Preoperative Care of the Bariatric Patient

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Chapter Objectives

1. Describe evidence-based preoperative evaluation of the bariatric patient.
2. Discuss risk assessment to optimize patient selection.
3. Discuss informed consent.
4. Explain the establishment of preoperative care pathways.

Introduction

Preoperative care of the bariatric patient starts before the patient arrives. Establishment of data-driven patient selection protocols and preoperative evaluation pathways not only streamlines practice but also improves patient safety. Both evaluation and individualized risk assessment are essential for achieving best outcomes and allowing the patient to give a truly informed consent. Ideally, comprehensive informed consent would include specific outcome assessments based on the patient's own metabolic acuity and known outcomes for weight loss and comorbidity resolution. Best preoperative care will yield a comprehensive understanding of a patient's medical history as it pertains to predicted outcomes, cardiac health, venous thromboembolism risk, sleep architecture and pulmonary function, gastroesophageal anatomy and *Helicobacter pylori* status, and psychological ability to comply with required postoperative recommendations. Regardless of whether a specific evaluation in question is subjective or objective, it should be standardized in an evidence-based protocol. This chapter will describe evidence-based comprehensive preoperative evaluation of the bariatric patient, discuss risk assessment to optimize patient selection and informed consent, and explain establishment of preoperative pathways.

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Patient Selection

Perhaps the most important part of the preoperative evaluation is patient selection. Ideally, patient selection is a dynamic process, rather than a single point-in-time decision. During the initial consultation, the surgeon and care team should take a thorough history and physical and determine if there are any immediate contraindications to surgery. If the patient is acceptable at that point, it only means they are acceptable to continue the preoperative evaluation. This workup should be conservative and data informed. Ultimately, the increase in the acceptance of weight loss surgery by the medical community and the public is likely based on improved outcomes. These outcomes are partially based on improved understanding of the risk and benefits of weight loss surgery.

Bariatric surgery patient selection is still based on the National Institute of Health Consensus Statement on Gastrointestinal Surgery for Severe Obesity. This states that patients with a body mass index (BMI) of 40 kg/m^2 or greater, or patients with a BMI of 35 kg/m^2 or greater with an obesity-related comorbidity, will likely benefit from weight loss surgery [1]. Please keep in mind this consensus was reflective of a time when open surgery was prevalent and different bariatric procedures were being performed, versus the more commonly done sleeve gastrectomy today. However, the consensus provides a good starting point, and other organizations have elected to follow these guidelines. For example, the International Diabetes Federation Taskforce in 2011 concordantly recommended bariatric surgery be considered for adults with a BMI $\geq$ 35 and Type 2 diabetes [2]. BMI cutoffs aid in selection criteria and have been largely adopted by insurance companies, but what about the postoperative risks as BMI increases? Multiple studies have documented

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that as the BMI increases so do the postoperative complications, especially as those BMIs became more extreme, for example, greater than 70 kg/m^2 [3]. While it seems nonintuitive to consider extreme weight an exclusion criterion for weight loss surgery, it should raise concern that these patients are not average-risk and require more extensive preoperative evaluation. Several studies have also shown that male gender and hypertension have been associated with increased mortality [4].

There are many more data points to examine beyond BMI, gender, and hypertension. For example, the patient's age and mobility should be taken into account. Finks et al. demonstrated that age greater than 50 and mobility limitations both independently increased the risk of a postoperative complication in a large study of 2075 patients undergoing gastric bypass [5]. A more recent study used the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) data set and again found that immobile patients had a greater risk of mortality and multiple complications regardless of procedure type, including both the gastric bypass and the sleeve gastrectomy [6]. Conversely, another study did not find any difference in perioperative mortality in immobile patients undergoing bariatric surgery but did find statistically significant less improvement in diabetes, hypertension, and obstructive sleep apnea in the wheelchair bound group [7]. The question of age and mobility limitations can be determined at the programmatic level. Should there be an age cutoff in your practice? Should you refuse to even consider surgery on a patient who cannot ambulate? The literature appears to mostly support an affirmative answer should you choose that path or at least an informed discussion for the patient regarding these issues should you choose not to enforce cutoffs.

There are other issues that predispose the patient to increased risk. For example, venous thromboembolism (VTE) risk must be evaluated, as well as cardiac risk and obstructive sleep apnea. These disease processes and how they affect the bariatric patient are discussed in depth in the next few sections.

Cardiac Evaluation

Evaluation of cardiac status and cardiac risk preoperatively is one of the essential elements in promoting safety in any surgical patient, but especially in morbidly obese patients. Obesity is associated with multiple comorbidities including diabetes, obstructive sleep apnea, dyslipidemia, and hypertension. All of these conditions can potentially contribute to severe cardiovascular events such as heart failure, arrhythmias, and sudden cardiac death. Excessive adipose accumulation increases cardiac workload by increasing sympathetic tone and heart rate as well as filling pressure leading to cardiac failure [8]. There is evidence that obesity has a paradoxical (protective) effect on mortality in patients presenting with STEMI, as a normal BMI is actually a predictor of inducible-VT [9]; however, increased BMI is also shown to predict increased cardiovascular mortality sometimes two to four times higher than normal weight individuals [10]. Rates of cardiac arrest and annualized mortality were found to be substantially higher in those undergoing bariatric surgery when compared with other forms of general surgery [11].

Preoperative workup should include history of coronary artery disease, coronary symptoms, and risk factors (diabetes, smoking, hypertension, etc.). Anyone over the age of 50 certainly requires cardiac evaluation. A physical and electrocardiogram (ECG) are then performed. If the patient's age is less than 50 with a normal ECG and no cardiac risk factors other than obesity, they fall into the low-risk stratification for a perioperative cardiac event. Regarding ECG interpretation, bariatric patients are more likely to have an increased QT interval which could degenerate into torsade de pointes [12]. This is important to recognize as several drugs used perioperatively in gastrointestinal surgery can produce prolonged QT.

Patients who have a history of heart failure, cerebrovascular disease, renal insufficiency, diabetes, or compensated ischemic heart disease will likely require stress testing to accurately evaluate left ventricular function according to the American College of Cardiology (ACC) and American Heart Association (AHA) Guidelines. Should the patient have had a recent intervention requiring a drug-eluting stent, it would be prudent to wait 6 months before attempting an elective procedure to decrease the risk of stent thrombosis and a cardiac event [13]. Aspirin should be continued perioperatively [14]. If the patient is on antiplatelet therapy, then the ACC/AHA 2014 guidelines recommend that the management of discontinuing antiplatelet therapies is at the discretion of the surgeon and cardiologist and to continue aspirin if possible.

We recommend that cardiac risk assessment be left to the expertise of a board-certified cardiologist. Bariatric surgeons should collaborate with cardiologists using evidence-based risk stratification. Test results should be available to anesthesia and the cardiology team chosen should be available postoperatively should the need arise.

Preoperative VTE Evaluation

The second leading cause of death after leaks in bariatric surgery patients is pulmonary embolism (PE) and is responsible for 40–50% of fatalities. Venous thromboembolism (VTE) rates, which include both PE and deep venous thrombosis (DVT), are reported to be between 0.25% and 3.5%. The majority of patients, approximately 97%, have a predicted risk of less than 1% of developing VTE, but identifying the other 2.5% of patients is critical. Among 45 examined

variables, a final risk-assessment model contained 10 variables that were predictive of post-discharge VTE including congestive heart failure, paraplegia, reoperation, dyspnea at rest, nongastric band surgery, age ≥60, male sex, BMI ≥50 kg/m^2, hospital stay ≥3 days, and operative time ≥3 h [15]. This study utilized a risk calculator and suggested that a calculated 0.4% risk should translate to 2 weeks of post-discharge prophylaxis, and this incorporated approximately 20% of patients. Very high risk was considered to be a calculated risk of >1% and would mandate 4 weeks of anticoagulation. The risk calculator can be found here http://www.r-calc.com under the formulas tab. Another scoring system, the Michigan Bariatric Surgery Collaborative, divides patients into low (<1%), moderate (1–4%), and high risk (>4%) and provides guidelines for chemical thromboprophylaxis based on this stratification [16].

Another recent study found that the major risk factors for VTE included a prior history of VTE, heart failure, postoperative complications, and open surgery with VTE rates at 30 and 90 days equaling 0.34% and 0.51% [17]. They found that no use of postoperative chemoprophylaxis was an independent predictive factor of VTE. None of these studies provide specific dosing strategies.

An even more rare concern is porto-mesenteric venous thrombosis with median development being 14 days post-op [18]. The most common cause of coagulopathy disorders was protein C and/or S deficiency followed by prothrombin gene mutation. It is therefore important to remember to take a thorough history. Any patient with a past history of VTE or a personal family history of the relatively uncommon hypercoagulable states such as factor V Leiden, protein C and S deficiency, and protein C resistance also increases the risk for VTE.

Lastly the use of inferior vena cava filters for prevention has largely fallen out of favor at most institutions. Several studies have demonstrated that there is no evidence to suggest that the benefits of the filter outweigh the risks [19, 20].

In addition to anticoagulants, the risk of VTE can be decreased further by smoking cessation, increasing ambulation, and use of thromboembolism-deterrent (TED) hose and sequential compression devices perioperatively. Anticoagulation can be proved to all patients postoperatively for a duration of at least 14, if not 30, days or can be more specifically individualized to each patient using the risk calculators cited above.

Sleep Apnea and Obesity Hypoventilation Evaluation

The incidence of obstructive sleep apnea (OSA) in the morbidly obese population is quoted at anywhere from 71% to 95% depending on the patient's BMI [21]. This places bariatric patients at significant risk for ischemic heart disease, hypertension, cerebrovascular accidents, and cardiac arrhythmias. Of particular interest to surgeons is the potential for postoperative respiratory issues including hypoxia, hypercapnia, and bronchospasm and the need for reintubation. This risk is exacerbated by the use of anesthetics and narcotic medications in the postoperative period. Hypercapnia as a component of obesity hypoventilation syndrome (OHS) puts patients with this syndrome at particular risk for becoming hyper-somnolent due to carbon dioxide narcosis.

The gold standard for evaluation is nocturnal polysomnography (PSG). During PSG, the number of apneic episodes can be quantitated. The apnea-hypopnea index (AHI) indicates the abscess of sleep apnea if less than 5, mild OSA for 5–15, moderate OSA for >15, and severe OSA if >30. However, ordering PSG routinely for every bariatric patient is not cost-effective or appropriate.

A consensus panel was formed to specifically address this issue. The panel provided 58 statements as recommendations for the guideline [22]. They determined that the Epworth Sleepiness Score (ESS) should not be used as a screening tool. They instead proposed that the STOP-Bang score be used to stratify high-risk OSA [23]. The STOP-Bang score includes risk factors for OSA such as snoring, daytime sleepiness, observed apnea, hypertension, age >50, neck circumference, and male gender. A score ≥3 indicates a moderate risk of OSA. The panel also recommended venous HCO_3 be used as part of the routine screening tool for coexistence of OHS and that OHS should be screened for in bariatric patients with OSA (coexistence 20%). Patients with neuromuscular disorders or obstructive lung disease should be considered as this may increase perioperative hypoventilation risk. Lastly, they stated that the oxygen desaturation index, which is the number of times per hour of sleep that the blood oxygen level drops below baseline, is reliable for detection of OSA.

If sleep apnea is diagnosed, a titration study is indicated to determine the appropriate setting of a continuous positive airway pressure (CPAP) device that can help maintain an open airway when the patient is asleep. Patients should be encouraged to bring this mask with them for use in the hospital after their surgery. Another set of guidelines from May 2012 can be found on the American Society for Metabolic and Bariatric Surgery (ASMBS) website.

Obesity hypoventilation syndrome (OHS) as mentioned above is present in a subset of patients with OSA. The diagnosis is made in obese patients with a pCO_2 >45 in the absence of other respiratory or neuromuscular disorders. A serum bicarbonate level of >27 is sensitive but not specific for elevated carbon dioxide. These patients suffer more profound hypoxemia when asleep. Selected patients such as those on home oxygen or those who have severe COPD may need formal pulmonary function testing prior to surgery.

Patients with severe pulmonary dysfunction are at risk for prolonged mechanical ventilation, tracheostomy, and higher mortality. A good understanding of the patient's preoperative pulmonary function is necessary to adequately assess this subset of patients for surgery.

Evaluation of Upper Gastrointestinal Anatomy

The decision on whether to evaluate patients preoperatively with an esophagogastroduodenoscopy (EGD) or an upper gastrointestinal series (UGI) is still controversial and varies between bariatric centers. Certainly patients undergoing revision surgery will need both an UGI and EGD to define the anatomy and evaluate for reflux or ulcers. If there is severe reflux or dysmotility suspected, then, rarely, manometry and pH studies may be needed.

The controversy comes in for patients undergoing a primary bariatric procedure. Some studies suggest a preoperative EGD in all patients. An analysis of 801 patients found abnormal EGD findings in 65% of patients, most commonly gastritis (32%) and gastroesophageal reflux (24%) [24]. Malignancies were observed in 0.5% of patients. *Helicobacter pylori* were diagnosed in 3.7%. Other studies suggest EGD be performed only in those patients with symptoms as the EGD is more likely to yield pathology [25].

Conversely, some studies recommend against EGD especially in patients undergoing a sleeve gastrectomy. One such study found that 89% of scopes were completely normal, and no cancers were found [26]. Another study evaluated the use of a preoperative swallow and recommends against it [27]. The researchers found that the preoperative swallow does not offer any advantage over selective intraoperative hiatal exploration in the discovery of a hiatal hernia. In fact they found that when there is a false positive result the surgery is slightly prolonged.

A meta-analysis identified 532 citations and included 48 studies to reveal that the proportion of EGDs resulting in a change in surgical management was 7.8% [28]. After removing benign findings with a controversial impact on management (hiatal hernia, gastritis, peptic ulcer), this was found to be 0.4%. Changes in medical management were seen in 27.5%, but after eliminating *Helicobacter pylori* infection, these were found to be 2.5%.

Based on the aforementioned data the following recommendations are reasonable. For symptomatic patients, EGD is recommended. EGD is preferable to UGI and can in addition allow a biopsy for *Helicobacter pylori*. For asymptomatic patients undergoing a sleeve gastrectomy, an EGD is not required. For operations in which the intestinal anatomy is excluded, such as a RYGB or biliopancreatic diversion with duodenal switch, an EGD is recommended. All patients undergoing revision should have evaluation of the anatomy using EGD, UGI, or both.

Regarding *Helicobacter pylori* infection, an EGD is not warranted solely for this reason as breath tests or stool antigens are available. Routine screening for *Helicobacter pylori* is recommended for high-prevalence areas. When performing an EGD, it is important to keep in mind that undiagnosed OSA may be observed when the patient undergoes conscious sedation.

Psychological Evaluation

All patients should undergo a preoperative psychological evaluation prior to bariatric surgery. This accomplishes several things. First, it screens for the few patients for whom surgery is contraindicated whether due to severe psychiatric disease such as schizophrenia or due to an inability to understand and adhere to the postoperative instructions. Second, it identifies those patients that may have a temporary contraindication such as undertreated depression, psychosis, or bipolar disorder. These patients may require several weeks to months of therapy to eventually proceed to surgery and reach the best postoperative outcome.

Psychiatric screening also evaluates for those patients that meet criteria for food addiction. One study found that 16.9% of patients met criteria for food addiction and 15–40% endorsed emotional eating [29]. Emotional eating may affect outcomes although further research needs to be done in this area. A second study found food addiction is present in 25% of patients and that these patients had a significantly higher prevalence of mood and anxiety disorders as well as suicidality [30]. The study did not find a link between food addiction and current alcohol addiction. Of note psychological screening also delves into present or past alcohol or drug abuse. Bariatric patients are at high risk of "addiction transfer" substituting food for a new addiction such as alcohol or drugs following surgery [31].

Often patients want to use their own psychologist, and this should be discouraged for two reasons. First, many therapists do not know how to perform a comprehensive bariatric evaluation and may not be familiar with how to counsel our particular patient population postoperatively. Second, if there is a failure of therapy, therapists may be reluctant to highlight that by rejecting someone for surgery.

We therefore recommend that a psychologist that can perform a high-quality pre-bariatric assessment be mandated and the resulting assessment be communicated with the surgical team in a multidisciplinary fashion or via a medical letter that summarizes the main conclusions of the evaluation.

Informed Consent

Truly informed consent requires a consent that is individualized to each patient. Upon completion of the preoperative workup, the benefit-risk ratio that was discussed at the patient's initial evaluation may have changed. If so, these findings must be discussed with the patient to obtain fully informed consent. Of note, Madan et al. showed that patients often forget significant elements of their preoperative teaching and education including the most common postoperative complications [32]. Thus, the consent process should ideally be another full discussion of the potential risks, including any extra risks those individualized to the patient, at their preoperative visit. It is a physician's legal obligation that the patient has all of the information required to make an informed decision.

Many institutions, and some states through legislation, are now requiring the physician, rather than another licensed healthcare provider such as a nurse practitioner, obtain surgical consent from the patient. Physicians should present their outcomes in the context of the national outcomes as well as risks and alternatives being offered to the patient. The provider obtaining consent should be familiar with the content of the forms and should review the forms with the patient. An individualized form specific to the procedure is preferred over the institution's generic consent form. The language in the consent form should be in simple terms. As lack of patient memory or understanding of the content of a consent form can sometimes discredit the multiple releases theoretically provided on signed standardized consent forms, it is essential the patient convey an understanding of what they are signing. The patient should be given a last chance to ask any and all questions prior to consenting. The surgeon should perform documentation of the specifics of this discussion.

The ultimate consent privilege lies with the patient alone. Once consent is obtained, the patient still retains the legal and ethical right to revoke the consent as well as ask additional questions to reinforce it. It is prudent for patients to be educated and express understanding for truly informed consent.

Conclusion: Standardized Care Pathways

In summary, it is essential to set up practice standards such that each patient can be approached in a standardized, evidence-based fashion preoperatively to optimize care. Recent literature reviews imply a decrease in hospital complications associated with care pathways. In one recent comparison of 65 patients who were treated in a care pathway versus 64 patients who were not, the pathway group had Foley catheters removed earlier, were mobilized on the surgery day more often, used spirometers more often, and had nutrition conducted in a better fashion [33]. While clinical pathways are typically used in the in-hospital setting, they can also enhance care in the preoperative setting. It is likely the surgeon's data review involved in setting up these pathways is at least partially what improves care by better informing the surgeon's practice. Also a comprehensive data review followed by standardized preoperative protocols will limit errors of omission and inappropriate offerings of surgery, ensuring no patient gets left behind or falls through the cracks while increasing efficiency and avoiding unnecessary testing. In this manner, risk of process failure is minimized and patient risk is reduced resulting in improved quality of care.

Hence, this chapter recommends that the surgeon who has not yet developed a formal preoperative pathway should perform a focused examination of their practice patterns, processes, and outcomes. These elements should then be compared to what is data driven in the literature. Discrepancies between the two should be corrected by changes in practice or justified objectively by variations in local standards of care. Once done, the final resolutions should be written down and followed as a formal standardized protocol for patient selection, a multisystem preoperative evaluation, and informed consent. Gaining acceptance by staff and collaborating physicians is often straightforward when offered in the context of education. Lastly, these standards have to be "living" documents and periodically reviewed to ensure that they evolve as new data emerges. As these pathways were recommended in previous "excellence" initiatives, they will likely be present in the new era of quality assessment and improvement.

Question Section

1. All of the following patient characteristics have been shown to increase the risk of perioperative complications except:
   A. Male gender
   B. Age >50
   C. Hypertension
   D. Black race
   E. Inability to walk 200 ft
2. Most current data support the following except:
   A. Prophylactic IVC filter in someone with a history of DVT
   B. Cardiac stress test in someone with a history of heart failure
   C. Preoperative and postoperative use of CPAP in a patient with an AHI >15
   D. Not offering surgery to someone with undertreated bipolar disease
   E. Obtaining a sleep study with a STOP-Bang score ≥3

3. A preoperative EGD is recommended for the following patients:
   A. Patients undergoing revision surgery
   B. Patients with a history of reflux
   C. Patients undergoing procedures that exclude the stomach
   D. Patients with a history of ulcer disease
   E. All of the above
4. Truly informed consent involves all of the following except:
   A. Explanation of risks and benefits
   B. Discussion of the patient's individualized risk profile
   C. Demonstrated fifth-grade reading level by the patient
   D. Expressed understanding by the patient
   E. The consent form written in simple terms

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