Nutritional Support in the Perioperative Period  Topic 17

Module 17.3

Professor of Surgical Oncology,
University of Edinburgh,
Clinical and Surgical Sciences (Surgery),
51 Little France Crescent,
Edinburgh, Scotland EH16 4SA

Learning Objectives:

- Understand the key concepts underpinning modern perioperative care;
- Know the principle domains within an ERAS protocol (pain, GI function and mobilisation);
- Be able to discuss practical aspects of patient management to manage surgical stress and attain optimal organ function and recovery in the perioperative period;
- Understand the importance of the multidisciplinary team, unit organisation, patient information, discharge criteria and audit within an ER programme;
- Gain insight into the key outcomes that are possible with an ER approach.

Contents:

1. Introduction
2. ERAS: the core concept
3. The multidisciplinary team
4. Elements of the ERAS protocol with a focus on stress management
5. Unit organisation/patient information
6. Discharge criteria
7. Audit
8. Implementation and compliance
9. Outcomes
10. Summary
11. References

Key Messages:

- Enhanced recovery is simply integrated, evidence-based, modern perioperative care;
- All patients undergoing major surgery should receive optimal nutritional and metabolic care to maintain homeostasis and promote rapid recovery.

1. Introduction

The rapid development and improvement of perioperative care in recent years has made it possible to completely revise perioperative nutritional care for most patients. With the introduction of Enhanced Recovery After Surgery (ERAS) protocols for most major surgical procedures, both the metabolic and functional circumstances for nutritional care has greatly improved. In this change of care, nutritional and metabolic care is a key component. In order to successfully apply modern perioperative care it is essential to understand the basis of ERAS and to change practice from traditional care to modern practice according to ERAS protocols. This module gives and overview of the ERAS protocols and how they impact nutritional and metabolic care and outcomes.

Copyright © by ESPEN LLL Programme 2015
Traditional peri-operative care has generally accepted that a stress response to major surgery is inevitable. This concept has recently been challenged with the view that a substantial element of the stress response can be avoided with the appropriate application of modern anaesthetic, analgesic and metabolic support techniques. These changes minimize the catabolic response to the surgery and allow nutrients to be handled in a more normal way than in traditional care where severe stress was prevailing. Conventional postoperative care has also emphasised prolonged rest for both the patient and their gastrointestinal tract. Similarly, this concept has recently been challenged. This conceptual change has major impact on the patients’ nutritional and metabolic care. In the catabolic patient, medium-term functional decline will ensue if active steps are not taken to return the patient to full function as soon as possible. These two concepts have been combined to produce a new view of how surgical patients should be cared for (the Enhanced Recovery After Surgery (ERAS) protocol). Using a multidisciplinary team approach with a focus on stress reduction and promotion of return to function, an ERAS protocol aims to allow patients to recover more quickly from major surgery, avoid medium-term sequelae of conventional postoperative care (e.g. decline in nutritional status and fatigue), reduce the risk for complications, and reduce health care costs by reducing hospital stay.

The move from traditional peri-operative care to an ERAS protocol is not straightforward. None of the elements within ERAS protocols have been proven to be pivotal in randomised trials. However, the Enhanced Recovery After Surgery (ERAS) group produced a comprehensive consensus of approximately 20 elements for patients undergoing colorectal resection in 2005 (1). This protocol has been tested extensively, and a prospectively audited case-series including >2000 colon and rectal resection patients was published in 2015 (2). The protocol for colonic resections was updated in 2012 (3) and continues to be updated. To date, the most frequently used model for ERAS has been open colorectal resection. However, there is no doubt that the same principles can be applied successfully to most other forms of major surgery [for instance gastric resection (4)]. Procedure specific guidelines for liver resection, pancreatic resection have also been published by the ERAS Society (see erassociety.org) and plans are in place for other procedures such as orthopaedics and gynaecology. Equally, the last 20 years has seen the revolution in laparoscopic surgery making a real impact on the rate at which patients recover from procedures such as cholecystectomy or colorectal resection. The key issue is to combine minimal access surgery with enhanced recovery to achieve optimum outcomes.

2. ERAS: the Core Concept

The core concept in enhanced recovery is to maintain homeostasis and organ function throughout the patient’s surgical journey. The key question to be asked by all involved is “what is keeping my patient from recovering and going home?” The three domains thought to be critical for recovery are:

- pain control
- gut function
- mobilisation

Every action of all staff involved in the multidisciplinary care of surgical patients must be focused on how to deliver optimal care in these three domains. Pain control is aiming at keeping the patient pain free throughout the recovery, initially with the use of thoracic epidurals, regional blocks or IV lidocaine, later on with oral analgesics. Gut function will be supported to allow intake of fluids and normal food as soon as possible and the return of bowel movements. Also, patients should be mobilised as quickly as possible aiming to return to normal preoperative levels as soon as possible.
3. The Multidisciplinary Team

In order to implement an ERAS protocol there must be an enthusiastic multidisciplinary team. Members of the team necessarily include nurses, anaesthetists and surgeons. However, it is vital to include the co-ordinated help from dieticians, physiotherapists and occupational therapists. Equally, the success of a programme will certainly depend on the involvement of hospital management and the audit team. Implementation is often a radical and sometimes painful process and no member of the team should be focussed on one single area of the patient’s journey. Every member of the team should be trying to optimise outcome right from the first attendance at the out-patient clinic to the time of discharge home.

4. Elements of the ERAS Protocol

Individual protocol elements combine to optimise perioperative fluid balance, provide dynamic analgesia, enforce early mobilisation and encourage early oral feeding. Evidence for the efficacy of these individual protocol elements is often extrapolated from traditional care pathways (1, 3). It is important to appreciate that individual protocol elements tend to synergise with each other. Thus optimal gut function is achieved not only with use of a thoracic epidural or IV lidocaine but also when good fluid balance is achieved. If the patient receives excess intravenous fluids to counteract epidural-related hypotension then any benefit on gut function from the epidural will be overwhelmed by fluid overload and gut-oedema/dysfunction. Insights to and understanding of the fluid balance in the perioperative care has recently been shown to be very poor and yet of great importance for gut function but also for general outcomes after surgery. For this reason a special module is dedicated to this topic (see module 17.4). The following section discusses many of the key individual elements of the ER approach and tries to put each in context with the other.

Perioperative fluid balance may be optimised through avoiding routine mechanical bowel preparation (5, 6), restricting unnecessary preoperative fasting (7) and providing preoperative oral carbohydrate loading. In the postoperative period intravenous fluid and sodium is restricted in favour of oral fluids which should be commenced on the first postoperative day (8). Hypotension related to epidural anaesthesia can be treated with judicious use of a vasopressor (9). Individually these elements have been shown to reduce preoperative anxiety (10), improve postoperative insulin sensitivity (11) and reduce complications and length of stay (12, 13).

Within an ERAS protocol anaesthesia based on intravenous or short acting volatile agents is favoured along with avoidance of pre-anaesthetic medication (14). These measures help to reduce both delay to mobilisation and oral intake in the immediate postoperative period. Intraoperative epidural analgesia, achieves both analgesia and sympathetic blockade which will contribute to a reduction in the postoperative stress response, insulin resistance (15) and gut paralysis (16). Epidural analgesia in the postoperative period provides dynamic analgesia for major open surgery (17) without the side-effects of sedation. The advances in laparoscopic surgery beyond simple cholecystectomy to colorectal resections, liver and even pancreatic surgery have been accompanied by the recognition that an epidural is no longer needed during most minimal access surgery and may be replaced by techniques such as one shot spinal diamorphine (18) or intravenous lidocaine infusion (19). Step-down analgesia is usually paracetamol and non-steroidal anti-inflammatory drugs. Careful management of the transition between epidural and oral analgesia is key to minimising the exposure of patients to systemic opioids.

Early postoperative feeding is encouraged (20) in the presence of a multi-modal anti-ileus package (21), even in the presence of an intestinal anastomosis. Early oral/enteral feeding has been associated with a reduced postoperative stay (22). Postoperative oral nutritional supplements are provided as they are of clear benefit in malnourished patients (23) and may benefit patients that are not malnourished (24, 25). When used in combination with preoperative carbohydrate loading and epidural analgesia enteral feeding have been shown to allow the maintenance of nitrogen equilibrium (26).
Elements of the ERAS protocol aim specifically to reduce postoperative nausea, vomiting and ileus. Routine intraoperative and postoperative antiemetics and reduced exposure to systemic opiates are important (27, 28). This is combined with maintenance of fluid balance (29, 30), epidural analgesia (31, 17, 16) or alternative analgesic techniques and early mobilisation. It is the combination of all of the above measures that act in synergy to secure that normal food can form the basis for the nutritional care in the ERAS protocol.

Adjuncts to minimal access surgery include the use of deep neuromuscular blockade (DNB) with agents such as rocuronium allowing reduction in inflation pressures (less haemodynamic upset) and better surgical access. Sugamadex allows almost immediate reversal of DNB at the end of surgery and thus the use of DNB does not prolong anaesthetic time (32). Maintaining optimal tissue perfusion during surgery with goal-directed fluid therapy remains a controversial area in terms of optimising outcomes within an ERAS protocol (33). Avoiding hypothermia remains a mainstay of stress reduction (34).

Peritoneal drains are avoided as they inhibit mobilisation and their use does not reduce the incidence or severity of anastomotic leaks (35, 36). Similarly urinary catheters are removed early, this may be possible within 24 hours of surgery (8). As protracted bed rest increases insulin resistance and muscle loss (along with other medical complications), mobilisation is encouraged and facilitated. Measures generally accepted within traditional care such as antibiotic prophylaxis, thromboprophylaxis, avoidance of routine nasogastric tubes and avoidance of perioperative hypothermia are employed within the ERAS protocol.

Following an ERAS protocol allows gastrointestinal function to recover earlier, nutritional status to be maintained and postoperative exercise tolerance to improve (37).

5. Unit Organisation / Patient Information

For an ERAS protocol to work well it is important that the surgical unit is re-organised. For example, schedules for theatre should take account of the fact that the ERAS patients should ideally be first on the list so that they have the afternoon and evening to start recovery. Equally, the ward space should be organised so that there is room for the patients to mobilise even with their epidurals (ambulatory epidurals). Moreover, patients should be encouraged to walk to a communal eating area for meals. Food and snacks should be freely available for when patients want to eat.

Explicit preoperative patient information can facilitate postoperative recovery and pain control, particularly in patients who exhibit the most denial and highest levels of anxiety (38). A clear explanation of what is to happen during hospitalisation facilitates adherence to the care pathway and allows timely recovery and early discharge (39, 40). Importantly, at this first encounter the patient should also be given a clear role with specific tasks to perform, including targets for food intake and oral nutritional supplements and targets for mobilisation, during the postoperative period (41, 42). Providing a diary for patients to complete the targets for each day can help focus both the patient and the staff on the protocol.

6. Discharge Criteria

Patients can be discharged when they meet the following criteria:

- good pain control with oral analgesia
- taking solid food, bowel movements and no intravenous fluids
- independently mobile or same level as prior to admission
- all of the above, no complication in need of hospital care and willing to go home

The discharge process starts at the preadmission counselling session when it is determined if the patient lives alone and has any special needs (e.g. transport, social support etc). Problems that will delay discharge must be addressed at this time rather
than once the patient has been admitted. It is clear that in most centres there is a delay between the time when the patient is recovered functionally and when they are actually discharged home (43). Minimising this delay requires optimal discharge planning.

7. Audit

All good surgical practice is based on ongoing audit. It is essential that outcomes be documented, particularly during the introduction of an ERAS programme, but also for the maintenance of a functional ERAS programme. This not only ensures that morbidity and mortality are optimal but that feedback is provided on aspects of the programme that may need further development of infrastructure / staff education.

8. Implementation and Compliance

The determinants of outcome within an ERAS programme are important to know so that protocols can be used to maximum efficiency on the correct groups of patients. It is evident that a protocol is not enough to implement an ERAS programme and that compliance with the protocol both pre-op and post-op is vital if good results are to be obtained (43). Compliance is a complex issue that requires audit of the process throughout the patient’s journey, ongoing motivation from the team leaders, support from the hospital managers and regular/ongoing (re-) education of staff. Equally, it is evident that although good functional recovery may be obtained with experience and protocol compliance, the organisation of healthcare services to facilitate discharge into the community needs to be optimal if the delay between a patient’s functional recovery and their actual discharge date is to be kept to a minimum.

9. Outcomes

Enhanced recovery protocols have been developed to address the sequelae of the metabolic response to elective surgery and to accelerate recovery by attenuating the stress response so that the length of hospital stay and the incidence of postoperative complications and mortality can be reduced, with the added benefits of reducing healthcare costs. These outcomes are difficult to address in small individual trials from single centres. A recent meta-analysis has, however, reported on sixteen randomised trials of patients (n=2,376) undergoing major elective open colorectal surgery (44). The length of hospital stay was reduced by 2.3 days and non-surgical complication rates were significantly reduced by 60%. There were no statistically significant differences in readmission and mortality rates. Such evidence suggests that ERAS pathways do indeed reduce the length of stay and complication rates after major open colorectal surgery without compromising patient safety.

Evidence from the literature, supports the view that an ERAS pathway seems to reduce the overall healthcare cost (45, 46). From a health economics point of view, the data suggest that, with the decrease in complications and hospital stay and similar readmission rates, the cost of treatment per patient would be significantly lower for those treated within an ERAS pathway than those receiving traditional care, despite the need for dedicated staff to implement the pathway.

ERAS programmes have developed considerably since first initiated by Kehlet in the 1980’s. The individual elements that make up such programmes will continue to evolve. However, it would now appear that current programmes can indeed minimise the impact of surgery and its sequelae and that limiting factors that may dominate in the future will be related to pre-existing comorbidity and old age. Such issues constitute some of the real challenges for ERAS protocols in the future.
10. Summary

Optimal nutritional and metabolic care (with a focus on stress reduction) should be provided for all patients undergoing major surgery. In a modern context this is best provided within a multimodal care pathway that aims to maintain homeostasis and optimise recovery of organ function. In addition to an evidence-based protocol, such an enhanced recovery pathway requires unit re-organisation, education of staff, repeated implementation, and monitoring of protocol compliance and outcomes.

11. References


34. NICE Clinical Guideline,65,2008.


