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Original Research Article

Effect of Enhanced Recovery after Surgery (ERAS) Protocols on Surgical Outcomes in Abdominal Surgeries

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Abstract

Background: Enhanced Recovery after Surgery (ERAS) protocols represent a multidisciplinary approach aimed at reducing surgical stress, optimizing recovery, and improving outcomes postoperatively. While ERAS has shown significant promise globally, its application and systematic evaluation in Indian tertiary care settings, especially in abdominal surgeries, remain limited.

Methods: Nalanda Medical College & Hospital (NMCH) researchers conducted a prospective observational study from August 2023 to July 2024 in Patna, Bihar. The study included 100 elective abdominal surgery patients. One group received normal perioperative care, while the other received ERAS. Postoperative complications, 30-day readmission rates, ambulation time, and bowel movement time were the main outcomes. SPSS statistical analysis considered p-values below 0.05 significant.

Results: Among 100 patients, the ERAS group (n=50) showed significantly better outcomes than the conventional group (n=50). Mean hospital stay was 3.2 vs. 5.6 days; time to ambulation was 14.5 vs. 32.2 hours; oral intake resumed at 10.8 vs. 27.4 hours. Complication rates like infection (6% vs. 18%) and ileus (4% vs. 16%) were notably lower in the ERAS group ($p<0.05$).

Conclusion: The study affirms that ERAS protocols can substantially enhance recovery and reduce morbidity in abdominal surgeries within an Indian tertiary care context. Their adoption could lead to better resource utilization and patient satisfaction. Larger multicentre trials are recommended to further establish standardized ERAS pathways in India.

Keywords: Abdominal Surgery, ERAS, Length of Stay, Multimodal Analgesia, Postoperative Recovery, Surgical Outcomes.

Introduction

Enhanced Recovery following Surgery (ERAS) is a multimodal perioperative care pathway that speeds up recovery following major surgeries. In the late 1990s, Danish Dr. Henrik Kehlet invented the ERAS technique [1]. Instead of reducing complications, it prioritised patient recovery, changing conventional surgical treatment. ERAS protocols combine surgical, anaesthetic, and nursing care to reduce surgical stress, postoperative problems, and recovery time [2]. Unlike standard perioperative treatment, which entails prolonged fasting, delayed mobilisation, and liberal narcotic and drain usage.

ERAS procedures include many pre-, intra-, and post-operative therapy. These include patient counselling and education before surgery, carbohydrate loading, standardised anaesthetic regimes, perioperative fluid overload minimisation, regional analgesic approaches, early ambulation, and oral nutrition resumption [3]. The goals are a shorter hospital stay, fewer physiological stress, and intact organ function after surgery. After demonstrating reproducible benefits in colorectal surgery, ERAS protocols were expanded to include gynaecology, urology, hepatobiliary, and orthopaedic operations [4].

The case for ERAS abdominal surgery is strong. Physical stress, discomfort, gastrointestinal issues, and longer recovery durations are prevalent after elective or emergency abdominal surgery [5,6]. Traditional perioperative treatments cause mobilisation delays, bowel dysfunction, nosocomial infections, and extended hospital stays, increasing healthcare costs and patient morbidity [7]. ERAS procedures in abdominal surgeries focus on modifiable factors such fewer problems, earlier

bowel function recovery, reduced opioid use, and patient satisfaction to enhance patient outcomes [8]. Multiple worldwide studies have shown that ERAS protocols improve abdominal surgery results. Large prospective multicentre research by the European ERAS Society found that ERAS reduced postoperative complications and hospital stays for colorectal surgery patients [9]. A meta-analysis of randomised controlled studies in The British Journal of Surgery found that ERAS programs reduced postoperative morbidity by 30-50% and hospital stay by 2-3 days for various abdominal procedures [10]. ERAS routes have been strongly promoted by the American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) to improve surgical quality and standardise therapy.

Research on ERAS procedures in India is growing, despite unequal implementation. Urban tertiary care facilities including AIIMS Delhi, PGIMER Chandigarh, and CMC Vellore have successfully piloted ERAS pathways in gastrointestinal procedures [11]. In 2022, the Indian Journal of Surgery reported that ERAS-assisted laparoscopic cholecystectomy patients had shorter hospital stays and faster bowel recovery than conventional patients. Another randomised trial at a Maharashtra teaching hospital found that ERAS for elective colorectal surgery reduced average stay by 2.5 days without increasing readmission rates.

Even though these results are promising, ERAS is not extensively employed in India's tier-2 and tier-3 hospitals, especially public teaching hospitals. Healthcare practitioners not knowing about the issue, inadequate resources, a lack of teamwork between disciplines, and a strong dependence on old surgical care models are the causes [12]. Most ERAS studies in India are observational, small-scale, have strict patient inclusion criteria, and lack long-term follow-up. State-run tertiary institutions in Eastern India, like Patna's Nalanda Medical College & Hospital (NMCH), which services a diverse and large patient population from Bihar and surrounding states, rarely conduct studies.

One of India's most populous states, Bihar, has few resources and makes high-quality surgical care challenging. Since NMCH, Patna is a major government teaching hospital, many patients undergo elective and emergency abdominal surgery there. However, traditional perioperative methods are still used more than evidence-based recovery techniques. Adopting and assessing ERAS protocols could improve surgical outcomes, maximise hospital resources, and set a national standard for analogous scenarios.

This study will assess the influence of ERAS procedures on abdominal surgery success at NMCH, Patna to satisfy this crucial informational gap. The research focusses on 100 patients from August 2023 to July 2024 to collect local data on the clinical efficacy, feasibility, and acceptance of ERAS routes in public-sector hospitals. Surgical problems, hospital stay, oral intake, ambulation, and readmission rates must be assessed.

To encourage NMCH and other Bihar government hospitals to adopt standardised ERAS protocols; and third, to add to the growing corpus of Indian research proving ERAS's success in abdominal surgery. If successful, the study could impact policy, training, and patient care in low-resource areas. By demonstrating that ERAS can benefit patients in high-volume tertiary care, the research hopes to change perioperative treatment in Eastern India.

While ERAS protocols are effective worldwide, little is known about adapting and applying them in public hospitals in India, particularly in Bihar. This is the first study to examine the effect of ERAS on abdominal surgical success in a realistic public healthcare setting. By improving recovery principles, surgical quality, patient experience, and healthcare cost can be improved. This research will aid clinical decision-making and institutional initiatives.

Objectives

- Assess the impact of ERAS procedures on postoperative recovery metrics in abdominal surgery patients at NMCH, Patna, including time to first mouthful, mobilisation timing, and bowel movement quality.
- To compare preoperative ERAS protocol management to typical perioperative care in minimising surgical complications, hospital stays, and readmissions.
- To assess the feasibility and acceptance of ERAS protocols among healthcare providers and patients within a resource-constrained tertiary care setting in Bihar.

Materials and Methods

Study Design: This study was designed as a prospective observational study aimed at evaluating the effects of Enhanced Recovery after Surgery (ERAS) protocols on postoperative outcomes in patients undergoing abdominal surgeries.

By following patients throughout the perioperative period and documenting clinical outcomes in real-time, the study provides an evidence-based assessment of ERAS implementation in a real-world clinical setting.

Setting: The research was conducted at Nalanda Medical College & Hospital (NMCH), Patna, and Bihar, a tertiary care teaching hospital that caters to a diverse and high-volume patient population in Eastern India. The institution provided a suitable

environment to test the feasibility, implementation, and outcomes of ERAS protocols within the existing infrastructure and resource limitations of a government-run facility.

Study Duration: The study was carried out over a period of 12 months, from August 2023 to July 2024. This timeframe allowed for adequate recruitment, implementation of ERAS elements, postoperative monitoring, and follow-up to evaluate the outcomes of interest.

Sample Size: A total of 100 adult patients scheduled for elective abdominal surgeries were enrolled in the study. The sample size was determined based on logistical feasibility and institutional surgical volume, ensuring a representative patient cohort for statistical analysis and meaningful conclusions.

Inclusion Criteria

- Age between 18 and 65 years.
- Undergoing elective abdominal surgeries such as hernia repair, cholecystectomy, colorectal surgery, or exploratory laparotomy.
- Provided written informed consent for participation in the study.
- Medically fit for ERAS protocol implementation, as determined by the surgical and anesthetic teams.

Exclusion Criteria

- Undergoing emergency abdominal surgeries (e.g., perforation, obstruction, and trauma).
- Having severe pre-existing comorbidities such as uncontrolled diabetes, renal failure, chronic obstructive pulmonary disease, or congestive heart failure.
- Patients requiring postoperative intensive care support or prolonged mechanical ventilation.
- Refusal to provide consent or inability to follow ERAS guidelines due to cognitive or physical limitations.

ERAS Protocol Elements: ERAS was used in this investigation. It followed worldwide criteria and was tailored to Nalanda Medical College & Hospital. Preoperative counselling was thorough and set realistic recovery goals. Patients were instructed to drink clear fluids up to two hours before surgery rather than fasting. Early postoperative nutrition began six hours after surgery. The multimodal analgesic method used NSAIDs, paracetamol, and localised blocks to reduce opioid use. Movement was encouraged after surgery, and nasogastric tubes and drains were removed rapidly to limit their use. A dedicated team of surgeons, anaesthetists, and nurses followed protocol through patient education and monitoring.

Control Group: A comparative observational method was used in this non-randomized controlled experiment. A control group of patients who got conventional perioperative care in the past or present was included. These patients followed standard treatments like long fasts, delayed feeding, liberal opiate use, and longer bed rest, so they could be compared.

Outcomes Measured: The study examined functional and clinical results after surgery to evaluate ERAS protocols. Postoperative complications, including surgical site infections, ileus, urine retention, and lung issues, were relevant. Hospitalisation began on surgery day and finished on discharge day. Time to ambulation was the number of hours or days it took the patient to stand and walk after surgery. How long it takes a patient after surgery to eat solid meals or clear fluids is called "time to oral intake". The 30-day readmission rates were also tracked to report surgery-related hospital readmissions. Daily inpatient monitoring and post-release telephonic follow-ups enabled extensive outcome tracking.

Data Analysis: Data was loaded into Excel for SPSS 26.0 analysis after collection. The demographic and clinical data was summarised using descriptive statistics including standard deviation, frequency, percentages, and mean. ERAS and traditional groups were compared for continuous factors including length of stay and time to ambulation using independent sample t-tests. Chi-square testing was used for categorical variables like readmission and complications rates. A p-value below 0.05 indicated statistical significance.

Results

Demographic Characteristics: Out of the 100 patients enrolled, 50 were managed under the ERAS protocol, and 50 received conventional perioperative care. The demographic distribution was comparable across both groups.

Table 1: Patient Demographics and Surgery Types

Variable	ERAS Group (n = 50)	Conventional Group (n = 50)	p-value
Mean Age (years ± SD)	44.2 ± 11.5	45.6 ± 12.1	**0.53**
Gender (M/F)	29 / 21	30 / 20	**0.84**
Laparoscopic Surgery (%)	28 (56%)	26 (52%)	**0.68**
Open Surgery (%)	22 (44%)	24 (48%)	
Type of Surgeries:			

Hernioplasty	14 (28%)	13 (26%)	
Cholecystectomy	16 (32%)	15 (30%)	
Appendectomy	10 (20%)	11 (22%)	
Other Abdominal Surgeries	10 (20%)	11 (22%)	

No significant difference in baseline demographics was observed between the groups.

Primary Clinical Outcomes: Implementation of ERAS protocols was associated with a significant improvement in several postoperative parameters, including early ambulation, faster return of bowel function, reduced length of stay, and lower complication rates.

Table 2: Comparison of Primary Surgical Outcomes

Outcome	ERAS Group (Mean ± SD)	Conventional Group (Mean ± SD)	p-value	95% Confidence Interval
Hospital Stay (days)	3.2 ± 0.9	5.6 ± 1.4	<0.001	1.8 – 2.7
Time to Ambulation (hours)	14.5 ± 3.6	32.2 ± 6.8	<0.001	14.4 – 20.3
Time to Oral Intake (hours)	10.8 ± 3.2	27.4 ± 4.9	<0.001	14.7 – 19.6
Time to First Bowel Movement (days)	1.8 ± 0.6	3.1 ± 1.0	<0.001	1.0 – 1.6

Postoperative Complications and Readmission: The incidence of complications such as surgical site infection and postoperative ileus was significantly lower in the ERAS group compared to the conventional group.

Table 3: Complication and Readmission Rates

Parameter	ERAS Group (n = 50)	Conventional Group (n = 50)	p-value
Surgical Site Infection	3 (6%)	9 (18%)	0.045
Postoperative Ileus	2 (4%)	8 (16%)	0.04
Urinary Retention	1 (2%)	3 (6%)	0.31
Pulmonary Complication	0 (0%)	2 (4%)	0.15
30-Day Readmission Rate	2 (4%)	7 (14%)	0.08

Statistical significance observed in infection and ileus rates.

Readmission showed a downward trend in the ERAS group but was not statistically significant.

Stratified Outcomes:

Open vs. Laparoscopic: Outcomes were stratified based on surgical approach. ERAS benefits were evident in both groups but more pronounced in laparoscopic surgeries.

Table 4: Stratified Outcomes by Surgical Approach

Parameter	Open Surgery – ERAS	Open – Conventional	Laparoscopic – ERAS	Laparoscopic – Conventional
Mean Hospital Stay (days)	**4.2**	6.3	2.6	4.9
Time to Oral Intake (hrs)	**12.1**	28.4	9.6	26.3
Complication Rate (%)	**18%**	32%	8%	16%

Laparoscopic patients under ERAS showed the best outcomes overall.

Discussion

This prospective observational study found that enhanced recovery after surgery (ERAS) protocols improved abdominal surgery outcomes. ERAS-treated patients at Nalanda Medical College and Hospital (NMCH), Patna, experienced less problems, shorter hospital stays, earlier ambulation, and faster bowel function than standard perioperative patients. The ERAS group had a two-day shorter mean hospital stay and considerably quicker durations to oral intake and ambulation, confirming the benefits of structured, multimodal surgical recovery paths. One notable difference was the ERAS group's shorter time to oral intake (mean: 10.8 hours vs. 27.4 hours). The essential ERAS concepts recommend early enteral feeding to reduce catabolic stress and stimulate gut function. ERAS patients had fewer postoperative ileus and pulmonary issues, indicating speedier ambulation. These good outcomes were due to patient education, minimal fasting, opioid-sparing analgesia, and early mobilisation.

Comparison with Prior Literature: Our study's findings match national and worldwide ERAS efficacy studies. In a meta-analysis that ERAS treatments reduced hospital stays, complications, and readmissions for abdominal surgeries, notably colorectal resections [13]. UK and Scandinavian research, the original ERAS deployment sites, has

consistently showed lower healthcare costs and better patient outcomes.

Most Indian study focused on colorectal or gynaecological surgery, however [14,15] found similar results. This study expanded to include hernioplasties, appendectomies, and cholecystect omies, making ERAS protocols more generalisable in surgery. This research reveals that ERAS works effectively in public tertiary care in India, which is good since it can adapt to low-resource settings.

Strengths of the Study: First to implement and assess ERAS at NMCH, Patna, and this project is ground-breaking in Eastern India. To encourage evidence-based surgery and this study's strength is its uniform implementation of ERAS protocols to many abdominal surgeries, ensuring protocol fidelity and treatment homogeneity. Real-time data collection with no recall or documentation bias is possible using a prospective method. The study compared ERAS efficacy in open and laparoscopic operations. The ERAS pathway also benefited from multidisciplinary collaboration. The surgical team, anaesthetists, nurses, and physiotherapists collaborated to ensure ERAS components including early eating, ambulation, and opioid-sparing analgesia were followed. ERAS can be implemented at a big, publicly-funded tertiary care facility with few resources and staff training, according to the results.

Limitations

The study's findings are promising, but it has limits. 100 patients is plenty for first observations, but not enough to draw conclusions concerning rare problems or readmissions. Due to Nalanda Medical College & Hospital's single-center setup, the results may not apply elsewhere.

Other hospitals may have different patient populations, infrastructure, and perioperative methods. The lack of follow-up data beyond 30 days following surgery excluded quality of life, delayed readmissions, chronic pain, and other important characteristics. Even with defined inclusion criteria, patient motivation, literacy, and support systems may have affected ERAS protocol adherence, introducing selection bias. Even if prospective, the non-randomized design cannot prove causation. To address these issues and strengthen the current results, larger, multicentric, randomised trials with longer follow-up are needed.

Future Directions: Future study should use larger, multi-center, randomised trials to remove confounding variables and create more robust evidence. Longitudinal research on quality of life, return to work, and cost-benefit analysis will promote ERAS treatments' wider usage.

Conclusion

Abdominal procedures performed using Enhanced Recovery after Surgery (ERAS) methods at Nalanda Medical College & Hospital had significantly better postoperative results than normal care. These included shorter hospital stays, earlier ambulation, faster bowel function, and fewer problems. These findings show that ERAS optimises healthcare resources, speeds recovery, and boosts patient satisfaction. Despite the study's small sample size and single-center methodology, results support ERAS in routine surgery. Future multicentre randomised trials with long-term follow-up should validate these advantages and provide uniform ERAS guidelines for Indian healthcare.

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