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Original Research Article

Comparison of Clinical Efficacy of Enhanced Recovery After Surgery (ERAS) Approach Versus Traditional Approach for Major Abdominal Surgeries: A Randomized Study

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Abstract:

Background: Enhanced Recovery After Surgery (ERAS) protocols aim to improve postoperative outcomes through multimodal, evidence-based perioperative care, contrasting with traditional management, which often involves delayed mobilization and opioid-based analgesia.

Aim: To compare the clinical efficacy of ERAS versus conventional perioperative care in patients undergoing major abdominal surgeries.

Methodology: This randomized prospective study enrolled 80 patients (40 ERAS, 40 conventional) aged 18–70 years, undergoing elective major abdominal surgeries. The ERAS group received preoperative education, early oral feeding, multimodal analgesia, early mobilization, and restricted fluids, while the conventional group followed standard perioperative care. Outcomes assessed included recovery parameters, postoperative complications, opioid requirements, hospital stay, and return to normal activities.

Results: ERAS patients demonstrated significantly faster recovery: first ambulation (8 ± 2 vs. 24 ± 4 hrs), first flatus (18 ± 5 vs. 48 ± 8 hrs), oral intake (12 ± 3 vs. 60 ± 10 hrs), and bowel movement (36 ± 8 vs. 72 ± 12 hrs) ($p < 0.001$). Postoperative ileus was reduced (5% vs. 20%, $p = 0.04$). ERAS patients had shorter hospital stays (4.5 ± 1.2 vs. 7.8 ± 2.1 days) and lower opioid use (0 vs. 30 ± 10 mg morphine equivalent, $p < 0.001$).

Conclusion: ERAS protocols significantly enhance postoperative recovery, reduce complications and opioid dependence, and shorten hospital stay, supporting their broader implementation in major abdominal surgery.

Keywords: ERAS, Major Abdominal Surgery, Postoperative Recovery, Multimodal Analgesia, Hospital Stay.

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Introduction

Recent decades have seen major improvements in surgical results which medical facilities attempt to achieve while decreasing both their treatment expenses and the duration of patient hospital stays. A major focus has been on enhancing recovery after surgery through structured, evidence-based protocols that optimize perioperative care. The concept of Enhanced Recovery After Surgery (ERAS), which people also call "fast-track surgery" and "multimodal surgery," establishes a new way to handle patient care during their surgical procedures. ERAS uses a multimodal method which decreases surgical metabolic stress response to enhance patient results and support their quick recovery from surgery. The method aims to achieve three objectives which include enabling patients to start moving actively while they maintain their regular daily routines and experience shorter hospital stays without developing any new postoperative complications or requiring additional hospital admissions [1].

The various surgical units implement different elements of ERAS protocols yet maintain particular essential components which establish fast-track programs. The complete package includes patient education, optimized anesthetic methods, multiple pain relief systems, which allow patients to start eating, and early patient movement after surgical procedures [2]. The ERAS protocols implement various improvements in patient care during the perioperative period to achieve faster recovery times and better patient health outcomes, which differ

from conventional perioperative methods that depend on extended fasting periods and deferred patient movement and limited pain management methods.

Strong evidence supports the effectiveness of ERAS programs in colorectal surgery because multiple randomized controlled trials and meta-analyses show that these programs reduce postoperative complications while decreasing hospital length of stay and improving patient satisfaction when compared to standard medical treatment [3]. These programs depend on early oral feeding as their main element, which researchers have studied in depth among patients who receive elective lower gastrointestinal surgical procedures. Research shows that patients who can start eating food after their operations experience reduced surgical complications which include postoperative ileus and wound infections while they recover faster than patients who follow standard feeding delays.

The use of ERAS protocols in upper gastrointestinal and complex abdominal surgeries is currently being implemented with greater caution. The surgical community has maintained its opposition to early patient feeding because of their fear that patients will experience gastric distension and anastomotic damage and leaks from surgical sites [4]. The emerging studies show that ERAS principles which include early feeding and mobilization can be safely used with various surgical patients who undergo gynecological and urological and upper gastrointestinal procedures [5].

The second most important element of ERAS requires hospitals to educate patients about their upcoming surgical procedures in order to prepare them for both the psychological and physical demands of surgery [6]. The patients who receive education about their recovery process which includes information about their initial movement schedule and their dietary progression will show better compliance with their postoperative care requirements. The use of multimodal analgesia which includes regional anesthesia and non-opioid medications, leads to decreased opioid usage and reduced side effects while it enables patients to start moving again.

The traditional approach to perioperative treatment practices which require patients to fast for extended periods and postpone their ability to walk and use opioids as their primary method of pain management. The standard practice which has existed for several decades leads to extended postoperative ileus complications and results in longer hospital time for patients. The ERAS protocols provide a patient-centered approach which uses evidence-based methods to support current surgical practices by showing that patients need to restore their body functions before they can start their surgical procedure.

The increasing number of studies which support ERAS needs more research through randomized comparative studies to assess its clinical effectiveness in comparison with standard treatment across all major abdominal surgical procedures. The unique characteristics of patient groups and surgical techniques and hospital protocols make it impossible to apply results from colorectal surgery studies to other surgical specialties. The complete assessment of ERAS protocols requires controlled studies which will deliver strong proof about their advantages and safety and practical application in different surgical environments.

The current randomized study investigates the clinical effectiveness of ERAS compared to traditional perioperative methods for patients who undergo major abdominal operations. The study evaluates postoperative recovery metrics together with complication rates and hospital stay duration and patient satisfaction metrics to assess the practical benefits of ERAS protocols and determine their suitability for implementation in standard surgical procedures. The results will provide important evidence that helps to enhance perioperative treatment methods while improving patient results and decreasing healthcare system demands.

Material and Methods

Study Design: This study was designed as a randomized prospective study comparing the clinical efficacy of the Enhanced Recovery After Surgery (ERAS) approach versus conventional perioperative care in patients undergoing major abdominal surgeries. The aim was to evaluate postoperative outcomes including recovery time, complication rates, hospital stay, and readmissions.

Study Area: The study was conducted at the Department of Anaesthesiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, which caters to a large number of patients requiring elective and emergency abdominal surgeries.

Study Duration: The study was carried out over a period of one year.

Study Participants

Inclusion Criteria

- Patients aged 18–70 years undergoing elective major upper or lower abdominal surgeries.
- Patients willing to provide written informed consent.
- Patients with American Society of Anesthesiologists (ASA) grade I–III.
- Patients capable of following postoperative mobilization and dietary instructions.

Exclusion Criteria

- Patients with ASA grade IV or above.
- Emergency surgical cases.
- Patients with severe comorbidities such as uncontrolled diabetes, chronic renal or liver disease.
- Patients with previous extensive abdominal surgeries or malignancies requiring complex resections.
- Patients unwilling or unable to comply with postoperative protocols.

Sample Size: A total of 80 patients were enrolled in the study and were randomized into two groups: 40 patients in the ERAS group and 40 patients in the conventional care group.

Procedure: All patients included in the study provided informed consent after the details of both surgical approaches were explained. Randomization was performed prior to surgery using computer-generated sequences to assign patients to either the ERAS or conventional care group.

Patients in the ERAS group were admitted a day before surgery and were educated regarding the operative procedure, expected postoperative recovery, and rehabilitation program. Preoperative bowel preparation was given only for lower abdominal procedures. Thrombotic prophylaxis using low-molecular-weight heparin was initiated the day before surgery. Patients were allowed oral intake up to 12 hours before surgery, depending on the site of operation. General anesthesia was administered, maintaining similar anesthetic protocols for all patients. Intraoperative body temperature was controlled at approximately 22°C to maintain normothermia.

Postoperatively, early mobilization was encouraged: patients were assisted to sit on the day of surgery and ambulate from the first postoperative day. Pain management included systemic paracetamol and parecoxib, while opioids were avoided. Nasogastric and nasojejunal tubes were removed early, and oral intake or enteral nutrition was introduced within 24 hours, depending on the type of surgery. Fluid intake was carefully monitored, ensuring total fluids did not exceed 2.5 L/24 hours. Discharge criteria included normal diet, bowel function, adequate pain control, stable laboratory results, and return to preoperative mobility.

Patients in the conventional care group received standard perioperative management as per the individual surgeon's preference. Bowel preparation and prophylactic measures were given as appropriate. Oral intake was typically delayed until passage of flatus, usually by the 4th postoperative day, and normal diet was introduced subsequently. Postoperative mobilization followed conventional practice, and opioid analgesics were used as required. Discharge criteria were similar to the ERAS group.

All patients were monitored for postoperative complications, mortality within 30 days, length of hospital stay, readmissions, and requirement for relaparotomy.

Statistical Analysis: All collected data were analyzed using SPSS version 27.0. Continuous variables were presented as mean ± standard deviation, and categorical variables as frequencies and percentages. Comparisons between ERAS and conventional care groups were performed using the student's t-test for continuous variables and Fisher's exact test for binary outcomes. A p-value < 0.05 was considered statistically significant.

Result

Table 1 presents the demographic characteristics of the study participants (n = 80), divided equally between the ERAS and conventional groups. The mean age was similar between the ERAS group (45.6 ± 12.3 years) and the conventional group (46.9 ± 11.8 years), with no statistically significant difference (p = 0.65). Gender distribution was also comparable, with 22 males and 18 females in the ERAS group versus 20 males and 20 females in the conventional group (p = 0.62). The mean BMI was slightly lower in the ERAS group (24.8 ± 3.2 kg/m²) compared to the conventional group (25.1 ± 3.5 kg/m²), but this difference was not significant (p = 0.72). Additionally, the distribution of ASA grades I, II, and III was nearly identical between groups (10/22/8 vs. 9/23/8; p = 0.95), indicating that both groups were well-matched in terms of baseline demographic and clinical characteristics.

Table 1: Demographic Characteristics of Study Participants (n=80)

Characteristic	ERAS Group (n=40)	Conventional Group (n=40)	p-value
Age (years, mean ± SD)	45.6 ± 12.3	46.9 ± 11.8	0.65
Gender (M/F)	22/18	20/20	0.62
BMI (kg/m², mean ± SD)	24.8 ± 3.2	25.1 ± 3.5	0.72
ASA Grade I/II/III	10/22/8	9/23/8	0.95

Table 2 presents the intraoperative parameters for both the ERAS and conventional groups. The mean duration of surgery was slightly shorter in the ERAS group (145 ± 25 minutes) compared to the conventional group (150 ± 28 minutes), but this difference was not statistically significant (p = 0.38).

Estimated blood loss was also lower in the ERAS group (220 ± 75 ml) than in the conventional group (235 ± 80 ml), yet this difference did not reach statistical significance (p = 0.42). Intraoperative fluid administration was significantly lower in the ERAS group (1800 ± 250 ml) compared to the conventional group (2000 ± 300 ml, p = 0.01), indicating more efficient fluid management. Notably, the ERAS protocol completely avoided the use of opioids intraoperatively, whereas all patients in the conventional group received opioids, highlighting a major distinction in analgesic strategy between the two approaches.

Table 2: Intraoperative Parameters

Parameter	ERAS Group (n=40)	Conventional Group (n=40)	p-value
Duration of surgery (min, mean ± SD)	145 ± 25	150 ± 28	0.38
Estimated blood loss (ml, mean ± SD)	220 ± 75	235 ± 80	0.42
Intraoperative fluids (ml, mean ± SD)	1800 ± 250	2000 ± 300	0.01*
Use of opioids intraoperatively	0%	100%	–

Table 3 shows the postoperative recovery parameters comparing the ERAS group and the conventional group. The ERAS group demonstrated significantly faster recovery across all measured parameters. Patients in the ERAS group ambulated for the first time at 8 ± 2 hours postoperatively, whereas those in the conventional group did so at 24 ± 4 hours (p < 0.001). Similarly, time to first flatus was markedly shorter in the ERAS group (18 ± 5 hours) compared to the conventional group (48 ± 8 hours, p < 0.001). Initiation of oral intake occurred at 12 ± 3 hours in the ERAS group versus 60 ± 10 hours in the conventional group (p < 0.001), and the time to first bowel movement was also significantly reduced in the ERAS group (36 ± 8 hours) compared to the conventional group (72 ± 12 hours, p < 0.001). These results indicate that the ERAS protocol substantially accelerates postoperative recovery.

Table 3: Postoperative Recovery Parameters

Parameter	ERAS Group (n=40)	Conventional Group (n=40)	p-value
Time to first ambulation (hrs)	8 ± 2	24 ± 4	<0.001*
Time to first flatus (hrs)	18 ± 5	48 ± 8	<0.001*
Time to oral intake (hrs)	12 ± 3	60 ± 10	<0.001*
Time to bowel movement (hrs)	36 ± 8	72 ± 12	<0.001*

Table 4 presents the postoperative complications occurring within 30 days in patients undergoing major abdominal surgeries under the ERAS and conventional care protocols. The ERAS group demonstrated lower rates of most complications compared to the conventional group, with surgical site infections observed in 5% versus 12.5%, pneumonia in 2.5% versus 7.5%, and anastomotic leaks in 2.5% versus 5%, although these differences were not statistically significant (p>0.05). Notably, postoperative ileus was significantly reduced in the ERAS group at 5% compared to 20% in the conventional group (p=0.04), indicating a clear benefit of the ERAS approach in promoting early bowel recovery. Other outcomes, including 30-day readmission (2.5% vs. 10%) and mortality (0% vs. 2.5%), were lower in the ERAS group but did not reach statistical significance. Overall, ERAS appears to decrease the incidence of certain postoperative complications, particularly ileus, suggesting improved recovery dynamics.

Table 4: Postoperative Complications (within 30 days)

Complication	ERAS Group (n=40)	Conventional Group (n=40)	p-value
Surgical site infection	2 (5%)	5 (12.5%)	0.24
Pneumonia	1 (2.5%)	3 (7.5%)	0.31
Anastomotic leak	1 (2.5%)	2 (5%)	0.55
Postoperative ileus	2 (5%)	8 (20%)	0.04*
Readmission within 30 days	1 (2.5%)	4 (10%)	0.17
Mortality	0 (0%)	1 (2.5%)	0.31

Table 5 shows that patients in the ERAS group had significantly better postoperative outcomes compared to the conventional group. The mean length of hospital stay was 4.5 ± 1.2 days in the ERAS group versus 7.8 ± 2.1 days in the conventional group (p < 0.001), indicating a faster discharge. Similarly, the total opioid requirement was markedly lower in the ERAS group, with no opioids needed, compared to 30 ± 10 mg morphine equivalent in the conventional group (p < 0.001). Additionally, patients in the ERAS group returned to normal activities much earlier, averaging 7 ± 2 days

compared to 12 ± 3 days in the conventional group ($p < 0.001$), highlighting the effectiveness of the ERAS protocol in accelerating recovery and reducing analgesic dependence.

Table 5: Postoperative Hospital Stay and Analgesic Requirement

Parameter	ERAS Group (n=40)	Conventional Group (n=40)	p-value
Length of hospital stay (days, mean ± SD)	4.5 ± 1.2	7.8 ± 2.1	<0.001*
Total opioid requirement (mg morphine equivalent)	0 ± 0	30 ± 10	<0.001*
Time to return to normal activity (days, mean ± SD)	7 ± 2	12 ± 3	<0.001*

Discussion

The randomized study results show that the Enhanced Recovery After Surgery (ERAS) method leads to better perioperative results than the standard treatment path used for major abdominal operations. The hospital stay outcomes better because patients experienced less need for fluids and they regained bowel function sooner and began walking earlier and their incidence of postoperative ileus decreased and their need for opioids diminished and their need for hospitalization decreased. The results match existing research which shows that multimodal goal directed perioperative care serves as an essential method to achieve optimal recovery after major surgical procedures.

Multiple studies documented in academic literature have obtained results which match our research findings. Varadhan et al. (2010) [7] conducted a meta-analysis of randomized controlled trials in open elective colorectal surgery and found that patients managed with ERAS protocols had a significantly shorter length of stay (mean difference: −3.5 days; 95% CI −4.3 to −2.7) and a lower rate of postoperative complications compared to conventional care ($p < .001$).The results demonstrate that ERAS patients show faster recovery of gastrointestinal function together with reduced incidence of ileus which leads to their earlier discharge from the hospital. Walter et al. (2009) [8] investigated enhanced recovery pathways and discovered that patients spent shorter times in hospitals (average 1.9–4.5 days) while experiencing faster bowel function recovery than when they received standard medical treatment ($p < .01$) which proved that early feeding together with mobilization provided important advantages in their enhanced recovery pathway that our protocol delivered.

The concept of reduced fluid administration and goal directed therapy which we observed in the ERAS group during the operation has received validation through multiple research studies. Holte and Kehlet (2006) [9] reported that restrictive perioperative fluid regimens produced fewer complications while enabling patients to recover their gastrointestinal motility at a faster rate compared to traditional liberal fluid strategies. The researchers demonstrated that our findings operated through optimized fluid balance which resulted in improved postoperative outcomes. The study by Joshi (2005) [10] found that intraoperative fluid restriction showed a connection to decreased tissue swelling which resulted in better healing at anastomotic sites thus helping to explain the lower postoperative ileus rate observed in our ERAS group. The studies demonstrate that fluid management functions as an essential element in the recovery processes of enhanced recovery protocols.

Analgesic strategies play a vital role in helping patients recover from their surgical procedures. The study results showed that when people stayed away from opioids their ability to move soon after surgery improved while their risk for negative effects decreased. Kehlet et al. (1996) [11] showed that patients who used opioid sparing techniques experienced faster recovery times because these methods reduced their symptoms of nausea and sedation and ileus which matched our study results. Patients in standard treatment groups who required opioid pain relief experienced extended periods before their gastrointestinal systems returned to normal functioning. The evidence demonstrates that multimodal analgesia supports functional recovery in ERAS protocols.

The published literature results match most of the findings but there are some differences which need to be discussed. Lassen et al. (2008) [12] conducted upper gastrointestinal surgery research which showed that patients who received early feeding after their procedure experienced no higher rates of complications or anastomotic leaks compared to those who received feeding after their procedure. Our research found that upper GI patients in the ERAS group needed more hospitalization time than those in lower intra-abdominal conditions, yet they had better outcomes than their matched controls. The results indicate that early feeding provides advantages to patients, but the benefits depend on specific surgical procedures which include surgical difficulty and different regional practices.

The ERAS protocols provide general advantages to medical procedures, yet our research did not include traditional elements which include mechanical

bowel preparation prohibition and epidural analgesia. Bucher et al. (2007) [13] and Pineda et al. (2008) [14] show that mechanical bowel preparation does not decrease postoperative complications, yet medical institutions continue to use this practice. Our research demonstrates that targeted early feeding combined with early mobilization and restricted fluids and opioid avoidance produces similar outcome improvements to those obtained through bowel prep elimination and epidural anesthesia use. The research conducted by Fearon et al. (2005) [15] demonstrated that recovery improvement occurs through modified ERAS protocols which maintain some bowel preparation requirements because multiple recovery elements work together to produce clinical advantages.

The study shows that ERAS research demonstrates decreased hospital stays which do not lead to higher readmission rates because their postoperative pathways create safer and more efficient results. Varadhan et al. (2010) [16] and Walter et al. (2009) both documented significant decreases in length of stay with ERAS care without corresponding increases in morbidity or readmission which created results that showed our shorter stays did not lead to increased 30-day readmission rates. The study results show important effects on healthcare resource usage and cost efficiency, yet the research lacks complete economic data.

The research studies found various outcomes which showed different results. Charoenkwan, (2014) [17], conducted a Cochrane review which examined major gynecologic abdominal surgery and discovered that early oral intake did not show consistent results because patient selection combined with surgical context determined how much ERAS protocols would benefit patients. The research needs additional studies because it does not yet identify which patient groups and surgical procedures achieve the best results from ERAS pathways.

The current study results show strong agreement with existing evidence that supports ERAS implementation in major abdominal surgical procedures. The enhanced recovery pathways show positive effects on essential clinical results which include faster functional recovery and lower complication rates and shorter hospital stays without creating additional hazards because they support multimodal evidence-based perioperative treatment. The existing research shows that the combined impact of ERAS components which include fluid management and opioid-free pain relief methods results in significant advantages despite certain traditional components being altered.

Conclusion

The present study demonstrates that the Enhanced Recovery After Surgery (ERAS) protocol significantly improves postoperative outcomes compared to conventional perioperative care in major abdominal surgeries. Patients managed under ERAS experienced faster recovery, evidenced by earlier ambulation, quicker return of bowel function, and earlier resumption of oral intake. They also had a reduced incidence of postoperative ileus, lower opioid requirements, shorter hospital stays, and earlier return to normal activities. These benefits were achieved without increasing morbidity, readmissions, or mortality, highlighting the safety and efficacy of the ERAS approach. Overall, the findings support the broader adoption of ERAS protocols, emphasizing a patient-centered, multimodal strategy that optimizes physiological recovery, enhances clinical outcomes, and promotes more efficient utilization of healthcare resources in abdominal surgical practice.

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