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TRANSFORMING RECOVERY IN ABDOMINAL SURGERIES: A RANDOMIZED CONTROLLED TRIAL OF ERAS VERSUS CONVENTIONAL CARE

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Abstract

Background: Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative care protocol aimed at minimizing surgical stress, accelerating functional recovery, and reducing complications. While extensively validated in colorectal and hepatopancreatobiliary surgery in the West, adoption remains limited in many Indian centers. This randomized controlled trial compared ERAS with conventional perioperative care in elective abdominal surgeries at a South Indian tertiary care hospital.

Methods: Fifty patients undergoing elective abdominal surgery were randomized into two groups: ERAS (n=25) and conventional care (n=25). ERAS interventions included minimal preoperative fasting, early oral intake, multimodal analgesia, and early ambulation. Primary outcomes were length of hospital stay, time to oral intake, time to ambulation, and return of bowel function. Secondary outcomes included postoperative complications, analgesic requirement, and patient satisfaction. Statistical significance was defined as $p < 0.05$.

Results: The ERAS group demonstrated significantly faster recovery:Length of stay: 3.6 ± 1.1 vs 6.2 ± 1.6 days ($p<0.001$),Time to oral intake: 6.5 ± 2.3 vs 22.8 ± 4.1 hours ($p<0.001$),Time to ambulation: 10.2 ± 3.1 vs 26.5 ± 5.8 hours ($p<0.001$),Return of bowel function: 16.5 ± 4.2 vs 32.2 ± 5.6 hours ($p<0.001$).Postoperative complications were lower in the ERAS group (16% vs 36%, $p=0.041$), with reduced analgesic requirement (2.1 ± 0.8 vs 4.5 ± 1.3 days, $p<0.001$). Patient satisfaction scores were higher in the ERAS group (8.6 ± 1.2 vs 6.9 ± 1.4, $p<0.001$).

Conclusion: ERAS protocols significantly enhanced postoperative recovery in abdominal surgeries by promoting early bowel function, ambulation, and nutrition, while reducing hospital stay, analgesic use, and complication rates. These findings are consistent with international evidence and highlight the feasibility and benefits of ERAS implementation in South Indian surgical practice.

Keywords: Enhanced Recovery After Surgery, ERAS, abdominal surgery, randomized controlled trial, perioperative care, India

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is a multimodal, evidence-based perioperative care pathway designed to attenuate surgical stress, optimize physiological recovery, and improve patient outcomes. Initially pioneered in colorectal surgery by Kehlet and Wilmore, ERAS protocols have since been adapted across a wide spectrum of abdominal and thoracic operations [1,2]. Key ERAS elements include shortened preoperative fasting, carbohydrate loading, avoidance of routine nasogastric tubes and drains, multimodal opioid-sparing analgesia, early mobilization, and early resumption of enteral nutrition [3,4]. Over the last decade, ERAS has transformed perioperative care in high-income countries, supported by robust randomized controlled trials and meta-analyses demonstrating reduced length of hospital stay, decreased complications, faster return of bowel function, and improved patient satisfaction compared with conventional pathways [5,6]. In colorectal surgery, meta-analyses show ERAS shortens hospital

stay by 2–3 days and reduces postoperative morbidity by nearly 30% [7]. Similar benefits have been reported in upper gastrointestinal, hepatopancreatobiliary, and gynecological procedures, consolidating ERAS as a global standard [8,9].

Despite the strength of evidence, ERAS implementation remains variable in low- and middle-income countries, including India. Barriers include lack of awareness among surgical teams, limited multidisciplinary coordination, entrenched conventional practices, and concerns about safety in high-risk patients [10,11]. Studies from Indian tertiary centers indicate that although individual ERAS elements are occasionally practiced, protocolized and audited implementation is rare [12]. Consequently, patients undergoing abdominal surgery often experience prolonged fasting, delayed mobilization, excessive opioid use, and extended hospital stay, contributing to higher morbidity and cost burden.

There is a growing need for region-specific evidence to address these gaps. Few Indian randomized studies have directly compared ERAS with conventional care in elective abdominal surgeries, particularly in diverse patient populations with limited resources [13]. Generating such data is vital to strengthen adoption and to reassure clinicians of its safety and efficacy in local settings.

The present randomized controlled trial was therefore undertaken at a South Indian tertiary care center to compare ERAS and conventional perioperative care in elective abdominal surgeries. The primary aim was to evaluate recovery metrics—length of stay, time to oral intake, ambulation, and return of bowel function—while secondary endpoints included complications, analgesic requirement, and patient satisfaction.

MATERIALS AND METHODS

Study Design and Setting

This study was designed as a single-center, parallel-group, randomized controlled trial conducted in the Department of General Surgery, Saveetha Medical College and Hospital (SMCH), Tamil Nadu, India. The trial was conducted between January 2024 and January 2025, comparing Enhanced Recovery After Surgery (ERAS) protocols with conventional perioperative care in patients undergoing elective abdominal surgeries.

Participants

Eligibility criteria were as follows:

Inclusion criteria: Adults aged 18–65 years, undergoing elective abdominal surgery, American Society of Anesthesiologists (ASA) grade I–III, and willing to provide informed consent.

Exclusion criteria: Emergency surgeries, ASA grade IV or higher, pregnancy or lactation, cognitive impairment preventing protocol adherence, and patients with advanced systemic disease.

Randomization and Blinding

A total of **50 eligible patients** were randomized using a computer-generated block randomization sequence into two groups:**ERAS group (n=25),Conventional care group (n=25)**

Allocation concealment was ensured using sealed opaque envelopes. Due to the nature of interventions, blinding of patients and surgical staff was not feasible; however, outcome assessors and statisticians were blinded to group allocation.

Interventions

ERAS group: Patients received protocol-driven care including minimal fasting, preoperative carbohydrate loading, early oral intake (within 6–8 hours postoperatively), avoidance of routine nasogastric tubes and drains, multimodal opioid-sparing analgesia, and early mobilization (within 12–24 hours).

Conventional care group: Patients were managed according to standard institutional practice with prolonged fasting, delayed oral intake (>24 hours), routine use of nasogastric tubes, opioid-centered analgesia, and delayed ambulation.

Data Collection Tools:ERAS compliance checklist,Standard postoperative observation chart,Patient satisfaction questionnaire (10-point Likert scale)

Outcomes

Primary outcomes: Length of hospital stay, time to oral intake, time to ambulation, and return of bowel function.

Secondary outcomes: Postoperative complications (wound infection, ileus, etc.), analgesic requirement, and patient satisfaction scores.

Sample Size

Based on prior studies showing a 2–3 day reduction in hospital stay with ERAS, a minimum of 22 patients per groupwas required to achieve 80% power at a 5% significance level. Allowing for dropout, 25 patients were enrolled per arm (total n=50).

Statistical Analysis

Data were analyzed using SPSS version 26 (IBM, Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median (IQR) and compared using independent t-test or Mann–Whitney U test. Categorical variables were analyzed using Chi-square or Fisher's exact test. $p < 0.05$ was considered statistically significant.

Ethical Considerations

The study was approved by the **Institutional Ethics Committee of SMCH**. Written informed consent was obtained from all participants prior to enrollment. The trial adhered to the Declaration of Helsinki (2013).

RESULTS

Participant Flow

Of 60 patients assessed for eligibility, 10 were excluded (6 did not meet inclusion criteria, 4 declined participation). The remaining 50 were randomized equally into the ERAS group (n=25) and conventional care group (n=25). All participants received their allocated intervention and were included in final analysis (

Baseline Characteristics

Baseline demographic and clinical characteristics were comparable between the two groups. Mean age was 44.6 ± 11.2 years in the ERAS group and 45.8 ± 12.1 years in the conventional group. The male-to-female ratio was similar (ERAS: 15:10; Conventional: 16:9). Distribution of ASA grades I–III did not differ significantly, ensuring both cohorts were well-matched at baseline.

Variable	ERAS (n=25)	Conventional (n=25)	p-value
Age (years)	44.6 ± 11.2	45.8 ± 12.1	0.72
Sex (M:F)	15:10	16:9	0.78
ASA Grade I	10 (40%)	9 (36%)	0.77
ASA Grade II	12 (48%)	13 (52%)	0.79
ASA Grade III	3 (12%)	3 (12%)	0.91

Table 1. baseline characteristics of study population

Primary Outcomes

Length of hospital stay: ERAS patients had a significantly shorter stay (3.6 ± 1.1 vs 6.2 ± 1.6 days; $p<0.001$).

Time to oral intake: Patients in the ERAS arm resumed oral feeding much earlier (6.5 ± 2.3 vs 22.8 ± 4.1 hours; $p<0.001$).Time to ambulation: Early mobilization was achieved in the ERAS group (10.2 ± 3.1 vs 26.5 ± 5.8 hours; $p<0.001$).Return of bowel function: ERAS facilitated earlier recovery of bowel activity (16.5 ± 4.2 vs 32.2 ± 5.6 hours; $p<0.001$).

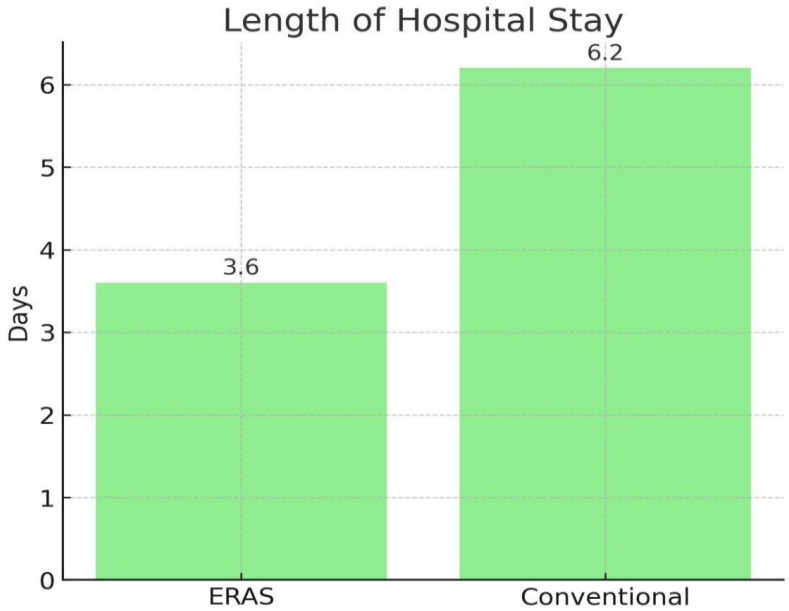

Figure 1. Mean length of hospital stay in both groups

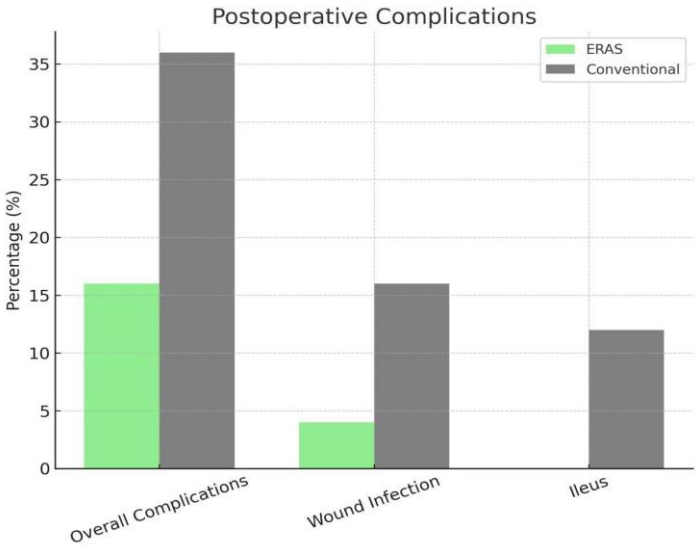

Figure 2. Postoperative complications in both the groups

Secondary Outcomes

Overall postoperative complications: Lower in ERAS (16% vs 36%; p=0.041).Wound infection: ERAS 4% vs Conventional 16% (p=0.157, NS).Ileus: ERAS 0% vs Conventional 12% (p=0.074).Analgesic requirement: Significantly lower in ERAS (2.1 ± 0.8 vs 4.5 ± 1.3 days; p<0.001).Patient satisfaction: Higher scores in ERAS (8.6 ± 1.2 vs 6.9 ± 1.4; p<0.001).

SUMMARY OF FINDINGS

ERAS significantly improved perioperative recovery across all primary outcomes, with fewer complications, reduced analgesic needs, and higher patient satisfaction. Although individual complications such as wound infection and ileus did not reach statistical significance, overall morbidity was significantly reduced in the ERAS group.

DISCUSSION

This randomized controlled trial demonstrates that implementation of Enhanced Recovery After Surgery (ERAS) protocols in abdominal surgeries significantly improves perioperative outcomes compared with conventional care. Patients in the ERAS group had shorter hospital stay, earlier resumption of oral intake, quicker mobilization, faster bowel recovery, reduced analgesic requirements, fewer complications, and greater satisfaction.

Our findings are consistent with global literature establishing ERAS as a transformative perioperative strategy. Kehlet and Wilmore first conceptualized “fast-track surgery” to attenuate the stress response and promote early recovery [1]. Since then, robust evidence has accumulated across colorectal, upper gastrointestinal, hepatopancreatobiliary, and gynecological surgeries [2–4]. A recent meta-analysis of randomized trials in colorectal surgery showed ERAS shortened hospital stay by 2–3 days and reduced morbidity by nearly 30% compared with traditional pathways [5]. Similarly, Ljungqvist et al. emphasized that ERAS improves outcomes while being cost-effective [6].

The present trial adds region-specific data from an Indian tertiary center, where ERAS adoption remains limited due to inertia in practice change, lack of multidisciplinary coordination, and safety concerns in resource-constrained settings [7,8]. Despite these challenges, our results confirm that ERAS can be successfully implemented with significant benefits, even in a diverse patient population. Early oral feeding and mobilization were achieved without increase in complications, addressing a common concern among surgeons accustomed to traditional prolonged fasting and bed rest [9].

Complication rates in our ERAS cohort (16%) were lower than conventional care (36%), aligning with international evidence [10,11]. Although individual events such as wound infection and ileus did not reach statistical significance due to limited sample size, the overall reduction in morbidity underscores the clinical impact of protocolized care. Importantly, analgesic requirements were nearly halved, reflecting the effectiveness of multimodal, opioid-sparing analgesia—an ERAS cornerstone that reduces ileus and promotes mobilization [12].

Strengths of this study include its prospective randomized design, strict adherence to protocol, and comprehensive outcome assessment. Limitations include the modest sample size, single-center scope, and short-term follow-up. Larger multicentric Indian studies are warranted to validate these findings and drive broader adoption.

In conclusion, ERAS is safe, feasible, and beneficial in the Indian context, providing superior recovery metrics and improved patient-centered outcomes compared with conventional perioperative care.

CONCLUSION

This randomized controlled trial highlights that Enhanced Recovery After Surgery (ERAS) protocols significantly improve postoperative recovery in abdominal surgeries compared with conventional care. Patients managed under ERAS experienced shorter hospital stay, earlier initiation of oral intake, quicker mobilization, faster bowel function recovery, reduced analgesic requirement, fewer complications, and higher satisfaction. These findings are consistent with global evidence and affirm the feasibility of ERAS implementation in an Indian tertiary care setting.

The results reinforce that conventional practices such as prolonged fasting, delayed ambulation, and opioid-centered analgesia prolong recovery and increase morbidity. By contrast, the structured multimodal ERAS pathway optimizes perioperative care, enhances safety, and improves patient-centered outcomes without increasing risk.

Broader implementation of ERAS, supported by institutional protocols and multidisciplinary collaboration, has the potential to transform perioperative care across diverse surgical practices in India. Larger multicentric studies are needed to confirm these benefits and encourage widespread adoption.

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