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Enhanced Recovery After Surgery (ERAS) Protocols: A Paradigm Shift in Perioperative Care and Breaking Our Practice Norms

Medical Science

KEYWORDS : Enhanced recovery protocol, ERAS, Fast track surgery, Perioperative care, Multimodal perioperative pathway

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ABSTRACT

Purpose: The objective of this article is to provide updated review to evidence based components of enhanced recovery after surgery (ERAS) against conventional perioperative care in elective and emergency surgeries.

Recent findings: Fast tract surgeries and multimodal enhanced recovery pathways are now achieving world wide recognition as standardized perioperative care in multiple surgical sub-specialties like colorectal and pelvis surgery, urological surgery, gynecological surgery, cardiothoracic and vascular surgery and hepatopancreatobiliary (HPB) surgery. This optimized care has challenged long standing traditional perioperative care and resulted in a evidenced based well established protocols, which enhances postoperative recovery, reduced hospital stay, readmission rate and overall medical cost. However issues relating to its awareness, training and education, implementation, auditing, patient compliance and cost effectiveness in limited resource settings need to be addressed.

Summary:

In Summery ERAS protocols are future of discipline-specific or surgery-specific optimized perioperative care pathways, which have potential to fast tract recovery without increasing postoperative mortality and morbidity if implemented with consistency. However it will need more research to address issues related to it.

Introduction:

Researchers from past few decades showed that change in even one component in perioperative care had significantly reduced hospital stay and morbidity[1]. So based on this observation group of physicians decided to incorporate multiple elements of standard surgical care into a protocol and made a comprehensive multimodal perioperative pathway initially for the elective colorectal surgery, which later on modified to other subspecialties like urology, orthopedics and pelvic surgery[2]. The principle behind ERAS was to integrate multiple components like pain, cognition, mobility, nutrition, hydration in care to improve outcomes and satisfaction. Enhanced recovery after surgery (ERAS) is an optimized well-structured protocol that is designed to reduce surgical stress and prepare patient for the surgery to fasten postoperative recovery[1]. ERAS protocol covers all three phases of perioperative surgical care and focus on factors such as prolonged bed rest, delayed return of normal bowel function, need for intravenous analgesia that usually cause delay in recovery, increase length of hospital stay and specialist intervention after surgery[3]. It decreases stress response and promotes physiological recovery by removing or reducing such factors. In elective colorectal surgery, to name a few, they selectively used mechanical bowel preparation, avoid preoperative fasting and use high carbohydrate fluid few hours before surgery, acquire goal directed fluid management, encourage early resumption of oral nutrition and mobilization, early removal of lines, drains and catheter if used, decrease or avoid use of opioid analgesia for gut function recovery[2-4].

ERAS protocol in elective colorectal surgery had to face some resistant initially after introduction because of its unconventional approach in avoiding bowel preparation and wound drainage and promoting time bound patient recovery[5]. Conventional perioperative care are based on personal experiences and traditional surgical teachings, however growing amount of research in different aspect of perioperative care made ERAS protocol more evidenced based and able to comment on those practices which are unnecessary or even halt postoperative recovery in surgical patients. Because of that most of the recent trials focusing on ERAS protocol and outcomes able to show reduced length of hospital stay along with decreased morbidity.

Text:

Until recently ERAS Society has recommended protocols in perioperative care for elective colon surgery, rectal and pelvic surgery, pancreaticodudenectomy and radical cystectomy for bladder cancer[6-9]. The basic components of ERAS are used to tailor surgery specific protocols. The recommendations are based on good quality randomized controlled trials or meta-analysis of them and quality of evidences and recommendations are assessed using GRADE (Grading of Recommendations, Assessment, Development and Evaluation) system[10].

Table 1 Basic Components of Enhanced recovery after surgery (ERAS)

Preoperative	Intraoperative	Postoperative
Preadmission counseling Fluid and carbohydrate loading No prolonged fasting No/selective bowel preparation Antibiotic prophylaxis Thromboprophylaxis No Premedication	Short acting anesthetic agents Epidural anesthesia/ analgesia No drains Avoidance of salt and water overload Maintenance of normothermia	Epidural anesthesia/ analgesia No nasogastric tubes Prevention of nausea and vomiting Early removal of catheter Early oral nutrition Non opioid oral analgesia/NSAIDS* Early mobilization Stimulation of gut motility Audit of compliance and outcomes

NSAIDs: Non-steroidal antinflammatory drugs.

Components:

Preoperative counseling

Preoperative stress and anxiety are associated with delayed postoperative recovery in the form of prolonged ileus and wound healing[11-12]. So preoperative behavioral and psychological interventions designed to reduce anxiety along counseling regarding surgical and anesthetic expectations may reduce fear and fasten postoperative recovery[13]. In summary, ERAS Society strongly recommends dedicated preoperative counseling routinely[6-9].

Preoperative optimization

Medical optimization like correction of anemia, control of diabetes and hypertension are necessary to improve surgical out-

comes[14]. Patients who are undergoing major abdominal surgery should be advised to stop smoking and drinking alcohol as both increases cardiopulmonary complications, wound infections and bleeding episodes[15]. So ERAS society recommends preoperative medical optimization, cessation of smoking and alcohol intake before 4 weeks of surgery and increasing exercise preoperatively[6-9].

Preoperative bowel preparation

Mechanical bowel preparation is associated with adverse physiological effects, which may be secondary to dehydration[16]. Several studies confirms that mechanical bowel preparation before colonic surgery is of no clinical benefit[17]. So mechanical bowel preparation should be avoided in major surgery[6-9].

Preoperative fasting

It has been a traditional practice to keep patient nil by mouth from midnight to prevent respiratory complications. But recent guidelines recommend intake of clear fluids up to 2 hours before induction of anesthesia and a fasting period of 6 hours for solid foods[18]. Unnecessary long preoperative fasting increases insulin resistance and discomfort after surgery[19]. Intake of clear fluids should be allowed up to 2 hours and solids up to 6 hours prior to induction of anesthesia[6-9].

Preoperative oral carbohydrate loading

Preoperative complex carbohydrate loading has been shown to reduced hunger, thirst and anxiety along with decrease postoperative insulin resistance[20-21]. Preoperative oral carbohydrate loading should be administered to all non-diabetic patients[6-9].

Prophylaxis against thromboembolism

Patients undergoing major abdominal and pelvic surgery are at risk of developing venous thromboembolism. Low molecular weight heparin (LMWH) and graduated compression stockings are effective in reducing the risk of venous thromboembolism[22-23]. High risk patients need prolonged pharmacological prophylaxis for 28 days along with compression stockings even if early recovery and early discharge from hospital[6-9].

Nasogastric intubation

Purpose of nasogastric tubes after major abdominal surgery is to delay bowel recovery, minimize risk of anastomotic leak, decrease pulmonary complications and shorten hospital stay. A meta-analysis showed that routine nasogastric decompression failed to accomplish its intended function[24]. So there is no rationale for routine use of nasogastric decompression during major abdominal surgery except during anesthesia to evacuate air from stomach and should be removed before the reversal of anesthesia[6-9].

Urinary drainage

Urinary drainage is used routinely during and after surgery to prevent post-operative urinary retention and to measure urinary output. Male gender, pre existing prostatism, open abdominal surgery, anorectal surgery, lack of pre-operative voiding, anesthesia time more than 2 h, regional anesthesia, emergency surgery are major risk factors for post operative urinary retention[7, 25]. Prolonged catheterization carries risk of urinary tract infections and catheter associated urinary tract infections are the most common hospital acquired infection accounting almost 40 % of all nosocomial infections[7]. A recent study shows that transurethral bladder catheter can be safely removed on postoperative day 1 even in presence of epidural catheter without increasing rate of re insertion[26].

Antimicrobial prophylaxis and skin preparation

An antibiotics prophylaxis is studied in depth in term of selection, coverage, dosage, timing, route and further dosage in prolonged surgery. So it has been established that patient receiving antibiotic prophylaxis 30-60 min before skin incision has lower surgical site infections[27]. Repeated doses of antibiotics in prolonged procedure (>3 hours) may be beneficial depending on pharmacokinetics of the drug used[28]. As skin is a major source of postoperative infection, optimization of preoperative skin asepsis reduce postoperative skin infection and chlorhexidine-alcohol is superior to povidone-iodine in preventing it[29]. Some studies claims that preoperative hair removal is harmful and should be avoided to prevent surgical site infection. However recent review shows that hair clipping is associated with less surgical site infections than shaving with razors and timing of it needs more research[30].

Drainage of peritoneal cavity

It is believed that use of drain in peritoneal cavity prevent accumulation of fluid in dissection area, infection and anastomotic leakage. Recent meta-analysis shows that there insufficient evidence to use routine perianastomotic drains to prevent anastomotic leaks[31]. Another systemic review showed that among 20 observed leaks, only 1 patient did pus or enteric contents in drain as an effluent[32]. So it is advisable not to use peritoneal drainage as a routine because it unsupported intervention, which might impair individual mobilization[6-9].

Postoperative nausea and vomiting

Postoperative nausea and vomiting (PONV) are most common complication after surgery with overall incidence of 30% and in high-risk patients as high as 70%[33]. Independent factors responsible for PONV are divided into the patient related, anesthesia related and surgery related[33]. It has been shown that identifying these risk factors and using prophylactic antiemetic agents as a multimodal approach can reduce incidence of PONV, which is responsible for increase hospital stay, readmission, pulmonary complications and significant postoperative discomfort[33].

Preventing postoperative ileus

Postoperative ileus (POI) is the single largest factor responsible for increase in hospital stay and health resource utilization as almost all patient develop POI after major abdominal surgery and prevention of POI is one of the key objectives in enhanced recovery protocols[34]. Preventive strategies include mid-thoracic epidural analgesia, avoidance of fluid overload before and during surgery, avoidance of nasogastric decompression, minimal invasive surgery, oral administration of magnesium and alvimopan, and gum chewing[6]. So multimodal approach should be used to prevent postoperative ileus.

Early mobilization

Early mobilization protocols reduce respiratory complications, deep venous thrombosis and pulmonary embolization, urinary tract infection, sepsis[35]. Inadequate control of pain in postoperative period, continued intravenous fluids, indwelling catheter and drains, lack of motivation and patient comorbidities may prevent early mobilization on post operative day 1[6-9]. Prolonged immobilization results in several unwanted effects like insulin resistance, muscle wasting, reduced muscle strength and reduced tissue oxygenation[6-9].

So patient should be mobilized as early as possible to reduce complications.

Perioperative fluid management

Perioperative fluid therapy plays a vital part in achieving successful outcomes after surgery and one of the most controversial component of ERAS protocol in terms of restrictive versus liberal use of fluid, monitoring of fluid therapy, type of fluid and use of vasopressors in perioperative care. So ERAS recommend that fluid requirement should be judiciously measured using different approach to optimize cardiac output in order to prevent overhydration and related complications. Vasopressors should be used

during and after surgery in management of arterial hypotension if patient is normovolaemic. Balanced crystalloids solutions are more physiological and should be preferred over normal saline as choice of fluid[6-9].

Perioperative nutritional care

As there has been a traditional practice to keep patient nil by mouth after major abdominal surgery for a period of time and then start liquids to solid diet as patient tolerate it. Recent meta-analysis found that early resumption of oral diet is associated with fewer surgical complications and faster recovery[36]. According to ERAS, Normal food is basis for nutrition in pre and postoperative patient so normal diet should be resumed as soon as possible after surgery which can reduce risk of infection and length of hospital stay provided that anti ileus multimodal pathway therapy is in place[6-9].

Application of ERAS

As effectiveness of ERAS protocols are well documented in literature with colon, rectal and pelvic surgeries, pancreaticodudenectomy and radical cystectomy, ERAS protocols are now modified and implemented in various surgical sub-specialties like orthopedic surgeries, gynecological surgeries, hepatic surgeries, cardiac surgeries and esophagus and bariatric surgeries. Initial results are encouraging; ERAS protocols are both safe and feasible.

Conclusion:

Multiple cohort studies, randomized controlled trials and meta-analysis had been conducted in all disciplines to assess, evaluate and establish surgery specific or discipline specific multi modal pathways and many of them came to conclusion that ERAS protocols are feasible which can reduce length of hospital stay, need for hospitalization and morbidity without increasing complications[2]. However slow adaptation and implementation of ERAS protocols in hospital settings are the issues that need to be addressed[2]. ERAS protocol in perioperative care allow us to rethink and evaluate our practices and is a trademark of organized highly specific evidenced base care. We are heading one step forward in defining what we have achieved so far in field of perioperative care management and standardizing those with each surgical disciplines, rather each major surgery to improve outcomes. ERAS protocols are based on the elective colorectal surgery, which help practitioners to employ current best practice to fasten the recovery of patients. As each surgery is different from other in terms of duration, magnitude, blood loss, technique, system involved, emergent or elective, it will take time to synthesize individualized protocols in other surgeries or disciplines before it becomes standard practice. However challenges we are facing today are awareness, education and training, slow adaptation, implementation, adherence and monitoring the outcomes of improved patient care as some traditional surgeons worry about adverse influence of this altered practice. As surgery is continuously changing field, updating guidelines from time to time based on available literature and training of those who are involved in the treatment of surgical patients should be considered seriously in order to get successful outcomes.

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