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Investigating the Impact of ERAS Protocols on Postoperative Outcome in Patients Undergoing Colorectal Surgery

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ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) protocols have been increasingly adopted in colorectal surgery to improve postoperative outcomes.

Objective: This study investigates the impact of ERAS protocols on postoperative outcomes in patients undergoing colorectal surgery

Methods: This is a cross-sectional study conducted on 60 consecutive patients undergoing colorectal surgery at Jinnah hospital from January 2024 to August 2024. The participants were divided into two groups with 30 participants each. Group I was treated as per ERAS protocol while Group II was given traditional care. Demographic data, mean operative time, Length of hospital stay, post-operative pain and post-operative complication was noted in both groups. Data was assessed on SPSS version 24.

Results: The mean operative time was notably shorter in Group I at 55.4 minutes compared to 64.7 minutes in Group II, (p-value=0.006). Post-operative pain, assessed via the Visual Analogue Scale, showed lower scores in Group I on all measured days: Day 1 (3.71 ± 0.97 vs. 4.69 ± 0.93 , $p = 0.033$), Day 2 (2.32 ± 0.85 vs. 3.13 ± 0.95 , $p = 0.03$), and Day 3 (1.49 ± 0.79 vs. 1.98 ± 0.98 , $p = 0.04$) (Table 2). Additionally, Group I experienced a quicker return to oral intake (1.3 ± 0.4 days vs. 1.9 ± 0.7 days, $p = 0.005$) and mobilization (2.1 ± 0.9 days vs. 3.6 ± 1.1 days, $p = 0.04$).

Conclusion: This study highlights the significant advantages of implementing ERAS protocols in colorectal surgery, demonstrating improved postoperative outcomes, compared to traditional care.

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) protocols have emerged as a transformative approach to perioperative care, particularly in colorectal surgery, where postoperative complications can significantly affect recovery. By integrating evidence-based practices aimed at optimizing surgical outcomes, ERAS focuses

on a holistic view of patient care, addressing physical, psychological, and environmental factors¹. These protocols encompass various components, including preoperative education, optimized nutrition, fluid management, minimally invasive techniques, multimodal analgesia, and early mobilization. Studies



have shown that ERAS protocols consistently reduce the length of hospital stay across various types of surgeries, including gastrectomy, colorectal surgery, prostatectomy, and bariatric surgery^{2,3}.

Colorectal surgery is associated with numerous postoperative challenges, such as infection, anastomotic leaks, pain management issues, and delays in functional recovery. Traditional recovery pathways often lead to prolonged hospital stays and increased morbidity due to complications⁴. In contrast, ERAS protocol has been found to reduce length of postoperative hospital stay (PHS) by 2.00 days, Time to first flatus by 12.18 hours and time to first defecation by 32.93 hours on average as compared to traditional post operative care (95 confidence interval [CI] -2.52 to -1.48, $p=0.00$)⁵.

Moreover, ERAS protocols in elderly patients undergoing colorectal surgery led to lower post-operative morbidity and shorter hospital stay compared to conventional care⁶. Higher adherence to the ERAS protocol is also associated with early detection of post operative complications and improved long-term survival after laparoscopic colorectal surgeries^{7,8}. Despite multiple benefits, the implementation of ERAS protocols in colorectal surgery faces several challenges. One significant issue is variability in adherence to the guidelines, which lead to inconsistent outcomes among different institutions and surgical teams. Additionally, patient selection presents challenges; certain populations, such as those with multiple comorbidities, may require modified protocols to optimize their recovery⁹. Institutional barriers such as resistance to change, resource constraints, and varying levels of administrative support can hinder the successful adoption of ERAS protocols, making it crucial for healthcare organizations to foster a culture that prioritizes enhanced recovery strategies.

When investigating the impact of Enhanced Recovery After Surgery (ERAS) protocols on postoperative outcomes in patients undergoing colorectal surgery, several gaps in the literature have been identified. There is a lack of research examining long-term outcomes, such as quality of life, functional recovery, and long-term complications¹⁰. While ERAS protocols include multiple elements (e.g., preoperative education, multimodal analgesia, early mobilization), research exploring the specific contributions of each element to overall outcomes is limited. There is a need for more research focusing on patient-reported outcomes especially in local context.

The objective of the study is to evaluate the impact of Enhanced Recovery After Surgery (ERAS) protocols on postoperative outcomes in patients undergoing colorectal surgery. This includes assessing factors such as postoperative pain management, length of hospital stays, rates of complications, recovery times, and overall

patient satisfaction. The study aims to determine whether the implementation of ERAS protocols leads to improved clinical outcomes compared to traditional postoperative care practices.

METHODOLOGY

This is a cross-sectional study conducted on 60 consecutive patients undergoing colorectal surgery at Jinnah hospital from January 2024 to August 2024 after taking approval from the ethical committee. Patients of age 18 years or older undergoing elective colorectal surgery and classified as ASA (American Society of Anesthesiologists) physical status I-III with no prior colorectal surgery were included in this study. On the other hand, patients with bowel perforation, significant comorbidities that could affect recovery (e.g., severe cardiovascular or respiratory conditions), ongoing inflammatory bowel disease, pregnant or breastfeeding were excluded from this study. Written informed consent was taken. All procedures were performed by the same colorectal surgeon and surgical team, ensuring consistency in technical aspects, such as the choice of surgical instruments and antibiotics. The participants were divided into two groups with 30 participants each. Group I was treated as per ERAS protocol while Group II was given traditional care. Key elements of the ERAS protocols included Intensive preoperative counseling by surgeons and anesthesiologists, Careful management to avoid sodium/fluid overload, Early introduction of oral nutrition and shortening postoperative fasting. In addition to use of warm-air body heating during surgery, early postoperative mobilization, use of oral magnesium oxide to promote gut function, early removal of urinary catheters, thoracic epidural anesthesia and avoidance of pre-anesthetic medication were employed on Group I. Discharge criteria included the ability to tolerate food and manage pain effectively. Demographic data such as age, gender, body mass index and ASA classification was collected. Mean operative time, Length of hospital stay, post operative pain through visual analogue scale, time to first oral intake and time to mobilization was noted in both groups. All the patients were followed 30 days post-surgery for any post operative complication (e.g., infections, anastomotic leaks. Data was assessed by using SPSS version 24. The chi square test was used to show the significance of association. p -values ≤ 0.05 will be considered statistically significant.

RESULTS

The average age of participants in Group I was 39.2 years $\pm$ 5.4 years. Gender distribution showed that 56.67% of Group I were male and 43.33% female, while in Group II, males comprised 63.33% and females 36.67%. The average Body Mass Index (BMI) in Group I was 24.77 kg/m² $\pm$ 3.05 kg/m², compared to 23.67

kg/m² ± 2.85 kg/m² in Group II. Regarding the American Society of Anesthesiologists (ASA) classification, Group I included 46.67% of participants in Class I, 30% in Class II, and 23.33% in Class III. In contrast, Group II had 36.67% in Class I, 43.33% in Class II, and 20% in Class III (Table 1).

The mean operative time was notably shorter in Group I at 55.4 minutes compared to 64.7 minutes in Group II, with a p-value of 0.006 indicating statistical significance. Post-operative pain, assessed via the Visual Analogue Scale, showed lower scores in Group I on all measured days: Day 1 (3.71 ± 0.97 vs. 4.69 ± 0.93, p = 0.033), Day 2 (2.32 ± 0.85 vs. 3.13 ± 0.95, p = 0.03), and Day 3 (1.49 ± 0.79 vs. 1.98 ± 0.98, p = 0.04) (Table 2). Additionally, Group I experienced a quicker return to oral intake (1.3 ± 0.4 days vs. 1.9 ± 0.7 days, p = 0.005) and mobilization (2.1 ± 0.9 days vs. 3.6 ± 1.1 days, p = 0.04). Finally, the average length of hospital stay was significantly shorter for Group I at 4.3 days compared to 6.2 days for Group II, with a p-value of 0.001 (Figure 1).

The study evaluated postoperative complications between two groups, Group I and Group II, following colorectal surgery. In terms of anastomotic leakage, Group I had a rate of 16.67% (5 patients), while Group II experienced a significantly higher rate of 30% (9 patients) (p = 0.008). Postoperative ileus occurred in 6.67% (2 patients) in both groups (p = 0.04). Pneumonia was observed in 3.33% (1 patient) in Group I, compared to 13.33% (4 patients) in Group II, demonstrating a significant difference (p = 0.01). Other complications were present in 3.33% (1 patient) in Group I, while none were reported in Group II (p = 0.01). Additionally, Group II had a significantly higher rate of readmission within 30 days after surgery (3.33%, 1 patient) compared to no readmissions in Group I (p = 0.01). Re-operation within 30 days occurred in 3.33% (1 patient) in Group I, while there were no re-operations in Group II (p = 0.01). Lastly, mortality was absent in Group I, whereas it occurred in 3.33% (1 patient) in Group II (p = 0.01) (Table 2).

Table 1
Demographic characteristics of the study population of group I and Group II

Variable	Group I (ERAS protocol) (n=30)	Group II (Traditional care) (n=30)
Age (year)	39.2 ± 5.4	41.5 ± 3.9
Gender		
Male	17 (56.67%)	19 (63.33%)
Female	13 (43.33%)	11 (36.67%)
BMI (kg/m ²)	24.77 ± 3.05 kg/m ²	23.67 ± 2.85

ASA Class I	14 (46.67%)	11 (36.67%)
Class II	9 (30%)	13 (43.33%)
Class III	7 (23.33%)	6 (20%)

Table 2
Assessment of pain management in group I and group II through visual analogue scale

Variable	Group I	Group II	P value
Pain assessment through Visual analogue scale score (mean ± standard deviation)			
Day 1 post operative	3.71 ± 0.97	4.69 ± 0.93	0.033
Day 2 post operative	2.32 ± 0.85	3.13 ± 0.95	0.03
Days 3 post operative	1.49 ± 0.79	1.98 ± 0.98	0.04

Figure 1
Assessment of Mean operative time, time of first oral intake, time to first mobilization and average length of hospital stay in Group I and Group II

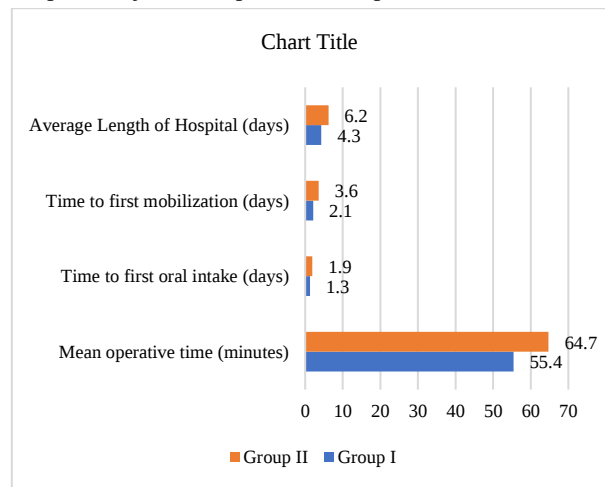


Table 3
Post operative outcomes

	Group I	Group II	P value
Post operative complications n (%)	5 (16.67)	9 (30)	0.008
Anastomotic leakage	2 (6.67)	2 (6.67)	0.04
Ileus	1 (3.33)	4 (13.33)	0.01
Pneumonia	1 (3.33)	0	0.01
other	1 (3.33)	3 (10)	0.01
Re-admission in 30	0	1 (3.33)	0.01

days after surgery			
Re-operation in 30 days	1 (3.33)	0	0.01
Mortality	0	1 (3.33)	0.01

DISCUSSION

The analysis of baseline characteristics reveals some notable distinctions between the two groups. Group I, following the ERAS protocol, had a slightly younger cohort and a marginally higher BMI compared to Group II, although these differences are unlikely to be clinically significant. The gender distribution was similar, indicating no gender-related bias in either group. A closer look at the ASA classification shows that Group I had a higher percentage of healthier patients (ASA Class I), while Group II had more patients in ASA Class II, reflecting a slightly higher level of preoperative risk in the traditional care group¹¹. These factors may impact the outcomes, particularly in terms of postoperative recovery and complication rates. Despite these minor differences, the groups were generally well-matched, providing a solid basis for comparing the impact of ERAS protocols versus traditional care. This baseline comparability strengthens the reliability of outcome differences observed in the study. The data reveals significant differences in key clinical outcomes between the two groups. Group I, managed with the ERAS protocol, demonstrated a shorter mean operative time, reflecting potentially more efficient procedures ($p = 0.006$) as found by J. Crippa et al in a randomized control trial¹². Pain management, as measured by the Visual Analogue Scale (VAS), showed better outcomes in Group I across the first three postoperative days, indicating enhanced early pain control under ERAS ($p < 0.05$ for all comparisons). These findings correlates with the result of randomized control trial conducted by S. L. van der Storm et al. in 2023¹³.

Additionally, patients in Group I experienced earlier initiation of oral intake and mobilization compared to Group II. This suggests that ERAS protocols facilitated a quicker return to normal physiological function, potentially reducing the risk of complications such as ileus. The overall hospital stay was significantly shorter for Group I (4.3 days vs. 6.2 days, $p = 0.001$), underscoring the effectiveness of ERAS in expediting recovery and reducing healthcare resource utilization. Anneloek Rauwerdink et al. has also deduced similar findings and suggested that ERAS protocol can result in increased health-related quality of

life, physical activity, and patient satisfaction¹⁴. These findings highlight the benefits of ERAS protocols in enhancing postoperative recovery, minimizing pain, and shortening hospitalization, supporting their adoption in *colorectal surgery*. The *postoperative complication rates* show notable differences between the two groups. Group I, which followed the ERAS protocol, had lower rates of anastomotic leakage (16.67% vs. 30%, $p = 0.008$) and pneumonia (3.33% vs. 13.33%, $p = 0.01$), suggesting improved outcomes with ERAS in preventing serious complications as suggested in the metaanalysis conducted by J. Tan et al¹⁵. These findings further emphasize the potential of ERAS protocols to reduce major postoperative complications and improve overall recovery trajectories.

This study demonstrates the significant benefits of implementing ERAS (Enhanced Recovery After Surgery) protocols in colorectal surgery, such as reducing postoperative complications, shortening hospital stays, and improving recovery times. These findings can be used to guide healthcare providers in adopting ERAS protocols for elective colorectal surgeries to enhance patient outcomes. The results also provide valuable insights into specific factors like pain management and early mobilization, which can be integrated into broader perioperative care plans¹⁶. Despite its valuable contributions, the study has limitations. The sample size is relatively small, which may limit the generalizability of the findings. Additionally, the study was conducted in a single center, which may introduce bias related to institutional practices or surgeon experience. The follow-up period, particularly for assessing long-term outcomes, is limited, and further studies with extended follow-up are needed to evaluate the sustainability of the benefits seen with ERAS.

CONCLUSION

This study highlights the significant advantages of implementing ERAS protocols in colorectal surgery, demonstrating improved postoperative outcomes, including reduced complication rates, quicker recovery milestones, and shorter hospital stays compared to traditional care. Despite some limitations, the findings strongly support the integration of ERAS protocols as a standard approach to enhance recovery and patient outcomes in colorectal surgery. Further research with larger and more diverse populations is recommended to validate these benefits and explore long-term effects.

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