

Impact of Enhanced Recovery After Surgery (ERAS) Protocols on Postoperative Pain and Early Mobilization: A Retrospective Study

Hamza Mushtaq^{1*}, Hussnain Ashiq¹, Hammad Habib¹, Aamir Waheed¹, Ghulam Hussain¹, Wajeeh-ur-Rehman¹

1. Department of Medicine, Quaid-e-Azam Medical College, Bahawalpur, Pakistan

Correspondence to: Hamza Mushtaq, Email: Hamza1124@gmail.com



ABSTRACT

Background: The significant cause of extended hospitalization and postoperative morbidity after abdominal surgery is postoperative pain and delayed mobilization. Enhanced Recovery After Surgery (ERAS) protocols are evidence-based, structured perioperative care systems that are aimed at minimizing surgical stress, maximizing pain management, and achieving early functional recovery. Nevertheless, there is limited evidence in practice as to their efficacy in general clinical practice.

Objective: To assess the effectiveness of ERAS protocols in reducing the intensity of postoperative pain and early mobilization in patients undergoing elective abdominal surgery compared to conventional perioperative care.

Methods: This was a retrospective comparative study that was carried out between May 2024 and March 2025. Ninety adult patients who were undergoing elective abdominal surgery were recruited and randomized into two equal groups of 45 patients who were put under ERAS protocols and 45 patients who were provided with conventional perioperative care. At 24 hours postoperatively, postoperative pain was gauged by the use of the Visual Analog Scale (VAS). The duration of the first ambulation, time in hospital, and postoperative complications were documented. Proper statistical tests were used to analyze data, and a p-value of less than 0.05 was taken to be statistically significant.

Results: Patients treated in accordance with ERAS indicated much lower VAS scores at 24 hours than the traditional care group (mean VAS: 3.2 ± 0.8 vs. 5.1 ± 1.0 ; $p < 0.001$). The ERAS group attained early mobilization much earlier (15.1 ± 3.4 hours vs. 27.2 ± 4.8 hours; $p = 0.001$). Hospital stay was also much lower in patients undergoing ERAS (3.5 ± 1.0 days vs. 6.0 ± 1.8 days; $p < 0.001$). The ERAS group had a reduced incidence of postoperative complications, which were not significantly different between the groups.

Conclusion: ERAS protocols can be used to enhance postoperative pain management, early mobility, and reduce hospitalization duration with no heightened risk of postoperative complications. These results justify the wider use of ERAS pathways to improve the postoperative outcomes and the best results of perioperative care.

Keywords: Enhanced Recovery After Surgery (ERAS), postoperative pain, early mobilization, abdominal surgery, length of hospital stay



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INTRODUCTION

Postoperative recovery is a multifactorial process, the result of which depends on the degree of surgical stress, methods of anesthesia, pain management methods, and perioperative care practices [1]. The two significant issues that present challenges worldwide, irrespective of the enhancement in the surgery processes, are postoperative pain and delayed

mobilization. Uncontrolled pain not only subjects patients to discomfort and respiratory dysfunction, but also slows down ambulation, increases hospitalization, and exposes patients to postoperative complications, such as atelectasis, venous thromboembolism, and muscle deconditioning. Mobilization, in its turn, is an important predictor of

functional recovery and has always been linked to positive clinical outcomes after surgery [2,3].

Historically, conventional approaches to perioperative care have focused on extended preoperative starvation, overliberal use of intravenous fluids, regular use of drains and nasogastric tubes, opioid analgesia, and slow resumption of oral intake and ambulation [4]. These, though previously thought to be the standard practice, are also found to worsen the physiological response to surgery and slow down the recovery. To address these shortcomings, the Enhanced Recovery After Surgery (ERAS) guidelines have been created as an evidence-based method for the management of the perioperative patient [5].

ERAS is a paradigm shift in traditional care, as it is an integration of several perioperative interventions, which were applied to reduce surgical stress levels, physiological processes, and recovery rate [6]. These recommendations include pre-patient education, nutritional optimization, mini-fasting and carbohydrate loading, standard practices of anesthesia, multimodal opioid-sparing analgesia, early removal of tubes and catheters, and organization of the first mobilization. The ERAS pathways, which are promoted and uniformly recognized by the ERAS Society, have been effectively applied in various areas of surgery, including colorectal, gynecological, urological, and general surgical subdisciplines, since their initial introduction [7].

The most significant aspects of ERAS are effective postoperative pain management and early mobilization. Sufficient analgesia helps patients to breathe, cough, and walk early and hence minimize pulmonary complications and thromboembolic risk [8]. Early mobilization is also central in the maintenance of muscle mass, enhancement of insulin sensitivity, recovery of the gastrointestinal system, and patient independence. As a result, the intensity and time of first ambulation are a feasible and clinically significant measure of the quality of recovery [9].

Despite the fact that the positive effects of ERAS protocols have numerous strong support points in randomized controlled trials and meta-studies, their implementation into the system of healthcare practices continues to vary, particularly among the low- and middle-income countries [10]. There is a lack of localized data that assesses the practical results of the ERAS implementation, and the issues of feasibility, compliance, and safety still prevail in numerous organizations. Institutional experience, where the implementation of ERAS protocols is evaluated retrospectively, can offer useful information concerning the effectiveness of these protocols in non-controlled trial conditions [11].

Thus, the current study was aimed at evaluating the effect of the ERAS protocols on the postoperative pain management and early mobilization among the patients undergoing elective abdominal surgery, in contrast to the traditional perioperative care. This study will help to add institution-specific evidence to the role of ERAS in enhancing the outcomes of postoperative outcomes and

inform larger implementation of this tool in clinical practice [12].

MATERIALS AND METHODS

The current retrospective comparative study was conducted at the tertiary care teaching hospital of Quaid-e-Azam Medical College, Bahawalpur, Pakistan, during eleven months, May 2024 to March 2025, with the approval (QAMC/ERC/2024/092) of the Institutional Ethical Review Committee. Since the study was conducted through the review of medical records, informed consent was not given, and patient data were kept confidential during the study process in accordance with the ethical standards.

The population of the study was composed of adult patients who had undergone elective abdominal surgery within the given period of study. The sample size used was 90 patients. The non-probability consecutive sampling was used to select patients, depending on the availability of their complete and retrievable medical records. The sampled patients were divided into two equal groups based on the perioperative care pathway that was taken. The ERAS group involved 45 patients treated using a well-organized Enhanced Recovery After Surgery, and the conventional care group had 45 patients treated using the normal perioperative management. The sample size was deemed adequate to assess the existence of clinically significant differences between the two groups on the outcomes of postoperative pain and mobilization.

The study included adult patients with an age range of 18 to 70 years old and a physical status of American Society of Anesthesiologists (ASA) I-III with a history of elective abdominal surgery. The patients were not included when emergency surgery, re-operations, or revision surgery was done, when patients were in need of long-term mechanical ventilation at the postoperative phase, and when patients had chronic pain syndromes or long-term opioid medication history, or when the medical records were incomplete or missing.

The patients in ERAS were treated based on an institutional ERAS pathway. This was a set of pathways that involved preoperative patient education and counseling, some preoperative starving and prompt resumption of oral fluids, multimodal opioid-sparing analgesia, standardized anesthetic procedures, timely removal of urinary catheters and surgical drains, where feasible, and programmed promotion of early mobilization during the first 24 hours of surgery. On the contrary, the conventional care group patients had standard perioperative care, which mostly included longer fasting, opioid pain treatment, delay in the onset of oral nutrition, and subsequent mobilization according to traditional care.

Hospital records were used to collect data in a retrospective study by using a structured data extraction proforma. Among the variables recorded were demographics of the patient (age and gender), type of surgery carried out, the intensity of post operation pain

measured in the visual analog scale (VAS) 24 hours after surgery, time taken to ambulate the patient after surgery to measure length of stay in days, presence or absence of post operation complications during the length of stay in hospital.

The main study outcomes measures were the score of postoperative pain at 24 hours and the time of the first ambulation. The length of hospital stay and occurrence of postoperative complications were the secondary outcome measures. SPSS version 26.0 was used to conduct statistical analysis. The continuous variables were represented in terms of mean and standard deviation, whereas the categorical variables were represented in terms of frequencies and percentages. The independent sample t-test of continuous variables and the chi-square test of categorical variables were used as the comparison tools between the ERAS and the conventional care groups. Any p-value below 0.05 was observed as being significant.

RESULTS

The final analysis involved a sample of 90 patients who had been electively operated on the abdomen between May 2024 and March 2025. Forty-five of them were treated using Enhanced Recovery After Surgery (ERAS) guidelines, and 45 were treated using conventional perioperative care. All the records included were full and appropriate to be assessed.

The demographic and clinical characteristics of the baseline of the two groups of patients were similar. Age, gender distinctions, and type of surgical procedure done did

not have a statistically significant difference between the ERAS and conventional care group, and hence sufficient homogeneity existed between the two cohorts on their baselines (Table 1).

The ERAS group achieved high levels of early mobilization. When patients were treated using ERAS procedures, the first ambulation occurred at an average of 15.1 ± 3.4 hours after surgery, as opposed to 27.2 ± 4.8 hours in the traditional care unit. This difference was statistically significant ($p < 0.001$), which indicates the efficacy of ERAS strategies in promoting early postoperative mobility.

The duration of hospitalization was also greatly decreased in the ERAS patients. The median hospitalization in the ERAS group was 3.5 ± 1.0 days compared with a much higher 6.0 ± 1.8 days in the conventional care group (the patients were discharged sooner and recovered faster in the first group), representing shorter hospital stays (Table 3).

The intensity of postoperative pain measured 24 hours after the surgery by means of the Visual Analog Scale (VAS) was statistically significant between the two groups. The patients in the ERAS group had a very low score in terms of pain levels as opposed to those handled by conventional care. The 24-hour VAS score was greater in the ERAS group (3.2 ± 0.8) than in the conventional care group (5.1 ± 1.0), indicating the more effective postoperative pain management in the patients treated according to the ERAS regimen ($p < 0.001$) (Table 2).

Table 1: Baseline Demographic and Clinical Characteristics of Study Population (n = 90)

Variable	ERAS Group (n = 45)	Conventional Care Group (n = 45)	p-value
Mean age (years)	46.3 ± 11.2	47.8 ± 10.9	0.56
Gender (Male/Female)	26 / 19	24 / 21	0.65
ASA I-II, n (%)	34 (75.6%)	32 (71.1%)	0.63
ASA III, n (%)	11 (24.4%)	13 (28.9%)	
Type of abdominal surgery	Comparable	Comparable	>0.05

Table 2: Comparison of Postoperative Pain Scores and Early Mobilization

Outcome Variable	ERAS Group (n = 45)	Conventional Care Group (n = 45)	p-value
VAS pain score at 24 hours	3.2 ± 0.8	5.1 ± 1.0	<0.001
Time to first ambulation (hours)	15.1 ± 3.4	27.2 ± 4.8	<0.001

Table 3: Comparison of Length of Hospital Stay and Postoperative Complications

Outcome Variable	ERAS Group (n = 45)	Conventional Care Group (n = 45)	p-value
Length of hospital stay (days)	3.5 ± 1.0	6.0 ± 1.8	<0.001
Any postoperative complication, n (%)	6 (13.3%)	9 (20.0%)	0.40
Postoperative nausea/vomiting	3 (6.7%)	5 (11.1%)	
Wound-related complications	2 (4.4%)	3 (6.7%)	
Urinary retention	1 (2.2%)	1 (2.2%)	

In both groups, postoperative complications were found, but their overall rate was lower in the ERAS group; nevertheless, the difference was not statistically significant ($p = 0.40$). There were no significant complications, re-operations, or deaths in either group throughout the stay at the hospital. Notably, ERAS protocols implementation did

not lead to higher levels of postoperative morbidity, which means that the high-level recovery outcomes were obtained without the loss of patient safety.

On the whole, these findings indicate that ERAS interventions are much more effective in postoperative pain management, earlier mobilization, and shorter hospital stays

than traditional perioperative strategies, and show similar postoperative safety outcomes.

DISCUSSION

The current retrospective analysis has shown that the adoption of Enhanced Recovery After Surgery (ERAS) practices is linked with a markedly better postoperative experience, especially pain management, early ambulation, and hospitalization duration, over traditional perioperative care [11]. These results add to the increasingly accumulating literature on ERAS as an efficient, harmless, and patient-focused practice of perioperative management [12].

One of the most crucial factors that determines the recovery of a patient who has gone through surgery is the postoperative pain. In this study, patients who were operated on using ERAS guidelines had much lower scores of pains 24 hours after the operations. This progress can be explained by the systematic application of multimodal, opioid-sparing analgesia that is included in ERAS pathways [13]. By inhibiting several pain pathways and the overdependence on opioids, especially nausea, vomiting, sedation, and ileus (which are proven to prolong recovery), are among the adverse effects of opioids reduced by the ERAS protocols. Better pain management not only leads to better patient comfort but also allows active involvement in early mobilization and rehabilitation [14].

One of the main pillars of the ERAS is early mobilization, which was significantly enhanced in the ERAS group in the current study. ERAS-abiding patients ambulated way earlier compared to patients using traditional care [15]. The physiological advantages of early ambulation are established, and they can be listed as: less muscle wasting, better pulmonary system, less insulin resistance, and fewer thromboembolic complications. The mobilization effect in the previous study is largely due to the cumulative impact of more effective pain management, early tube and catheter withdrawal, and active promotion of movement, which are all components of ERAS guidelines [16].

A considerable amount of shortening in the length of stay among patients who were being handled under ERAS protocols was noticed. Reduced hospital stay is a common observation in all ERAS publications, and it has clinical and economic significance, especially in health care systems with limited resources [17]. Reduced length of stay saves health care funds, improves bed turnover as well, and minimizes the risk of health care-acquired infections without compromising patient safety. The shorter length of stay in the ERAS in the given study was not followed by the subsequent rise in the number of postoperative complications, which proves the safety and effectiveness of the ERAS implementation [18].

Remarkably, the general problems of postoperative complications did not differ significantly between the ERAS and the conventional care group. This finding will address an existing concern that the accelerated recovery

systems can result in more dangerous operations. This is not the case since findings suggest that ERAS protocols have a better recovery outcome and have a similar safety profile. Absence of increment of morbidity has the capacity to legitimize the application of ERAS into the routine clinical practice [17,19].

The study has limitations, despite the above being its strengths. The retrospective type of design suffers from selection bias and the quality of medical records. The sample size was sufficient to detect the differences in primary outcomes, but it was rather small, and it was restricted to one center, which can be a limitation to generalization [15,18]. Also, there were no long-term outcomes like readmissions, and the quality of life reported by patients. It is suggested that future prospective and multicentre studies with bigger samples should be conducted to prove these results and investigate the long-term advantages of ERAS protocols [19,20].

CONCLUSION

This study indicates that Enhanced Recovery After Surgery (ERAS) regimens are effective in controlling postoperative pain, promoting early mobilization, and shortening the length of stay in elective abdominal surgery patients, with no adverse effects associated with postoperative complications. ERAS is a safe, effective, and evidence-based system of perioperative care optimization and acceleration of the postoperative recovery. ERAS pathways are to be expanded to enhance surgical outcomes, patient satisfaction, and healthcare resources efficiency, especially in environments where efficient recovery and decreased hospital load are of paramount importance.

Conflict of Interest: The authors declare that they have no conflicts of interest.

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Data Availability Statement: The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request, subject to ethical and institutional guidelines.

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