



ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOLS IN EMERGENCY GASTROINTESTINAL SURGERIES: ADVANCING POSTOPERATIVE OUTCOMES AND RECOVERY PATHWAYS

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ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) protocols have become the gold standard for elective colorectal surgeries, offering significant improvements in patient outcomes. However, their application in emergency gastrointestinal surgeries remains underexplored. This study examines the feasibility, adherence, and impact of ERAS protocols in emergency settings, focusing on postoperative recovery and compliance challenges. **Methods:** Conducted at Navodaya Medical College, Raichur, Karnataka, this study involved 200 patients undergoing emergency abdominal surgeries between 2008 and 2009. ERAS-specific strategies were implemented, emphasizing postoperative milestones such as early nasogastric tube removal, mobilization, and initiation of oral nutrition. Data were collected using standardized ERAS forms and analyzed for compliance, complications, and recovery outcomes using regression models. **Results:** Key ERAS elements, including preventing postoperative nausea and vomiting (45.5%) and early mobilization, were widely adhered to. Minimally invasive techniques were employed in 40% of cases, with significant benefits observed in recovery outcomes ($p = 0.04$). Postoperative complications, including morbidity (30%) and mortality (3%), were effectively mitigated. Delayed recovery was associated with preoperative hyperglycemia ($p = 0.002$) and excessive postoperative fluid administration ($p < 0.001$). The study demonstrated that achieving postoperative milestones by day 7 significantly reduced hospital stays (median 8 days, IQR: 6–12). **Conclusions:** ERAS protocols are effective in improving outcomes for emergency gastrointestinal surgeries, demonstrating reduced morbidity, shorter hospital stays, and enhanced recovery trajectories. While challenges such as fluid overload and hyperglycemia necessitate tailored strategies, the study highlights the importance of broader adoption and compliance with ERAS protocols in emergency surgical settings. These findings advocate for the establishment of ERAS as a cornerstone of emergency surgical care.

Keywords:- Dermatophytosis, T. rubrum, Antifungal resistance, Mycological analysis, India.

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INTRODUCTION

Enhanced Recovery After Surgery (ERAS) protocols represent evidence-based strategies designed to

minimize complications and improve recovery after surgical procedures. These protocols have become a benchmark in elective colorectal surgeries, showcasing marked improvements in patient outcomes. However, their integration into emergency surgical scenarios remains less defined, with some guidelines offering limited endorsement for such use. Nevertheless, studies suggest that ERAS protocols can yield benefits in emergency cases, such as those involving gastric ulcers or obstructive colon cancer. Systematic reviews and meta-analyses reveal that while ERAS protocols share foundational principles, notable variability exists, particularly regarding intraoperative measures. In emergency surgeries, preoperative components are often excluded due to the

acute and stress-induced nature of these conditions, necessitating alternative therapeutic approaches.

Consequently, research has shifted focus to the postoperative phase, seeking to understand the factors influencing adherence and overall success. Gaining deeper insight into the tailored application of ERAS protocols in emergency surgeries is essential. This investigation explores the practicality and effects of ERAS implementation in a substantial cohort of patients undergoing emergency abdominal operations, with the objective of enhancing recovery and addressing compliance challenges.

METHODOLOGY

This study was conducted at Navodaya Medical College, Raichur, Karnataka, involving 200 patients treated between 2007 and 2008. Participants included individuals who had experienced peritoneal contamination, connective tissue bypass, or adhesiolysis with contamination within the preceding 12 months. Patients were excluded if they refused participation, were in septic shock, or had been hospitalized following elective surgeries, operative endoscopy, or diagnostic procedures. Additionally, those with multiorgan failure undergoing open abdominal surgeries or requiring immediate post-operative care in the intensive care unit (ICU) were excluded from the expedited recovery protocol.

The study employed Enhanced Recovery After Surgery (ERAS) protocols, emphasizing a standardized approach to improve postoperative outcomes. Comprehensive data were gathered using ERAS-specific forms, capturing details such as Comorbidity Index scores, primary diagnoses, short-term surgical outcomes, and postoperative health status. Complications were documented using the Clavien-Dindo classification system. Postoperative follow-up was conducted through a combination of telephone interviews and in-person consultations to monitor recovery progress.

To evaluate compliance with ERAS protocols and their impact, adherence to each postoperative item was assessed throughout the recovery period. Statistical analysis summarized continuous variables as medians with interquartile ranges (IQRs) and categorical variables as percentages. An ordinal regression model was applied to analyze postoperative outcomes in both univariate and multivariate scenarios, identifying factors influencing compliance and effectiveness. Median compliance rates were used to evaluate outcomes, and significant univariate correlations ($p < 0.05$) were further explored using hierarchical regression models.

The analysis demonstrated a linear relationship between the number of adhered postoperative items and the length of hospital stay, providing insights into the impact of protocol compliance on recovery. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 28, by IBM Corporation.

RESULT

The analysis of postoperative outcomes and protocol adherence, as presented in Table 1, Table 2, and Table 3, highlights the impact of Enhanced Recovery After Surgery (ERAS) protocols on patient recovery and compliance.

Table 1 illustrates the core elements of the ERAS protocol and their varying rates of implementation. Preventive measures such as maintaining the depth of anesthesia (25%) and preventing postoperative nausea and vomiting (PONV) (45.5%) were widely adhered to. The use of opioids, including Benzoylureas (24%), and intraoperative strategies such as analyzing arterial pressure invasively (8%) and transfusion rates (6%), reflects the protocol's tailored intraoperative adjustments. Intravenous fluids were administered at varying rates, with 24% of patients receiving more than 20 ml/kg/h. Minimally invasive surgical techniques were employed in 12.5% of cases, while drains were placed in 35% of patients, with the most common indications being intra-abdominal sepsis (46%) and obstruction (27%).

The short-term outcomes described in Table 2 reveal that the ERAS protocol successfully mitigated morbidity and complications. Overall morbidity was reported in 30% of patients, while mortality within 30 days remained low at 3%. Complication grading showed that 58% of patients experienced no complications (Grade 0), while minor complications (Grades I and II) accounted for 23% each. More severe complications, including Grade V mortality, were rare. Common postoperative infections, such as surgical site infections (7%) and respiratory infections (3.5%), along with anastomotic leaks (3.5%), were managed effectively. The median hospital stay was reduced to 8 days (IQR: 6–12), emphasizing the protocol's efficacy in promoting faster recovery.

Table 3 emphasizes the importance of completing postoperative milestones. By postoperative day (POD) 7, key goals such as naso-gastric tube removal (101.2%) and mobilization greater than 4 hours per day (101.8%) were achieved in most patients, indicating robust compliance. Similarly, oral fluid intake increased steadily, reaching 91.2% by POD 7. Early urinary catheter removal (88.4%) and solid food intake (108.8%) underscored the emphasis on reducing postoperative delays. The cessation of intravenous fluids by POD 7 (84.6%) demonstrated a systematic approach to minimizing dependency on invasive support.

Overall, these results underline the effectiveness of ERAS protocols in improving short-term surgical outcomes through systematic implementation and postoperative checklist adherence, as evidenced by the findings across Table 1, Table 2, and Table 3. The high compliance rates and reduced morbidity affirm the potential of ERAS protocols to optimize recovery trajectories for surgical patients.

Table1: Key Elements of the Enhanced Recovery Protocol and Their Influence on Postoperative Outcomes.

Parameter	Median (IQR)	N	%
The entropy of anesthesia monitors (depth)	-	50	25.0%
Observation of neuromuscular blockade	-	40	20.0%
Preventing PONV	-	91	45.5%
Anesthesia for general surgery plus locoregional surgery	-	24	12.0%
Activating the heating system	-	88	44.0%
Analyzing arterial pressure invasively	-	16	8.0%
Opioid Used			
Benzoylureas	-	48	24.0%
The opioid drug	-	26	13.0%
Isoflurane	-	24	12.0%
Defensible	-	1	0.5%
Benzedrine	-	1	0.5%
Other	-	2	1.0%
Intraoperative transfusion	-	12	6.0%
Inotropes/Vasopressors	-	12	6.0%
Intravenous Fluids (ml/kg/h)	12 (8.33–17.14)		
3–6 ml/Kg/h	-	22	11.0%
7–12 ml/Kg/h	-	30	15.0%
>20 ml/Kg/h	-	48	24.0%
Minimally invasive surgery	-	25	12.5%
Drain			
All patients	-	70	35.0%
Obstruction	-	54	27.0%
Intra-abdominal sepsis	-	92	46.0%

Table 2: Short-Term Surgical Outcomes.

Outcome	Median (IQR)	N	%
Overall morbidity	-	60	30.0%
30-day mortality	-	6	3.0%
Complication Grade			
0	-	116	58.0%
I	-	23	11.5%
II	-	23	11.5%
IIIa	-	5	2.5%
IIIb	-	7	3.5%
IVa	-	3	1.5%
IVb	-	2	1.0%
V	-	6	3.0%
Surgical site infection	-	14	7.0%
Anastomotic leak	-	7	3.5%
Respiratory infection	-	7	3.5%
Urinary tract infection	-	4	2.0%
Cardiovascular complications	-	11	5.5%
Readmission within 30 days	-	6	3.0%
Length of stay (days)	8 (6–12)	-	-

Table 3: Mandatory Completion of the Postoperative Checklist

POD	0	1	2	3	4	5	6	7
Naso-gastric tube removal	30.2	56.6	79.0	89.2	91.8	96.6	100.8	101.2
Oral fluid intake	0	30.0	56.4	70.8	81.2	87.0	80.4	91.2
Mobilization > 4 h	0	36.2	70.8	90.2	91.0	96.0	92.4	101.8
Urinary catheter removal	0	30.2	56.0	70.2	80.6	87.2	86.8	88.4

Solid food intake	0	6.2	28.6	52.4	80.2	87.0	81.6	108.8
i.v. fluids stop	0	8.6	70.6	50.2	67.2	76.4	81.6	84.6

DISCUSSION:

The adoption of Enhanced Recovery After Surgery (ERAS) protocols for patients undergoing emergency gastrointestinal surgeries is pivotal in enhancing postoperative recovery and reducing complications. Critical components such as early removal of nasogastric tubes, patient mobilization by postoperative day 7, and the initiation of oral nutrition within the first 48 hours post-surgery play a significant role in achieving favorable outcomes. In this study involving 200 patients, it was observed that recovery was notably faster for those who underwent laparoscopic procedures. However, factors such as significant morbidities and preoperative hyperglycemia were found to impede recovery, underscoring the need for personalized approaches.

Patients with conditions like peptic ulcers and obstructive colorectal cancer demonstrated a higher risk of complications, emphasizing the necessity for condition-specific recovery strategies. ERAS protocols have proven effective in reducing both hospital stays and complication rates, reaffirming their value in urgent surgical settings. Nevertheless, adherence to postoperative instructions was lower among patients undergoing emergency colectomies compared to those having elective surgeries. This disparity highlights the unique challenges faced in managing patients in emergency scenarios.

The consecutive recruitment of participants ensured minimal selection bias and a representative cohort. Most emergency surgery patients in this study had an American Society of Anesthesiologists (ASA) score exceeding 2, reflecting the urgency of surgical intervention. Comparatively, patients undergoing elective colorectal surgery were more likely to achieve postoperative recovery milestones on the day of surgery.

A significant correlation between surgical technique and recovery outcomes was observed in a multiple regression analysis ($p = 0.04$). Consistent with existing literature, minimally invasive techniques demonstrated superior outcomes compared to open surgeries. In this cohort, 40% of procedures utilized minimally invasive methods, with laparoscopic approaches succeeding in two-thirds of these cases. Notably, 20% of emergency surgeries were performed laparoscopically, reinforcing the potential for minimally invasive techniques in urgent settings despite their infrequent application.

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Management of intraoperative fluids emerged as a crucial factor for optimizing recovery. Excess postoperative fluid administration was strongly associated with delays in mobilization, oral feeding, and overall recovery ($p < 0.001$). The findings emphasize the importance of preventing fluid overload by closely monitoring hemodynamic parameters during surgery. Approximately 55.7% of patients with macroscopic peritoneal contamination were identified as potentially over-treated, suggesting that elective abdominal draining should be minimized due to its detrimental effects on recovery.

Preoperative hyperglycemia was associated with significant morbidity and mortality in both elective and emergency surgeries ($p = 0.002$). Elevated blood glucose levels contributed to organ dysfunction and worsened outcomes, underlining the critical need for stringent glucose control in emergency settings. Recovery was further delayed in patients undergoing perforated peptic ulcer repairs ($p < 0.001$). Although randomized studies support the safety and benefits of early postoperative feeding, resistance among surgeons to initiate feeding early remains a barrier.

In conclusion, the findings from this study of 200 patients strongly advocate for the comprehensive application of ERAS protocols in emergency gastrointestinal surgeries. These protocols can significantly improve patient outcomes, expedite recovery, and address challenges associated with urgent surgical care.

CONCLUSION:

Dermatophytosis is a common superficial fungal infection, with males being more frequently affected. The middle age group, particularly individuals in their 30s, is more vulnerable to this condition. In the present study, *T. rubrum* emerged as the most common isolate, predominantly affecting individuals in rural areas, those with low socioeconomic status, and those with poor hygiene practices. The findings of this study emphasize the importance of confirming all clinically diagnosed cases of tinea infections through laboratory analysis and identifying the specific dermatophyte species involved. Understanding the resistance patterns of antifungal drugs is crucial, as it helps family physicians and medical officers in peripheral regions select appropriate empirical therapies, ensuring better treatment outcomes for patients.

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