

Enhanced Recovery after Surgery versus Conventional Care in Elective Laparotomy- A Prospective Interventional Study

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ABSTRACT

Introduction: Enhanced Recovery After Surgery (ERAS) care protocol is better in improving the quality of postoperative care which can mitigate surgical stress and accelerate postoperative recovery.

Aim: To compare ERAS care protocol with conventional care in cases with major gastrointestinal surgeries.

Materials and Methods: The present study was a prospective interventional study in which 56 cases undergoing elective laparotomy surgeries were recruited. Cases were randomly divided into two groups i.e., group 1 cases were managed according to ERAS care protocol and group 2 cases received conventional care. The preoperative, intraoperative and postoperative outcomes like duration of oral intake of drugs, duration of hospital stay, duration of drain tube removal and ambulatory period was

recorded. The Clavien-Dindo classification system was followed for postoperative assessment. Chi-square test was used to analyse qualitative data.

Results: The ERAS care group showed a better outcome than the conventional group in terms of early oral dietary intake (by 2nd day in 89.28% of ERAS and 3.57% in conventional group), less ambulatory period (on the day of surgery in 85.71% of ERAS and 7.14% of conventional group), early removal of a nasogastric and urinary catheter (92.86% in ERAS and 3.57% in conventional group). The duration of hospital stay, postoperative drain removal, incidence of postoperative complications and infections at the surgical site were statistically significant ($p < 0.05$).

Conclusion: The ERAS care protocols were effective in reducing hospital stay, postoperative complications and early oral dietary intake.

Keywords: Clavien-dindo classification, Hospital stay, Postoperative complications

INTRODUCTION

The Enhanced Recovery After Surgery (ERAS) care protocols were developed by Henrik Kehlet in 1997 [1]. ERAS is a structured approach that facilitates standardised evidence-based components for care to patients undergoing specific operative methods [2]. The surgical procedures can trigger stress through postoperative pain, complications and economic burden due to prolonged hospital stay [3]. The ERAS care protocol is a multimodal perioperative care pathway that was designed to mitigate surgical stress and maintain normal physiology which optimises early postoperative recovery and reduces the duration of hospital stay and re-admissions [4]. The ERAS care pathways are effective in terms of the decreased postoperative need for analgesia, decreased pain, decreased complications, decreased hospital stay, early return of dietary consumption, decreased re-admission rate, decreased mortality, decreased re-operation rate and enhanced patient satisfaction [5,6].

Few single and multicentric studies and meta-analyses reported that the active implementation of ERAS protocol is beneficial in colorectal and benign gynaecologic and gynaecologic oncology surgeries [7,8]. To fulfill the inadequate literature availability related to the effect of ERAS protocol in major gastrointestinal surgeries, present study was designed and compared the ERAS care protocols with conventional care in cases with major gastrointestinal surgeries.

MATERIALS AND METHODS

The present prospective interventional study was conducted in the Department of General Surgery at Government Medical College and Hospital, Nizamabad, Telangana, India, from August 2019 to July 2021. Informed consent was obtained from all the study cases after explaining the detailed study procedure, risks and benefits of

the study and study protocol was approved by Institutional Ethics Committee (IEC) (No. GMCH/IRB-IEC/2019/Jun/26P).

Inclusion criteria: Cases of American Society of Anesthesiologists (ASA) grade I and II [9], undergoing elective laparotomy i.e., cholecystectomy, gastrectomy, hernia repair, bowel resection and haemodynamically stable cases were included in the study.

Exclusion criteria: Cases undergoing multiple surgeries, pregnant women, acute abdominal trauma, cases under steroids, cases of ASA grade III and IV and not willing to participate were excluded from the study.

All the cases undergoing elective laparotomy in the Department of General Surgery during August 2019 to July 2021 were included as sample size. The study cases were divided into two groups i.e., group 1 received treatment according to ERAS protocol and group 2 received conventional postoperative care. The demographic details and case history were collected through patient records and haemodynamic stability was checked after detailed general examination. All the cases were clinically and radiologically examined.

Preoperative care: Preoperative counseling was given to the group 1 only. Instead of preoperative mechanical bowel preparation, selective bowel was given for cases undergoing ERAS protocol. However, for cases of conventional preoperative mechanical bowel preparation was done. All the cases of group 1 were medicated with antibiotic augmentin which was not followed for group 2.

Intraoperative care: Group 1 had thoracic epidural analgesia, hypothermia prevention measures and short surgical incision. However, group 2 had comparatively large surgical incision and did not receive hypothermia measures. Intraoperative drain was placed in group 2 whereas drain was not placed in group 1.

Postoperative care: Duration of oral intake of drugs, duration of hospital stay, duration of drain tube removal and ambulatory period was assessed as primary outcomes. Postoperative follow-up of patients was done until their discharge at periodic intervals. The postoperative assessment was performed based on Clavien-Dindo classification system [10].

STATISTICAL ANALYSIS

Data was analysed by using Statistical Package for the Social Sciences (SPSS) version 16.0. Descriptive statistics was used to analyse demographic and categorical variables. Chi-square test was used to analyse qualitative data. The $p < 0.05$ was considered as statistically significant.

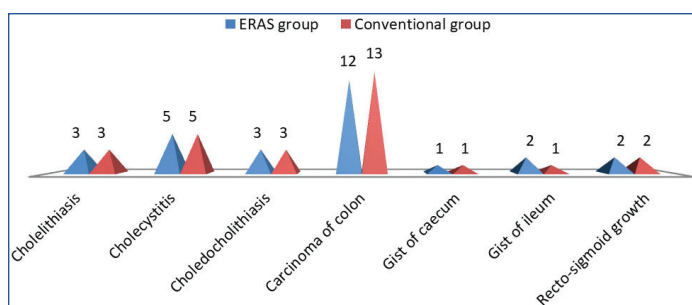
RESULTS

Majority of the cases were between age group 31-40 years and 41-50 years in both study groups. Male participants were more than females [Table/Fig-1].

Demographic variables	Total number of cases (n=56)	
	Group 1 n (%)	Group 2 n (%)
Age (years)		
21-30	4 (14.2)	4 (14.2)
31-40	8 (28.6)	7 (25)
41-50	6 (21.4)	7 (25)
51-60	5 (17.9)	5 (17.9)
>60	5 (17.9)	5 (17.9)
Gender		
Male	21 (75)	18 (64.3)
Female	7 (25)	10 (35.7)
ASA grade		
Grade I	10 (35.7)	12 (42.9)
Grade II	18 (64.3)	16 (57.1)
BMI (Kg/m ²)	26.4±4.36	26.7±4.74

[Table/Fig-1]: Demographic data of study participants.

The commonly associated clinical condition in both study groups was carcinoma of colon (12 and 13 in ERAS and conventional group), respectively [Table/Fig-2].



[Table/Fig-2]: Clinical condition associated in the study participants.

Preoperative bowel preparation was not provided in group 1 participants, however, 27 cases of group 2 were provided with bowel. All the participants of EARS group underwent preoperative counseling to reduce the postoperative mental burden, while preoperative counseling was not given to conventional group cases [Table/Fig-3]. The open cholecystectomy was most commonly performed surgical procedure [Table/Fig-4]. Intraoperative drains were provided in 10 cases of group 1 and in 27 cases of group 2. In group 1, 24 cases were provided with nasogastric and urinary catheter, whereas in group 2, it was provided in 25 cases [Table/Fig-5].

The duration of hospital stay, postoperative drain removal, incidence of postoperative complications and infections at the surgical site were statistically significant ($p < 0.05$) [Table/Fig-6].

Preoperative variables	Total number of cases (n=56)	
	Group 1 (n=28)	Group 2 (n=28)
Bowel preparation		
Provided	-	27
Not provided	28	01
Preoperative counseling		
Provided	28	-
Not provided	-	28
Preoperative medication (Antibiotics)		
Provided	28	-
Not provided	-	28

[Table/Fig-3]: Comparison of preoperative care between study groups.

Surgical procedure	Total cases (n=56)	
	Frequency	Percentage
Cholecystectomy with CBD explore	07	12.5
Open cholecystectomy	14	25
Elective laparotomy	05	8.9
Left hemicolectomy	09	16.1
Right hemicolectomy	12	21.4
Extended right hemicolectomy	06	10.7
Resection and anastomosis	03	5.4

[Table/Fig-4]: Details of preferred surgical procedure.

CBD: Common bile duct

Intraoperative variables	Total number of cases (n=56)	
	Group 1 (n=28)	Group 2 (n=28)
Thoracic epidural anaesthesia		
Provided	28	-
Not provided	-	28
Measure to prevent hypothermia		
Provided	28	-
Not provided	-	28
Length of incision		
Small	28	04
Large	-	24
Intraoperative drain		
Provided	10	27
Not provided	18	01
Nasogastric and urinary catheter		
Provided	24	25
Not provided	04	03

[Table/Fig-5]: Comparison of intraoperative care between study groups.

Postoperative details	Group 1	Group 2	χ^2 value	p-value
Duration of hospital (days)				
4	28	03	26.52	0.018
5	-	18		
6	-	07		
Time to start oral diet				
2 nd day	25	01	3.65	0.637
4 th day	03	27		
Ambulation period				
On the day of surgery	24	02	3.44	0.328
1 st day after surgery	04	26		
Postoperative drain removal				
2 nd day	08	-	5.80	0.048
3 rd day	18	05		
4 th day	02	16		
5 th day	-	07		

Removal of nasogastric and urinary catheter				
Early	26	01	2.36	0.274
Late	02	27		
Incidence of postoperative complications				
No complication	26	22	5.98	0.029
With complications	02	06		
Infection at surgical site				
Present	05	17	4.61	0.038
Absent	23	11		
Readmission of cases				
Admitted	01	15	2.78	0.274
Not admitted	27	13		

[Table/Fig-6]: Postoperative assessment.

A p-value <0.05 is considered to be statistically significant

DISCUSSION

The ERAS protocol makes use of multimodal intervention approaches like preoperative counseling, no mechanical bowel preparation, reduced preoperative fasting, proper pain control strategies, early start of oral dietary intake, early mobilisation and less hospital stay [11]. The present study compared the ERAS care protocols with conventional care in cases undergoing major gastrointestinal surgeries at the tertiary care hospital, Nizamabad, Telangana, India.

Preoperative care: Several reports have shown that preoperative counselling has a beneficial effect in cases in regard to postoperative relief of pain, stress and anxiety [12]. The surgeons should provide necessary information to the participants in regard to choice of surgical procedure, about intraoperative and postoperative complications associated with surgery, duration of hospital stay and economic burden [13]. A study by Ripollés-Melchor J et al., stated that preoperative ERAS adherence in terms of preoperative counselling, carbohydrate intake, avoidance of urinary catheterisation and avoidance of fasting was better in the ERAS group [14].

Intraoperative care: A study by Ripollés-Melchor J et al., stated that ERAS group had less use of intraoperative fluid [14]. A study by Pędzwiatr M et al., reported no significant difference between preoperative and intraoperative ERAS protocol elements [15].

Postoperative care: The duration of hospital stay, postoperative drain removal, incidence of postoperative complications and infections at the surgical site were statistically significant ($p < 0.05$) [Table/Fig-6]. A study by Lohsiriwat V and Jitmongngan R, noticed significantly shorter duration of hospital stay and fewer re-admission rates in the ERAS care group than non ERAS care group [13]. A study by Ripollés-Melchor J et al., stated that the duration of hospital stay, early ambulatory period and early oral dietary intake was observed in ERAS group [14]. A study by Sharma J et al., noticed the mean duration of hospital stay in ERAS group was 5.56 days while in the conventional group it was 8.75 days.

The postoperative requirement of nasogastric tube re-insertion, re-admission was similar in both study groups [16]. Shida D et al., stated that the duration of hospital stay was reduced to 3 days in cases that followed ERAS protocols [17]. A meta-analysis by Hajibandeh S et al., reported that ERAS protocol is effective in the early return of bowel function, restart of oral intake and reported low postoperative complications [18]. Wisely JC and Barclay KL stated that inpatient mortality, repetition of surgery, postoperative re-admission and duration of hospital stay was comparable and similar in cases before and after the introduction of ERAS care protocols [19]. A study by Shang Y et al., reported that the cases treated with modified ERAS protocols showed less duration of hospital stay and prolonged ileus. The study also concluded that modified ERAS care protocol was safe and effective in emergency cases associated with favourable clinical benefits [20]. A study by Moydien MR et al., on 78 cases with penetrating abdominal trauma posted for emergency laparotomy

was divided randomly into ERAS care group and non ERAS care group. The cases of ERAS group had significantly early oral dietary intake and earlier removal of a nasogastric tube and urinary catheter. The postoperative complication and duration of hospital stay was less in ERAS group [21]. Abdelrazik AN and Ahmad SS found a shorter duration of hospital stay, shorter ambulatory period, early start of oral dietary intake and fewer postoperative complications in the laparotomy group followed ERAS care protocol [22]. Dietary consumption may fasten the gastrointestinal recovery and decrease the rate of associated complications and duration of hospital stay [23,24]. The results of the above studies were consistent with the present study findings. Further studies are required to evaluate long term outcome of ERAS care protocol in different operative techniques, emergency surgeries with large sample size.

Limitation(s)

This study was conducted with limitations in terms of less sample size, focused on short term outcome and could not assess the long term outcomes and mortality details.

CONCLUSION(S)

Enhanced Recovery After Surgery (ERAS) care protocols was effective in reducing hospital stay, postoperative complications, less ambulatory period and early removal of postoperative drain. The enforcement of ERAS protocols at institutional setups may be helpful to improve patient care, safety and healthcare system.

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