Multidisciplinary Enhanced Recovery After Surgery (ERAS) Pathway for Hepatobiliary and Pancreatic Surgery

28

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Abstract

Enhanced Recovery After Surgery (ERAS) is a multimodal multidisciplinary bundle aiming to provide the best evidence-based care to the patient in order to improve recovery by reducing the surgical stress. The principles of ERAS have been successfully applied in many surgical disciplines, including hepatobiliary and pancreatic surgery. The present chapter will review the current evidence in favor of ERAS for liver and pancreas surgery with focus on the multidisciplinary interaction between healthcare professionals involved in the patient's perioperative care.

28.1 Introduction

Enhanced Recovery After Surgery (ERAS) is a multimodal multidisciplinary pathway aiming to provide the best evidence-based care to the patient with the involvement of a multidisciplinary team [1]. The aim of enhanced recovery is not only to shorten patient's length of stay, which was initially named "fast-track", but mainly to restore patient's preoperative function allowing the patient to get back to his baseline condition early [2]. ERAS focuses on "Enhanced" not on "fast", meaning general improvement of patient's condition is the key that may as secondary (positive) effect speed up the entire perioperative process. The principles of ERAS have been successfully applied in many surgical disciplines, including hepatobiliary and pancreatic surgery. The implementation of ERAS into clinical practice is a new way of conceive the perioperative period with new organization. To apply successfully an ERAS pathway is demanding and requires the full involvement and training of a dedicated multidisciplinary team (MDT), as illustrated on Fig. 28.1.

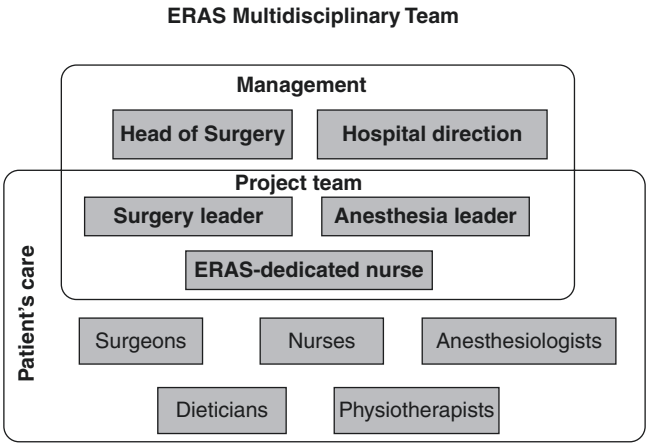

Fig. 28.1 Organization chart of an Enhanced Recovery After Surgery (ERAS) multidisciplinary team

Specific ERAS guidelines were first published in 2016 for liver surgery [3] and were updated in 2019 for pancreatoduodenectomy [4]. These recommendations were based on a systematic review and processed by a modified Delphi process and detailed the associated evidence and recommendation for each ERAS items (23 for liver, 27 for pancreas). The present chapter will go through the practical implementation of an ERAS program and the current evidence supporting ERAS for liver and pancreas surgery, with focus on the multidisciplinary management of the patient and the active involvement of the patient himself.

28.2 ERAS: Moving from Evidence-Based into Clinical Practice

The evidence-based items included in ERAS is a continuous process covering the entire patient's journey, starting from the pre-admission until home-discharge and follow-up. The main areas of focus are preoperative counselling and optimization, normovolemia, multimodal opioid sparing analgesia,

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as well as early scheduled nutrition and mobilization. According to the latest available guidelines, ERAS items for liver and pancreatic surgery are summarized in Table 28.1. The translation of evidence-based elements of enhancement into clinical practice represent a proper challenge. Simply elaborating and establishing a protocol is not enough [5] and much more efforts and changes in organization are required to improve the perioperative outcome.

Table 28.1 Enhanced Recovery After Surgery (ERAS) items for liver and pancreas surgery

	Liver	Pancreas
Preoperative counselling	Dedicated multimedia preoperative counselling.	
Prehabilitation		Prehabilitation program three to six weeks before surgery.
Biliary drainage		Avoidance of preoperative drainage, only if bilirubin >250 µmol/l, cholangitis, or neoadjuvant treatment.
Smoking and alcohol cessation	Smoking and high alcohol consumption cessation at least four weeks before surgery.	
Preoperative nutrition	Patients at risk (weight loss 10–15% within six months, Body Mass Index (BMI) < 18.5 kg/m^2 and serum albumin <30 g/l in the absence of liver or renal dysfunction) should receive oral nutritional supplements for seven days prior to surgery.	Preoperative nutritional intervention if severe weight loss. Nutritional status assessment based on BMI and weight loss.
Immunonutrition	Limited evidence for use.	Not recommended.
Oral bowel preparation	Avoidance of oral bowel preparation.	
Fasting and carbohydrate drinks	Clear fluids until two hours, solids six hours before surgery. Carbohydrate loading on evening and two hours before surgery.	
Preanaesthetic medication	No long acting sedative premedication.	No anxiolytics. Acetaminophen and single dose gabapentinoid.
Anti-thrombotic prophylaxis	Concomitant chemical and mechanical thromboprophylaxis.	
Perioperative steroids	Steroids (methylprednisolone) may be used before hepatectomy in normal liver parenchyma, since it decreases liver injury and intraoperative stress. Steroids should not be given in diabetic patients.	
Antimicrobial prophylaxis and skin preparation	Single iv antibiotic 30–60 minutes before incision. Skin preparation with a scrub of chlorhexidine-alcohol.	Single dose iv antibiotic less than 60 min before skin incision. Intraoperative bile culture if preoperative biliary stenting. Therapeutic postoperative antibiotics if positive bile culture. Use of alcohol-based preparations and wound protectors.
Epidural	Not recommended in open liver surgery for ERAS patients. Wound infusion catheter or intrathecal opiates can be good alternatives combined with multimodal analgesia.	Thoracic epidural analgesia (T5–8) for open. If no epidural: Intravenous lidocaine or transversus abdominis plane block/ wound infiltration.
Minimally invasive surgery	Laparoscopic liver resection can be performed by hepato-biliary surgeons experienced in laparoscopic surgery, in particular left lateral sectionectomy and resections of lesions located in anterior segments.	Laparoscopic pancreatoduodenectomy (PD) only in highly experienced high-volume center. No recommendation for robotic-assisted PD.
Postoperative analgesia		Multimodal opioid sparing analgesia.
Wound catheter		Preperitoneal wound catheter as alternative to epidural for open PD.
Postoperative Nausea and Vomiting (PONV) prophylaxis	Multimodal PONV prophylaxis adapted to risk factors.	
Hypothermia prevention	Active warming (cutaneous and perfusions warming) to maintain body temperature ≥36 °C.	
Glycaemic control	Glucose levels should be maintained as close to normal as possible without causing hypoglycemia.	
Fluid balance	The maintenance of low central venous pressure (below 5 cmH_2O) with close monitoring during hepatic surgery is advocated. Balanced crystalloid should be preferred.	Avoidance of fluid overload.
Nasogastric intubation	No postoperative gastric tube	

Table 28.1 (continued)

	Liver	Pancreas
Abdominal drains	No routine abdominal drain	Perianastomotic drain removal at 72 hours in low-risk patients
Somatostatin analogues	–	No systematic use of somatostatin
Urinary catheter	Removal on POD 3	Early urinary catheter removal
Delayed gastric emptying (DGE)	An omentum flap to cover the cut surface of the liver reduces the risk of DGE after left-sided hepatectomy	No acknowledged prophylactic strategy. Early diagnosis of intraabdominal complications. Artificial nutrition in case of prolonged DGE.
Stimulation of bowel movement	Stimulation of bowel movement after liver surgery is not indicated.	Use of chewing gum, alvimopan or mosapride.
Diet	Normal diet after surgery according to tolerance.	
Mobilization	Early and active mobilization.	
Audit	Regular and continuous audit.	

A MDT must be gathered first under the initiative of a project leader or "ERAS champion". In our experience, the surgeons in charge of the respective units were designed as leaders of the team and were supported by two to three designated surgeons. In other hospitals anesthesiologists are the champions but the process remain the same: surgeons, anesthesiologists, nurses and patients working together. An optimal MDT should include at least a nurse, an anesthesiologists, an administrator and a surgeon. Other health care workers like physiotherapists or nutritionists as part of the team. A dedicated and specifically trained ERAS nurse is of uttermost importance. The support of the administration is essential from the beginning, to obtain the required resources and monitor the financial benefits. The team should then undergo training to implement an enhanced recovery pathway in their own unit or hospital. ERAS implementation process is a systematic training program provided by ERAS academic experts and conducted over a 8 to 10 months structured period. Following the definition of measurable goals, actions and plans are put into practice, then observation and measurement are taken, and finally adequate adjustments are made. Regular multidisciplinary audit, also including nutritionists and physiotherapists, are conducted in order to monitor compliance and sustainability of changes achieved following the implementation process. The use of a systematic interactive audit system allows standardization of outcomes reporting and continuous data analysis [6]. Long term follow-up studies acknowledged the sustainability of such multidisciplinary implementation and maintenance of ERAS program [7]. With the Covid pandemic, the way to implement ERAS program is about to evolve and e-learning platforms will be used instead of in person meetings.

28.3 ERAS Benefits in Hepato-Biliary and Pancreatic Surgery

Following successful ERAS implementation, clinical benefits in liver surgery were consistently reported. At least five meta-analysis [8–12], with the latest published in 2020 reported a significant reduction in length of stay as well as 30%–50% reduction of postoperative complications, without increasing mortality or readmission. When reported, the functional recovery as well as the quality of life was also improved with ERAS [8]. ERAS compliance was ranging from 65% to 74% [10] and the rate of liver specific complications was not reduced by ERAS implementation [9]. Less than 20% of included studies in the latest metanalysis [10], reported a systematic audit. Therefore, significant improvement in the reporting of compliance as well as the application of systematic audit are awaited in ERAS for hepato-biliary surgery.

Regarding pancreatic surgery, the effect of ERAS on clinical outcome was frequently reported from 2007 until now in many studies. Their results were gathered in five main meta-analysis [13–17], which reported a significant reduction of overall morbidity and length of stay without any increase in readmission rate when an enhanced recovery protocol was applied. Concerning pancreatic surgery specific complications, such as delayed gastric emptying and pancreatic fistula, three of the five abovementioned meta-analysis [14, 15, 17] described a reduction of delayed gastric emptying and a similar rate of clinically significant pancreatic fistula with ERAS compared to historical care. However, the high variability of the number of ERAS items used in each study leads to heterogeneity in the included study.

A recent multicenter cohort study including 404 patients undergoing pancreateoduodenectomy within ERAS assessed the application of the guidelines in daily clinical practice [18]. The number of items applied divided the total number, also called "compliance", was 62%, with the postoperative period being the most challenging part. Each item of an enhanced recovery protocol is of importance, but it is mainly their cumulative proportion, expressed as overall compliance, was a major factor for clinical outcome as an overall compliance of more than 70% was associated with a significant reduction of overall complications and length of stay. When looking at the impact of each element, the avoidance of postoperative nasogastric tube and early mobilization were independent factors associated with improved outcome after pancreatoduodenectomy.

The long-term outcome after pancreatic and liver surgery is also correlated with the multidisciplinary oncological treatment, including adjuvant chemotherapy. As postoperative complications might increase the interval between the surgical procedure and the start of chemotherapy, the potential role of ERAS compliance on this interval was evaluated in a retrospective analysis [19]. An overall compliance equal or more than 67% was associated with a significant decrease of the interval between surgery and chemotherapy for patients >65 years old.

As already mentioned, economical resources are a frequently raised issue when considering implementing ERAS, as it requires specific resources such as an enhanced recovery dedicated nurse, information's booklet and database [20]. These investments may lead to resistance to enhanced recovery implementation [21]. However, these initial costs are quickly overwhelmed by the in-hospital cost reduction induced not only by the reduction of length of stay, but also by the decrease of complications. In hepato-biliary and pancreatic surgery, a recent systematic review [22] described among the five included studies in pancreas surgery, a mean cost reduction in favor of the ERAS of USD 7020. In liver surgery, only three studies were found, which precluded a systematic cost analysis. However, a cost-minimization analysis for liver surgery showed a total mean cost reduction of € 3080 per patient following ERAS implementation [23].

28.4 ERAS as a Multidisciplinary Team Approach

A multidisciplinary team (MDT) approach provides comprehensive patient-centered care by gathering a range of different health care professionals sharing a common objective. As ERAS is a multimodal multidisciplinary approach in order to improve patient outcome, the multidisciplinary work is essential, not only during the implementation period but also in the crucial period of sustainability.

Understanding barriers and enablers to ERAS implementation is a key process to improve collaboration within the MDT. An interesting study assessed qualitative barriers and enables across nurses, surgeons and anesthesiologists [24]. Nurses identified patient's reluctance to early mobilization and feeding, which could be overcome by patient education. Lack of manpower and time was also identified. From the surgeons' perspective, nursing culture and lack of nursing time, as well as personal preferences and resistance to change were potential barriers. Anesthesiologists expressed concerns that changing nursing culture and surgeon's behavior would be difficult, and this could be overwhelmed by improved communication and collaboration. A systematic review [25] included studies with focus on health professionals' experiences of ERAS implementation and identified five main themes: communication and collaboration, resistance to change, role and significance of protocol-based care, and knowledge and expectation. This review concluded that communication among partners and with patients, as well provision of comprehensive information to health professionals and patients, in addition with Identifying a local ERAS champions could improve ERAS implementation.

28.5 Conclusion

ERAS is a powerful improvement tool for the patient's perioperative course. But application of ERAS in hepato-biliary and pancreatic surgery requires multidisciplinary communication and collaboration in order to deliver evidence-based best practice in a setting of patient-centered care. Under these circumstances, ERAS leads to improved patient outcome, with reduced complications and improved functional outcome associated with reduced length of stay for hepato-biliary and pancreatic surgery. In addition, implementation of ERAS pathway is a cost-effective intervention, allowing support from healthcare administration. Patient education and involvement, as well as multidisciplinary communication and collaboration are essential to reach high compliance to ERAS items, resulting in improved outcome.

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