations are not uniform The following are examples from U.S. guidelines published since 2013 that address issues of maturity and psychosocial status.

Endocrine Society

- The child has attained Tanner 4 or 5 pubertal development and final or near-final adult height.
- Psychological evaluation confirms the stability and competence of the family unit.
- The patient demonstrates the ability to adhere to the principles of healthy dietary and activity habits (Styne et al, 2017).

Bariatric Procedure Selection for Adolescents

The choice of procedure in adolescents may also differ from adults, but there is a lack of consensus in guidelines or expert opinion as to the preferred procedure(s) for adolescents. The following factors should be considered in the choice of bariatric surgery in adolescents (Aikenhead et al, 2011; PMID: 25586970):

- As in adults, laparoscopic gastric bypass is the most common procedure in adolescents.
- Devices used for laparoscopic adjustable gastric band (LAGB) do not have FDA approval in the United States for individuals younger than age 18 years.
- Some guidelines for bariatric surgery in adolescents do not recommend biliopancreatic diversions (BPD) because of the greater frequency of nutritional deficiencies on long-term follow-up, but other guidelines do not specify that BPD not be done in adolescents.

In 2018, the American Society for Metabolic and Bariatric Surgery (ASMBS) published an updated guideline on pediatric metabolic and bariatric surgery (Pratt et al, 2018). With regard to choice of procedure, the guideline stated:

- "Vertical sleeve gastrectomy has become the most used and most recommended operation in adolescents with severe obesity for several reasons, near-equivalent weight loss to RYGB [Roux-en-Y gastric bypass] in adolescents, fewer reoperations, better iron absorption, and near-equivalent effect on comorbidities as RYGB in adolescents. However, given the more extensive long-term data available for RYGB, we can recommend the use of either RYGB or VSG in adolescents."

Hiatal Hernia Repair Guidelines

In 2018, the ASMBS and the American Hernia Society published a consensus guideline on bariatric surgery and hernia surgery (Menzo et al, 2018). The guideline contained the following conclusions and summary recommendations:

- "There is a significant link between obesity and hernia formation both after abdominal surgery and de novo. There is also evidence that abdominal wall hernia can more commonly present with obstruction or strangulation in patients with obesity."
- "There is a higher risk for complications and recurrence after hernia repair in patients with obesity."
- "In patients with severe obesity and ventral hernia, and both being amenable to laparoscopic repair, combined hernia repair and metabolic/bariatric surgery may be safe and associated with good short-term outcomes and low risk of infection. There is a relative lack of evidence, however, about the use of synthetic mesh in this setting."
- "In patients with severe obesity and abdominal wall hernia that is not amenable to laparoscopic repair, a staged approach is recommended. Weight loss prior to hernia repair is likely to improve hernia repair outcomes. Metabolic/bariatric surgery appears to provide far more significant and rapid weight loss than other modalities and would be a good option for selected patients with severe obesity and large, symptomatic abdominal wall hernia."

The Society of American Gastrointestinal and Endoscopic Surgeons issued evidence-based guidelines for the management of hiatal hernia (Kohn et al, 2013). The Society noted that the general methodologic quality of available studies is low. Recommendations for indications for repair are as follows:

- "Repair of a type I hernia [sliding hiatal hernias, where the gastroesophageal junction migrates above the diaphragm] in the absence of reflux disease is not necessary" (moderate-quality evidence, strong recommendation).
- "All symptomatic paraesophageal hiatal hernias should be repaired [high-quality evidence, strong recommendation], particularly those with acute obstructive symptoms or which have undergone volvulus."
- "Routine elective repair of completely asymptomatic paraesophageal hernias may not always be indicated. Consideration for surgery should include the patient"s age and co-morbidities" (moderate-quality evidence, weak recommendation).

BENEFIT APPLICATION

Experimental or investigational procedures, treatments, drugs, or devices are not covered (See General Exclusion Section of brochure).

FDA REGULATORY STATUS

Forms of bariatric surgery performed without specific implantable devices are surgical procedures and, as such, are not subject to regulation by the FDA.

Table 1 shows forms of bariatric surgery with implantable devices approved by the FDA through the premarket approval process.

Table 1. FDA Approved Bariatric Surgery Devices

Device	Manufacturer	PMA Date	Labeled Indications
Obalon™ intragastric balloon system	Obalon Therapeutics, Inc.	Sept 2016	For use in obese adults (BMI, 30 to 40 kg/m^2) who have failed weight reduction with diet and exercise, and have no contraindications. Maximum placement time is 6 mo. Balloon is encased in a capsule. The capsule is swallowed and begins to dissolve after exposure to fluids in the stomach. After verification of capsule placement in the stomach, the balloon is filled with a gas mixture. Up to 3 balloons can be used during the 6 mo treatment period.
AspireAssist System	Aspire Bariatrics	Jun 2016	For long-term use in conjunction with lifestyle therapy and continuous medical monitoring in obese adults >22 y, with a BMI of 35.0 to 55.0 kg/m^2 and no contraindications to the procedure who have failed to achieve and maintain weight loss with nonsurgical weight loss therapy.
ORBERA intragastric balloon system	Apollo Endosurgery	Aug 2015	For use in obese adults (BMI, 30 to 40 kg/m^2) who have failed weight reduction with diet and exercise, and have no contraindications. Maximum placement time is 6 mo. Balloon placed endoscopically and inflated with saline.
LAP-BAND Adjustable Gastric Banding System	Apollo Endosurgery (original applicant: Allergan)	Apr 2010	For use in weight reduction for severely obese adults with BMI of at least 40 kg/m^2 or a BMI of at least 30 kg/m^2 with ≥1 severe comorbid conditions who have failed more conservative weight-reduction alternatives (eg, supervised diet, exercise, behavior modification programs).
REALIZE Adjustable Gastric Band	Ethicon Endosurgery	Nov 2007	For use in weight reduction for morbidly obese patients and for individuals with BMI of at least 40 kg/m^2, or a BMI of at least 35 kg/m^2 with ≥1 comorbid conditions, or those who are ≥45.4 kg over their estimated ideal weight. Indicated for use only in morbidly obese adults who have failed more conservative weight-reduction alternatives (eg, supervised diet, exercise, behavior modification programs).

BMI: body mass index: FDA: U.S. Food and Drug Administration; PMA: premarket approval.

In February 2017, the FDA issued a letter to health care providers discussing the potential risks with liquid-filled intragastric balloons in response to reports of 2 types of adverse events related to the balloons. Several dozen reports concerned spontaneous overinflation of the balloons, which caused pain, swelling, and vomiting. The second set of adverse event reports indicated that acute pancreatitis developed in several patients due to compression of gastrointestinal structures. These reports involved both ReShape (no longer marketed in the U.S.) and ORBERA brands. The adverse events may require premature removal of the balloons.

In August 2017, the FDA issued a second letter to health care providers informing them of 5 unanticipated deaths occurring from 2016 through the time of the letter, due to intragastric balloons. The FDA recommended close monitoring of patients receiving these devices. In June 2018, the FDA reported that, since 2016, a total of 12 deaths occurred in patients with liquid-filled intragastric balloons worldwide; 7 of these deaths were in patients in the U.S.

In April 2020, the FDA provided an update on risks and continued to recommend that healthcare providers "instruct patients about the symptoms of life-threatening complications such as balloon deflation, gastrointestinal obstruction, and gastric and esophageal perforation and monitor patients closely during the entire duration of treatment for potential complications, including acute pancreatitis, spontaneous hyperinflation, and other potentially life-threatening complications."

RATIONALE

Summary of Evidence

Adults with Class 3 Obesity

For individuals who are adults (18 years or older) with class 3 obesity (body mass index [BMI] ≥40kg/m^2) who are treated with bariatric surgery using open or laparoscopic gastric bypass using a Roux-en-Y, laparoscopic adjustable gastric banding, open or laparoscopic sleeve gastrectomy, or open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch, the evidence includes randomized controlled trials (RCTs), observational studies, and systematic reviews. Relevant outcomes are overall survival (OS), change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. Evidence from nonrandomized comparative studies, case series, and meta-analyses of RCTs has consistently reported that bariatric surgery results in substantially greater weight loss than nonsurgical therapy. Data from the largest comparative study (the SOS study) found that bariatric surgery was associated with improvements in mortality, type 2 diabetes (T2D), cardiovascular risk factors, and quality of life. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Adults with Class 2 Obesity

For individuals who are adults (18 years or older) with class 2 obesity (BMI ≥35 to 39.9 kg/m^2) who are treated with bariatric surgery using open or laparoscopic gastric bypass using a Roux-en-Y, laparoscopic adjustable gastric banding, open or laparoscopic sleeve gastrectomy, or open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch, the evidence includes RCTs, observational studies, and systematic reviews. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. Evidence from nonrandomized comparative studies, case series, and meta-analyses of RCTs has consistently reported that bariatric surgery results in substantially greater weight loss than nonsurgical therapy. Data from the largest comparative study (the SOS study) found that bariatric surgery was associated with improvements in mortality, T2D, cardiovascular risk factors, and quality of life. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Adults with Class 1 Obesity and Type 2 Diabetes

For individuals who have Class 1 obesity (BMI ≥30 to 34.9 kg/m^2) and T2Ded with bariatric surgery using open or laparoscopic gastric bypass using a Roux-en-Y, laparoscopic adjustable gastric banding, open or laparoscopic sleeve gastrectomy, or open or laparoscopic biliopancreatic bypass/diversion (ie, Scopinaro procedure) with duodenal switch, the evidence includes systematic reviews of RCTs and observational studies. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. Systematic reviews of RCTs and observational studies have found that certain types of bariatric surgery are more efficacious than medical therapy as a treatment for T2D in adults with obesity, including those with a BMI between 30 and 34.9 kg/m^2. The greatest amount of evidence assesses gastric bypass, with some comparative studies on laparoscopic adjustable gastric banding, laparoscopic sleeve gastrectomy, and biliopancreatic bypass/diversion. Systematic reviews have found significantly greater remission rates of diabetes, decrease in hemoglobin A1c (HbA1c) levels, and decrease in BMI with bariatric surgery than with nonsurgical treatment. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Adults with a Body Mass Index <35 kg/m^2 Who Do Not Have Type 2 Diabetes

For individuals with a BMI <35 kg/m^2 who do not have T2D who receive bariatric surgery, the evidence includes systematic reviews of RCTs and observational studies. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. A few small RCTs and case series have reported a loss of weight and improvements in comorbidities for this population. However, the evidence does not permit conclusions on the long-term risk-benefit ratio of bariatric surgery in this population. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Revision Bariatric Surgery

For individuals who are adults who receive revision bariatric surgery, the evidence includes systematic reviews, case series, and registry data. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. SSystematic reviews and case series have shown that patients receiving revision bariatric surgery experienced satisfactory weight loss and reduced comorbidities including gastroesophageal reflux disease. Data from a multinational bariatric surgery database has found that corrective procedures following primary bariatric surgery are relatively uncommon but generally safe and efficacious. A large retrospective analysis found a serious complication rate of 7.2% for conversion to Roux-en-Y gastric bypass (RYGB) in 13,432 individuals and no difference in 30-day mortality compared to primary RYGB. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Adolescents with Obesity

For individuals who are adolescent children with obesity who are treated with bariatric surgery using open or laparoscopic gastric bypass, laparoscopic adjustable gastric banding, or open or laparoscopic sleeve gastrectomy, the evidence includes RCTs, observational studies, and systematic reviews. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. Systematic reviews of studies on bariatric surgery in adolescents, who mainly received gastric bypass or laparoscopic adjustable gastric banding or sleeve gastrectomy, found significant weight loss and reductions in comorbidity outcomes with bariatric surgery. For bariatric surgery in the adolescent population, although data are limited on some procedures, studies have generally reported that weight loss and reduction in risk factors for adolescents are similar to that for adults. Most experts and clinical practice guidelines have recommended that bariatric surgery in adolescents be reserved for individuals with severe comorbidities, or for individuals with a BMI greater than 50 kg/m^2. Also, greater consideration should be placed on the patient developmental stage, on the psychosocial aspects of obesity and surgery, and on ensuring that the patient can provide fully informed consent. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Preadolescent Children with Obesity

For individuals who are preadolescent children with obesity who receive bariatric surgery, there are no studies focused solely on this population. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. Several studies of bariatric surgery in adolescents have also included children younger than 12 years old. A recent (2021) cohort study included 801 children ages 5 to 14 years in their total cohort of children and adolescents, and excess weight loss and comorbidity resolution were substantial and long-lasting without safety concerns across all age groups. However, comparative studies are still lacking. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Hiatal Hernia Repair with Bariatric Surgery

For individuals with obesity and a preoperative diagnosis of a hiatal hernia who receive hiatal hernia repair with bariatric surgery, the evidence includes a systematic review, cohort studies, and case series. Relevant outcomes are OS, change in disease status, functional outcomes, health status measures, quality of life, and treatment-related mortality and morbidity. A systematic review found that hiatal hernia repair during sleeve gastrectomy was superior to sleeve gastrectomy alone for gastroesophageal reflux disease remission, but not de novo. Results from the cohort studies and case series have shown that, when a preoperative diagnosis of a hiatal hernia has been present, repairing the hiatal hernia during bariatric surgery resulted in fewer complications. However, the results are limited to individuals with a preoperative diagnosis. There was no evidence on the use of hiatal hernia repair when the hiatal hernia diagnosis is incidental. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American Association of Clinical Endocrinologists and American College of Endocrinology

In 2016, the American Association of Clinical Endocrinologists (AACE) and the American College of Endocrinology (ACE) jointly published comprehensive clinical guidelines on the medical care of individuals with obesity.[1,] The guidelines addressed 9 broad clinical questions with 123 recommendations. The recommendations specific to bariatric surgery are shown in Table 13. The guidelines noted that a de novo evidence-based review of questions pertaining to bariatric surgery was not undertaken. Instead, the 2013 guidelines from AACE, the Obesity Society, and the American Society for Metabolic & Bariatric Surgery were reviewed and determined to be adequate. Key recommendations from those guidelines were included in the 2016 document and are shown in Table 2.

Table 2. Recommendations on Bariatric Surgery Included in the American Association of Clinical Endocrinologists and the American College of Endocrinology Guidelines for Medical Care of Patients with Obesity (2016)

Key Question	Recommendation	Evidence Grade	Best Evidence Level
9.1 Is bariatric surgery effective to treat obesity and weight-related complications?	R120. Patients with a BMI of >40 kg/m2 without coexisting medical problems and for whom the procedure would not be associated with excessive risk should be eligible for bariatric surgery	A	1
9.2 When should bariatric surgery be used to treat obesity and weight-related complications?	R121. Patients with a BMI of ≥35 kg/m^2 and 1 or more severe obesity-related complications, including T2D, hypertension, obstructive sleep apnea, obesity hypoventilation syndrome, Pickwickian syndrome, nonalcoholic fatty liver disease or nonalcoholic steatohepatitis, pseudotumor cerebri, gastroesophageal reflux disease, asthma, venous stasis disease, severe urinary incontinence, debilitating arthritis, or considerably impaired QOL may also be considered for a bariatric surgery procedure. Patients with BMI of 30 to 34.9 kg/m^2 with diabetes or metabolic syndrome may also be considered for a bariatric procedure, although current evidence is limited by the number of patients studied and lack of long-term data demonstrating net benefit.		
	BMI ≥35 kg/m^2 and therapeutic target of weight control and improved biochemical markers of CVD risk	A	1
	BMI ≥30 kg/m^2 and therapeutic target of weight control and improved biochemical markers of CVD risk	B	2
	BMI ≥30 kg/m^2 and therapeutic target of glycemic control in T2DM and improved biochemical markers of CVD risk	C	3
	R122. Independent of BMI criteria, there is insufficient evidence to recommend a bariatric surgical procedure specifically for glycemic control, lipid lowering, or CVD risk reduction alone	D	NA
	R123. All patients should undergo pre-operative evaluation for weight-related complications and causes of obesity, with special attention directed to factors that may affect a	A	1

	recommendation for bariatric surgery or be ameliorated by weight loss resulting from the procedure		

BMI: body mass index; CVD: cardiovascular disease; NA: not applicable; QOL: quality of life; T2D: type 2 diabetes.

American Academy of Clinical Endocrinologists, ACE, the Obesity Society, the American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists

In 2019, an update of the joint 2013 guidelines on support for bariatric surgery patients were published by the AACE, the Obesity Society, the American Society for Metabolic and Bariatric Surgery (ASMBS), Obesity Medicine Association, and American Society of Anesthesiologists.[131,] Recommendations on the following questions are summarized below.

- "Which patients should be offered bariatric surgery?"
  - "Patients with a BMI [body mass index] ≥40 kg/m^2 without coexisting medical problems and for whom bariatric surgery would not be associated with excessive risk should be eligible for a bariatric procedure."
  - "Patients with a BMI ≥35 kg/m^2 and 1 or more severe obesity-related complications remediable by weight loss, including T2D, high risk for T2D, poorly controlled hypertension, nonalcoholic fatty liver disease/nonalcoholic steatohepatitis, OSA [obstructive sleep apnea], osteoarthritis of the knee or hip, and urinary stress incontinence, should be considered for a bariatric procedure."
  - "Patients with the following comorbidities and BMI≥35 kg/m^2 may also be considered for a bariatric procedure, though the strength of evidence is more variable; obesity-hypoventilation syndrome and Pickwickian syndrome after a careful evaluation of operative risk; idiopathic intracranial hypertension; [gastroesophageal reflux disease]; severe venous stasis disease; impaired mobility due to obesity, and considerably impaired quality of life."
  - "Patients with BMI of 30 to 34.9 kg/m^2 with T2D with inadequate glycemic control despite optimal lifestyle and medical therapy should be considered for a bariatric procedure; current evidence is insufficient to support recommending a bariatric procedure in the absence of obesity."
  - "The BMI criterion for bariatric procedures should be adjusted for ethnicity (eg, 18.5 to 22.9 kg/m^2 is normal range, 23 to 24.9 kg/m^2 overweight, and ≥25 kg/m^2 obesity for Asians)."
  - "Bariatric procedures should be considered to achieve optimal outcomes regarding health and quality of life when the amount of weight loss needed to prevent or treat clinically significant obesity-related complications cannot be obtained using only structured lifestyle change with medical therapy."
- "Which bariatric surgical procedure should be offered?"
  - "Selecting a bariatric procedure should be based on individualized goals of therapy (e.g., weight loss target and/or improvement in specific obesity-related complications), available local-regional expertise (obesity specialists, bariatric surgeon, and institution), patient preferences, personalized risk stratification, and other nuances as they become apparent. Notwithstanding technical surgical reasons, laparoscopic bariatric procedures should be preferred over open bariatric procedures due to lower early postoperative morbidity and mortality. Laparoscopic adjustable gastric banding, sleeve gastrectomy, RYGB [Roux-en-y gastric bypass], and LBPD/DS [laproscopic biliopancreatic diversion/duodenal switch], or related procedures should be considered as primary bariatric and metabolic procedures performed in patients requiring weight loss and/or amelioration of obesity-related complications. Physicians must exercise caution when recommending BPD [biliopancreatic diversion], BPD with duodenal switch, or related procedures because of the greater associated nutritional risks related to the increased length of bypassed small intestine. Newer nonsurgical bariatric procedures may be considered for selected patients who are expected to benefit from short-term (ie, about 6 months) intervention with ongoing and durable structured lifestyle with/without medical therapy."

Individuals with Type 2 Diabetes Mellitus

In 2022, The AACE published updated guidelines for the comprehensive care of individuals with diabetes mellitus.[132,] Recommendations related to bariatric procedures are shown in Table 3.

Table 3. Recommendations on Bariatric Surgery Included in the American Association of Clinical Endocrinology Guidelines on Care of Persons with Diabetes Mellitus (2022)

Recommendation Number	Recommendation	Evidence Grade	Best Evidence Level
10.9	Persons with a BMI ≥35 kg/m^2 and 1 or more severe obesity-related complications remediable by weight loss, including T2D, high risk for T2D (insulin resistance, prediabetes, and/or metabolic syndrome), poorly controlled hypertension, NAFLD/NASH, OSA, osteoarthritis of the knee or hip, and urinary stress incontinence, should be considered for a bariatric procedure	C	3
10.10	Persons with BMI 30 to 34.9 kg/m^2 and T2D with inadequate glycemic control despite optimal lifestyle and medical therapy should be considered for a bariatric procedure	B	2

BEL: best evidence level; BMI: body mass index; GOE: grade of evidence; NAFLD: nonalcoholic fatty liver disease; NASH: nonalcoholic steatohepatitis; OSA: obstructive sleep apnea; T2D: type 2 diabetes.

Veterans Affairs/Department of Defense

In 2020, the Department of Veterans Affairs/Department of Defense (VA/DoD) published a clinical practice guideline for the management of adult overweight and obesity.[133,] Recommendations on bariatric surgery are shown in Table 4

Table 4. Recommendations on Bariatric Surgery Included in VA/DoD Obesity Treatment Guidelines (2020)

Recommendation Number	Recommendation Statement	Strength of Evidence[1]
12	We suggest offering the option of metabolic/bariatric surgery, in conjunction with a comprehensive lifestyle intervention, to patients with a body mass index of ≥30 kg/m2 and type 2 diabetes mellitus.	Weak
13	We suggest offering the option of metabolic/bariatric surgery, in conjunction with a comprehensive lifestyle intervention, for long-term weight loss/maintenance and/or to improve obesity-associated condition(s) in adult patients with a body mass index ≥40 kg/m2 or those with body mass index ≥35 kg/m2 with obesity-associated condition(s).	Weak
14	There is insufficient evidence to recommend for or against metabolic/bariatric surgery to patients over age 65.	Neither for nor against
15	There is insufficient evidence to recommend for or against percutaneous gastrostomy devices for weight loss in patients with obesity.	Neither for nor against
16	We suggest offering intragastric balloons in conjunction with a comprehensive lifestyle intervention to patients with obesity (body mass index ≥30 kg/m^2) who prioritize short-term (up to six months) weight loss.	Weak
17	There is insufficient evidence to recommend for or against intragastric balloons for long-term weight loss to support chronic weight management or maintenance.	Neither for nor against

[1]The relative strength of the recommendation is based on a binary scale, "Strong" or "Weak." A strong recommendation indicates that the Work Group is highly confident that desirable outcomes outweigh
undesirable outcomes. If the Work Group is less confident of the balance between desirable and undesirable outcomes, they present a weak recommendation.

Society of American Gastrointestinal and Endoscopic Surgeons

In 2013, the Society of American Gastrointestinal and Endoscopic Surgeons issued evidence-based guidelines on the management of a hiatal hernia, which included a recommendation about the repair of hiatal hernias incidentally detected at the time of bariatric surgery.[129,] These guidelines stated:

"During operations for Roux-en-Y gastric bypass, sleeve gastrectomy and the placement of adjustable gastric bands, all detected hiatal hernias should be repaired" (moderate quality evidence, weak recommendation).

Guidelines for Children and Adolescents

Childerhose et al (2017) conducted a systematic review of adolescent bariatric surgery recommendation documents published in the United States and provided recommendations based on their review.[134,] The literature search was conducted from 1999 through 2013 and identified 16 recommendations for inclusion: 10 clinical practice guidelines, 4 position statements, and 2 consensus statements. Fifteen of the 16 publications recommended bariatric surgery for adolescents. The main reasons for recommending bariatric surgery for adolescents included: (1) surgery is effective in producing short- and long-term weight loss; (2) surgery is appropriate when the patient does not respond to behavioral or medical interventions; (3) surgery is appropriate when serious comorbidities threaten the health of the patient; and (4) surgery can improve long-term health and/or emotional problems. Body mass index thresholds ranged from 35 kg/m^2 or more to 50 kg/m^2 or more, with lower thresholds usually requiring the presence of at least 1 serious comorbidity. The minimum age was specified in 10 publications, with most using physiologic maturity (Tanner stage IV and/or 95% of adult height based on bone age, corresponding to ≥13 years for females and to ≥15 years for males) rather than years.

American Academy of Pediatrics

In 2019, the American Academy of Pediatrics (AAP) published a report outlining the current evidence regarding adolescent bariatric surgery that provided recommendations for practitioners and policy makers.[135,] Within this report, AAP listed indications for adolescent metabolic and bariatric surgery that reflected 2018 ASMBS recommendations. Additionally, the AAP report noted that generally accepted contraindications to bariatric surgery included: "a medically correctable cause of obesity, untreated or poorly controlled substance abuse, concurrent or planned pregnancy, current eating disorder, or inability to adhere to postoperative recommendations and mandatory lifestyle changes."

In 2023, the AAP published their first evidence-based clinical practice guideline for the evaluation and treatment of children and adolescents (ages 2 to 18 years) with obesity.[136,] The recommendations put forth in the guideline are based on evidence from RCTs and comparative effectiveness trials, along with high-quality longitudinal and epidemiologic studies gathered in a systematic review process described in their methodology. The AAP's recommendation related to bariatric surgery is below:

- "Pediatricians and other PHCPs [pediatric health care providers] should offer referral for adolescents 13 years and older with severe obesity (BMI ≥ 120% of the 95th percentile for age and sex) for evaluation for metabolic and bariatric surgery to local or regional comprehensive multidisciplinary pediatric metabolic and bariatric surgery centers (Grade C Evidence Quality)."

They list indications for adolescent metabolic and bariatric surgery (Table 5) that align with the 2019 indications.

Table 5. Indications for Adolescent Metabolic and Bariatric Surgery

Weight Criteria	Comorbid Conditions
Class 2 obesity; BMI ≥35, or 120% of the 95th percentile for age and sex, whichever is lower Class 3 obesity; BMI ≥40, or 140% of the 95th percentile for age and sex, whichever is lower	Clinically significant disease, including, but not limited to, OSA (AHI >5), T2D, IIH, NASH, Blount disease, SCFE, depressed health-related quality of life, and hypertension Not required but commonly present

AHI: apnea-hypopnea index; BMI: body mass index; IIH: idiopathic intracranial hypertension; NASH: non-alcoholic steatohepatitis; OSA: obstructive sleep apnea; SCFE: slipped capital femoral epiphysis; T2D: type 2 diabetes.

American Society for Metabolic and Bariatric Surgery

In 2012, the ASMBS best practice guidelines found that current evidence was insufficient to discriminate among specific bariatric procedures, but allowed that there was an increasing body of data showing safety and efficacy of Roux-en-Y gastric bypass and adjustable gastric band for the pediatric population.[137,] Bariatric surgery was recommended for pediatric patients with morbid obesity and the following comorbidities:

- Strong indications: T2D, moderate or severe obstructive sleep apnea (apnea-hypopnea index >15), nonalcoholic steatohepatitis, pseudotumor cerebri.

- Less strong indications: cardiovascular disease, metabolic syndrome.

The guidelines stated that depression and eating disorders should not be considered exclusion criteria for bariatric surgery. The guidelines also noted that depression should be monitored following the procedure and that eating disorders should be treated and the patient stabilized before the procedure.

In 2018, ASBMS published an update to the 2012 guideline.[138,] Summary of major changes in the guideline included:

- "Vertical sleeve gastrectomy has become the most used and most recommended operation in adolescents with severe obesity for several reasons, near-equivalent weight loss to RYGB in adolescents, fewer reoperations, better iron absorption, and near-equivalent effect on comorbidities as RYGB in adolescents. However, given the more extensive long-term data available for RYGB, we can recommend the use of either RYGB or VSG in adolescents. Long-term outcomes of after vertical sleeve gastrectomy are still not well understood."
- "There are no data that the number of preoperative weight loss attempts correlated with success after metabolic/bariatric surgery. Compliance with a multidisciplinary preoperative program may improve outcomes after metabolic/bariatric surgery but prior attempts at weight loss should be removed as a barrier to definitive treatment for obesity."
- "The use of the most up to date definitions of childhood obesity are as follows: (1) BMI cut offs of 35 kg/m^2 or 120% of the 95th percentile with a comorbidity, or (2) BMI >40 kg/m^2 or 140% of the 95th percentile without a comorbidity (whichever is less). Requiring adolescents with a BMI >40 to have a comorbidity (as in the old guidelines) puts children at a significant disadvantage to attaining a healthy weight. Earlier surgical intervention (at a BMI <45 kg/$m^{2)}$ can allow adolescents to reach a normal weight and avoid lifelong medication therapy and end organ damage from comorbidities."
- "Certain comorbidities should be considered in adolescents, specifically the psychosocial burden of obesity, the orthopedic diseases specific to children, , and cardiac risk factors. Given the poor outcomes of medical therapies for T2D in children, these comorbidities may be considered an indication for metabolic/bariatric surgery in younger adolescents or those with lower obesity percentiles."
- "Vitamin B deficiencies, especially B1 appear to be more common in adolescents both preoperatively and postoperatively; they should be screened for and treated. Prophylactic B1 for the first 6 months postoperatively is recommended as is education of patients and primary care providers on the signs and symptoms of common deficiencies."
- "Developmental delay, autism spectrum, or syndromic obesity should not be a contraindication to metabolic/bariatric surgery. Each patient and caregiver team will need to be assessed for the ability to make dietary and lifestyle changes required for surgery. Multidisciplinary teams should agree on the specific needs and abilities of the given patient and caregiver and these should be considered on a case-by-case basis with the assistance of the hospital ethics committee where appropriate."
- "Because metabolic/bariatric surgery results in better weight loss and resolution of comorbidities in adolescents at lower BMI"s with fewer comorbidities, referrals should occur early, as soon as a child is recognized to suffer from severe obesity disease (BMI >120% of the 95th percentile or BMI of 35). Prior weight loss attempts, Tanner stage, and bone age should not be considered when referring patients to a metabolic/bariatric surgery program."
- "Unstable family environments, eating disorders, mental illness, or prior trauma should not be considered contraindications for metabolic/bariatric surgery in adolescents; however, these should be optimized and treated where possible before and surrounding any surgical intervention for obesity."

In 2022, the ASMBS updated their guideline on indications for metabolic and bariatric surgery.[139,] They noted that prospective data demonstrated durable weight loss and maintained co-morbidity remission in patients as young as 5 years of age. Additionally, the ASMBS stated that metabolic and bariatric surgery do not negatively impact pubertal development or linear growth, and therefore a specific Tanner stage and bone age should not be considered a requirement for surgery. Other statements supported 2018 recommendations, including that syndromic obesity, developmental delay, autism spectrum, or a history of trauma would not be considered a contraindication to bariatric surgery in children or adolescents.

Endocrine Society

In 2008, the Endocrine Society published recommendations on the prevention and treatment of pediatric obesity.[140,] In 2017, the Society sponsored an update of these guidelines by the Pediatric Endocrine Society and the European Society of Endocrinology.[141,] These guidelines recommended the following:

"We suggest that bariatric surgery be considered only under the following conditions:

- The child has attained Tanner 4 or 5 pubertal development and final or near-final adult height.

- The child has a BMI > 40 kg/m^2 or has BMI above 35 kg/m^2 and significant, extreme comorbidities.
- Extreme obesity and comorbidities persist, despite compliance with a formal program of lifestyle modification, with or without a trial of pharmacotherapy.
- Psychological evaluation confirms the stability and competence of the family unit.
- There is access to an experienced surgeon in a pediatric bariatric surgery center of excellence that provides the necessary infrastructure for patient care, including a team capable of long-term follow-up of the metabolic and psychosocial needs of the patient and family.
- The patient demonstrates the ability to adhere to the principles of healthy dietary and activity habits.

We recommend against bariatric surgery for preadolescent children, for pregnant or breast-feeding adolescents (and those planning to become pregnant within 2 yr of surgery) and in any patient who has not mastered the principles of healthy dietary and activity habits and/or has an unresolved substance abuse, eating disorder, or untreated psychiatric disorder."

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

In 2006, the Centers for Medicare & Medicaid Services published a National Coverage Determination on bariatric surgery.[142,] The Centers determined that:

"...the evidence is adequate to conclude that open and laparoscopic Roux-en-Y gastric bypass (RYGBP), laparoscopic adjustable gastric banding (LAGB), and open and laparoscopic biliopancreatic diversion with duodenal switch (BPD/DS), are reasonable and necessary for Medicare beneficiaries who have a body mass index (BMI) ≥35, have at least 1 co-morbidity related to obesity, and have been previously unsuccessful with medical treatment for obesity."

The decision memo also states, "The evidence is not adequate to conclude that the following bariatric surgery procedures are reasonable and necessary; therefore, the following are non-covered for all Medicare beneficiaries:

1. open vertical banded gastroplasty;
2. laparoscopic vertical banded gastroplasty;
3. open sleeve gastrectomy;
4. laparoscopic sleeve gastrectomy; and
5. open adjustable gastric banding."[142,]

REFERENCES

1. Garvey WT, Mechanick JI, Brett EM, et al. AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS AND AMERICAN COLLEGE OF ENDOCRINOLOGY COMPREHENSIVE CLINICAL PRACTICE GUIDELINES FOR MEDICAL CARE OF PATIENTS WITH OBESITYEXECUTIVE SUMMARYComplete Guidelines available at https://www.aace.com/publications/guidelines. Endocr Pract. Jul 2016; 22(7): 842-84. PMID 27472012
2. Centers for Disease Control and Prevention. Overweight & Obesity. Last Reviewed: June 3, 2022; https://www.cdc.gov/obesity/basics/adult-defining.html. Accessed March 29, 2024.
3. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. JAMA. Oct 13 2004;292(14):1724-1737. PMID 15479938
4. Maggard MA, Shugarman LR, Suttorp M, et al. Meta-analysis: surgical treatment of obesity. Ann Intern Med. Apr 5 2005;142(7):547-559. PMID 15809466
5. Gomes-Rocha SR, Costa-Pinho AM, Pais-Neto CC, et al. Roux-en-Y Gastric Bypass Vs Sleeve Gastrectomy in Super Obesity: a Systematic Review and Meta-Analysis. Obes Surg. Jan 2022; 32(1): 170-185. PMID 34642872
6. Currie AC, Askari A, Fangueiro A, et al. Network Meta-Analysis of Metabolic Surgery Procedures for the Treatment of Obesity and Diabetes. Obes Surg. Oct 2021; 31(10): 4528-4541. PMID 34363144
7. Wilhelm SM, Young J, Kale-Pradhan PB. Effect of bariatric surgery on hypertension: a meta-analysis. Ann Pharmacother. Jun 2014;48(6):674-682. PMID 24662112
8. Ricci C, Gaeta M, Rausa E, et al. Early impact of bariatric surgery on type II diabetes, hypertension, and hyperlipidemia: a systematic review, meta-analysis and meta-regression on 6,587 patients. Obes Surg. Apr 2014;24(4):522-528. PMID 24214202

9. Cuspidi C, Rescaldani M, Tadic M, et al. Effects of bariatric surgery on cardiac structure and function: a systematic review and meta-analysis. Am J Hypertens. Feb 2014;27(2):146-156. PMID 24321879
10. Kwok CS, Pradhan A, Khan MA, et al. Bariatric surgery and its impact on cardiovascular disease and mortality: a systematic review and meta-analysis. Int J Cardiol. Apr 15 2014;173(1):20-28. PMID 24636546
11. Afshar S, Kelly SB, Seymour K, et al. The effects of bariatric surgery on colorectal cancer risk: systematic review and meta-analysis. Obes Surg. Oct 2014;24(10):1793-1799. PMID 25015708
12. Andersen JR, Aasprang A, Karlsen TI, et al. Health-related quality of life after bariatric surgery: a systematic review of prospective long-term studies. Surg Obes Relat Dis. Mar-Apr 2015; 11(2): 466-73. PMID 25820082
13. Arterburn DE, Olsen MK, Smith VA, et al. Association between bariatric surgery and long-term survival. JAMA. Jan 6 2015;313(1):62-70. PMID 25562267
14. Bower G, Toma T, Harling L, et al. Bariatric Surgery and Non-Alcoholic Fatty Liver Disease: a Systematic Review of Liver Biochemistry and Histology. Obes Surg. Dec 2015; 25(12): 2280-9. PMID 25917981
15. Cheung D, Switzer NJ, Ehmann D, et al. The impact of bariatric surgery on diabetic retinopathy: a systematic review and meta-analysis. Obes Surg. Sep 2015;25(9):1604-1609. PMID 25515499
16. Driscoll S, Gregory DM, Fardy JM, et al. Long-term health-related quality of life in bariatric surgery patients: A systematic review and meta-analysis. Obesity (Silver Spring). Jan 2016; 24(1): 60-70. PMID 26638116
17. Groen VA, van de Graaf VA, Scholtes VA, et al. Effects of bariatric surgery for knee complaints in (morbidly) obese adult patients: a systematic review. Obes Rev. Feb 2015;16(2):161-170. PMID 25487972
18. Hachem A, Brennan L. Quality of Life Outcomes of Bariatric Surgery: A Systematic Review. Obes Surg. Feb 2016; 26(2): 395-409. PMID 26494369
19. Lindekilde N, Gladstone BP, Lubeck M, et al. The impact of bariatric surgery on quality of life: a systematic review and meta-analysis. Obes Rev. Aug 2015; 16(8): 639-51. PMID 26094664
20. Lopes EC, Heineck I, Athaydes G, et al. Is Bariatric Surgery Effective in Reducing Comorbidities and Drug Costs? A Systematic Review and Meta-Analysis. Obes Surg. Sep 2015; 25(9): 1741-9. PMID 26112137
21. Ricci C, Gaeta M, Rausa E, et al. Long-term effects of bariatric surgery on type II diabetes, hypertension and hyperlipidemia: a meta-analysis and meta-regression study with 5-year follow-up. Obes Surg. Mar 2015;25(3):397-405. PMID 25240392
22. Yang XW, Li PZ, Zhu LY, et al. Effects of bariatric surgery on incidence of obesity-related cancers: a meta-analysis. Med Sci Monit. May 11 2015; 21: 1350-7. PMID 25961664
23. Madadi F, Jawad R, Mousati I, et al. Remission of Type 2 Diabetes and Sleeve Gastrectomy in Morbid Obesity: a Comparative Systematic Review and Meta-analysis. Obes Surg. Dec 2019; 29(12): 4066-4076. PMID 31655953
24. Yan G, Wang J, Zhang J, et al. Long-term outcomes of macrovascular diseases and metabolic indicators of bariatric surgery for severe obesity type 2 diabetes patients with a meta-analysis. PLoS One. 2019; 14(12): e0224828. PMID 31794559
25. Castellana M, Procino F, Biacchi E, et al. Roux-en-Y Gastric Bypass vs Sleeve Gastrectomy for Remission of Type 2 Diabetes. J Clin Endocrinol Metab. Mar 08 2021; 106(3): 922-933. PMID 33051679
26. Carmona MN, Santos-Sousa H, Lindeza L, et al. Comparative Effectiveness of Bariatric Surgeries in Patients with Type 2 Diabetes Mellitus and BMI ≥ 25 kg/m 2 : a Systematic Review and Network Meta-Analysis. Obes Surg. Dec 2021; 31(12): 5312-5321. PMID 34611827
27. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. N Engl J Med. Dec 23 2004;351(26):2683-2693. PMID 15616203
28. Scopinaro N, Papadia F, Marinari G, et al. Long-term control of type 2 diabetes mellitus and the other major components of the metabolic syndrome after biliopancreatic diversion in patients with BMI < 35 kg/m2. Obes Surg. Feb 2007;17(2):185-192. PMID 17476869
29. Sjostrom CD, Lissner L, Wedel H, et al. Reduction in incidence of diabetes, hypertension and lipid disturbances after intentional weight loss induced by bariatric surgery: the SOS Intervention Study. Obes Res. Sep 1999;7(5):477-484. PMID 10509605
30. Sjostrom L, Narbro K, Sjostrom CD, et al. Effects of bariatric surgery on mortality in Swedish obese subjects. N Engl J Med. Aug 23 2007;357(8):741-752. PMID 17715408
31. Courcoulas AP, Christian NJ, Belle SH, et al. Weight change and health outcomes at 3 years after bariatric surgery among individuals with severe obesity. JAMA. Dec 11 2013;310(22):2416-2425. PMID 24189773
32. Arterburn D, Wellman R, Emiliano A, et al. Comparative Effectiveness and Safety of Bariatric Procedures for Weight Loss: A PCORnet Cohort Study. Ann Intern Med. Dec 04 2018; 169(11): 741-750. PMID 30383139
33. Arterburn DE, Johnson E, Coleman KJ, et al. Weight Outcomes of Sleeve Gastrectomy and Gastric Bypass Compared to Nonsurgical Treatment. Ann Surg. Dec 01 2021; 274(6): e1269-e1276. PMID 32187033
34. Wadden TA, Chao AM, Bahnson JL, et al. End-of-Trial Health Outcomes in Look AHEAD Participants who Elected to have Bariatric Surgery. Obesity (Silver Spring). Apr 2019; 27(4): 581-590. PMID 30900413
35. Blue Cross Blue Shield Association Technology Evaluation Center (TEC). Laparoscopic adjustable gastric banding for morbid obesity. TEC Assessment. 2006;Vol 21:Tab 13.
36. Ibrahim AM, Thumma JR, Dimick JB. Reoperation and Medicare Expenditures After Laparoscopic Gastric Band Surgery. JAMA Surg. Sep 01 2017; 152(9): 835-842. PMID 28514487
37. Chakravarty PD, McLaughlin E, Whittaker D, et al. Comparison of laparoscopic adjustable gastric banding (LAGB) with other bariatric procedures; a systematic review of the randomised controlled trials. Surgeon. Jun 2012;10(3):172-182. PMID 22405735
38. Dixon JB, O'Brien PE, Playfair J, et al. Adjustable gastric banding and conventional therapy for type 2 diabetes: a randomized controlled trial. JAMA. Jan 23 2008;299(3):316-323. PMID 18212316
39. Gu L, Huang X, Li S, et al. A meta-analysis of the medium- and long-term effects of laparoscopic sleeve gastrectomy and laparoscopic Roux-en-Y gastric bypass. BMC Surg. Feb 12 2020; 20(1): 30. PMID 32050953

40. Han Y, Jia Y, Wang H, et al. Comparative analysis of weight loss and resolution of comorbidities between laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass: A systematic review and meta-analysis based on 18 studies. Int J Surg. Apr 2020; 76: 101-110. PMID 32151750
41. Sharples AJ, Mahawar K. Systematic Review and Meta-Analysis of Randomised Controlled Trials Comparing Long-Term Outcomes of Roux-En-Y Gastric Bypass and Sleeve Gastrectomy. Obes Surg. Feb 2020; 30(2): 664-672. PMID 31724116
42. Shenoy SS, Gilliam A, Mehanna A, et al. Laparoscopic Sleeve Gastrectomy Versus Laparoscopic Roux-en-Y Gastric Bypass in Elderly Bariatric Patients: Safety and Efficacy-a Systematic Review and Meta-analysis. Obes Surg. Nov 2020; 30(11): 4467-4473. PMID 32594469
43. Borgeraas H, Hofs D, Hertel JK, et al. Comparison of the effect of Roux-en-Y gastric bypass and sleeve gastrectomy on remission of type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. Obes Rev. Jun 2020; 21(6): e13011. PMID 32162437
44. Zhao H, Jiao L. Comparative analysis for the effect of Roux-en-Y gastric bypass vs sleeve gastrectomy in patients with morbid obesity: Evidence from 11 randomized clinical trials (meta-analysis). Int J Surg. Dec 2019; 72: 216-223. PMID 31756544
45. Lee Y, Doumouras AG, Yu J, et al. Laparoscopic Sleeve Gastrectomy Versus Laparoscopic Roux-en-Y Gastric Bypass: A Systematic Review and Meta-analysis of Weight Loss, Comorbidities, and Biochemical Outcomes From Randomized Controlled Trials. Ann Surg. Jan 01 2021; 273(1): 66-74. PMID 31693504
46. Xu C, Yan T, Liu H, et al. Comparative Safety and Effectiveness of Roux-en-Y Gastric Bypass and Sleeve Gastrectomy in Obese Elder Patients: a Systematic Review and Meta-analysis. Obes Surg. Sep 2020; 30(9): 3408-3416. PMID 32277330
47. Osland E, Yunus RM, Khan S, et al. Weight Loss Outcomes in Laparoscopic Vertical Sleeve Gastrectomy (LVSG) Versus Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) Procedures: A Meta-Analysis and Systematic Review of Randomized Controlled Trials. Surg Laparosc Endosc Percutan Tech. Feb 2017; 27(1): 8-18. PMID 28145963
48. Osland EJ, Yunus RM, Khan S, et al. Five-Year Weight Loss Outcomes in Laparoscopic Vertical Sleeve Gastrectomy (LVSG) Versus Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) Procedures: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Surg Laparosc Endosc Percutan Tech. Dec 2020; 30(6): 542-553. PMID 32658120
49. Juodeikis Z, Brimas G. Long-term results after sleeve gastrectomy: A systematic review. Surg Obes Relat Dis. Apr 2017; 13(4): 693-699. PMID 27876332
50. Zhang Y, Wang J, Sun X, et al. Laparoscopic sleeve gastrectomy versus laparoscopic Roux-en-Y gastric bypass for morbid obesity and related comorbidities: a meta-analysis of 21 studies. Obes Surg. Jan 2015;25(1):19-26. PMID 25092167
51. Trastulli S, Desiderio J, Guarino S, et al. Laparoscopic sleeve gastrectomy compared with other bariatric surgical procedures: a systematic review of randomized trials. Surg Obes Relat Dis. Sep-Oct 2013;9(5):816-829. PMID 23993246
52. Brethauer SA, Hammel JP, Schauer PR. Systematic review of sleeve gastrectomy as staging and primary bariatric procedure. Surg Obes Relat Dis. Jul-Aug 2009;5(4):469-475. PMID 19632646
53. Hofs D, Fatima F, Borgeraas H, et al. Gastric bypass versus sleeve gastrectomy in patients with type 2 diabetes (Oseberg): a single-centre, triple-blind, randomised controlled trial. Lancet Diabetes Endocrinol. Dec 2019; 7(12): 912-924. PMID 31678062
54. Peterli R, Wlnerhanssen BK, Peters T, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity: The SM-BOSS Randomized Clinical Trial. JAMA. Jan 16 2018; 319(3): 255-265. PMID 29340679
55. Salminen P, Helmi M, Ovaska J, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity: The SLEEVEPASS Randomized Clinical Trial. JAMA. Jan 16 2018; 319(3): 241-254. PMID 29340676
56. Wlnerhanssen BK, Peterli R, Hurme S, et al. Laparoscopic Roux-en-Y gastric bypass versus laparoscopic sleeve gastrectomy: 5-year outcomes of merged data from two randomized clinical trials (SLEEVEPASS and SM-BOSS). Br J Surg. Jan 27 2021; 108(1): 49-57. PMID 33640917
57. Helmio M, Victorzon M, Ovaska J, et al. SLEEVEPASS: a randomized prospective multicenter study comparing laparoscopic sleeve gastrectomy and gastric bypass in the treatment of morbid obesity: preliminary results. Surg Endosc. Sep 2012;26(9):2521-2526. PMID 22476829
58. Karamanakos SN, Vagenas K, Kalfarentzos F, et al. Weight loss, appetite suppression, and changes in fasting and postprandial ghrelin and peptide-YY levels after Roux-en-Y gastric bypass and sleeve gastrectomy: a prospective, double blind study. Ann Surg. Mar 2008;247(3):401-407. PMID 18376181
59. Himpens J, Dapri G, Cadiere GB. A prospective randomized study between laparoscopic gastric banding and laparoscopic isolated sleeve gastrectomy: results after 1 and 3 years. Obes Surg. Nov 2006;16(11):1450-1456. PMID 17132410
60. Farrell TM, Haggerty SP, Overby DW, et al. Clinical application of laparoscopic bariatric surgery: an evidence- based review. Surg Endosc. May 2009;23(5):930-949. PMID 19125308
61. Skogar ML, Sundbom M. Duodenal Switch Is Superior to Gastric Bypass in Patients with Super Obesity when Evaluated with the Bariatric Analysis and Reporting Outcome System (BAROS). Obes Surg. Sep 2017; 27(9): 2308-2316. PMID 28439748
62. Strain GW, Gagner M, Inabnet WB, et al. Comparison of effects of gastric bypass and biliopancreatic diversion with duodenal switch on weight loss and body composition 1-2 years after surgery. Surg Obes Relat Dis. Jan- Feb 2007;3(1):31-36. PMID 17116424
63. Prachand VN, Davee RT, Alverdy JC. Duodenal switch provides superior weight loss in the super-obese (BMI > or =50 kg/m2) compared with gastric bypass. Ann Surg. Oct 2006;244(4):611-619. PMID 16998370
64. Strain GW, Torghabeh MH, Gagner M, et al. Nutrient Status 9 Years After Biliopancreatic Diversion with Duodenal Switch (BPD/DS): an Observational Study. Obes Surg. Jul 2017; 27(7): 1709-1718. PMID 28155056
65. Marceau P, Biron S, Hould FS, et al. Duodenal switch improved standard biliopancreatic diversion: a retrospective study. Surg Obes Relat Dis. Jan-Feb 2009;5(1):43-47. PMID 18440876
66. Yan Y, Sha Y, Yao G, et al. Roux-en-Y Gastric Bypass Versus Medical Treatment for Type 2 Diabetes Mellitus in Obese Patients: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Medicine (Baltimore). Apr 2016; 95(17): e3462. PMID 27124041

67. Wu GZ, Cai B, Yu F, et al. Meta-analysis of bariatric surgery versus non-surgical treatment for type 2 diabetes mellitus. Oncotarget. Dec 27 2016; 7(52): 87511-87522. PMID 27626180
68. Cummings DE, Cohen RV. Bariatric/Metabolic Surgery to Treat Type 2 Diabetes in Patients With a BMI 35 kg/m2. Diabetes Care. Jun 2016; 39(6): 924-33. PMID 27222550
69. Cummings DE, Rubino F. Metabolic surgery for the treatment of type 2 diabetes in obese individuals. Diabetologia. Feb 2018; 61(2): 257-264. PMID 29224190
70. Muller-Stich BP, Senft JD, Warschkow R, et al. Surgical versus medical treatment of type 2 diabetes mellitus in nonseverely obese patients: a systematic review and meta-analysis. Ann Surg. Mar 2015;261(3):421-429. PMID 25405560
71. Rao WS, Shan CX, Zhang W, et al. A meta-analysis of short-term outcomes of patients with type 2 diabetes mellitus and BMI </= 35 kg/m2 undergoing Roux-en-Y gastric bypass. World J Surg. Jan 2015;39(1):223-230. PMID 25159119
72. Simonson DC, Vernon A, Foster K, et al. Adjustable gastric band surgery or medical management in patients with type 2 diabetes and obesity: three-year results of a randomized trial. Surg Obes Relat Dis. Dec 2019; 15(12): 2052-2059. PMID 31931977
73. Ikramuddin S, Billington CJ, Lee WJ, et al. Roux-en-Y gastric bypass for diabetes (the Diabetes Surgery Study): 2-year outcomes of a 5-year, randomised, controlled trial. Lancet Diabetes Endocrinol. Jun 2015; 3(6): 413-422. PMID 25979364
74. Liang Z, Wu Q, Chen B, et al. Effect of laparoscopic Roux-en-Y gastric bypass surgery on type 2 diabetes mellitus with hypertension: a randomized controlled trial. Diabetes Res Clin Pract. Jul 2013;101(1):50-56. PMID 23706413
75. Courcoulas AP, Belle SH, Neiberg RH, et al. Three-Year Outcomes of Bariatric Surgery vs Lifestyle Intervention for Type 2 Diabetes Mellitus Treatment: A Randomized Clinical Trial. JAMA Surg. Oct 2015; 150(10): 931-40. PMID 26132586
76. Courcoulas AP, Gallagher JW, Neiberg RH, et al. Bariatric Surgery vs Lifestyle Intervention for Diabetes Treatment: 5-Year Outcomes From a Randomized Trial. J Clin Endocrinol Metab. Mar 01 2020; 105(3): 866-76. PMID 31917447
77. Schauer PR, Bhatt DL, Kirwan JP, et al. Bariatric Surgery versus Intensive Medical Therapy for Diabetes - 5-Year Outcomes. N Engl J Med. Feb 16 2017; 376(7): 641-651. PMID 28199805
78. Mingrone G, Panunzi S, De Gaetano A, et al. Bariatric-metabolic surgery versus conventional medical treatment in obese patients with type 2 diabetes: 5 year follow-up of an open-label, single-centre, randomised controlled trial. Lancet. Sep 05 2015; 386(9997): 964-73. PMID 26369473
79. Wentworth JM, Playfair J, Laurie C, et al. Multidisciplinary diabetes care with and without bariatric surgery in overweight people: a randomised controlled trial. Lancet Diabetes Endocrinol. Jul 2014;2(7):545-552. PMID 24731535
80. Halperin F, Ding SA, Simonson DC, et al. Roux-en-Y gastric bypass surgery or lifestyle with intensive medical management in patients with type 2 diabetes: feasibility and 1-year results of a randomized clinical trial. JAMA Surg. Jul 2014;149(7):716-726. PMID 24899464
81. Blue Cross Blue Shield Association Technology Evaluation Center (TEC). Laparoscopic adjustable gastric banding in patients with body mass index less than 35 kg/m2 with weight-related comorbidity. TEC Assessments. 2012;Volume 27:Tab 3.
82. Slater GH, Ren CJ, Siegel N, et al. Serum fat-soluble vitamin deficiency and abnormal calcium metabolism after malabsorptive bariatric surgery. J Gastrointest Surg. Jan 2004;8(1):48-55; discussion 54-45. PMID 14746835
83. Dolan K, Hatzifotis M, Newbury L, et al. A clinical and nutritional comparison of biliopancreatic diversion with and without duodenal switch. Ann Surg. Jul 2004;240(1):51-56. PMID 15213618
84. Blue Cross Blue Shield Association Technology Evaluation Center (TEC). TEC Special Report: The relationship between weight loss and changes in morbidity following bariatric surgery for morbid obesity. TEC Assessments. 2003;Vol 18:Tab 18.
85. Coffin B, Maunoury V, Pattou F, et al. Impact of Intragastric Balloon Before Laparoscopic Gastric Bypass on Patients with Super Obesity: a Randomized Multicenter Study. Obes Surg. Apr 2017; 27(4): 902-909. PMID 27664095
86. Cottam D, Qureshi FG, Mattar SG, et al. Laparoscopic sleeve gastrectomy as an initial weight-loss procedure for high-risk patients with morbid obesity. Surg Endosc. Jun 2006;20(6):859-863. PMID 16738970
87. Alexandrou A, Felekouras E, Giannopoulos A, et al. What is the actual fate of super-morbid-obese patients who undergo laparoscopic sleeve gastrectomy as the first step of a two-stage weight-reduction operative strategy? Obes Surg. Jul 26 2012;22(10):1623-1628. PMID 22833137
88. Silecchia G, Rizzello M, Casella G, et al. Two-stage laparoscopic biliopancreatic diversion with duodenal switch as treatment of high-risk super-obese patients: analysis of complications. Surg Endosc. May 2009;23(5):1032-1037. PMID 18814005
89. Li H, Wang J, Wang W, et al. Comparison Between Laparoscopic Sleeve Gastrectomy and Laparoscopic Greater Curvature Plication Treatments for Obesity: an Updated Systematic Review and Meta-Analysis. Obes Surg. Sep 2021; 31(9): 4142-4158. PMID 34227019
90. Sullivan S, Swain JM, Woodman G, et al. Randomized sham-controlled trial evaluating efficacy and safety of endoscopic gastric plication for primary obesity: The ESSENTIAL trial. Obesity (Silver Spring). Feb 2017; 25(2): 294-301. PMID 28000425
91. Shoar S, Poliakin L, Rubenstein R, et al. Single Anastomosis Duodeno-Ileal Switch (SADIS): A Systematic Review of Efficacy and Safety. Obes Surg. Jan 2018; 28(1): 104-113. PMID 28823074
92. Torres A, Rubio MA, Ramos-Lev AM, et al. Cardiovascular Risk Factors After Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy (SADI-S): a New Effective Therapeutic Approach?. Curr Atheroscler Rep. Nov 07 2017; 19(12): 58. PMID 29116413
93. Rohde U, Hedback N, Gluud LL, et al. Effect of the EndoBarrier Gastrointestinal Liner on obesity and type 2 diabetes: a systematic review and meta-analysis. Diabetes Obes Metab. Mar 2016; 18(3): 300-5. PMID 26537317
94. Courcoulas A, Abu Dayyeh BK, Eaton L, et al. Intragastric balloon as an adjunct to lifestyle intervention: a randomized controlled trial. Int J Obes (Lond). Mar 2017; 41(3): 427-433. PMID 28017964
95. Genco A, Cipriano M, Bacci V, et al. BioEnterics Intragastric Balloon (BIB): a short-term, double-blind, randomised, controlled, crossover study on weight reduction in morbidly obese patients. Int J Obes (Lond). Jan 2006;30(1):129-133. PMID 16189503
96. Kotzampassi K, Grosomanidis V, Papakostas P, et al. 500 intragastric balloons: what happens 5 years thereafter? Obes Surg. Jun 2012;22(6):896-903. PMID 22287051

97. Saber AA, Shoar S, Almadani MW, et al. Efficacy of First-Time Intragastric Balloon in Weight Loss: a Systematic Review and Meta-analysis of Randomized Controlled Trials. Obes Surg. Feb 2017; 27(2): 277-287. PMID 27465936
98. Moura D, Oliveira J, De Moura EG, et al. Effectiveness of intragastric balloon for obesity: A systematic review and meta-analysis based on randomized control trials. Surg Obes Relat Dis. Feb 2016; 12(2): 420-9. PMID 26968503
99. Zheng Y, Wang M, He S, et al. Short-term effects of intragastric balloon in association with conservative therapy on weight loss: a meta-analysis. J Transl Med. Jul 29 2015; 13: 246. PMID 26219459
100. Kotinda APST, de Moura DTH, Ribeiro IB, et al. Efficacy of Intragastric Balloons for Weight Loss in Overweight and Obese Adults: a Systematic Review and Meta-analysis of Randomized Controlled Trials. Obes Surg. Jul 2020; 30(7): 2743-2753. PMID 32300945
101. Thompson CC, Abu Dayyeh BK, Kushner R, et al. Percutaneous Gastrostomy Device for the Treatment of Class II and Class III Obesity: Results of a Randomized Controlled Trial. Am J Gastroenterol. Mar 2017; 112(3): 447-457. PMID 27922026
102. Noren E, Forssell H. Aspiration therapy for obesity; a safe and effective treatment. BMC Obes. 2016; 3: 56. PMID 28035287
103. Matar R, Monzer N, Jaruvongvanich V, et al. Indications and Outcomes of Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: a Systematic Review and a Meta-analysis. Obes Surg. Sep 2021; 31(9): 3936-3946. PMID 34218416
104. Parmar CD, Gan J, Stier C, et al. One Anastomosis/Mini Gastric Bypass (OAGB-MGB) as revisional bariatric surgery after failed primary adjustable gastric band (LAGB) and sleeve gastrectomy (SG): A systematic review of 1075 patients. Int J Surg. Sep 2020; 81: 32-38. PMID 32738545
105. Brethauer SA, Kothari S, Sudan R, et al. Systematic review on reoperative bariatric surgery: American Society for Metabolic and Bariatric Surgery Revision Task Force. Surg Obes Relat Dis. Sep-Oct 2014;10(5):952-972. PMID 24776071
106. Dang JT, Vaughan T, Mocanu V, et al. Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: Indications, Prevalence, and Safety. Obes Surg. May 2023; 33(5): 1486-1493. PMID 36922465
107. Petrucciani N, Martini F, Benois M, et al. Revisional One Anastomosis Gastric Bypass with a 150-cm Biliopancreatic Limb After Failure of Adjustable Gastric Banding: Mid-Term Outcomes and Comparison Between One- and Two-Stage Approaches. Obes Surg. Dec 2021; 31(12): 5330-5341. PMID 34609712
108. Almalki OM, Lee WJ, Chen JC, et al. Revisional Gastric Bypass for Failed Restrictive Procedures: Comparison of Single-Anastomosis (Mini-) and Roux-en-Y Gastric Bypass. Obes Surg. Apr 2018; 28(4): 970-975. PMID 29101719
109. Sudan R, Nguyen NT, Hutter MM, et al. Morbidity, mortality, and weight loss outcomes after reoperative bariatric surgery in the USA. J Gastrointest Surg. Jan 2015;19(1):171-178; discussion 178-179. PMID 25186073
110. Catalano MF, Rudic G, Anderson AJ, et al. Weight gain after bariatric surgery as a result of a large gastric stoma: endotherapy with sodium morrhuate may prevent the need for surgical revision. Gastrointest Endosc. Aug 2007;66(2):240-245. PMID 17331511
111. Herron DM, Birkett DH, Thompson CC, et al. Gastric bypass pouch and stoma reduction using a transoral endoscopic anchor placement system: a feasibility study. Surg Endosc. Apr 2008;22(4):1093-1099. PMID 18027049
112. Thompson CC, Slattery J, Bundga ME, et al. Peroral endoscopic reduction of dilated gastrojejunal anastomosis after Roux-en-Y gastric bypass: a possible new option for patients with weight regain. Surg Endosc. Nov 2006;20(11):1744-1748. PMID 17024527
113. Eid GM, McCloskey CA, Eagleton JK, et al. StomaphyX vs a sham procedure for revisional surgery to reduce regained weight in Roux-en-Y gastric bypass patients: a randomized clinical trial. JAMA Surg. Apr 2014;149(4):372-379. PMID 24554030
114. Dakin GF, Eid G, Mikami D, et al. Endoluminal revision of gastric bypass for weight regain--a systematic review. Surg Obes Relat Dis. May-Jun 2013;9(3):335-342. PMID 23561960
115. Cohen RV, Oliveira da Costa MV, Charry L, et al. Endoscopic gastroplasty to treat medically uncontrolled obesity needs more quality data: A systematic review. Surg Obes Relat Dis. Jul 2019; 15(7): 1219-1224. PMID 31130406
116. Qi L, Guo Y, Liu CQ, et al. Effects of bariatric surgery on glycemic and lipid metabolism, surgical complication and quality of life in adolescents with obesity: a systematic review and meta-analysis. Surg Obes Relat Dis. Dec 2017; 13(12): 2037-2055. PMID 29079384
117. Black JA, White B, Viner RM, et al. Bariatric surgery for obese children and adolescents: a systematic review and meta-analysis. Obes Rev. Aug 2013;14(8):634-644. PMID 23577666
118. Treadwell JR, Sun F, Schoelles K. Systematic review and meta-analysis of bariatric surgery for pediatric obesity. Ann Surg. Nov 2008;248(5):763-776. PMID 18948803
119. Dumont PN, Blanchet MC, Gignoux B, et al. Medium- to Long-Term Outcomes of Gastric Banding in Adolescents: a Single-Center Study of 97 Consecutive Patients. Obes Surg. Jan 2018; 28(1): 285-289. PMID 29103071
120. Inge TH, Zeller MH, Jenkins TM, et al. Perioperative outcomes of adolescents undergoing bariatric surgery: the Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS) study. JAMA Pediatr. Jan 2014;168(1):47-53. PMID 24189578
121. Olbers T, Beamish AJ, Gronowitz E, et al. Laparoscopic Roux-en-Y gastric bypass in adolescents with severe obesity (AMOS): a prospective, 5-year, Swedish nationwide study. Lancet Diabetes Endocrinol. Mar 2017; 5(3): 174-183. PMID 28065734
122. Willcox K, Brennan L. Biopsychosocial outcomes of laparoscopic adjustable gastric banding in adolescents: a systematic review of the literature. Obes Surg. Sep 2014;24(9):1510-1519. PMID 24849913
123. O'Brien PE, Sawyer SM, Laurie C, et al. Laparoscopic adjustable gastric banding in severely obese adolescents: a randomized trial. JAMA. Feb 10 2010;303(6):519-526. PMID 20145228
124. Nadler EP, Youn HA, Ren CJ, et al. An update on 73 US obese pediatric patients treated with laparoscopic adjustable gastric banding: comorbidity resolution and compliance data. J Pediatr Surg. Jan 2008;43(1):141-146. PMID 18206472
125. Manco M, Mosca A, De Peppo F, et al. The Benefit of Sleeve Gastrectomy in Obese Adolescents on Nonalcoholic Steatohepatitis and Hepatic Fibrosis. J Pediatr. Jan 2017; 180: 31-37.e2. PMID 27697327
126. Alqahtani AR, Elahmedi M, Abdurabu HY, et al. Ten-Year Outcomes of Children and Adolescents Who Underwent Sleeve Gastrectomy: Weight Loss, Comorbidity Resolution, Adverse Events, and Growth Velocity. J Am Coll Surg. Dec 2021; 233(6): 657-664. PMID 34563670

127. Greenstein RJ, Nissan A, Jaffin B. Esophageal anatomy and function in laparoscopic gastric restrictive bariatric surgery: implications for patient selection. Obes Surg. Apr 1998;8(2):199-206. PMID 9730394
128. Pilone V, Vitiello A, Hasani A, et al. Laparoscopic adjustable gastric banding outcomes in patients with gastroesophageal reflux disease or hiatal hernia. Obes Surg. Feb 2015;25(2):290-294. PMID 25030091
129. Kohn GP, Price RR, DeMeester SR, et al. Guidelines for the management of hiatal hernia. Surg Endosc. Dec 2013;27(12):4409-4428. PMID 24018762
130. Chen W, Feng J, Wang C, et al. Effect of Concomitant Laparoscopic Sleeve Gastrectomy and Hiatal Hernia Repair on Gastroesophageal Reflux Disease in Patients with Obesity: a Systematic Review and Meta-analysis. Obes Surg. Sep 2021; 31(9): 3905-3918. PMID 34254259
131. Mechanick JI, Apovian C, Brethauer S, et al. CLINICAL PRACTICE GUIDELINES FOR THE PERIOPERATIVE NUTRITION, METABOLIC, AND NONSURGICAL SUPPORT OF PATIENTS UNDERGOING BARIATRIC PROCEDURES - 2019 UPDATE: COSPONSORED BY AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS/AMERICAN COLLEGE OF ENDOCRINOLOGY, THE OBESITY SOCIETY, AMERICAN SOCIETY FOR METABOLIC BARIATRIC SURGERY, OBESITY MEDICINE ASSOCIATION, AND AMERICAN SOCIETY OF ANESTHESIOLOGISTS - EXECUTIVE SUMMARY. Endocr Pract. Dec 2019; 25(12): 1346-1359. PMID 31682518
132. Blonde L, Umpierrez GE, Reddy SS, et al. American Association of Clinical Endocrinology Clinical Practice Guideline: Developing a Diabetes Mellitus Comprehensive Care Plan-2022 Update. Endocr Pract. Oct 2022; 28(10): 923-1049. PMID 35963508
133. Department of Veterans Affairs/Department of Defense. Clinical Practice Guidelines. Management of Adult Overweight and Obesity (OBE) (2020). https://www.healthquality.va.gov/guidelines/CD/obesity/. Accessed April 2, 2024
134. Childerhose JE, Alsamawi A, Mehta T, et al. Adolescent bariatric surgery: a systematic review of recommendation documents. Surg Obes Relat Dis. Oct 2017; 13(10): 1768-1779. PMID 28958402
135. Armstrong SC, Bolling CF, Michalsky MP, et al. Pediatric Metabolic and Bariatric Surgery: Evidence, Barriers, and Best Practices. Pediatrics. Dec 2019; 144(6). PMID 31656225
136. Hampl SE, Hassink SG, Skinner AC, et al. Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. Pediatrics. Jan 09 2023. PMID 36622115
137. Michalsky M, Reichard K, Inge T, et al. ASMBS pediatric committee best practice guidelines. Surg Obes Relat Dis. Jan-Feb 2012;8(1):1-7. PMID 22030146
138. Pratt JSA, Browne A, Browne NT, et al. ASMBS pediatric metabolic and bariatric surgery guidelines, 2018. Surg Obes Relat Dis. Jul 2018; 14(7): 882-901. PMID 30077361
139. Eisenberg D, Shikora SA, Aarts E, et al. 2022 American Society for Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO): Indications for Metabolic and Bariatric Surgery. Surg Obes Relat Dis. Dec 2022; 18(12): 1345-1356. PMID 36280539
140. August GP, Caprio S, Fennoy I, et al. Prevention and treatment of pediatric obesity: an Endocrine Society clinical practice guideline based on expert opinion. J Clin Endocrinol Metab. Dec 2008;93(12):4576-4599. PMID 18782869
141. Styne DM, Arslanian SA, Connor EL, et al. Pediatric Obesity-Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline. J Clin Endocrinol Metab. Mar 01 2017; 102(3): 709-757. PMID 28359099
142. Centers for Medicare and Medicaid Services (CMS). Decision Memo for Bariatric Surgery for the Treatment of Morbid Obesity (CAG-00250R). 2006; https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=160. Accessed April 1, 2024.
143. Gloy VL, Briel M, Bhatt DL, et al. Bariatric surgery versus non-surgical treatment for obesity: a systematic review and meta-analysis of randomised controlled trials. BMJ. Oct 22 2013;347:f5934. PMID 24149519
144. Puzziferri N, Roshek TB, 3rd, Mayo HG, et al. Long-term follow-up after bariatric surgery: a systematic review. JAMA. Sep 3 2014;312(9):934-942. PMID 25182102
145. Colquitt JL, Pickett K, Loveman E, et al. Surgery for weight loss in adults. Cochrane Database Syst Rev. 2014;8:CD003641. PMID 25105982
146. Kang JH, Le QA. Effectiveness of bariatric surgical procedures: A systematic review and network meta-analysis of randomized controlled trials. Medicine (Baltimore). Nov 2017; 96(46): e8632. PMID 29145284
147. Park CH, Nam SJ, Choi HS, et al. Comparative Efficacy of Bariatric Surgery in the Treatment of Morbid Obesity and Diabetes Mellitus: a Systematic Review and Network Meta-Analysis. Obes Surg. Jul 2019; 29(7): 2180-2190. PMID 31037599
148. Cosentino C, Marchetti C, Monami M, et al. Efficacy and effects of bariatric surgery in the treatment of obesity: Network meta-analysis of randomized controlled trials. Nutr Metab Cardiovasc Dis. Sep 22 2021; 31(10): 2815-2824. PMID 34348877

POLICY HISTORY - THIS POLICY WAS APPROVED BY THE FEP® PHARMACY AND MEDICAL POLICY COMMITTEE ACCORDING TO THE HISTORY BELOW:

Date	Action	Description
December 2023	New Policy - language clarity	Policy Statement language edited to provide clarity adding Diabetes Type II, as well adding this language in other relevant text throughout the policy. FEP adopting to align with 2024 member benefits.
June 2024	Replace policy	Policy updated with literature review through March 7, 2024; references added. Evidence review extensively pruned for clarity. Policy statements and evidence review indications revised to align with current obesity classification terminology and clinical practice guidelines. New medically necessary statement added for bariatric surgery in adults with class 2 obesity and at least 1 obesity-related comorbid condition. Medically necessary statement on revision surgery clarified to include GERD as an indication for revision surgery.