Section: General Surgery

Original Research Article

COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY (ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN EMERGENCY GASTROINTESTINAL SURGERIES

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ABSTRACT

Background: Emergency laparotomy is associated with high postoperative morbidity, delayed functional recovery, and prolonged hospital stays. Enhanced Recovery After Surgery (ERAS) protocols are well established in elective surgery but remain underutilised in emergency settings because of concerns regarding feasibility and safety. This study aimed to compare ERAS with conventional postoperative care in emergency gastrointestinal surgery by assessing morbidity, complications, and length of hospital stay. **Materials and Methods:** This prospective comparative study was conducted at a tertiary care hospital. A total of 150 patients (75 in each group) undergoing emergency gastrointestinal surgery were included. Patients undergoing emergency laparotomy were allocated to either ERAS-based or conventional care. Baseline characteristics, postoperative recovery parameters, complications, and hospital stay were analysed. **Results:** Baseline characteristics were comparable between the ERAS and conventional groups. ERAS patients showed earlier mobilisation (98.7% vs. 25.3%, $p < 0.001$), earlier enteral feeding (100% vs. 22.7%, $p < 0.001$), and faster bowel recovery (time to first flatus 1.20 ± 0.40 vs. 3.15 ± 1.44 days, $p < 0.001$). Early discharge by postoperative day 4 occurred in 70.7% of ERAS patients compared with 26.7% in conventional care ($p < 0.001$). Prolonged hospital stay was significantly lower in the ERAS group (29.3% vs. 73.3%, $p < 0.001$). Postoperative complications, including pulmonary complications (1.3% vs. 16.0%, $p = 0.004$) and surgical site infection (1.3% vs. 17.3%, $p = 0.002$), were reduced in the ERAS group. **Conclusion:** ERAS-based perioperative care significantly improves recovery, reduces complications, and shortens hospital stay in patients undergoing emergency gastrointestinal laparotomy, without compromising safety.

INTRODUCTION

Emergency gastrointestinal surgery is a high-risk area in general surgery. Patients usually present late with perforation peritonitis, intestinal obstruction, generalised peritonitis, or abdominal trauma, requiring urgent surgery with less time for optimisation.[1] Emergency laparotomy causes physiological stress and frequent complications. In the absence of structured perioperative care, recovery is delayed, and hospital stay is prolonged, particularly among elderly and frail patients.[2,3,4] Emergency laparotomy patients require practical strategies that reduce surgical stress and help recovery, as structured enhanced recovery after surgery (ERAS) -based care has been shown to improve outcomes even in emergency surgical settings.[2]

Conventional postoperative care in many hospitals still follows traditional practices, such as prolonged fasting, delayed mobilisation, liberal intravenous fluid use, routine placement of tubes and drains, and dependence on opioid analgesia. These measures are often applied uniformly, without considering their impact on recovery, postoperative complications, or length of hospital stay.[5] These practices commonly lead to ileus, pulmonary complications, delayed bowel recovery, and longer hospital stays. Such limitations highlight the need to compare conventional care with ERAS-based approaches aimed at improving postoperative recovery.[6]

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ERAS is a structured, team-based approach to perioperative care that relies on close coordination between surgeons, anaesthetists, nursing staff, and other healthcare personnel. It applies evidence-based measures across the preoperative, intraoperative, and postoperative periods to reduce the physiological stress of surgery and promote early recovery.[6] Key elements include avoiding unnecessary fasting, initiating early enteral feeding, encouraging early mobilisation, using multimodal and opioid-sparing analgesia, maintaining normothermia, and optimising fluid therapy. These measures work together to preserve physiological function, reduce postoperative complications, and shorten hospital stays. By standardising care and focusing on modifiable perioperative factors, ERAS shifts practice away from traditional routines toward recovery-oriented management, improving overall surgical outcomes without increasing readmissions.[7] ERAS has been widely studied and validated for elective colorectal and gastrointestinal surgeries. Evidence shows that structured multimodal perioperative care reduces postoperative complications, improves recovery, and shortens hospital stays. These have been shown consistently across studies, making ERAS an accepted standard in elective gastrointestinal surgical practice.[8]

Emergency gastrointestinal surgery differs from elective surgery because patients often present late, are septic, and are unstable, with little time for optimisation. Indian data on ERAS in emergency settings are scarce, and its usefulness in such situations remains uncertain, creating a research gap. ERAS focuses on modifiable perioperative factors such as nutrition, pain control, mobilisation, and fluid management, which may improve recovery even in emergencies. Therefore, this study aimed to compare ERAS with conventional postoperative care in emergency gastrointestinal surgery by assessing morbidity, complications, and length of hospital stay.

MATERIALS AND METHODS

This prospective cohort study was conducted over one year in the Department of General Surgery at Government Rajaji Hospital, Madurai, and included 150 patients. Institutional Ethics Committee approval was obtained, and written informed consent was obtained from all the participants. The study was approved by the Institutional Review Board of Madurai Medical College prior to data collection.

Inclusion and Exclusion Criteria

The study included adult patients aged > 18 years who underwent emergency gastrointestinal surgery. Patients aged < 18 years, those undergoing elective procedures, and those with severe comorbid illnesses were excluded.

Methods

The study included 150 patients who underwent emergency gastrointestinal surgery and were selected using random sampling method. Patients were randomly allocated into two equal groups of 75 each. One group received conventional postoperative care, while the other was managed according to the ERAS protocol.

Patient details, such as age, diagnosis, and type of procedure, were recorded. Preoperative, intraoperative, and postoperative factors were noted for both groups, and outcomes were assessed based on morbidity, complications, and duration of hospitalisation. All patients underwent proper clinical evaluation and necessary investigations before the surgery.

Patients in the ERAS group received preadmission counselling, antibiotic prophylaxis, early oral intake, early mobilisation, thromboprophylaxis, and opioid-sparing analgesia, with early removal of tubes and drains. Mechanical bowel preparation was avoided in the ERAS group as the study involved emergency cases. Thoracic epidural analgesia was administered intraoperatively in the ERAS group. Conventional care patients followed routine postoperative practice. Patients in the conventional group received opioid-based analgesia. The outcomes of both groups were compared to assess the effectiveness of ERAS in emergency gastrointestinal surgeries. Return of bowel function was defined as passage of flatus or stool. Discharge criteria included tolerance of oral diet, adequate pain control, passage of flatus or stool, independent ambulation, and satisfactory home support.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using the latest version of SPSS software version 29. Quantitative variables were described using the mean, standard deviation, and range. The associations between variables were assessed using the chi-square test and Student's t-test, as appropriate. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 150 patients undergoing emergency gastrointestinal surgery were included in the study, with 75 allocated to the conventional postoperative care group and 75 to the ERAS protocol group. All enrolled patients completed follow-up and were included in the final analysis. The mean age was 41.28 ± 11.19 years in the conventional group and 39.37 ± 11.04 years in the ERAS group ($p = 0.295$). Males constituted the majority in both groups (64% in the conventional group vs 51.1% in the ERAS group) ($p = 0.737$).

Perforative peritonitis and intestinal obstruction were the most common diagnoses in both groups, and the overall diagnostic distribution did not differ significantly between the groups ($p = 0.827$). Laparotomy with perforation closure was the most frequently performed procedure in both groups (33.3% in the conventional group vs. 21.3% in the ERAS group), followed by laparotomy with

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peritoneal drainage and resection with anastomosis. The distribution of surgical procedures was comparable between the groups (p = 0.942). [Table 1]

Table 1: Baseline demographic, clinical, and operative characteristics

Variable	Category	Conventional	ERAS	P value
Age in years	<25	8 (10.7%)	12 (16%)	0.295
	26-35	20 (26.7%)	15 (20%)	
	36-45	16 (21.3%)	26 (34.7%)	
	46-55	23 (30.7%)	17 (22.7%)	
	>55	8 (10.7%)	5 (6.7%)	
	Mean ± SD	41.28 ± 11.19	39.37 ± 11.04	
Gender	Male	48 (64%)	45 (51.1%)	0.737
	Female	27 (36%)	30 (34.1%)	
Diagnosis	APP AB	7 (9.3%)	10 (13.3%)	0.827
	APP PF	6 (8%)	7 (9.3%)	
	BIA-M.T	0	1 (1.3%)	
	BIJ-SP IJ	0	1 (1.3%)	
	D.PF	10 (13.3%)	7 (9.3%)	
	G.PF	11 (14.7%)	6 (8%)	
	GANG CHL	1 (1.3%)	1 (1.3%)	
	I.PF	7 (9.3%)	8 (10.7%)	
	INT	4 (5.3%)	5 (6.7%)	
	L.AB	5 (6.7%)	3 (4%)	
	MLB OBS	4 (5.3%)	7 (9.3%)	
	P.A	0 (0.0%)	1 (1.3%)	
	PEL AB	3 (4.0%)	5 (6.7%)	
	PEN INJ	1 (1.3%)	1 (1.3%)	
	SB OBS	6 (8.0%)	2 (2.7%)	
	SIG VOL	4 (5.3%)	2 (2.7%)	
	SMI	1 (1.3%)	3 (4%)	
	STAB INJ	4 (5.3%)	5 (6.7%)	
	STAB LI	1 (1.3%)	0	
Procedure	Damage control surgery (DCS)	1 (1.3%)	1 (1.3%)	0.942
	Hartmann's procedure	5 (6.7%)	7 (9.3%)	
	Laparotomy with resection and anastomosis	11 (14.7%)	12 (16%)	
	Laparotomy with perforation closure	25 (33.3%)	16 (21.3%)	
	Laparotomy with appendicectomy	6 (8%)	7 (9.3%)	
	Laparotomy with cholecystectomy	1 (1.3%)	1 (1.3%)	
	Laparotomy with diversion colostomy	3 (4%)	5 (6.7%)	
	Laparotomy with peritoneal drainage	15 (20%)	19 (25.3%)	
	Laparotomy with ileostomy	7 (9.3%)	6 (8%)	
	Laparotomy with perforation closure	1 (1.3%)	1 (1.3%)	

All patients in the ERAS group received preoperative counselling, compared to 17.3% in the conventional group (p < 0.001). Preoperative antibiotics were administered in 100% of ERAS patients versus 32% of patients in the conventional group (p < 0.001). Normal intraoperative temperature was maintained in all ERAS patients, whereas prolonged hypothermia was observed in 68% of patients in the conventional group (p < 0.001). [Table 2]

Table 2: Comparison of preoperative and intraoperative protocol compliance between groups

Variable	Category	Conventional	ERAS	P value
Preop counselling	Yes	13 (17.3%)	75 (100)	< 0.001
	No	62 (82.7%)	0	
Preop antibiotics	Yes	24 (32%)	75 (100)	< 0.001
	No	51 (68%)	0	
Hypothermia recovery	Normal	24 (32%)	75 (100)	< 0.001
	Prolonged	51 (68%)	0	

Drains were removed on postoperative day 3 in 46.7% of patients in the ERAS group versus 12% in the conventional group (p < 0.001). Thromboprophylaxis was administered in 100% of the ERAS group patients and 22.7% of the conventional group patients (p < 0.001). Early mobilisation was achieved in 98.7% of patients in the ERAS group versus 25.3% in the conventional group (p < 0.001). Non-opioid analgesics were used in 100% of ERAS patients versus 22.7% of patients managed with conventional care (p < 0.001). Early enteral feeding was initiated in all ERAS patients versus 22.7% of patients in the conventional group (p < 0.001). [Table 3]

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Table 3: Comparison of postoperative recovery measures between groups

Variable	Category	Conventional	ERAS	P value
Duration of tubes (days)	1	3 (4%)	5 (6.7%)	< 0.001
	2	9 (12%)	14 (18.7%)	
	3	9 (12%)	35 (46.7%)	
	4	10 (13.3%)	13 (17.3%)	
	5	20 (26.7%)	3 (4%)	
	6	15 (20%)	0	
	7	8 (10.7%)	0	
	9	1 (1.3%)	0	
	No drain	0	5 (6.7%)	
Thromboprophylaxis	Yes	17 (22.7%)	75 (100%)	< 0.001
	No	58 (77.3%)	0	
Early mobilization	Yes	19 (25.3%)	74 (98.7%)	< 0.001
	No	56 (74.7%)	1 (1.3%)	
Non-opioid analgesics	Yes	17 (22.7%)	75 (100%)	< 0.001
	No	58 (77.3%)	0	
Early enteral feed	Yes	17 (22.7%)	75 (100%)	< 0.001
	No	58 (77.3%)	0	

Postoperative pulmonary complications occurred in 16% of patients in the conventional group versus 1.3% in the ERAS group (p = 0.004). Urinary tract infection was observed in 14.7% of conventional patients versus 1.3% in the ERAS group (p = 0.007). Deep vein thrombosis occurred in 9.3% of patients in the conventional group versus no cases in the ERAS group (p = 0.02). Surgical site infection was noted in 17.3% of patients managed with conventional care versus 1.3% in the ERAS group (p = 0.002). [Table 4]

Table 4: Comparison of postoperative complication rates between groups

Postoperative complication	Conventional	ERAS	P value
Pulmonary complications	12 (16%)	1 (1.3%)	0.004
Urinary tract infection	11 (14.7%)	1 (1.3%)	0.007
Deep vein thrombosis	7 (9.3%)	0	0.02
Surgical site infection	13 (17.3%)	1 (1.3%)	0.002

Early discharge by postoperative day (POD) 4 occurred in 26.7% of patients in the conventional group vs. 70.7% in the ERAS group (p < 0.001). Delayed postoperative bowel recovery was observed in 77.3% of patients in the conventional group versus none in the ERAS group (p < 0.001). Prolonged pain occurred in 77.3% of the conventional group patients versus none in the ERAS group (p < 0.001). Prolonged hypothermia recovery was observed in 68% of the conventional group versus no cases in the ERAS group (p < 0.001). Prolonged hospital stay was noted in 73.3% of patients in the conventional group vs. 29.3% in the ERAS group (p < 0.001). [Table 5]

Table 5: Comparison of overall postoperative outcomes and length of hospital stay between groups

Outcome variable	Conventional	ERAS	P value
Early discharge (≤ POD 4)	20 (26.7%)	53 (70.7%)	< 0.001
Delayed postoperative bowel recovery	58 (77.3%)	0	< 0.001
Prolonged duration of pain	58 (77.3%)	0	< 0.001
Prolonged hypothermia recovery	51 (68%)	0	< 0.001
Prolonged duration of hospital stay	55 (73.3%)	22 (29.3%)	< 0.001

DISCUSSION

Our study showed that ERAS improves recovery after laparotomy. Patients experienced faster bowel recovery, better pain control, fewer complications, quicker return to normal temperature, shorter hospital stays, and earlier discharge, whereas baseline patient characteristics and surgical profiles remained comparable between the ERAS and conventional care groups.

In our study, both groups were similar at baseline, with no significant differences in age, sex, diagnoses, or types of operations performed. Similarly, Nair et al. showed similar baseline profiles, with comparable mean age (31.2 vs 30.5 years) and identical male predominance (54.8%) in both ERAS and conventional groups.9 Sharma et al. reported similar diagnoses in both groups, with acute intestinal obstruction (36% vs 38%) and intestinal perforation evenly distributed, showing no significant difference between ERAS and conventional care (p = 0.690).[10] Vinas et al. reported comparable operative profiles: resection–anastomosis (11/29 vs 10/21), Hartmann's procedure (13/29 vs 7/21), lavage–drainage (3/29 vs 2/21), and simple suture (2/29 each), with no significant intergroup difference (p > 0.05).[11] These studies strengthen our results by showing that ERAS and conventional groups were well matched at baseline, confirming that differences in outcomes are due to the ERAS protocol rather than variations in patient characteristics or surgical procedures.

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Our study showed that ERAS care ensured universal antibiotic prophylaxis and normothermia, whereas conventional management showed poor antibiotic use and frequent intraoperative hypothermia. Similarly, Ripollés-Melchor et al. showed that all ERAS patients received preoperative antibiotics (100%), while antibiotic administration rates for the conventional group were not reported in this study.[12] Hoefnagel et al. found that active (ERAS-equivalent) warming maintained normothermia, with 0% of patients <35 °C at surgery end, whereas 68% of the passive (conventional) group developed intraoperative hypothermia (<36 °C) ($p < 0.001$).[13] These studies support that ERAS protocols reliably ensure timely antibiotic use and temperature control, whereas conventional care is inconsistent, leading to higher rates of intraoperative hypothermia and avoidable perioperative risks.

In this study, ERAS significantly improved postoperative recovery, enabling earlier drain removal, universal thromboprophylaxis, prompt mobilisation, opioid-sparing analgesia, and early initiation of enteral nutrition compared with conventional care. Similarly, Pawar et al. found that early oral feeding began on POD 1 in 66.67% of ERAS patients. Urinary catheters were removed on POD 1 in 97.44%, and nasogastric tubes on surgery day (64.10%) or POD 1 (33.33%) (all $p < 0.001$).[14] Nagula and Abhishek reported that ERAS patients had earlier drain removal by POD 3 (64.3% vs 17.9%, $p = 0.048$), earlier mobilisation on surgery day (85.7% vs 7.1%), and earlier enteral feeding by POD 2 (89.3% vs 3.6%), all significantly favouring ERAS care.[15]

Pergialiotis et al. reported that universal thromboprophylaxis was achieved (low-molecular-weight heparin and stockings 100%). Early mobilisation occurred on POD 0 in 71.3% of patients ($p < 0.001$). Early enteral feeding was initiated in 73.9% of patients on POD 0 and 86.5% by POD 1 ($p < 0.001$).[16] These studies strengthen our findings by showing that ERAS promotes faster recovery, with earlier drain and tube removal, early mobilisation, routine thromboprophylaxis, reduced opioid use, and earlier feeding compared with conventional care.

In our study, the ERAS protocol significantly reduced the incidence of pulmonary, urinary, thromboembolic, and surgical site complications compared to conventional perioperative care. Similarly, Teeuwen et al. found that patients in the ERAS group had fewer complications: chest infection 1.6% vs. 4.1%, UTI 0% vs. 6.6%, and surgical site infections 4.9% vs. 11.5% (superficial) and 1.6% vs. 6.6% (deep), with no DVT in either group.[17] Xu et al. found that venous thromboembolism occurred less frequently with ERAS (0.6% vs. 4.5%, $p = 0.033$), while overall infectious complications were similar between the ERAS and conventional groups (4 vs. 6 cases, $p = 0.534$).[18] These studies confirm that ERAS reduces postoperative complications, supporting our findings of safer recovery and lower morbidity compared with conventional perioperative care.

Our study showed that ERAS care enabled earlier discharge, faster bowel recovery, better pain control, quicker normothermia restoration, and shorter hospital stay than conventional care. Similarly, Sharma et al. ERAS significantly reduced recovery delays, with shorter hospital stay (5.56 vs 8.75 days), earlier bowel function (1.78 vs 2.51 days), lower pain scores (3.48 vs 3.94), and fewer pulmonary complications (14.0% vs 32.7%; $p < 0.05$).10 Pawar et al. found that ERAS significantly improved recovery, with shorter hospital stay (3.17 vs 7.87 days), earlier bowel function (1.20 vs 3.15 days), lower pain scores, reduced readmissions (10.26% vs 33.33%), and fewer postoperative complications ($p < 0.05$).[14] Lin et al. show that ERAS significantly improved recovery, with shorter hospital stay (6.2 vs 8.1 days), faster bowel function, lower pain scores (2.5 vs 3.8), and earlier oral intake ($p < 0.001$).[19] These studies support our findings by showing that ERAS helps patients recover faster, with less pain, fewer complications, earlier feeding, and shorter hospital stays than conventional care. Differences in effect size across studies may be explained by variation in emergency disease severity, baseline nutritional status, and adherence to ERAS components.

The strengths of this study include its prospective design, comparable baseline characteristics between groups, protocol-based ERAS implementation, and objective measurement of postoperative outcomes.

Limitations

This single-centre study had a limited sample size and lacked blinding. Long-term outcomes and patient-reported measures were not evaluated, which may restrict the broader applicability and assessment beyond the early postoperative period.

Clinical implications

ERAS should be used more widely in emergency surgery to improve recovery, and future research should involve larger hospitals and follow-up of patients for longer periods. These findings apply specifically to emergency gastrointestinal surgery in tertiary-care settings.

CONCLUSION

ERAS care helped patients recover faster after emergency laparotomy without increasing the risk. Patients were able to move earlier, regain bowel function sooner, experience less pain, and leave the hospital earlier. Complications were fewer than those with conventional care. The baseline characteristics were comparable, supporting the validity of the observed outcomes. This study provides prospective evidence from emergency gastrointestinal surgery supporting the use of ERAS in this setting.

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