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Enhanced Recovery for Breast Reconstruction Surgery

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Abstract

Purpose of Review Enhanced recovery pathways are a well-described perioperative healthcare program involving evidence-based interventions. Enhanced recovery is designed to standardize techniques such as drug selection and nerve blocks in order to speed recovery and reduce overall hospital costs.

Recent Findings A PubMed literature search was performed for articles that included the terms enhanced recovery and breast reconstruction surgery. The present investigation summarizes enhanced recovery literature related to breast surgery with a focus on breast reconstruction.

Summary Enhanced recovery considerations discussed in this review include patient education, preadmission optimization, perforator flap planning, anesthetic techniques, optimized fasting, venous thrombosis prophylaxis, early mobilization, and antimicrobial prophylaxis.

Keywords Enhanced recovery after surgery (ERAS) · Surgery · Breast surgery · Postoperative care · Preoperative care · Fast track recovery

Introduction

Enhanced recovery after surgery (ERAS)© is increasingly becoming more readily available in healthcare. ERAS consists of a multimodal approach to healthcare that focuses on patient-centered care. ERAS achieves this patient-centered care through the team effort of many healthcare providers including nurses, technicians, surgeons, anesthesiologists, pharmacists, ERAS coordinators, and other supportive staff [1••]. The ERAS Society has identified three key factors that prolong hospital stay: dehydration, pain, and reduced mobility. There are many other elements that may also enhance recovery, including minimally invasive procedures, avoidance of drains/tubes, reduction of surgical stress, and nutrition and gut motility [1••].

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ERAS protocols have been shown to be helpful in breast reconstruction patients. This review article will discuss the pertinent aspects of breast reconstruction and its role in the successful implementation of ERAS protocols.

Methods

A PubMed literature search was performed for articles that included the terms enhanced recovery and breast reconstruction surgery. The present investigation summarizes enhanced recovery literature related to breast surgery with a focus on breast reconstruction. Enhanced recovery considerations discussed in this review include patient education, preadmission optimization, perforator flap planning, anesthetic techniques, optimized fasting, venous thrombosis prophylaxis, early mobilization, and antimicrobial prophylaxis.

Overall Criteria for Breast Reconstruction ERAS

One group recently published guidelines for breast reconstruction endorsed by the ERAS Society [1••]. These guidelines describe 18 care elements in the pre-, intra-, and postoperative periods. They include as follows: minimal fasting, carbohydrate loading, multimodal pain prophylaxis and nausea prophylaxis, early refeeding, and early ambulation, and we expand upon these guidelines in this manuscript.

1. Preadmission information, education, counseling
2. Preadmission optimization
3. Perforator flap planning
4. Perioperative fasting
5. Preoperative carbohydrate loading
6. Venous thromboembolism prophylaxis
7. Antimicrobial prophylaxis
8. Postoperative nausea and vomiting prophylaxis
9. Perioperative and intraoperative analgesia
10. Standard anesthetic protocol
11. Preventing intraoperative hypothermia
12. Perioperative intravenous fluid management
13. Postoperative analgesia
14. Early feeding
15. Postoperative flap monitoring
16. Postoperative wound management
17. Early mobilization
18. Postdischarge home support and physiotherapy

Preoperative Period

Preadmission Education, Counseling, and Information

It is strongly recommended to discuss the surgical and anesthetic plans with the patient to manage their expectations and concerns about the perioperative journey [1••]. Offering preoperative patient education and information allows patient involvement in decision-making about breast reconstruction and results in less anxiety and better satisfaction [2].

Preadmission Optimization

Smoking, alcohol consumption, and obesity adversely affect the postoperative outcomes in breast reconstruction surgery [3–5]. Optimizing these factors contributes in less postoperative complications and better recovery [1••]. It is recommended to stop smoking and alcohol consumption at least 1 month prior to the surgery [1••]. Weight reduction to reach body mass index of 30 kg/m^2 is also a strong recommendation to achieve successful reconstruction [1••].

Perforator Flap Planning

Despite the risks of computed tomographic angiography, it is preferred for preoperative perforator mapping over the Doppler ultrasonography [6]. Its use is strongly recommended [1••], as it has shown reduction in flap complications and operative time [6].

Preoperative Fasting

Reducing the fasting hours has been demonstrated to be safe when compared to prolonged preoperative fasting, with no differences in terms of gastric emptying and risk of aspiration [7••]. Instead, it may be beneficial as it helps reducing thirst sensation, preoperative patient discomfort, and dehydration [8]. The recommended fasting period prior to surgery is 6 h for solid foods and 2 h for clear fluids [9••].

Preoperative Carbohydrate Loading

Ingestion of carbohydrate-rich drinks 2 h before surgery has illustrated to improve insulin sensitivity and reduce thirst and hunger sensation [10]. It also may protect the body from adverse catabolic effects of surgery and prolonged fasting [11]. Despite the low evidence of preoperative carbohydrate loading, it is strongly recommended to administer it 2 h before induction of anesthesia because of its potential benefits and low risk of harm [1••]. In well-controlled diabetics, it is safe to provide the carbohydrate drink 3 h prior to surgery [12].

Intraoperative Period

Venous Thromboembolism Prophylaxis

Breast reconstruction doubles the risk for venous thromboembolism (VTE) in patients undergoing mastectomy and breast reconstruction [13]. Furthermore, obesity and aging, if present in those patients, add more risk for VTE [14]. Therefore, prophylaxis against VTE is a strong recommendation in ERAS protocol for those patients after exclusion of bleeding risk factors [1••]. Unfractionated heparin is preferred over low molecular weight heparin as a pharmacologic prophylaxis besides mechanical prophylaxis with intermittent pneumatic compression [15].

Antimicrobial Prophylaxis

Surgical site infection is a major burden in breast reconstruction surgery [16]. Skin disinfection with chlorhexidine-containing antiseptics and administration of an antibiotic against skin microbes 1 h before skin incision are strong ERAS recommendations [1••]. Irrigation of the breast pocket with antibiotic is another way that may reduce the bacterial load [17].

Postoperative Nausea and Vomiting Prophylaxis

Use of 5-hydroxytryptamine receptor 3 (5-HT3) blocker and dexamethasone combination is better than using one of these drugs alone [18]. Moreover, addition of preoperative Neurokinin-1 blocker to 5-HT3 blocker use has shown better results and more protection against postoperative nausea and vomiting (PONV) than 5-HT3 blocker alone [19, 20]. Therefore, multimodal drug use against PONV is a strong ERAS recommendation in patients undergoing breast reconstruction surgery [1••].

Analgesia

Optimum pain control facilitates enhanced recovery and early discharge [21••]. Preoperative gabapentin, nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase-2 (COX-2) inhibitors, and bupivacaine incisional infiltration are examples of analgesics that could be given to reduce opioid consumption and control postoperative pain in patients undergoing breast reconstruction surgery [21••, 22–24]. However, intraoperative administration of these drugs may provide better optimization of postoperative pain due to the length of the operation [1••]. Multimodal opioid sparing analgesia is strongly recommended in ERAS practices for breast reconstruction surgery [1••]. Regional and local blocks can also be used to minimize sedation and pain. Transverse abdominis plane blocks have also been shown to decrease pain in patients. Bupivacaine via infusion catheter has also been shown to decrease postoperative opioid consumption. One injection of bupivacaine can last for several days, which is beneficial to continued catheter-based infusions.

Anesthetic Protocol

Maintenance of anesthesia in breast surgery can be achieved by standard general or regional plans [1••]. Regional anesthesia plan has the advantage of opioid consumption reduction but without reducing pain or length of stay and is associated with a decreased recurrence of subsequent breast cancer (via natural killer T cells) [25, 26]. On the other hand, general anesthesia with total intravenous anesthesia (TIVA) has the advantage of reducing PONV [27]. ERAS guidelines for breast reconstruction surgery recommend the use of general anesthesia with TIVA [1••]. Maintenance of anesthesia during breast surgery can include general anesthesia including total intravenous anesthesia, general anesthesia with a volatile anesthetic, and/or regional anesthesia. Although general anesthesia is the most frequently utilized from of anesthesia for breast surgery, it may not be the best choice if the healthcare provider is concerned about patient narcotic consumption.

Temperature Control

Hypothermia has been shown to adversely affect wound healing and increase incidence of infection with subsequent prolonged hospital stay [28]. Prevention of unintentional hypothermia protects against delayed recovery and allows for better outcomes and early discharge [29, 30]. Forced air is the recommended warming modality for its safety and efficacy [1••]. Intraoperative monitoring of body temperature and keeping it above 36 °C are considered a strong recommendation for ERAS success [1••].

Fluid Therapy

Optimum perfusion is essential to maintain organ function and flap vitality [31]. Hypervolemia and hypovolemia both are harmful and carry risk of complications [32, 33]. Goal-directed fluid therapy based on dynamic parameters is recommended to help achieving optimum volume resuscitation [1••]. Surgical stress can induce endocrine responses, including the release of vasopressin (antidiuretic hormone). Vasopressin causes reabsorptive actions via the collecting duct in kidneys and can cause water retention, which can to some extent offset the hypovolemic effect of fasting. Hypovolemia is associated with a poorer clinical outcome. Using vasopressors to correct hypotension in normovolemic patients undergoing breast reconstruction has shown to be safe and does not harm the flap [31]. Fluid overload, on the other hand, can cause interstitial edema and local inflammation which can

impair regeneration of collagen, and negatively affect tissue healing. This can increase the risk of wound dehiscence, wound infections, and anastomotic leakage.

Postoperative Period

Early Feeding

Early oral intake as soon as possible within 24 h postoperatively is recommended in ERAS [1••]. Early feeding has shown to be safe and it helps in better recovery and early discharge [34, 35].

Postoperative Flap Monitoring

The breast flap should be closely monitored for early detection and prompt treatment of any postoperative complications [1••]. It is recommended to monitor the flap for at least 72 h after surgery. Clinical observation is enough as a monitoring modality [36]. However, implantable Doppler monitor is essential in cases of buried flaps [36]. The recommended intervals for monitoring are every hour in the first 24 h, then every 2 h within the second 24 h, and every 3–4 h in the third 24 h [1••].

Early Mobilization

Prolonged bed rest adversely affects the postoperative outcomes with subsequent delayed recovery [37]. While early mobilization protects against complications of recumbency and facilitates rapid recovery and early discharge [38], patients should be encouraged to mobilize within the first 24 h [1••].

Postdischarge Support and Physiotherapy

Providing care that continues after patient discharge is a strong recommendation in ERAS guidelines for breast reconstruction surgery [1••]. It allows better patient recovery and improves physical activity [39]. The recommended postdischarge care includes physiotherapy rehabilitation programs, supervised exercise programs, and in-home nursing visits [1••].

Summary

In summary, stakeholders should meet for any ERAS-driven system to provide input and understand the benefits of such protocols. For breast surgery such as breast reconstruction procedures, the contributions of the surgeon, the anesthesia, and nursing teams each provide additive potential benefits to support techniques, policies, or evolving systems that will ensure success of the ERAS components. ERAS has its strength from the fact that is driven by clinical data and is concordance with common sense strategies, including preoperative patient education, preadmission optimization of the patient, detailed perforator flap planning, most effective anesthetic techniques, optimized fasting, venous thrombosis prophylaxis, early mobilization, and antimicrobial prophylaxis. ERAS protocols have been evolving over the past two decades, and there are many clinical sites that are lacking or uninterested to consider implementing through multifactorial reasons. Patients having breast surgery or any other type of surgical interventional are best served through evolving discussion and input from the numerous stakeholders involved in their care. Refinement of ERAS protocols through updated guidelines can be highly beneficial in clinical practice to maximize standardization and to obtain a receptive audience of healthcare providers.

Authors' Contribution The manuscript has been read and approved by all the authors, the requirements for authorship have been met, and each author believes that the manuscript represents honest work. All authors contributed equally to the manuscript and are involved in institutional protocols and policies for enhanced recovery pathways.

Compliance with Ethical Standards

Conflict of Interest Amir Elhassan, Ahmed Ahmed, Hamdy Awad, Michelle Humeidan, Carmen L. Labrie-Brown, and Elyse M. Cornett declare no conflict of interest. Alan D. Kaye serves on the Speakers Bureau of Depomed and Merck. Richard D. Urman received research funding from Medtronic.

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