Role Of Enhanced Recovery After Surgery (ERAS) In Hepatobiliary Surgery: Reducing Complications And Length Of Stay

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KEYWORDS

ERAS Protocols, Hepatobiliary Surgery, Pain Management, Postoperative Complications, Recovery, Hospital Stay, Intensive Care Unit

ABSTRACT:

Background: Hepatobiliary surgery is a complex and high-risk field, often requiring long and complicated recovery periods. Enhanced Recovery After Surgery (ERAS) protocols have been introduced to optimize recovery by addressing key factors such as pain management, early mobilization, and nutritional support. These protocols aim to reduce complications and promote quicker recovery, but their effectiveness in hepatobiliary surgery remains uncertain. ***Objective:*** This study aimed to evaluate the impact of ERAS protocols on postoperative outcomes in hepatobiliary surgery, particularly focusing on pain management, length of ICU and hospital stays, and complications. ***Method:*** A prospective cohort study was conducted on patients undergoing hepatopancreatobiliary (HPB) surgeries at North East Medical College Hospital, Sylhet, Bangladesh, from January 2024 to December 2024. Patients were divided into two groups: the ERAS group (n=50) and the control group (n=45). Both groups received similar preoperative care, with the ERAS group following a structured postoperative recovery plan. Data on demographic details, surgical procedures, postoperative complications, length of ICU and hospital stays, and pain scores were collected and analyzed using SPSS software. ***Results:*** There were no significant differences in ICU stay (1.7 ± 2.2 days vs. 1.5 ± 0.8 days, p=0.735) or hospital stay (6.19 ± 6 days vs. 6.44 ± 5.2 days, p=0.645) between the ERAS and control groups. However, the ERAS group demonstrated significantly lower pain scores (3.4 ± 0.77 vs. 4.47 ± 0.88, p<0.001). The ERAS group also had a higher percentage of patients requiring blood transfusions (12.8% vs. 9.3%) and NG tube re-insertion (12.8% vs. 4.7%), though these differences were not statistically significant. Postoperative complications were slightly more common in the ERAS group (25.5% vs. 20.9%, p=0.628). ***Conclusion:*** The ERAS protocols significantly improved

pain management in hepatobiliary surgery, as evidenced by lower VAS scores in the ERAS group. While there were no significant differences in ICU stay, hospital stay, or complications, ERAS protocols appear to optimize recovery by reducing pain. Further studies are needed to evaluate the broader impact of ERAS on other postoperative complications and long-term recovery outcomes.

INTRODUCTION

Hepatobiliary surgery, involving the liver, pancreas, gallbladder, and bile ducts, is a complex field that carries significant risks and challenges. These surgeries are often required for patients suffering from liver diseases, gallstones, or malignancies in the hepatobiliary system. However, the recovery process following such procedures can be prolonged and complicated, affecting patient outcomes, healthcare resources, and overall quality of life. [1-3] In response to these challenges, Enhanced Recovery After Surgery (ERAS) protocols have been developed and increasingly applied to improve patient recovery and optimize outcomes after major surgeries.

The concept of ERAS was first introduced in the early 2000s and has since been adopted in various surgical disciplines, including hepatobiliary surgery. ERAS is a multimodal perioperative care pathway designed to improve recovery times and reduce complications by addressing key factors such as nutrition, pain management, early mobilization, and minimizing surgical stress. [4] By incorporating evidence-based strategies into the surgical process, ERAS aims to promote faster recovery, decrease complications, and reduce the length of hospital stays, ultimately leading to better patient outcomes and decreased healthcare costs.

One of the major goals of ERAS in hepatobiliary surgery is to enhance postoperative recovery. Traditional recovery protocols often lead to prolonged hospital stays due to complications such as infections, delayed wound healing, and gastrointestinal dysfunction. ERAS protocols focus on minimizing these risks by implementing preoperative nutritional optimization, intraoperative techniques that reduce surgical trauma, and postoperative measures to facilitate early mobilization and reduced opioid use. [5-6] This holistic approach to recovery not only aids in faster healing but also contributes to a reduction in hospital readmission rates, allowing patients to return to normal life sooner.

Reducing complications is another critical aspect of ERAS in hepatobiliary surgery. Complications such as infections, anastomotic leaks, and liver dysfunction can significantly impact patient recovery and prolong hospital stays. By optimizing fluid management, controlling pain effectively, and reducing the use of invasive procedures, ERAS protocols minimize the likelihood of these complications. Furthermore, the protocol emphasizes early detection and intervention for any signs of complications, ensuring that problems are addressed promptly before they become severe, leading to improved outcomes for patients undergoing complex surgeries.[7-8]

ERAS protocols have also shown promise in reducing the overall length of stay in hospitals, an important consideration in modern healthcare settings. In a world where resources are often limited, reducing hospital stays not only benefits the patients by decreasing the risk of hospital-acquired infections and promoting a quicker return to everyday life but also allows for the efficient use of healthcare resources. Shorter hospital stays translate to cost savings for healthcare systems and provide the opportunity to treat more patients, improving access to care.

Objective

To evaluate the impact of ERAS protocols on postoperative outcomes in hepatobiliary surgery, particularly focusing on pain management, length of ICU and hospital stays, and complications.

METHODOLOGY

This study was conducted on patients who underwent hepatopancreatobiliary (HPB) surgeries at North East Medical College Hospital, Sylhet, Bangladesh, from January 2024 to December 2024. The inclusion criteria were adult patients undergoing HPB surgeries for malignant or non-malignant

diseases, including liver, gallbladder, and pancreatic disorders. The exclusion criteria included patients who underwent simple laparoscopic cholecystectomy, those who were smokers or alcohol abusers, and patients with significant comorbidities that could interfere with recovery.

The study participants were divided into two groups: the ERAS group (n=50), who received ERAS protocols, and the control group (n=45), who received conventional postoperative care. Patients in the ERAS group had surgeries performed during which enhanced recovery protocols were implemented postoperatively. The control group, which included patients who followed standard postoperative care procedures. All patients provided informed written consent, and the study protocol was approved by the Ethics Committee.

Preoperative preparation was standardized across both groups. No mechanical bowel preparation was performed, and patients were allowed clear oral fluids up to 4 hours before surgery and solid foods up to 6 hours before the operation. Preoperative sedatives or anxiolytics were not administered. A single dose of prophylactic antibiotics (Ampicillin-Sulbactam, 3 g) was given intravenously to all patients 30 to 60 minutes before incision. Epidural pain control was provided to all patients. Surgeries were performed by a consistent team of surgeons with extensive experience in HPB procedures.

Postoperative management in both groups followed similar protocols. Enoxaparin (40 mg) was administered subcutaneously once daily for up to 4 weeks post-surgery to prevent deep vein thrombosis. Intravenous Ketorolac (30 mg) was administered initially, which was switched to oral nonsteroidal anti-inflammatory drugs once the patient was able to tolerate oral intake. Pain was managed based on visual analogue scale (VAS) scores, aiming for pain control with a score of 4 or lower. Additionally, Esomeprazole (40 mg 12 hourly) was administered to prevent gastric acid secretion. For patients experiencing postoperative nausea and vomiting, metoclopramide (10 mg every 8 hours intravenously) was given, and if symptoms persisted, ondansetron (4 mg) was administered.

In the ERAS group, specific postoperative interventions were implemented to promote faster recovery. The nasogastric tube was removed six hours after surgery, and a surgical diet was initiated. On postoperative day (POD) 1, patients were given tea, clear fluids, juices, and biscuits, with a normal diet introduced on POD 2. Nasogastric tubes, intra-abdominal drains, and Foley catheters were removed by POD 1. In contrast, diet initiation in the control group was based on the surgeon’s discretion, typically beginning between POD 3 and 5. Depending on the surgeon's assessment, nasogastric tubes in this group were removed between POD 1 and 5.

Both groups were encouraged to mobilize on POD 1, with the use of incentive spirometry and abdominal support belts. Oxygen therapy was initiated if oxygen saturation fell below 92%. Postoperative wound dressing changes were performed 48 hours after surgery, and all patients had their beds positioned at a 30-degree elevation to promote early mobilization and lung expansion.

Data were collected prospectively using a structured questionnaire that included demographic details, operative information, postoperative complications, length of hospital stay, intensive care unit (ICU) stay, blood transfusions, nasogastric tube reinsertion, and time to nasogastric tube removal. Pain scores were recorded at 6 hours post-surgery using the visual analogue scale (VAS). Data were analyzed using SPSS software (IBM SPSS Statistics, USA), with independent sample T-tests used for continuous variables and chi-square tests for categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The percentage of female patients in the ERAS group was 44%, and in the control group, it was 42%. The percentage of patients with diabetes was 20% in the ERAS group and 18% in the control group. The percentage of patients with hypertension was 24% in the ERAS group and 20% in the control group. The percentage of patients with coronary vascular diseases was 12% in the ERAS group and 11% in the control group.

Table 1: Demographic status of the study group

Parameter	ERAS Group	Control Group	p-value
Mean Age (years)	46.5 ± 13.2%	50.2 ± 13.4%	0.073
Female Patients	44%	42%	0.82
Patients with Diabetes	20%	18%	0.58
Patients with Hypertension	24%	20%	0.53
Patients with Coronary Vascular Diseases	12%	11%	0.82

The distribution of surgical procedures between the ERAS and control groups revealed some differences. The ERAS group had a significantly higher percentage of patients undergoing Roux-en-Y hepaticojejunostomy (21.3% vs. 4.7%, p=0.029) and retroperitoneal mass resection (4.3% vs. 0%, p=0.495). The ERAS group also had a higher proportion of patients undergoing right hepatectomy (14.9% vs. 7.0%, p=0.320) and left hepatectomy (10.6% vs. 7.0%, p=0.716). In contrast, the control group had a higher percentage of patients undergoing liver metastasectomy (23.3% vs. 12.8%, p=0.271) and partial hepatectomy (14.0% vs. 4.3%, p=0.145). Other procedures, such as the Whipple procedure, hydatid cyst resection, and cholecystectomy, showed similar proportions between the two groups. No patients in the ERAS group underwent hepatic cyst drainage, while 2.3% of patients in the control group did. Additionally, pancreatic debridement, total pancreatectomy, and choledochoduodenostomy were performed exclusively in the ERAS group. The p-values indicate that the differences observed in certain procedures are statistically significant, while others show no notable differences.

Table 2: Type of Surgical Procedure

Type of Surgical Procedure	ERAS Group (%)	Control Group (%)
Roux-en-Y hepaticojejunostomy	21.3%	4.7%
Right hepatectomy	14.9%	7.0%
Whipple procedure	12.8%	16.3%
Liver metastasectomy	12.8%	23.3%
Left hepatectomy	10.6%	7.0%
Hydatid cyst resection	6.4%	9.3%
Cholecystectomy	4.3%	7.0%
Partial hepatectomy	4.3%	14.0%
Choledochoduodenostomy	2.1%	0%
Distal pancreatectomy	2.1%	9.3%
Retroperitoneal mass resection	4.3%	0%
Pancreatic debridement	2.1%	0%
Total pancreatectomy	2.1%	0%
Hepatic cyst drainage	0%	2.3%

The postoperative data showed no significant difference in the duration of ICU stay (1.7 ± 2.2 days for the ERAS group vs. 1.5 ± 0.8 days for the control group, p=0.735) or the duration of hospital stay (6.19 ± 6 days for the ERAS group vs. 6.44 ± 5.2 days for the control group, p=0.645). However, the ERAS group had a higher percentage of patients requiring PRBC transfusion (12.8%) compared to the control group (9.3%), though this difference was not statistically significant (p=0.883). Additionally, the ERAS group had a higher percentage of patients with NG tube re-insertion (12.8%) compared to the control group (4.7%), but again, this difference was not significant (p=0.270). Postoperative complications were slightly more common in the ERAS group (25.5%) compared to the control group (20.9%), with no significant difference (p=0.628). Notably, the ERAS group experienced significantly lower pain severity, as indicated by a lower VAS score (3.4 ± 0.77) compared to the control group (4.47 ± 0.88, p<0.001).

Table 3: Percentages for postoperative data

Variable	ERAS Group (%)	Control Group (%)

Duration of ICU stay, days	1.7 ± 2.2	1.5 ± 0.8
Duration of hospital stay, days	6.19 ± 6	6.44 ± 5.2
PRBC transfusion, units	12.8%	9.3%
NG tube re-insertion	12.8%	4.7%
Postoperative complications	25.5%	20.9%
Pain severity, VAS score	3.4 ± 0.77	4.47 ± 0.88

DISCUSSION

In this study, we assessed the outcomes of Enhanced Recovery After Surgery (ERAS) in patients undergoing hepatobiliary (HPB) surgeries and compared these outcomes with a control group receiving conventional postoperative care. Our results indicated that the demographic characteristics between the two groups were similar, with no significant differences in age, gender, or preoperative comorbidities such as diabetes, hypertension, or coronary vascular disease. This finding aligns with other studies, where ERAS protocols are implemented across diverse patient populations without significant demographic differences affecting the outcomes. [10] Our study found no significant differences in the ICU stay (p=0.735) or the total hospital stay (p=0.645) between the two groups, which is consistent with some previous studies showing that ERAS protocols typically do not reduce the overall length of stay unless a significant shift in postoperative care practices occurs. [11]

Regarding the surgical procedures, we observed that the ERAS group had a significantly higher percentage of patients undergoing Roux-en-Y hepaticojejunostomy (21.3% vs. 4.7%, p=0.029), which may be attributed to specific surgical indications or the preference for a more tailored approach in complex cases. This is consistent with the flexibility of ERAS protocols to be applied to a wide variety of surgical procedures, even in complex cases. The differences in procedure distribution, such as a higher percentage of liver metastasectomy in the control group (23.3% vs. 12.8%, p=0.271), suggest that the ERAS group may have been utilized more in specific high-complexity procedures, as ERAS protocols are often preferred for more complicated surgeries due to the enhanced recovery benefits in such settings. [12]

Postoperative data revealed no significant differences in the overall ICU stay or hospital stay duration between the groups, suggesting that while ERAS protocols may optimize recovery in certain aspects, they do not drastically alter the need for prolonged hospital care. However, the ERAS group experienced significantly lower pain severity, with a VAS score of 3.4 ± 0.77 compared to 4.47 ± 0.88 in the control group (p<0.001). This aligns with multiple studies indicating that ERAS protocols contribute to better pain management outcomes, particularly through the use of multimodal analgesia and early mobilization strategies. [13] Interestingly, the ERAS group had a higher percentage of patients requiring **PRBC transfusion** (12.8% vs. 9.3%) and **NG tube re-insertion** (12.8% vs. 4.7%), though these differences were not statistically significant, indicating that while ERAS can reduce some complications, it may not universally impact all postoperative outcomes.

The higher rate of postoperative complications in the ERAS group (25.5% vs. 20.9%, p=0.628) suggests that while ERAS protocols aim to reduce morbidity through early mobilization and improved care, some patients may still experience complications due to the nature of the surgeries involved. This finding mirrors studies that report no significant decrease in postoperative complication rates, especially in high-risk or complex surgeries.[14] The application of ERAS protocols in these settings must be carefully tailored to individual patient risk profiles.

CONCLUSION

In conclusion, our study demonstrates that the implementation of Enhanced Recovery After Surgery (ERAS) protocols in hepatobiliary surgery leads to significantly improved pain management, as evidenced by a lower visual analog scale (VAS) score in the ERAS group. While there were no significant differences in ICU stay, hospital stay, or overall complications between the ERAS and control groups, the ERAS group showed promising results in terms of pain reduction and recovery optimization. Despite the higher rates of blood transfusion and NG tube re-insertion in the ERAS group,

these findings highlight the potential benefits of ERAS in improving recovery outcomes, particularly in pain management. These results suggest that ERAS protocols can be effectively integrated into hepatobiliary surgeries, although further research is needed to evaluate their impact on other postoperative complications and long-term recovery outcomes.

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