

Existing practice of perioperative management of colorectal surgeries in a regional cancer institute and compliance with ERAS guidelines

Address for correspondence:

Dr. Angshuman Rudra Pal,
Tata Medical Center,
Newtown, Kolkata - 700 156,
West Bengal, India.
E-mail: angshunitya@gmail.
com

Angshuman Rudra Pal, Suparna Mitra, Sobhan Aich, Jyotsna Goswami

Department of Anaesthesiology, Critical Care and Pain, Tata Medical Center, Kolkata, West Bengal, India

ABSTRACT

Background and Aims: Enhanced recovery after surgery (ERAS) protocol in colorectal surgery has been shown to result in reduced rates of postoperative complications and length of stay (LOS) in the hospital. Although there is clear guideline and evidences available, their implementation into daily clinical practice faces some difficulties. We aimed to audit the existing practice of perioperative care in colorectal surgeries and find out the adherence to ERAS protocol. **Methods:** We collected data from medical record of 215 patients undergoing colorectal surgery in a regional cancer institute of eastern India. The patient data were retrospectively collected, which included, demographic data, adherence to major components of ERAS pathway, postoperative complications, and length of hospital stay. **Results:** The median LOS after surgery was 9 days (interquartile range [IQR] 6-12.75). Approximately, 15% patients had postoperative complications. We found good adherence (more than 80%) to certain elements of ERAS such as preoperative counseling and nutritional assessments, selective bowel preparation, antibiotic and antithrombotic prophylaxis, etc. **Conclusion:** The audit revealed that compliance to individual ERAS elements were variable, which needed urgent modification for better adherence to ERAS guidelines.

Key words: Colorectal surgery, compliance, enhanced recovery after surgery

Access this article online
Website: www.ijaweb.org
DOI: 10.4103/ija.IJA_382_18
Quick response code


INTRODUCTION

An enhanced recovery protocol (ERP) is a set of standardized perioperative procedures and practices that is applied to patients undergoing a given elective surgery. Enhanced recovery after surgery (ERAS) protocols have been developed for colorectal surgery patients to reduce physiological stress and postoperative organ dysfunction through optimisation of perioperative care and recovery, resulting into reduction of complication rates and length of stay (LOS).^[1] Gustafsson and coworkers demonstrated improved outcome with better compliance to an evidence-based ERAS protocol. Patients treated with less than 50% compliance had a complication rate of almost 50%, whereas with 90% compliance had fewer than 20% complications. The ERAS protocol includes perioperative opioid-sparing analgesia, a laparoscopic approach for the colorectal resection, avoidance of nasogastric tubes and peritoneal drains, aggressive management of postoperative nausea and vomiting, and early oral feedings and ambulation.^[2] However, multidisciplinary involvement

makes several aspects of the program vulnerable to failure and may explain the reported differences in the rates of adherence to the various components of ERAS.^[3-6] We present a 1-year audit of 208 cases of colorectal surgeries and try to establish our adherence to ERAS protocol with the existing practice pattern.

METHODS

After taking approval from institutional ethical committee, all patients undergoing elective surgeries for colorectal cancer ($n = 215$) in a tertiary comprehensive

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How to cite this article: Pal AR, Mitra S, Aich S, Goswami J. Existing practice of perioperative management of colorectal surgeries in a regional cancer institute and compliance with ERAS guidelines. *Indian J Anaesth* 2019;63:26-30.

cancer care center during the period between December 2015 and December 2016 were included in this study. The ERAS protocol is based on multimodal approach including pre, intra, and postoperative components as recommended by the ERAS group.^[7,8] The data were collected retrospectively from hospital electronic medical record, which included patient demographics, ERAS preoperative components, surgical procedures, and intraoperative components including anaesthetic technique, postoperative components, complications, and LOS.

The definitions of each ERAS core elements are described in Table 1. The LOS was defined as duration of stay in the hospital from day of surgery to discharge during primary admission. The compliance rate for each ERAS element was calculated as percentage of patients following the elements during perioperative period. No routine use of mechanical bowel preparation (MBP) was considered to be compliant to ERAS protocol. The balanced fluid management during the perioperative period (from the induction of anaesthesia till 8 am on the 1st postoperative day {POD}) in ERAS protocol was defined as infusion of less than 3000 ml for colon surgery and less than 3500 ml for rectal resections.^[1] As per ERAS protocol, carbohydrate drink is any drink containing 12.5% complex carbohydrate with evidence-based safety profile that it can be given 2 h before anaesthesia induction. Complications were defined and included if occurring within 30 days after surgery.^[9] Complications were subdivided into grades I to V depending on increasing severity according to the Clavien-Dindo classification.^[10] Clavien-Dindo grade I to II complications were classified as minor and grades IIIa to IVb as major, with grade V indicating death.

RESULTS

Out of 215 patients, 7 patients were excluded because of incompleteness of data. Finally, we analyzed data of 208 patients. The characteristics of the patients and operative factors are shown in Table 2. The mean age of the study population was 54 years, out of which 65% were male. The mean American Society of Anesthesiologist score was 2, and mean BMI was 23.33. The majority of patients had colon cancer and had colectomy. Larger proportion had undergone open surgery. The mean compliance to perioperative ERAS components was 66.79%. The degree of adherence to the individual elements is summarized in Table 3. Good compliance was found to certain elements i.e. preoperative counseling and nutritional assessments, antibiotic and antithrombotic prophylaxis, and maintenance of normothermia, early feeding, and mobilisation [Figure 1].

Overall, postoperative 30-day mortality was 0.05% (1 death). Approximately, 15% patients had postoperative complications [Table 4] in the form of anastomotic leak (4.32%), ileus (6.73%),

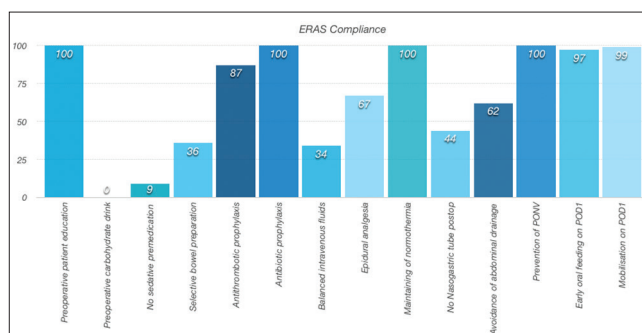


Figure 1: Compliance to ERAS elements

Table 1: Definition of ERAS compliance	
ERAS element	Definition of compliance
Pre-admission education	Received verbal education about ERAS during Pre-anaesthesia checkup and counseling
Selective bowel preparation	No bowel preparation for colonic resection
Preoperative carbohydrate drinks	Defined as at least 50 g carbohydrate in at least 400 mL fluid in the form of a dedicated preoperative beverage with a proven safety profile. Given up until 2 h before anaesthesia
Antibiotic prophylaxis	Antibiotic prophylaxis before skin incision
TED prophylaxis	Thromboprophylaxis [Low-molecular-weight heparin (LWMH or LMWH) and compression stockings]
Avoidance of long-acting sedative premedication	No long acting sedative premedication given
Epidural analgesia	Epidural analgesia activated before first incision
PONV prophylaxis	Given PONV prophylaxis
Forced air-heating	Upper-body forced air-heating used
Compliance with balanced intravenous fluids	Given less than 3000 mL (colon) or less than 3500 mL (rectal) intravenously, on the day of surgery
Avoidance of nasogastric tube drainage	Nasogastric tube removed at end of the anaesthesia
Avoidance of abdominal drainage	No postoperative abdominal drainage

Table 2: Patient characteristics

Category	n	%
Age (years)	54.2±10.5	
Sex		
Male	135	65
Female	73	35
BMI (Kg/m ²)	23.33±4.43	
ASA Grade		
1	12	5.8
2	148	71.2
3	48	23.1
Tumor location		
Colon	142	68.3
Rectal	66	31.7
Surgical approach		
Open	143	68.75
Laparoscopic	65	31.25
Procedure type-colectomy		
LAR	75	36
APR	33	15.9
Others	27	13
	73	35.1

Table 3: Protocol compliance

Components of ERAS	Compliance	Number of patients	%
Preoperative patient education	Yes	208	100
	No	0	
Preoperative carbohydrate drink	Yes	0	0
	No	208	
No sedative premedication	Yes	19	9
	No	189	91
Selective bowel preparation	Yes	75	36
	No	133	64
Antithrombotic prophylaxis	Yes	181	87
	No	27	13
Antibiotic prophylaxis	Yes	208	100
	No	0	0
Compliance with balanced intravenous fluids	Yes	71	34
	No	137	66
Epidural analgesia	Yes	139	67
	No	69	37
Maintaining normothermia	Yes	208	100
	No	0	0
No nasogastric tubes postoperatively	Yes	92	44
	No	116	56
Avoidance of abdominal drainage	Yes	129	62
	No	79	38
Prevention of PONV	Yes	208	100
	No	0	0
Early oral feeding (On POD1)	Yes	202	97
	No	6	3
Full mobilisation on POD1	Yes	206	99
	No	2	1

pneumonia (0.09%), and others (2.88%). According to Clavien-Dindo classification, complications were minor in 11 (5%) and major in 20 (9.6%) patients.

The median LOS in hospital after surgery was 9 days (interquartile range [IQR] 6-12.75). The mean intraoperative blood loss was 272 ml, and postoperative loss in drain was 200 ml in 24 h.

DISCUSSION

Although adoption of ERAS protocol is now an established practice in most of the developed countries, the scenario is not the same in India. We audited 1 year data of colorectal surgery to find out existing practice and our adherence to ERAS.

Among the preoperative components, compliance is good with preoperative counseling and preoperative optimisation. However, most patients (91%) received sedative premedication according to institutional protocol because oncosurgical patients tend to be more anxious despite preoperative counseling. After sedative premedication, we have been able to start oral diet and mobilisation on first POD. The evidence-based recommendation of ERAS society is not to use MBP routinely in colonic surgery and may use in total mesorectal excision with diverting stoma.^[7,8,11,12] In our study population, selective bowel preparation was administered only to those who underwent left sided colon and rectal surgery to improve the visualisation of lumen and smaller tumors.

Minimum preoperative fasting for solid food till 6 h and clear liquids 2 h before surgery has been shown to maintain perioperative nutrition.^[4-7] However, this practice is difficult to implement in our settings: first, 6-h fasting for a 8 am case, patient need to take solid food at around 2 am midnight, which has logistic problems. Second, long-standing traditional belief regarding preoperative fasting because of the fear of aspiration. Preoperative intake of oral complex carbohydrate (12.5% maltodextrin) drink reduces catabolic state and improves patient's well-being.^[7,8] However, this important component could not be included in our practice as the carbohydrate drink was not available in India during the study period. Steve Kwon *et al.* in their study concluded that pharmacologic thromboprophylaxis was associated with significantly lower rates of 90-day mortality and supported the universal use of pharmacologic prophylaxis along with mechanical thromboprophylaxis with compression stockings in colorectal operations.^[13] In our study group, 87% received thromboprophylaxis either with mechanical, pharmacological, or both during the perioperative period.

Table 4: Postoperative outcome

Adverse events	n	%
Postoperative complication	31	14.9
Anastomotic leakage	9	4.32
Ileus	14	6.73
Pneumonia	2	0.09
Others	6	2.88
Readmission	39	18.75
Reoperation within 30 days	17	8.17
Mortality	1	0.05

All patients (100%) of the study population received intravenous antibiotic prophylaxis 30–60 min before the incision that covered against aerobic and anaerobic bacteria and repeated according to the duration of surgery and the half-life of the drug as per ERAS guideline.^[14] Although investigators found minimally invasive surgery embedded in a fast track program yields optimal outcome, only 31% of the study population received laparoscopic colonic resection, which was associated with a shorter LOS and reduced complications.^[15] Intraoperative normothermia helps to reduce incidence of wound infection, shivering, bleeding, and patient discomfort.^[16] Temperature was monitored and maintained within normal range in all patients of the study population with the help of warming devices such as forced-air heating blankets and warm intravenous fluid infusion. In our series of colorectal surgeries, in 44% of cases, the nasogastric tube was continued in the postoperative period as their disease process was chronic obstructive in nature.

A standard anaesthetic protocol using short-acting induction agents such as propofol combined with a short-acting opioid such as fentanyl and short-acting muscle relaxants and maintenance with short-acting inhalational anaesthetics such as sevoflurane or desflurane in oxygen-enriched air facilitates early recovery after surgery, which is also our routine anaesthesia protocol.^[17] In our case series, 67% received epidural analgesia, which is in compliance with ERAS protocol. Rest 22% received short acting opioid such as fentanyl infusion and 11% received morphine. Postoperative nausea and vomiting is a common cause of patient dissatisfaction and delayed discharge from hospital.^[18] The practice in our hospital is to give prophylactic antiemetic to all postoperative patients.

ERAS society has discouraged routine drainage after surgery because it is an unsupported intervention that probably impairs mobilisation.^[1] We have been able

to avoid postoperative drain in 62% of our patients. Early mobilisation is one of the most important factors in the ERAS protocol requiring full cooperation from patients and their families. Smart NJ *et al.* showed that failure to mobilize was one of the most common reasons for ERAS deviation and was associated with prolonged LOS.^[19] Almost all (99%) our patients were mobilized from bed to chair on first POD. In a randomised study, it has been seen that leaving the bladder catheter as long as the epidural analgesia is maintained resulted in a higher incidence of urinary tract infection and prolonged hospital stay, and removal of the catheter on the next morning does not lead to higher rate of catheterisations.^[20] However, median day of catheter removal in our series was third POD as there was high incidence of urinary retention and foley's catheter reinsertion. Takaaki Fujii *et al.* in their study demonstrated that very early feeding on POD 1 after colorectal resection is safe and feasible and did not increase the incidence of anastomotic leakage or other complications.^[21] In our audit, we found 97% of patients received oral feed from first POD with only 16% of patients requiring NG decompression.

In the patients, who do not have any comorbidity and do not develop any postoperative complications, the target LOS for colon surgery is 3 days and for rectal surgery (anastomosis below the peritoneal reflection) is 4 days.^[22] However, median LOS in our case series was 9 days. The reasons of increased LOS when searched was found to be multifold including postoperative abdominal distension or bowel dilatation after open surgical approach leading to nasogastric tube reinsertion, urinary catheter reinsertion because of urinary retention, prophylactic and therapeutic antibiotic administration for temperature spikes, infection, delayed functioning of stoma, delayed drain removal, or re-exploration. However, in patients with laparoscopic surgery, LOS was 5 days with early ambulation, early enteral feeding, and early removal of NG tube, abdominal drains, and urinary catheter. Analysis from an international registry also demonstrated that use of laparoscopic surgery independently decreases LOS.^[23]

Dai Shida *et al.* in their study found that incidence of postoperative complications (Grade 2 or higher Clavien-Dindo classification) in traditional and ERAS group was 15% and 10%, respectively.^[24] In our audit, according to Clavien-Dindo classification, total incidence of complications was 15%.

However, we encountered several limitations to practical implementation of all the components of ERAS during the perioperative period such as non-availability of preoperative carbohydrate diet, unnecessary prolonged fasting, less number of laparoscopic approaches either owing to lack of resources or system operations, and practice of traditional care-giving in hospital. This information is shared in a multidisciplinary meeting with the surgical teams, and definitive measures are being taken to improve adherence to ERAS protocol. Preoperative carbohydrate drink is now available, which will be used. We plan to re-audit our change of practice and the outcome after use of this drink.

CONCLUSION

Compliance to individual ERAS elements was variable, which needed urgent modification for better adherence to ERAS guidelines.

Acknowledgments

Department of gastrointestinal surgery, Tata Medical Center.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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