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Review Article

Enhanced Recovery After Surgery (ERAS)

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Abstract

Keyword:

Enhanced Recovery After Surgery. Preoperative Nutrition, Pre-operative fasting, Carbohydrate loading.

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ERAS, enhanced recovery after surgery have become an important focus of perioperative management after colorectal surgery, vascular surgery, thoracic surgery and radical cystectomy. These programs attempt to modify the physiological and psychological responses to major surgery, and have been shown to lead to a reduction in complications and hospital stay, improvements in cardiopulmonary function, earlier return of bowel function and earlier resumption of normal activities. The stress response is initiated by a variety of physical insults, such as tissue injury, infection, hypovolemia or hypoxia. The ERAS program is aimed at attenuating the body's response to surgery which is characterized by its catabolic effect. Autonomic afferent impulses from the area of injury or trauma stimulate the hypothalamus-pituitary-adrenal axis and mediate the body's subsequent endocrine response. Enhanced recovery after surgery (ERAS) protocols starts preoperatively, and continue during anesthesia and surgery and post operatively. Pre-operative overnight fasting is not good!! It is claimed to avoid pulmonary aspiration without evidence to support this!!
Shortened fluid fast does not increase risk of aspiration, regurgitation or related morbidity while preoperative long fasting increases metabolic stress, hyperglycemia and insulin resistance. Best practice is fasting patients for solids up to 6 hours preoperatively and clear fluids up to 2 hours only, without increase in complications. Early postoperative nutrition as soon as it is safe to swallow, decreases metabolic response leading to less insulin resistance, reduces loss of muscle strength and lowers incidence of wound infection, pneumonia, intra-abdominal abscess or even mortality

Introduction

After major surgery some of our patients look fatigued, tired, pale, and without bowel movement which is called "post operative stress response to surgery", while others are active and look healthy in-spite of the major surgery. Our colleagues the anesthetists have initiated a society to study Enhanced Recovery After Surgery (ERAS). They developed an evidence-based approach for healthier and quicker recovery after major surgery. Major surgery includes oncosurgery, vascular,

and thoracic surgery, and radical hysterectomy, but may also apply to moderate surgery like simple hysterectomy and Caesarean operations.

This is a collaborative Enhanced Recovery After Surgery guideline for optimal perioperative care surgeries. An Embase and PubMed database search of publications was performed. All recommendations on the Enhanced Recovery After Surgery topics are based on the best available evidence**.**

Initiated by Professor Henrik Kehlet in the 1990s,1 ERAS, enhanced recovery programs (ERPs) or "fast-track" programs have become an important focus of perioperative management after colorectal surgery,2 vascular surgery,3 thoracic surgery4 and more recently radical cystectomy.5 These programs attempt to modify the physiological and psychological responses to major surgery,6 and have been shown to lead to a reduction in complications and hospital stay, improvements in cardiopulmonary function, earlier return of bowel function and earlier resumption of normal activities.7 The key principles of the ERAS protocol include pre-operative counselling, preoperative nutrition, avoidance of perioperative fasting and carbohydrate loading up to 2 hours preoperatively, standardized anesthetic and analgesic regimens (epidural and non-opiod analgesia) and early mobilization8.

Mechanism of post operative stress:

The stress response is initiated by a variety of physical insults, such as tissue injury, infection, hypovolemia or hypoxia. The ERAS program is aimed at attenuating the body's response to surgery which is characterized by its catabolic effect.9 Autonomic afferent impulses from the area of injury or trauma stimulate the hypothalamus-pituitary-adrenal axis and mediate the body's subsequent endocrine response.10 Increased cortisol levels stimulate gluconeogenesis and glyconeogenesis in the liver, with triglyercides being converted to glycerol and fatty acids providing the substrates for gluconeogensis. Adrenocorticotropic hormone and cortisol production leads to protein catabolism, weight loss, muscle (skeletal and visceral) wasting and nitrogenous loss.11 There is also a relative lack of insulin and peripheral insulin resistance occurs due to alpha-2-adrenergic inhibition of pancreatic B cells (facilitated by catecholamines) and defects in the insulin receptor/intracellular signalling pathway. Hyperglycaemia is therefore a significant finding after surgery,12 and the observed insulin resistance is a major variable influencing length of stay,13 poor wound healing and increased risk of infective complications. The degree of insulin resistance is associated with the extent of surgery, and if postoperative hyperglycaemia is controlled, mortality and morbidity can be reduced by half.14 Methods which reduce the insulin resistance include adequate pain relief,15 16 avoiding a prolonged period when oral intake is interrupted, and the use of carbohydrate loading.

Method:

Enhanced recovery after surgery (ERAS) protocols starts preoperatively, and continue during anesthesia and surgery and post operatively.

Pre-operatively:

It is well-known that poor nutrition is detrimental to outcomes postoperatively.[17] It frequently occurs with comorbidities and with underlying disease processes[18]. Inadequate nutrition is an independent risk factor for complications, increased hospital stays and costs.[19] More recently, data from Vanderbilt University demonstrate that nutritional deficiency preoperatively is a strong predictor of 90-day mortality and poor overall survival.[20]

Pre-operative overnight fasting is not good!! It is claimed to avoid pulmonary aspiration without evidence to support this!!

Shortened fluid fast does **not** increase risk of aspiration, regurgitation or related morbidity while preoperative long fasting increases metabolic stress, hyperglycemia and insulin resistance.

Reducing insulin resistance is achieved by carbohydrate loading, adequate pain relief, and early oral feeding after recovery.

Best practice is fasting patients for solids up to 6 hours preoperatively and clear fluids up to 2 hours only, without increase in complications.

Guidelines adopted by the Royal College of Anesthetists and the American Society of Anesthesiologists advise carbohydrate loading two hours before operations by clear carbohydrate drink such as an apple or lemon juice or tea or coffee without milk. This reduces post operative insulin resistance and reduces protein losses and reduces preoperative thirst, hunger and anxiety[21].

During surgery:

Preferred practice during operation, when possible, includes:

Pre-op parenteral antimicrobial prophylaxis, and of course aseptic techniques.

Clippers rather than razors to remove hair.

Skin preparation with chlorhexidine gluconate plus alcohol is preferred to povidone iodine plus alcohol

Regional anesthesia, spinal or epidural is preferred to general anesthesia.

The aim of providing anesthesia that reduces the surgical stress response, provides analgesia, and encourages the rapid return of mobilization, eating, and drinking. In addition, postoperative nausea

and vomiting (PONV) with multimodal prophylaxis in this high-risk group of patients is required. Extremes of fluid balance and organ dysfunction should be avoided.[22]

For many patients, either general or regional anesthesia can be used; there is little evidence to recommend one technique over the other.

Regional anesthesia (such as intrathecal or epidural) can provide excellent intraoperative and postoperative analgesia. However, side effects such as motor block, hypotension, and urinary retention limit their postoperative use. If an epidural catheter has been used, it should be discontinued soon after the surgery because analgesic requirements are generally modest. There is little evidence to support other modalities such as ketamine, lidocaine, alpha-2 agonists, and pregabalin.[23]

Too much IV fluids during surgery cause intestinal edema and paralytic ileus.

Fluid management should be directed toward replacing intraoperative blood loss while aiming for euvolemia to avoid the problems associated with fluid overload (eg, edema, ileus) or hypovolemia (eg, acute kidney injury). Maintenance of blood pressure once euvolemia is achieved should be with vasoactive drugs to avoid fluid overload.[24]

Minimal invasive surgery is recommended with preference of vaginal approach then Laparoscopy then open.

Epidural and minimally invasive surgery is preferred when possible.

Surgical technique including fine tissue handling

Intra-operative warming as too cold operating room is harmful and body temperature should remain above 36˚C.

Glycemic control should be kept below 150mg/dl.

Post operatively:

Early postoperative nutrition as soon as it is safe to swallow, decreases metabolic response leading to less insulin resistance, reduces loss of muscle strength and lowers incidence of wound infection, pneumonia, intra-abdominal abscess or even mortality.

No advantage in keeping patients' nil by mouth after elective surgery.[25]

Postoperative Ileus etiology is multi-factorial.

Bowel function relies on a combination of enteric and central nervous systems, and neurotransmitters. Secondly hormonal influences, and thirdly local inflammatory pathways.

We avoid paralytic ileus by Gentle tissue handling, less opioids and avoid too much intra-operative fluid. Early feeding and early mobilization are recommended.

In addition to preoperative carbohydrate loading, early postoperative nutrition can ameliorate the metabolic response leading to less insulin resistance, lower nitrogen losses and reduce the loss of muscle strength.[26]

A Cochrane review in 2006 found a direction of effect towards a reduction in complications and mortality rate,65 and in an update to their original metanalysis, Lewis and colleagues confirmed no benefit to keeping patients nothing by mouth (NBM) postoperatively, a reduction in complications and a reduced mortality rate; although, the mechanism for reduced mortality remains unclear.[27]

An assessment of gastrointestinal function and patient tolerability is essential when commencing postoperative oral intake. Lewis and colleagues demonstrated no detrimental effect with early feeding, but a trend towards a lower incidence of anastomotic dehiscence, wound infection, pneumonia, intra-abdominal abscess or mortality in patients who received early enteral feeding.

Summary of ERAS advice is made by NICE
National Institute for Health and Care Excellence in UK

Pre op:

* Short fasting period

* Carbohydrate loading (clear liquids)

* Written information – counseling

* Clear fluid before operation helps to reduce headache & vomiting

After op:

* Carbohydrate drink like fruit juice without pulp, coffee or tea without milk

Peri-op:

* Epidural catheter

* Surgical technique

* Intra-operative warming

* Prophylactic antibiotics

Post-op:

* Enforced mobilization

* Early feeding

* No surgical drain but, if necessary, remove early

* Early restricted fluid regimen

* Adequate post op analgesia: Paracetamol: oral and if not possible IV.

Second choice: NSAIDs oral if not possible IM/IV

Opioids if severe pain is expected

PCA

Conclusions:

Enhanced recovery after surgery protocols were initially described in open colorectal surgery, but have since been studied in a variety of surgical specialties, including urology. Although growing evidence from several RCTs, systematic reviews and meta-analyses suggest significant benefits from ERAS pathways, there are still major difficulties when introducing these evidence-based guidelines into routine practice.[28] The fact that less than half of patients are involved in a postoperative care pathway suggests that perioperative care continues to resemble traditional and conventional attitudes.[29] Many surgeons state that they have "never heard of ERAS," while others cite inadequate multidisciplinary and community support as an impediment to implementation.[30]

In terms of barriers to introducing ERAS, even the simple measures discussed in this review still represent fundamental changes in practice, and can therefore be difficult to achieve. Kahokher and colleagues outlined the key aspects required for the implementation of an ERAS protocol.[31] One of the most important aspects is the ERAS team, which includes pre-admission staff, dieticians, nurses, physiotherapists, social workers, occupational therapists and doctors. All team members must be familiar ERAS principles and be motivated to carry out the program; they must be able to overcome traditional concepts, teaching and attitudes towards perioperative care.

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References:

[1] Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth.* 1997;78:606–17.

[2]. Wind J, Polle SW, Fung Kon Jin PH, et al. Systematic review of enhanced recovery programmes in colonic surgery. *Br J Surg.* 2006;93:800–9.

[3] Podore PC, Throop EB. Infrarenal aortic surgery with a 3-day hospital stay: A report on success with a clinical pathway. *J Vasc Surg.* 1999;29:787–92.

[4] Tovar EA, Roethe RA, Weissig MD, et al. One-day admission for lung lobectomy: an incidental result of a clinical pathway. *Ann Thorac Surg.* 1998;65:803–6.
[5] Koupparis A, Dunn J, Gillatt D, et al. Improvement of an enhanced recovery protocol for radical cystecomy. *British Journal of Medical and Surgical Urology.* 2010;3:237–40.

[6] Fearon KC, Ljungqvist O, Von Meyenfeldt M, et al. Enhanced recovery after surgery: a consensus review of clinical care for patients undergoing colonic resection. *Clin Nutr.* 2005;24:466–77

[7] Lassen K, Soop M, Nygren J, et al. Consensus review of optimal perioperative care in colorectal surgery: Enhanced Recovery After Surgery (ERAS) Group recommendations. *Arch Surg.* 2009;144:961–9.
[8] Weimann A, Braga M, Harsanyi L, et al. ESPEN Guidelines on Enteral Nutrition: Surgery including organ transplantation. *Clin Nutr.* 2006;25:224–44.

[9] Desborough JP. The stress response to trauma and surgery. Br J Anaesth. 2000;85:109–17.
[10] Hall GM. The anaesthetic modffication of the endocrine and metabolic response to surgery. *The Annals of The Royal College of Surgeons of England.* 1985;67:25–29.

[11] Desborough JP. The stress response to trauma and surgery. *Br J Anaesth.* 2000;85:109–17.

[12] Mathur S, Plank LD, Hill AG, et al. Changes in body composition, muscle function and energy expenditure after radical cystectomy. *BJU Int.* 2008;101:973–7. 77. discussion.

[13] Thorell A, Nygren J, Ljungqvist O. Insulin resistance: a marker of surgical stress. *Curr Opin Clin Nutr Metab Care.* 1999;2:69–78

[14] van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. *N Engl J Med.* 2001;345:1359–67.

[15] Greisen J, Juhl CB, Grofte T, et al. Acute pain induces insulin resistance in humans. *Anesthesiology.* 2001;95:578–84.
[
[16] Uchida I, Asoh T, Shirasaka C, et al. Effect of epidural analgesia on postoperative insulin resistance as evaluated by insulin clamp technique. *Br J Surg.* 1988;75:557–62.

[17] van Bokhorst-de van der Schueren MA, van Leeuwen PA, Sauerwein HP, et al. Assessment of malnutrition parameters in head and neck cancer and their relation to postoperative complications. Head Neck. 1997;19:419–25.

[18] Von Meyenfeldt MF, Meijerink WJ, Rouflart MM, et al. Perioperative nutritional support: a randomised clinical trial. Clin Nutr. 1992;11:180–6.

[19] Correia MI, Caiaffa WT, da Silva AL, et al. Risk factors for malnutrition in patients undergoing gastroenterological and hernia surgery: an analysis of 374 patients. Nutr Hosp. 2001;16:59–64

[20] preoperative nutritional deficiency on mortality after radical cystectomy for bladder cancer. J Urol. 2011;185:90–6.

[21] Lauren TH, Malcolm GM: Carbohydrate loading in the preoperative setting, February 2015, South African medical journal 105(3):173

[22] Feldheiser, A. · Aziz, O. · Baldini, G.Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice *Acta Anaesthesiol Scand.* 2016; **60**:289-334

[24] Liu, H. · Brown, M. · Sun, L: Complications and liability related to regional and neuraxial anesthesia *Best Pract Res Clin Anaesthesiol.* 2019; 33:487-497

[25] Eskicioglu C, Forbes SS, Aarts MA, et al. Enhanced recovery after surgery (ERAS) programs for patients having colorectal surgery: a meta-analysis of randomized trials. *J Gastrointest Surg.* 2009;13:2321–9.

[26] Correia MI, da Silva RG. The impact of early nutrition on metabolic response and postoperative ileus. *Curr Opin Clin Nutr Metab Care.* 2004;7:577–83.

[27] Lewis SJ, Andersen HK, Thomas S. Early enteral nutrition within 24 h of intestinal surgery versus later commencement of feeding: a systematic review and meta-analysis. *J Gastrointest Surg.* 2009;13:569–75.

[28] Polle SW, Wind J, Fuhring JW, et al. Implementation of a fast-track perioperative care program: what are the difficulties? *Dig Surg.* 2007;24:441–9.

[29] Maessen J, Dejong CH, Hausel J, et al. A protocol is not enough to implement an enhanced recovery programme for colorectal resection. *Br J Surg.* 2007;94:224–31.

[30] Walter CJ, Smith A, Guillou P. Perceptions of the application of fast-track surgical principles by general surgeons. *Ann R Coll Surg Engl.* 2006;88:191–5.
[31] Kahokehr A, Sammour T, Zargar-Shoshtari K, et al. Implementation of ERAS and how to overcome the barriers. *Int J Surg.* 2009;7:16–9.