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Preoperative Evaluation of the Obese Patient

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Introduction

Recent Gallup data report that obesity rates remain at an all time high in the United States.[1] More than one third of American adults are overweight (body mass index, BMI 25.0–29.9 kg/m^2), an additional one in four are obese (BMI ≥30 kg/m^2), and more than 11 million are considered morbidly obese (BMI ≥40 kg/m^2).[2] As patients continue to work toward a healthier lifestyle in our "obesogenic environment,"[3] bariatric surgery (also known as metabolic surgery) remains a valuable option. Studies have shown that bariatric surgeries help patients achieve long-term weight loss, but the benefits of these procedures go beyond their effect on weight alone. These procedures reduce mortality rates and are oftentimes used to cure metabolic diseases prevalent in our society, such as diabetes mellitus, hypertension, hyperlipidemia, and nonalcoholic fatty liver disease.[4] In 2009, there were an estimated 220,000 bariatric surgeries performed in the United States.[5]

Obese patients commonly have comorbidities such as diabetes mellitus and obstructive sleep apnea that place them at increased risk for surgical and perioperative complications. They may also have symptoms (such as shortness of breath, dyspnea, orthopnea, and chest pain) and abnormalities on electrocardiograms that make their preoperative workup confusing. Thus, it is necessary to thoroughly and efficiently address the unique factors in this patient population in order to optimize short- and long-term surgical outcomes. This manuscript presents a concise and evidence-based approach to the preoperative evaluation of the bariatric patient undergoing metabolic surgery.

Bariatric Specific History and Physical

As with all patient encounters, the first step is to conduct a thorough history and physical. The patient should be screened for metabolic causes of obesity such as hypothyroidism, polycystic ovary syndrome, and less commonly Cushing's Syndrome.[6] Other comorbidities associated with obesity should also be sought out, as many of these can adversely affect surgical outcomes if undiagnosed. These include diabetes mellitus, hypertension, dyslipidemia, gallbladder disease, obstructive sleep apnea, obesity hypoventilation syndrome (Pickwickian Syndrome), congestive heart failure, coronary artery disease, nonalcoholic fatty liver disease, gout, cancer, and metabolic syndrome.

Medications can play a significant role in weight gain and may present a barrier to losing weight. Some common culprits include insulin, sulfonylureas, corticosteroids, beta blockers, and some classes of antidepressants, antipsychotics, and antiepileptics. These should be reconciled accurately, and appropriate changes should be made in collaboration with primary care providers.

The initial evaluation should also include a complete social history detailing support systems, family dynamics, and active substance abuse. Lifestyle habits, including nutrition and exercise, should be assessed, and education should be provided on ways to ensure long-term success. A mental-health screening will help to rule out eating disorders and other conditions that may affect a patient's ability to be compliant. A patient's weight history, including history of weight gain and previous attempts at weight loss, should also be documented. A thorough review of systems and physical exam concludes the initial evaluation.

Initial Laboratory Workup

According to the AACE/TOS/ASMBS Guidelines, it is recommended that the following labs be checked preoperatively: fasting blood glucose, renal function, liver profile, lipid profile, urinalysis, prothrombin time/international normalized ratio (PT/INR), complete blood cell count (CBC), and iron studies.[7] Vitamin and mineral levels that are commonly affected by bariatric surgery should also be checked and replaced where necessary preoperatively. These include calcium, folic acid, vitamin A, vitamin B_{12}, and vitamin D. All women of childbearing age should have a pregnancy test.

Contraindications

Physicians must ensure that no contraindications to surgery exist. The absolute contraindications include prohibitive cardiac or pulmonary disease, central diabetes insipidus, poorly controlled mental health disease, current drug or alcohol abuse, and any cognitive impairment that would inhibit a patient from following postoperative instructions.[8] Advanced age was once believed to be a contraindication for bariatric surgery, but the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) conducted a surveillance study of more than 40,000 patients, which showed no statistical difference in mortality and morbidity among extremes of age.[9]

Obesity Surgery Risk

The Longitudinal Assessment of Bariatric Surgery (LABS-1) study was a prospective, multicenter, cohort study of 4,776

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consecutive patients undergoing bariatric surgeries (open or laparoscopic Roux-en-Y gastric bypass or laparoscopic adjustable gastric banding).[10] The primary outcome was a composite of any of the following within 30 days after surgery: death, venous thromboembolism, reintervention, or failure to be discharged from the hospital. Overall mortality from bariatric surgery was 0.3% at 30 days, with open procedures being more risky than laparoscopic ones. Overall risk for the primary outcome was 4.1%. A history of venous thromboembolism, obstructive sleep apnea, impaired functional status (inability to walk 200 feet), and extremes of BMI (>75 kg/m^2) were independent risk factors for the composite endpoint. Age, gender, and other comorbidities were not shown to be independently associated with the primary endpoint.

Preoperative Weight Loss

Weight loss should be attempted before bariatric surgery. Weight loss improves overall health and comorbidities, and helps to obtain desired glycemic control, which reduces surgical and postoperative complication rates. Furthermore, preoperative weight loss can reduce liver volume and help improve exposure of the gastroesophageal area. Many studies have demonstrated that preoperative weight loss reduces liver volume and intrahepatic fat.[11–14] These studies have consistently shown a reduction in perceived complexity of surgery. Other studies have also shown a reduction in operative time[15,16] and short-term complication rate.[13] Though short-term postoperative weight loss seems to be improved,[16] studies are inconsistent regarding preoperative weight loss and long-term postoperative weight reduction outcomes.[15,17]

Cardiac Evaluation

Obesity alone is not a risk factor for postoperative cardiac complications.[18] Therefore, the initial cardiac evaluation on a bariatric patient should begin with a history, physical exam, and electrocardiogram only.[7] Obesity is associated with a variety of baseline electrocardiogram abnormalities (such as tachycardia, low QRS voltage, left axis deviation, and prolonged QRS and QT intervals), but these alone should not prompt further investigation. More extensive testing should be considered when history and physical exam increase suspicion for underlying cardiac disease.[7,19–22]

The American College of Cardiology Foundation/American Heart Association (ACCF/AHA) has identified several "active cardiac conditions" that, if present, should prompt a delay in surgery until optimized.[23] These high-risk clinical predictors include unstable angina or recent myocardial infarction, decompensated heart failure, significant arrhythmias, and severe valvular disease. These conditions confer a very high risk of perioperative cardiac events and death if not optimally managed before surgery.

Once "active cardiac conditions" have been ruled out, clinicians should assess the patient's functional status.[23] Functional status is an indicator of the myocardium's ability to tolerate the stress of the surgical procedure, and the risk of perioperative ischemia may be increased for patients who cannot function at a level of four metabolic equivalents (METs). Patients with a functional capacity of greater than four METs going for intermediate risk surgery, such as bariatric surgery, can proceed without further evaluation.

For those who do not meet the MET threshold, the ACCF/AHA recommend factoring in specific clinical risk factors derived from the Lee Revised Cardiac Risk Index (RCRI) to determine whether further testing or risk reduction strategies should be employed.[23] These risk factors include: a history of ischemic heart disease, a history of compensated or prior heart failure, a history of cerebrovascular disease, diabetes mellitus, and renal insufficiency. Stress testing is not recommended in patients without any of these clinical risk factors, as it is unlikely to change management. In patients with at least one or two clinical risk factors and poor functional METs, noninvasive stress testing may be considered if it will change management (see Fig. 1).

Echocardiograms should be pursued if the patient has dyspnea of unclear etiology, if the patient has congestive heart failure with worsening dyspnea or exam consistent with volume overload, or if severe valvular disease is suspected.[24] Distinguishing between dyspnea due to cardiac disease and that caused by deconditioning associated with obesity may be challenging in this population.

Patients with documented cardiac disease benefit from beta-blocker therapy, with a goal heart rate of less than 70 beats per minute prior to surgery.[25,26] Atenolol and other long-acting beta blockers have been shown to provide superior cardioprotective effects when compared to short-acting beta blockers such as metoprolol succinate.[25] If initiating beta-blocker treatment, experts agree that slowly achieving the goal heart rate over 2–4 weeks preoperatively should be sufficient,[25] since rapid titration increases the risk of perioperative hypotension and stroke.[27] All patients already taking beta blockers should continue this medication perioperatively.[20,25] Until recently, patients with cardiovascular risk factors were also thought to benefit from beta-blocker initiation preoperatively. However, based on the results of a recently published meta-analysis, this practice has been called into question. In this meta-analysis, beta-blocker use in noncardiac surgery was shown to be associated with a 27% increase in all-cause mortality.[28]

Pulmonary Evaluation

Perioperatively, obese patients experience pulmonary complications more frequently than they experience cardiac complications.[29] Room air oxygen saturation should be checked on all bariatric patients at the time of initial visit. If the oxygen saturation is less than 90%, then pulmonary function tests (PFTs) and arterial blood gas (ABG) should be checked.[30] PFTs will help determine if underlying intrinsic lung disease exists. This should also be performed in patients with poorly controlled asthma or chronic obstructive pulmonary disease (COPD).[30] The ABG will aid in detecting obesity hypoventilation syndrome (OHS).[7] Patients with OHS are at increased risk for acute respiratory failure following the surgery and extubation. There is no clear evidence supporting the use of routine preoperative chest X-rays. At this time, expert opinion recommends them for patients with a history of cardiopulmonary disease or those older than 60 years of age.[31]

Obstructive Sleep Apnea

Obstructive sleep apnea (OSA) is an independent risk factor for all-cause mortality,[32] and obesity is the most important

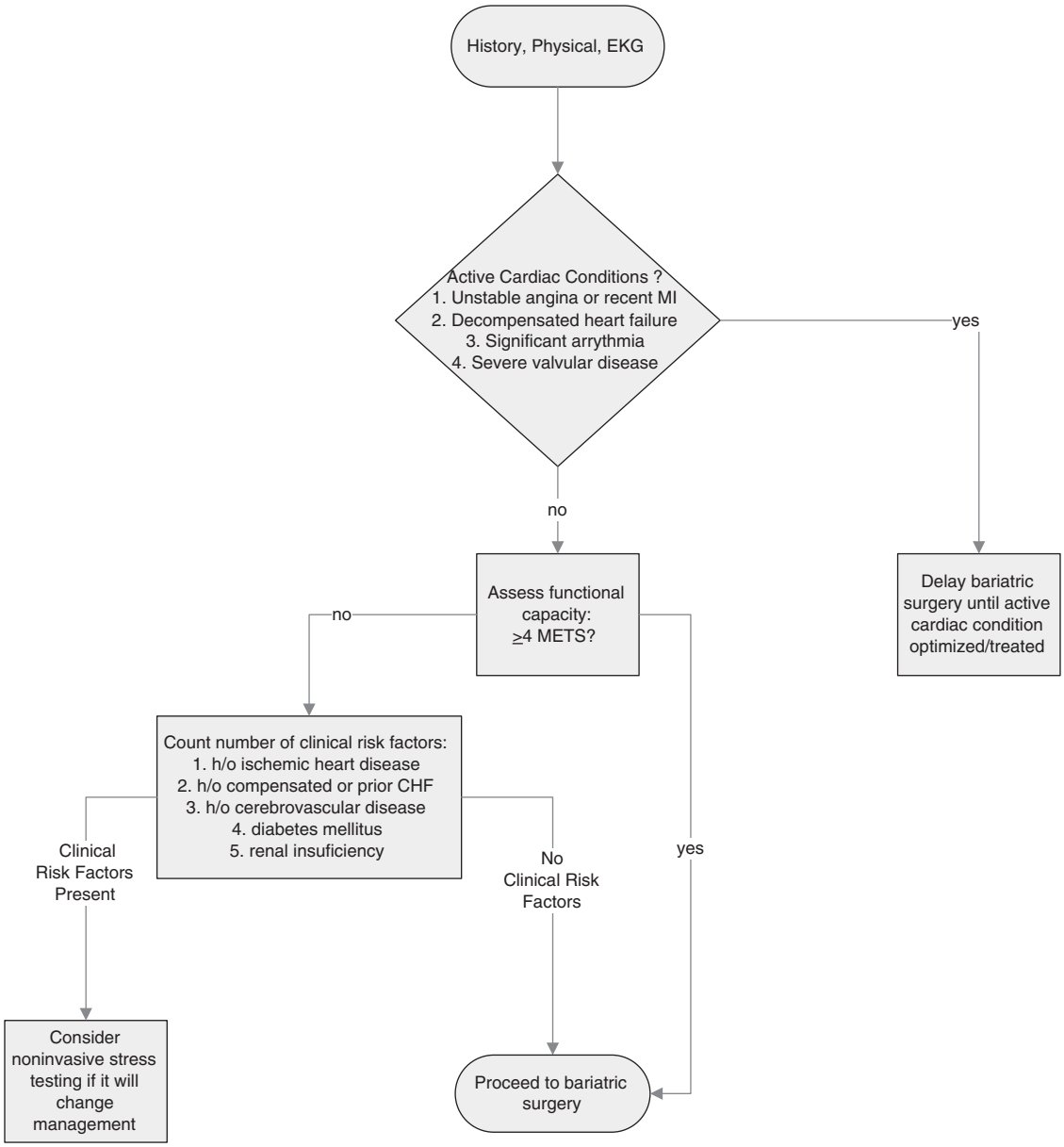

FIG. 1. Preoperative cardiac risk assessment (based on 2007 ACCF/AHA guidelines). ACCF/AHA, American College of Cardiology Foundation/American Heart Association.

risk factor for OSA. Patients presenting for bariatric surgery have a very high rate of diagnosed and undiagnosed OSA,[33–35] greater than 90% in some studies.[36] Perioperative complications of untreated OSA, many of which are nonrespiratory, have been well documented in the literature.[37,38] These risks are amplified by the patient's recent exposure to anesthesia and narcotics, as well as the need for supine positioning in the early postoperative period. Treatment of OSA with continuous positive airway pressure can help to prevent or abate the potential complications,[35] including respiratory arrest, arrhythmias, chest pain, and pulmonary embolism. Most studies agree that universal preoperative screening for OSA with at least a questionnaire and physical exam is necessary.[33] Some studies even support routine screening polysomnography in pre-bariatric surgery patients.[39,40]

Diabetes Mellitus Management

Patients with optimal diabetic control preoperatively have been shown to have higher rates of diabetes remission postoperatively.[7] Preoperative glycemic control has also been shown to decrease the risk of postoperative wound infections and acute renal failure. Therefore, a hemoglobin A1c of 6.5–7% should be the target in most diabetic patients preoperatively.[7,41] However, in those with long-standing difficult-to-control disease or in those with extensive comorbidities, a hemoglobin A1c of 7–8% is acceptable.[7,41]

Medications

Patients should be instructed to stop nonsteroidal anti-inflammatory drug (NSAID) use 1 week preoperatively in

order to decrease the risk of postoperative anastomotic ulcers.[42] Premenopausal females should discontinue oral contraceptives for one full cycle prior to surgery to minimize the risk of postoperative venous thromboembolism.[7] Similarly, postmenopausal females must discontinue hormone replacement therapy at least 3 weeks prior to surgery.[7]

Helicobacter Pylori Testing

Though treatment of *H. pylori* prior to undergoing bariatric surgery has been shown to reduce the risk of marginal ulcer formation, routine screening on all patients is not recommended.[7,43] Since obesity has not been proven to be a risk factor for infection, the decision to screen should not be based on this alone. Instead, physicians must determine if risk factors for *H. pylori* infection (e.g., poor hygiene, prior history of living in very crowded conditions or developing countries, and African American or Hispanic ethnicity) exist, and screen only those who are at high risk.[43–45]

Psychological Evaluation

Patients should be screened for behavioral traits that may lead to difficulty following strict postoperative dietary recommendations.[8,46] Patients should also be screened for maladaptive eating disorders such as binge eating, grazing, and night eating syndrome.[8] Furthermore, those patients with substance abuse should be counseled on cessation and initiated into rehabilitation programs prior to undergoing bariatric surgery.[46–49]

Smoking

All smokers should be encouraged to achieve cessation preoperatively. Smoking has been shown to be associated with perforated marginal ulceration following bariatric surgery.[50] Smoking has also been shown to predispose patients to postoperative pneumonia, which is associated with an increased 30-day mortality.[51] A more than 20 pack-year history of smoking was also associated with difficulty in weaning from the ventilator postoperatively.[52] Ideally, cessation should be achieved at least 6 weeks preoperatively.[53] There has been some concern that smoking cessation shortly before surgery (within 8 weeks) may actually increase the risk of postoperative complications. However, a recent meta-analysis showed that there was no increase in rate of overall or pulmonary-related complications amongst recent quitters,[54] so smoking cessation should be encouraged at anytime preoperatively.

Prophylactic Inferior Vena Cava Filters

Prophylactic inferior vena cava (IVC) filters are not recommended for routine placement in obese patients going for bariatric surgery. IVC filters carry the risk of complications directly related to the filter itself, including filter migration and IVC thrombosis.[55] In fact, one study showed that Roux-en-Y gastric bypass surgery patients with an IVC filter were more likely than those without to have a fatal pulmonary embolism.[55] Furthermore, analysis of data from the Bariatric Outcomes Longitudinal Database showed that the risk of VTE was greater in patients with an IVC filter (hazard ratio 7.66; 95% confidence interval 4.55–12.91).[56] At this time, it is not clear which subset of patients, if any, would benefit from prophylactic IVC filter placement. It may be considered in patients with a prior history of PE or DVT, patients with a BMI greater than 60 kg/m^2, those with obesity hypoventilation syndrome, or those with severe venous stasis (albeit with careful weighing of the benefits versus the risks).

Pregnancy

Weight loss after bariatric surgery can lead to improvements in polycystic ovary syndrome, anovulation, and menstrual irregularities.[57] This can improve fertility rates. Contraception counseling should be a component of the overall counseling for any woman of reproductive age undergoing bariatric surgery.[57] This is especially important for adolescents because pregnancy rates after bariatric surgery in this group are double that of the general adolescent population.[58] There may also be an increased risk of oral contraception failure after bariatric surgery due to malabsorption. Therefore, consideration should be given to nonoral forms of contraception. Regarding postoperative reproductive health, some experts advise that patients wait until active weight loss has stopped before becoming pregnant. This typically occurs 12–24 months postoperatively and allows patients to achieve their weight-loss goals and prevents the fetus from being exposed to rapid maternal weight loss.[59] Achieving pregnancy prior to this may be associated with congenital abnormalities linked to suboptimal nutritional status and micronutrient deficiency.[60]

Conclusion

As outlined above, there are several aspects to consider carefully when evaluating patients for bariatric surgery. This summary provides a concise evidence-based approach to managing the obese patient preoperatively and navigating the unique challenges presented by this patient population.

Summary Recommendations

Bariatric-specific history and physical

- Screen for metabolic causes of obesity and obesity-related comorbidities.
- Reconcile medications, with specific focus on orexigenic medications.
- Perform a complete social history, including discussion of support systems, active or past substance abuse, dietary habits, and exercise habits.
- Mental-health screening.

Initial laboratory workup

- Fasting blood glucose, renal function, liver profile, lipid profile, urinalysis, PT/INR, CBC, and iron studies on all patients.
- Check vitamin and mineral levels commonly affected by bariatric surgery: calcium, folic acid, vitamin A, vitamin B_{12}, and vitamin D.
- Pregnancy test on all women of childbearing age.

Contraindications

- Determine if any contraindications to surgery exist.
- Advanced age is not a contraindication to surgery.

Obesity surgery risk

- Appropriate risk assessment and management should be conducted preoperatively when evaluating potential candidates for bariatric surgery.

Preoperative weight loss

- Preoperative weight loss should be achieved to improve technical aspects of surgery and operative times.

Cardiac evaluation

- Obesity alone is not a risk factor for postoperative cardiac complications.
- Cardiac evaluation beyond history and physical exam and electrocardiogram should be pursued only if suspicion of underlying cardiac disease.
- Stress testing in selected patients with poor functional capacity and cardiac risk factors.
- Echocardiogram if evidence of volume overload, unexplained shortness of breath, or if suspected severe valvular disease.
- Continue beta blockers for those already taking them.
- Benefit of beta blockers in those with risk factors is being called into question.

Pulmonary evaluation

- Conduct room air oxygen saturation on all patients; if <90%, perform PFTs and ABG.
- PFTs if uncontrolled asthma or COPD.
- No role for routine chest X-rays.

OSA

- Universal screening questionnaire, with low threshold for polysomnography.

Diabetes mellitus

- Goal HgA1c of 6.5–7% prior to surgery (7–8% if severe disease).

Medications

- Discontinue NSAIDs and all estrogen therapy prior to bariatric surgery.

H. pylori *testing*

- Preoperative screening (and treatment if positive) for patients at high risk for infection.

Psychological evaluation

- Universal screening for maladaptive behaviors, eating disorders, and active substance abuse.

Smoking

- Smoking cessation should be pursued, ideally at least 6 weeks preoperatively.

IVC filters

- IVC filters are not recommended for routine use.

Pregnancy

- Counsel all women of reproductive age, especially adolescents, about contraception and consider using nonoral forms of contraception postoperatively.
- Ideally, avoid pregnancy until after active phase of weight loss postoperatively.

Disclosure Statement

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