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Enhanced Recovery After Surgery: A Better Protocol for Better Outcomes

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Abstract

***Background:** Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative management approach that provides better outcomes for less expense. ERAS has been introduced to the practice to improve patients' perioperative performance and solve barriers to early discharge. ERAS protocol is formed of multiple components, implemented together in a synergistic way to maximize patients' improvement and cost savings. Currently, many surgeries can be managed with ERAS protocol. However, the diversity of surgical procedures makes it difficult to manage every surgical specialty with a single uniform ERAS protocol. Multiplicity and complexity of ERAS components are considered main barriers to significant adherence and successful adoption of the protocol in the clinical practice, rendering full protocol implementation a serious challenge.*

***Objectives:** This article is aiming to review the current ERAS components and its contribution to perioperative outcomes in the clinical practice.*

***Contents:** This article contains review on significance, guidelines and recommendations of current ERAS components in the perioperative pathway.*

***Conclusion:** ERAS is formed of multiple components that need to be refined to provide a procedure-specific ERAS protocol rather than a single uniform protocol for different surgical specialties. ERAS is a multidisciplinary protocol that needs enormous collaborative efforts from patients, nurses, physicians, and administrative staff involved in the perioperative care of surgical patients to ensure full and correct implementation of ERAS protocol.*

Keywords: *Enhanced Recovery; Perioperative; ERAS; Fast track surgery*

Introduction

Offering patient's safety, satisfaction, and high-quality healthcare services with reduced cost is a good reflection of the perioperative value-based care.[(1)]Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative management approach that provides better outcomes for less expense.[(2)] ERAS has been introduced to the clinical practice to improve patients' perioperative performance and solve barriers to early discharge. Currently, many surgeries have shown quick recovery, less morbidity and postoperative outcomes improvements in patients managed with ERAS protocol.[(3)]However, the wide range of surgical procedures subject to ERAS protocol, makes it difficult to manage every surgical specialty with a single uniform ERAS protocol. Moreover, multiplicity and complexity of ERAS components have been deemed main barriers to significant adherence and successful adoption of the protocol in the clinical practice, rendering full protocol implementation a serious challenge.[(4)]. The aim of our review is to discuss the current ERAS components and its contribution on perioperative outcomes in the clinical practice.

Preoperative Components

Preadmission Counseling

There is limited evidence about the benefits of preoperative education on postoperative patient outcomes in different surgical specialties.[5] However, stoma education preoperatively in colorectal surgery has been confirmed to be beneficial in reducing the length of stay and improving patient independence.[6] Furthermore, preoperative education allows better patient involvement in decision making with subsequent improvement in patient compliance to perioperative instructions.[7] It also has a positive psychological impact by managing patient expectation, reducing anxiety and improving satisfaction.[7] Despite the limited evidence for this element, multiple ERAS guidelines recommend preoperative education for its potential benefits and limited risks.[5, 8, 9]

Preadmission Nutrition And Fasting

Overnight fasting has been discouraged by many guidelines and societies for its drawbacks.[10] Fasting for long time converts patient body to catabolic state that adversely affects postoperative muscle strength resulting in delayed recovery.[11] Preparing the patient preoperatively in a good fed state is essential to ensure better recovery.[12] Reducing fasting hours to six hours for solid foods and allowing oral ingestion of clear fluids two hours before induction of anesthesia, have been proven to be safe with no risks of decreased gastric pH, delayed gastric emptying or aspiration.[10]

Carbohydrate loading drinks have been introduced to provide preoperative nutritional optimization, less thirst, hunger and anxiety and more patient comfort.[13] Patients received carbohydrates rich drinks have shown improved outcomes and reduced length of stay when compared to fasting patients.[14] However, no differences in postoperative outcomes have been shown when carbohydrates loading group compared with clear water or placebo groups.[14]Recent ERAS guidelines strongly recommend short fasting time; two hours for clear liquids and six hours for solid foods,[5, 8, 9, 15, 16] and oral administration of carbohydrate rich drinks two hours before surgery.[5, 8, 9, 17]

Bowel Preparation

Mechanical bowel preparation (MBP) is no longer recommended as a preparatory step for abdominal surgeries.[18] Its undesirable consequences like dehydration and electrolyte disturbances contradict ERAS principles and delay the return of baseline body function.[19] Furthermore, MBP has shown no beneficial effects regarding lowering the rate of postoperative complications.[20] However, addition of oral antibiotic preparation (OBP) to MBP in recent studies has shown an evidence of reduction of surgical site infection, incisional site infection and overall morbidity.[21]

Preadmission optimization

Prehabilitaion is defined as encouragement of physical exercise before surgery meant to improve patient performance status and functional capacity.However, current literatures have illustrated poor evidence regarding its beneficial effects on clinical outcomes.[22] The questionable benefits of prehabilitation have directed ERAS guidelines for colorectal and bariatric surgeries to weakly recommend it.[9, 15] While some other ERAS guidelines have not mentioned it at all as a part of its recommendations.[5, 8, 16, 17]

Perioperative Components

Pain Control

Optimum pain control is a cornerstone for enhanced recovery and early discharge.[23] Opioid alternatives like acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), and cyclooxygenase-2 (COX-2) inhibitors, all are examples of analgesics that can be administered to reduce opioid consumption and control postoperative pain in surgical patients. This multimodal opioid sparing analgesia when given on scheduled rather than on demand basis, has demonstrated superior reduction of postoperative pain, less opioid consumption with subsequent decrease of opioid adverse effects.[24]

Regional anesthetic techniques are considered gold standard analgesic modality that can successfully reduce the need for systemic opioid administration resulting in enhanced recovery and better outcomes. However, these better outcomes are limited to the use of thoracic epidural analgesia (TEA) for open, but not laparoscopic surgeries.[25] Patients undergoing laparoscopic surgery and having TEA may experience delayed discharge due to the added potential for hypotension.[26] Therefore, TEA use is a strong recommendation by ERAS guidelines for open abdominal surgeries only.[15] While its use for laparoscopic surgeries should be limited to patients at high risk of pulmonary complications, and patients with a great possibility of conversion to open surgery

Perioperative Nausea/Vomiting

One of the major barriers to patient comfort and early discharge is postoperative nausea and vomiting (PONV). Prophylaxis against PONV is considered a major element in ERAS pathway with a strong recommendation in several ERAS guidelines for different surgeries.[5, 8, 9, 15-17] However, routine use of antiemetic medications for all patients has not shown any beneficial reduction in the incidence of PONV.[27] On the other hand, when antiemetics administered based on risk assessment, it has demonstrated significant reduction in PONV.[28] Therefore, ERAS guidelines discourage the routine use of antiemetics for all patients and recommend administration of antiemetics based on PONV risk assessment.[15]

Preemptive multimodal prophylaxis against PONV has been shown to be superior to monotherapy with better outcomes in high risk groups.[29] For instance, dexamethasone at induction and ondansetron at emergence have resulted in greater efficacy than single drug use.[30] Additionally, combination of total intravenous anesthesia (TIVA) with multiple antiemetics has been revealed superior to multimodal prophylaxis with inhaled anesthetic.[31] Interestingly, there are data reporting effectiveness of acetaminophen in reducing PONV via decreasing pain and opioid consumption.[32] However, this effect has been shown to be limited to the preoperative intravenous (IV) administration only, and no significant effect has been noticed when the drug was given after pain onset.[32].

Intraoperative Fluid Management

Fluid management presents a significant challenge during major surgeries. Copious and restricted fluid administrations have both demonstrated variable outcomes in major bowel surgery, suggesting that the ideal regimen may have to be tailored to each individual patient. Therefore, goal directed fluid therapy (GDFT) has been preferred in high risk patient undergoing major surgery with major fluid shift. It has been revealed to diminish post operative morbidity and decrease the length of stay.[33] However, GDFT effects have been offset when compared with more wise fluid therapy in the setting of ERAS.[34]

During periods of hemodynamic instability due to neuraxial blockade, euvolemia should be confirmed first and any hypotension in normovolemic patients should be managed with vasopressors.[15] A low dose vasopressor has been proven to restore organ perfusion better than fluid administration in such cases.[35]

Surgical Approach

Minimal invasiveness

Reducing invasiveness of surgical approach using laparoscopic and robotic surgeries ensures reduction of surgical stress response. Minimally invasive approach has been illustrated to cause significant postoperative outcome improvement.[36] When compared with open surgery, laparoscopy has shown superior short-term outcomes in the form of better postoperative pain control, earlier mobilization, rapid restoring of gut motility, with shorter length of stay.[37] On the other hand, major concerns have been expressed about increased costs and tumor recurrence due to incomplete removal of the growth during laparoscopy use. However, several studies on laparoscopic surgeries have shown no differences in terms of complete removal of the mass, securing safety margins and recurrence rates when compared with open surgeries.[38]Moreover, high costs associated with laparoscopy use have been offset by the savings from the lower postoperative morbidity and shorter length of hospitalization.[39] Therefore, ERAS guidelines for different abdominal surgeries strongly recommend the minimally invasive approach whenever possible.

Nasogastric Tube and Abdominal Drains

Routine use of nasogastric tube (NGT) in abdominal surgeries has been discouraged for its questionable benefits and potential harms.[9, 15-17] Nasogastric decompression has been shown non-significant in reducing the incidence of wound dehiscence and anastomotic leaks.[40] Patients who did not receive NGT experienced same outcomes as patients who received NGT.[41]Moreover, NGT insertion has been linked to delayed initiation of oral intake and increased incidence of pulmonary and nasopharyngeal infections.[41] ERAS guidelines for different abdominal surgeries recommend avoidance of routine use of NGT and suggest its selective use for patients with refractory ileus not responding to conservative management.[9, 15-17]

In the same way, routine use of intra-abdominal drains has been revealed nonbeneficial. Its routine use has been shown to be non-significant enough to demonstrate any reduction in postoperative

complications.[42] Instead, abdominal drains have been associated with development of more complications like fistulas and cutaneous ulceration. ERAS guidelines recommend the selective use and, when deemed possible, early removal of abdominal drains.[9, 15]

Postoperative Components

Mobilization

Early mobilization has been revealed to be one of the independent predictors of successful ERAS implementation.[43] It allows avoidance of prolonged bed rest and its adverse sequelae resulting in reduced morbidity and improved postoperative outcomes.[44]Postoperative outcomes improvement facilitates enhanced recovery, shorter length of stay and early discharge. However, data available has shown different definitions for early mobilization with no specific strategy has been described.[15] Most of the ERAS guidelines recommend enforced early mobilization within the first 24 hours after surgery without any specification of duration, intensity, target or frequency of mobilization.[5, 8, 15]

Ileus prevention

Postoperative ileus is a major cause of prolonged hospitalization, patient discomfort and financial load. Prevention of postoperative ileus and promotion of bowel motility is one of the main goals of ERAS practices in different abdominal surgeries.[15] Early postoperative feeding has been demonstrated to facilitate early return of bowel function, shorter hospital stay and faster discharge.[45] Early offering of regular diet after surgery has shown no differences in terms of vomiting rate, need for NGT or increased complications rate.[46] Different ERAS guidelines for colorectal surgery recommend early feeding postoperatively as soon as possible.[15]

Additionally, several studies have revealed that chewing sugar free gums may facilitate early restoring of gut mobility.[47] Despite the poor quality of these studies, American and French ERAS guidelines for colorectal surgery recommends chewing gums for its limited risk and potential benefits.[15]

Postoperative fluid management

IV fluid should be stopped as early as possible and oral administration of clear fluid should be encouraged. Daily weight monitoring allows checking for any excess fluid administration. In hypotensive patient due to TEA, fluid responsiveness should be assessed first together with reduction of TEA rates and use of vasopressor instead of fluid in normovolemic patients.[35]

Urinary catheter

Patients with prolonged urinary catheterization has shown to have double risk of urinary tract infection (UTI) than patients with early postoperative removal of urinary catheter.[48] This UTI requires more care with prolonged hospitalization and increased costs. In addition, No difference in retention rates has been observed in TEA with early or late catheter removal.[49] Therefore, urinary catheter should be removed within the first 24 hours in colonic and upper rectal surgeries, and 48 hours in mid-rectal or lower rectal surgeries and patients at risk of retention.[15] Selective late removal is reserved only for male patients, extensive pelvic dissection and excess fluid administration.[50]

Conclusion

ERAS is formed of multiple components that need to be refined to provide a procedure-specific ERAS protocol rather than a single uniform protocol for different surgical specialties. ERAS is a multidisciplinary protocol that needs enormous collaborative efforts from patients, nurses, physicians, and administrative staff involved in the perioperative care of surgical patients to ensure full and correct implementation of ERAS protocol.

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