Enhanced Recovery in Emergency Abdominal Surgery

10

Joël L. Lavanchy and Beat Schnüriger

10.1 Introduction

The concept of ERAS includes pre-, intra-, and postoperative treatment bundles in order to improve patients' outcomes on different levels. One of the first study collaborations to scientifically elaborate best practices on perioperative care was founded in 2001 by Ken Fearon and Olle Ljungqvist. This collaboration resulted in an evidence-based guideline on elective colonic resection and was published in 2005 [1]. The legacy of the ERAS-study group lies in the definition of treatment bundles in the pre-, intra-, and postoperative course involving all aspects and professions of surgical care including surgeons, nurses, anesthesiologists, ICU physicians, etc. It has been successfully applied in clinical practice and scientifically investigated for patients undergoing elective bariatric [2], cardiac [3], colorectal [4, 5], gynecologic [6], head and neck [7], hepatic [8], pancreatic [9], reconstructive [10], thoracic [11] and urologic surgery [12].

However, it is in the nature of emergency surgery that patients are unprepared for surgical intervention at the time of admission and that they present in altered psychosocial and pathophysiological conditions. This group of acutely ill patients is not amenable e.g., for a prehabilitation program. Moreover, as timely decision-making and treatment is critical in the emergency setting, the possibilities of preoperative optimization are limited.

Nevertheless, there is great optimization potential during the intra- and postoperative course of acute surgical interventions. ERAS protocols have been successfully implemented in emergency patients—selected articles will be presented in this chapter.

J. L. Lavanchy · B. Schnüriger (✉)
Acute Care Surgery Team, Department of Visceral Surgery and Medicine, Inselspital Bern University Hospital, University of Bern, Bern, Switzerland
e-mail: Joel.Lavanchy@insel.ch; Beat.Schnueriger@insel.ch

R. Latifi et al. (eds.), *Emergency General Surgery in Geriatrics*, Hot Topics in Acute Care Surgery and Trauma, https://doi.org/10.1007/978-3-030-62215-2_10

10.2 Definition of Enhanced Recovery After Surgery

The optimization and standardization of interventions aim to enhance the recovery of patients in order to reduce morbidity, intensive care unit length of stay, and H-LOS. Which in turn, translates into reduced hospitalization costs and socioeconomic benefits for the entire society. Table 10.1 shows the items of the latest ERAS protocol [4]. Of note, enhanced recovery programs not only define treatment bundles but also monitor whether patients are treated according to the defined protocols.

10.3 Enhanced Recovery After Surgery Protocols in Emergency Abdominal Surgery

The introduction of ERAS protocols in various fields of elective abdominal surgery led to decreased morbidity resulting in faster recovery and shorter H-LOS [16–18]. Succeeding in elective surgery, ERAS protocols have been adapted for emergency surgery by focusing on intra- and postoperative treatment bundles, as preoperative optimization is not feasible.

10.3.1 Contents of ERAS Protocols in Emergency Surgery

Currently, there are four trials investigating ERAS versus conventional care (CC) in patients undergoing emergency abdominal surgery [13–15, 19]. These studies included patients undergoing emergency colonic resections or required operation for perforated peptic ulcer. In three studies [13–15], the pre-, intra-, and postoperative ERAS items were described in detail and are marked with asterisks (*) in Table 10.1. One study does not give details on the assessed ERAS items [19].

Table 10.1 Items of ERAS protocols

Preoperative	Intraoperative	Postoperative
Counseling*	Standard anesthetic protocol*	Analgesia*
Optimization (Risk assessment, smoking cessation, etc.)	Fluid and electrolyte management*	Thromboprophylaxis*
Prehabilitation	Prevention of hypothermia*	Fluid and electrolyte management*
Improving nutritional care	Minimal surgical access*	Early removal or avoidance of urinary drainage*
Management of anemia	Avoidance of drainage of the peritoneal cavity*	Prevention of ileus*
Prevention of nausea and vomiting*	Avoidance of nasogastric intubation*	Glycemic control
Preanesthetic medication*		Nutritional care*
Antimicrobial prophylaxis and skin preparation*		Early mobilization*
No bowel preparation*		
Fluid and electrolyte management		
Avoidance of fasting and carbohydrate loading*		

*Investigated in emergency abdominal surgery [13–15]

10.3.2 Impact on Outcomes of Enhanced Recovery After Surgery Protocols in Emergency Surgery

The first study that compared ERAS with conventional care (CC) in patients undergoing emergency abdominal surgery was published in 2014 [13]. Since then, three additional studies followed [14, 15, 19]. The mean age of included patients in these four studies ranged from 36.6 to 68 years.

In 2014, a randomized controlled trial assessing the applicability of ERAS protocols in emergency abdominal surgery was published [13]. These investigators demonstrated that an ERAS protocol in peptic ulcer surgery in young patients with a mean age of 36.6 years is able to reduce the H-LOS with similar morbidity and mortality rates. Likewise, in 2014, a retrospective matched cohort study showed that an ERAS protocol reduced H-LOS in patients undergoing emergency colorectal resection compared to conventional care [14]. However, in 2016 a retrospective cohort study did not demonstrate reduced H-LOS in emergency abdominal surgery patients following an ERAS protocol, but reduced major complications compared to conventional care [19]. A retrospective matched cohort study of patients undergoing emergency colorectal resection—published in 2018—showed a shorter time to normal bowel function, reduced H-LOS and morbidity when comparing ERAS to CC [15].

In summary, the findings of these four studies comparing ERAS with CC in patients undergoing emergency abdominal surgery suggest, that (1) ERAS is feasible also in emergency cases, (2) had a positive impact on H-LOS and morbidity, and (3) was without impact on mortality.

10.4 ERAS Protocols in Elderly Patients Undergoing Emergency Surgery

Currently, there are no studies available that specifically assess ERAS protocols in elderly patients undergoing acute surgical interventions. However, ERAS protocols have been investigated in elderly patients undergoing *elective* surgery [20–23].

In 2012 and 2014, there were two prospective, randomized controlled trials published comparing ERAS with CC in a total of 78 and 233 elderly patients undergoing elective colorectal resection for cancer [20, 23]. The median age of the investigated populations were 71.5 and 75.2 years, respectively. Both studies revealed a shorter H-LOS in the ERAS compared to the CC group. On the other hand, in 2016 a matched retrospective cohort study of 88 patients with a median age of 77.2 years undergoing elective open pancreaticoduodenectomy showed similar morbidity when comparing ERAS with CC [21].

Despite the lack of direct scientific evidence, ERAS protocols are expected to be beneficial also in the elderly acute population [24]. Frail patients, in particular, would profit from an adapted enhanced recovery program. The geriatric population with increased cardio-pulmonary, renal, hepatic, and neurologic comorbidities and reduced reserves including e.g., malnutrition are more susceptible to worse

outcomes [25, 26]. Therefore, close monitoring, early mobilization, optimization of perioperative analgesia, adapted volume resuscitation, tight glucose control, etc., are even more important than in younger, otherwise healthier patients. However, the feasibility of ERAS protocols in elderly emergency patients needs to be assessed thoughtfully. It is of paramount importance to adapt the ERAS bundles according to the capabilities of geriatric patients, e.g., early mobilization might not be possible due to coexisting musculoskeletal or neurologic disorders. Therefore, the feasibility and impact on outcomes of the implementation of defined ERAS protocols in the elderly emergency population need to be investigated in prospective, randomized studies.

References

1. Fearon KC, Ljungqvist O, Von Meyenfeldt M, Revhaug A, Dejong CH, Lassen K, Nygren J, Hausel J, Soop M, Andersen J, Kehlet H. Enhanced recovery after surgery: a consensus review of clinical care for patients undergoing colonic resection. Clin Nutr. 2005;24(3):466–77. https://doi.org/10.1016/j.clnu.2005.02.002.
2. Thorell A, MacCormick AD, Awad S, Reynolds N, Roulin D, Demartines N, Vignaud M, Alvarez A, Singh PM, Lobo DN. Guidelines for perioperative care in bariatric surgery: enhanced recovery after surgery (ERAS) society recommendations. World J Surg. 2016;40(9):2065–83. https://doi.org/10.1007/s00268-016-3492-3.
3. Engelman DT, Ben Ali W, Williams JB, Perrault LP, Reddy VS, Arora RC, Roselli EE, Khoynezhad A, Gerdisch M, Levy JH, Lobdell K, Fletcher N, Kirsch M, Nelson G, Engelman RM, Gregory AJ, Boyle EM. Guidelines for perioperative care in cardiac surgery: enhanced recovery after surgery society recommendations. JAMA Surg. 2019;154(8):755–66. https://doi.org/10.1001/jamasurg.2019.1153.
4. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N, Rockall TA, Young-Fadok TM, Hill AG, Soop M, de Boer HD, Urman RD, Chang GJ, Fichera A, Kessler H, Grass F, Whang EE, Fawcett WJ, Carli F, Lobo DN, Rollins KE, Balfour A, Baldini G, Riedel B, Ljungqvist O. Guidelines for perioperative care in elective colorectal surgery: enhanced recovery after surgery (ERAS(R)) society recommendations: 2018. World J Surg. 2019;43(3):659–95. https://doi.org/10.1007/s00268-018-4844-y.
5. Nygren J, Thacker J, Carli F, Fearon KC, Norderval S, Lobo DN, Ljungqvist O, Soop M, Ramirez J, Enhanced Recovery After Surgery S. Guidelines for perioperative care in elective rectal/pelvic surgery: enhanced recovery after surgery (ERAS(R)) society recommendations. Clin Nutr. 2012;31(6):801–16. https://doi.org/10.1016/j.clnu.2012.08.012.
6. Nelson G, Bakkum-Gamez J, Kalogera E, Glaser G, Altman A, Meyer LA, Taylor JS, Iniesta M, Lasala J, Mena G, Scott M, Gillis C, Elias K, Wijk L, Huang J, Nygren J, Ljungqvist O, Ramirez PT, Dowdy SC. Guidelines for perioperative care in gynecologic/oncology: enhanced recovery after surgery (ERAS) society recommendations-2019 update. Int J Gynecol Cancer. 2019;29(4):651–68. https://doi.org/10.1136/ijgc-2019-000356.
7. Dort JC, Farwell DG, Findlay M, Huber GF, Kerr P, Shea-Budgell MA, Simon C, Uppington J, Zygun D, Ljungqvist O, Harris J. Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction: a consensus review and recommendations from the enhanced recovery after surgery society. JAMA Otolaryngol Head Neck Surg. 2017;143(3):292–303. https://doi.org/10.1001/jamaoto.2016.2981.
8. Melloul E, Hubner M, Scott M, Snowden C, Prentis J, Dejong CH, Garden OJ, Farges O, Kokudo N, Vauthey JN, Clavien PA, Demartines N. Guidelines for perioperative care for liver surgery: enhanced recovery after surgery (ERAS) society recommendations. World J Surg. 2016;40(10):2425–40. https://doi.org/10.1007/s00268-016-3700-1.

9. Lassen K, Coolsen MM, Slim K, Carli F, de Aguilar-Nascimento JE, Schafer M, Parks RW, Fearon KC, Lobo DN, Demartines N, Braga M, Ljungqvist O, Dejong CH, Society E, European Society for Clinical N, Metabolism, International Association for Surgical M, Nutrition. Guidelines for perioperative care for pancreaticoduodenectomy: enhanced recovery after surgery (ERAS(R)) society recommendations. Clin Nutr. 2012;31(6):817–30. https://doi.org/10.1016/j.clnu.2012.08.011.
10. Temple-Oberle C, Shea-Budgell MA, Tan M, Semple JL, Schrag C, Barreto M, Blondeel P, Hamming J, Dayan J, Ljungqvist O, Society E. Consensus review of optimal perioperative care in breast reconstruction: enhanced recovery after surgery (ERAS) society recommendations. Plast Reconstr Surg. 2017;139(5):1056e–71e. https://doi.org/10.1097/PRS.0000000000003242.
11. Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, Brunelli A, Cerfolio RJ, Gonzalez M, Ljungqvist O, Petersen RH, Popescu WM, Slinger PD, Naidu B. Guidelines for enhanced recovery after lung surgery: recommendations of the enhanced recovery after surgery (ERAS(R)) society and the european society of thoracic surgeons (ESTS). Eur J Cardiothorac Surg. 2019;55(1):91–115. https://doi.org/10.1093/ejcts/ezy301.
12. Cerantola Y, Valerio M, Persson B, Jichlinski P, Ljungqvist O, Hubner M, Kassouf W, Muller S, Baldini G, Carli F, Naesheimh T, Ytrebo L, Revhaug A, Lassen K, Knutsen T, Aarsether E, Wiklund P, Patel HR. Guidelines for perioperative care after radical cystectomy for bladder cancer: enhanced recovery after surgery (ERAS((R))) society recommendations. Clin Nutr. 2013;32(6):879–87. https://doi.org/10.1016/j.clnu.2013.09.014.
13. Gonenc M, Dural AC, Celik F, Akarsu C, Kocatas A, Kalayci MU, Dogan Y, Alis H. Enhanced postoperative recovery pathways in emergency surgery: a randomised controlled clinical trial. Am J Surg. 2014;207(6):807–14. https://doi.org/10.1016/j.amjsurg.2013.07.025.
14. Lohsiriwat V. Enhanced recovery after surgery vs conventional care in emergency colorectal surgery. World J Gastroenterol. 2014;20(38):13950–5. https://doi.org/10.3748/wjg.v20.i38.13950.
15. Shang Y, Guo C, Zhang D. Modified enhanced recovery after surgery protocols are beneficial for postoperative recovery for patients undergoing emergency surgery for obstructive colorectal cancer: a propensity score matching analysis. Medicine (Baltimore). 2018;97(39):e12348. https://doi.org/10.1097/MD.0000000000012348.
16. Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. JAMA Surg. 2017;152(3):292–8. https://doi.org/10.1001/jamasurg.2016.4952.
17. Delaney CP, Fazio VW, Senagore AJ, Robinson B, Halverson AL, Remzi FH. 'Fast track' postoperative management protocol for patients with high co-morbidity undergoing complex abdominal and pelvic colorectal surgery. Br J Surg. 2001;88(11):1533–8. https://doi.org/10.1046/j.0007-1323.2001.01905.x.
18. Adamina M, Kehlet H, Tomlinson GA, Senagore AJ, Delaney CP. Enhanced recovery pathways optimize health outcomes and resource utilization: a meta-analysis of randomized controlled trials in colorectal surgery. Surgery. 2011;149(6):830–40. https://doi.org/10.1016/j.surg.2010.11.003.
19. Wisely JC, Barclay KL. Effects of an enhanced recovery after surgery programme on emergency surgical patients. ANZ J Surg. 2016;86(11):883–8. https://doi.org/10.1111/ans.13465.
20. Jia Y, Jin G, Guo S, Gu B, Jin Z, Gao X, Li Z. Fast-track surgery decreases the incidence of postoperative delirium and other complications in elderly patients with colorectal carcinoma. Langenbeck's Arch Surg. 2014;399(1):77–84. https://doi.org/10.1007/s00423-013-1151-9.
21. Partelli S, Crippa S, Castagnani R, Ruffo G, Marmorale C, Franconi AM, De Angelis C, Falconi M. Evaluation of an enhanced recovery protocol after pancreaticoduodenectomy in elderly patients. HPB (Oxford). 2016;18(2):153–8. https://doi.org/10.1016/j.hpb.2015.09.009.
22. Tejedor P, Pastor C, Gonzalez-Ayora S, Ortega-Lopez M, Guadalajara H, Garcia-Olmo D. Short-term outcomes and benefits of ERAS program in elderly patients undergoing colorectal surgery: a case-matched study compared to conventional care. Int J Color Dis. 2018;33(9):1251–8. https://doi.org/10.1007/s00384-018-3057-z.

23. Wang Q, Suo J, Jiang J, Wang C, Zhao YQ, Cao X. Effectiveness of fast-track rehabilitation vs conventional care in laparoscopic colorectal resection for elderly patients: a randomized trial. Color Dis. 2012;14(8):1009–13. https://doi.org/10.1111/j.1463-1318.2011.02855.x.
24. Paduraru M, Ponchietti L, Casas IM, Svenningsen P, Pereira J, Landaluce-Olavarria A, Font RF, Miguel IP, Ugarte-Sierra B. Enhanced recovery after surgery (ERAS)—the evidence in geriatric emergency surgery: a systematic review. Chirurgia (Bucur). 2017;112(5):546–57. https://doi.org/10.21614/chirurgia.112.5.546.
25. Lavanchy JL, Holzgang MM, Haltmeier T, Candinas D, Schnuriger B. Outcomes of emergency abdominal surgery in octogenarians: a single-center analysis. Am J Surg. 2019;218(2):248–54. https://doi.org/10.1016/j.amjsurg.2018.11.023.
26. Rangel EL, Cooper Z, Olufajo OA, Reznor G, Lipsitz SR, Salim A, Kwakye G, Calahan C, Sarhan M, Hanna JS. Mortality after emergency surgery continues to rise after discharge in the elderly: predictors of 1-year mortality. J Trauma Acute Care Surg. 2015;79(3):349–58. https://doi.org/10.1097/TA.0000000000000773.