

Preoperative Planning and Patient Optimization



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KEYWORDS

• Ventral hernia repair • Preoperative patient optimization • Modifiable risk factors

KEY POINTS

- Ventral hernia repair is becoming an increasingly complex field of surgery.
- Hernia dimensions, operative history, and wound class are just a few of the variables that create an infinite number of patient permutations for which there is no standardized classification scheme.
- The variety of repair techniques and prosthetic reinforcement types in the context of such an amorphous group of patients makes controlled study of surgical morbidity and outcomes an extreme challenge.
- In a field in which consensus can be rare, preoperative patient optimization can be something that all surgeons champion.

Ventral hernia repairs (VHRs) comprise a wide degree of complexity. Hernia size, location, number and type of previous repairs, loss of domain, use of prior component separation techniques, previous mesh use, wound class, and abdominal wall compliance all affect decision-making regarding the operative approach. These variables encompass the 1 cm primary umbilical defect, as well as the concurrent midline and lateral defects, commonly associated with a permanent ostomy. If the patient is fortunate enough not to have an emergent presentation related to bowel obstruction or strangulation, the surgeon can plan for definitive repair of the hernia in an elective setting. Although surgeons have little control over the complexity of the patient's hernia and operative history, there are certain patient variables that can be optimized before elective abdominal wall reconstruction. This article reviews the literature that supports routine expectations for smoking cessation; weight loss; diabetic, nutritional, or metabolic optimization; and decolonization techniques. These methods aim to diminish postoperative complications such as wound infections and recurrence. The authors advocate routine adherence to these requirements before elective surgery not just to optimize the most complex cases but also to prevent smaller hernias from becoming complex.

The authors have nothing to disclose.

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SMOKING CESSATION

Perhaps the most well-studied modifiable patient risk factor is smoking. The deleterious effect of smoking on wound healing has several mechanisms. Fundamentally, smoking leads to elevated blood levels of carbon monoxide, which binds hemoglobin, shifts the oxygen-hemoglobin dissociation curve to the left, and decreases oxygen tissue delivery by as much as 15%.^{1,2} Also, although blood levels of neutrophils are increased by 20% in smokers, both neutrophil and monocyte chemotactic-mediated migration into wounds is impaired, blunting the inflammatory response.^{3,4} For those neutrophils and monocyte-macrophages that do arrive in the wound bed, *in vivo* studies have indicated that their oxidative burst-mediated phagocytosis (responsible for the effective destruction of pathogens such as *Staphylococcus aureus* and *Escherichia coli*) is reduced by more than half in smokers.^{5,6} Finally, fibroblast dysfunction, coupled with imbalanced protease and antiprotease levels in smokers' tissue, impairs collagen deposition, granulation tissue formation, and remodeling.⁷⁻⁹ Nonetheless, smokers are at a severe disadvantage in regard to wound healing and their ability to overcome wound morbidity, particularly surgical site infection (SSI).

The evidence to support the negative effect of smoking on postoperative wound morbidity in all surgical patients has consequently accrued. A meta-analysis of cohort studies and randomized controlled trials encompassing nearly 480,000 subjects across surgical subspecialties associated smoking with increased rates of wound necrosis (odds ratio [OR] 3.8), dehiscence (OR 2.1), SSI (OR 1.8), all wound complications (OR 2.3), and subsequent hernia formation (OR 2.1).¹⁰ Specifically in the context of VHR, smoking has been routinely associated with wound morbidity. In a large cohort of 1505 subjects undergoing VHRs from 13 veterans' hospitals using all techniques, logistic regression identified smoking as the only modifiable risk factor associated with a 5% wound infection rate.¹¹ Furthermore, multivariate analysis from data extracted from the American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) database for more than 72,000 open and laparoscopic repairs associated smoking within 12 months of surgery with deep wound infection (OR 1.6). Interestingly, any history of smoking was also associated with superficial (OR 1.1), deep (OR 1.6), and organ space (OR 1.3) infection, as well as a host of other postoperative complications (eg, pneumonia, reintubation, sepsis, reoperation).¹² A separate NSQIP study specifically looking at all VHRs in 2011 ($n = 12,673$) found that, in addition to its association with all complications, smoking was independently associated with 30-day readmission.¹³ Although administrative databases such as NSQIP are often limited by 30-day follow-up, retrospective analyses with longer follow-up have found a 4-fold increase of incisional hernia after a primary laparotomy in smokers.¹⁴

Fortunately, the harmful effects of smoking in regard to wound morbidity and hernia occurrence seem to be mitigated by smoking cessation before elective surgery. In a Cochrane review of 13 randomized controlled trials recruiting smokers before elective surgery, 7 trials looked at the association of preoperative abstinence with postoperative complications. For the 2 trials ($n = 210$) that initiated intensive interventions (defined as multisession face-to-face counseling at least 4 weeks before surgery) a reduction in all complications (relative risk [RR] 0.42) and wound morbidity (RR 0.31) was found. Brief interventions or those less than 4 weeks from surgery were not able to demonstrate a significant impact on morbidity, and were less likely to lead to long-term smoking cessation.¹⁵ Based on these available data, the authors counsel patients on smoking cessation during at least 2 preoperative visits, and require abstinence for a minimum of 4 weeks before elective operations.

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