ORIGINAL RESEARCH PAPER

General Surgery

A COMPARATIVE ANALYSIS OF ERAS & TRADITIONAL APPROACHES IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY

KEY WORDS: ERAS, laparoscopic cholecystectomy, postoperative pain, hospital stay, recovery, cost-effectiveness.

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ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) protocols have transformed perioperative care, particularly in elective laparoscopic procedures. Traditional postoperative care involves prolonged fasting, delayed ambulation, and extended hospitalization. In contrast, ERAS emphasizes early nutrition, mobilization, and multimodal analgesia, aiming for faster recovery and reduced complications. **Aim:** This study aimed to compare ERAS protocols with traditional perioperative care in patients undergoing elective laparoscopic cholecystectomy, focusing on postoperative pain, length of hospital stays, and total hospitalization cost. **Materials And Methods:** This was a prospective observational study conducted over 12 months on 100 patients undergoing laparoscopic cholecystectomy at Al-Ameen Medical College and Hospital, Vijayapura. Patients were randomized into two groups: Group A (n=50) managed with ERAS protocols and Group B (n=50) with traditional care. Key parameters such as Visual Analog Scale (VAS) pain scores, duration of hospital stay, and cost were recorded. Statistical significance was assessed using t-tests and chi-square tests ($p<0.05$ considered significant). **Results:** The ERAS group showed a statistically significant reduction in mean postoperative pain scores, shorter hospital stays, and decreased total hospitalization cost compared to the traditional care group ($p<0.05$). No significant complications, readmissions, or need for re-surgery were observed in either group. **Conclusion:** Implementation of ERAS protocols in elective laparoscopic cholecystectomy leads to improved clinical outcomes, including reduced postoperative pain, shorter hospital stays, and cost-effectiveness, thereby enhancing patient satisfaction and recovery.

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is a multimodal perioperative care approach designed to improve surgical outcomes by minimizing the physiological stress of surgery. Originally developed for colorectal surgery, ERAS has now been adapted to various surgical disciplines, including laparoscopic cholecystectomy.[1]

Laparoscopic cholecystectomy, being minimally invasive, offers advantages such as less postoperative pain, reduced complications, and faster recovery when compared to open techniques. However, traditional care practices often involved prolonged fasting, use of bowel preparations, opioid-based analgesia, and delayed initiation of feeding and ambulation, which could prolong recovery.[2,3]

ERAS protocols counter these by implementing evidence-based practices such as limited fasting, preoperative carbohydrate loading, multimodal analgesia with opioid-sparing strategies, early mobilization, and early initiation of oral nutrition. These interventions have been shown to reduce surgical stress, maintain physiological function, and accelerate recovery.[4,5]

Avoidance of nasogastric tubes, selective use of drains, maintaining normothermia, and promoting early ambulation have also been associated with decreased postoperative ileus and complications such as pulmonary issues and infections.[6,7] Additionally, early oral feeding after surgery is associated with improved gastrointestinal function and reduced incidence of nausea, vomiting, and paralytic ileus.[8]

Studies have demonstrated that ERAS protocols lead to reduced hospital stays, lower healthcare costs, and improved patient satisfaction without increasing complication or readmission rates.[9–11]

Despite the growing evidence supporting ERAS, its implementation remains inconsistent across institutions. Hence, the present study aims to evaluate the comparative outcomes of ERAS protocols versus traditional perioperative care in patients undergoing elective laparoscopic cholecystectomy at a tertiary care center.

Aims And Objective

Aim:

To compare Enhanced Recovery After Surgery (ERAS) protocols with traditional perioperative care in patients undergoing elective laparoscopic cholecystectomy and evaluate their impact on postoperative pain, hospital stay, and treatment cost.

Objective:

To assess the effectiveness of ERAS protocols in terms of:

1. Postoperative recovery time
2. Hospitalization duration
3. Visual Analog Scale (VAS) pain scores
4. Overall cost of hospitalization compared to traditional care practices in laparoscopic cholecystectomy patients.

MATERIALS AND METHODS

Study Design:

Prospective, observational, comparative study.

Source Of Data:

All patients undergoing elective laparoscopic cholecystectomy at the Department of General Surgery, Al-Ameen Medical College and Hospital, Vijayapura, between November 2022 and October 2023 were considered for inclusion in the study as per the inclusion and exclusion criteria.

Inclusion Criteria:

1. Patients aged between 18 and 75 years.
2. Diagnosed with chronic cholecystitis, gallstones, or gallbladder polyps.
3. American Society of Anesthesiologists (ASA) physical status grade I or II.
4. Fit for elective laparoscopic cholecystectomy.
5. Provided informed written consent prior to participation.

Exclusion Criteria:

1. Age below 18 years or above 75 years.
2. History of previous abdominal surgery.
3. ASA grade III or higher.
4. Acute cholecystitis or choledocholithiasis.
5. Pregnancy or lactating females.
6. Severe comorbidities (uncontrolled diabetes, cardiovascular, hepatic, or renal disorders).
7. Patients unable to understand or comply with the study protocol.

Method Of Collection Of Data:

Patients undergoing laparoscopic cholecystectomy were randomized into two groups:

- Group A (ERAS group)
- Group B (Traditional care group)

Preoperative, intraoperative, and postoperative details were recorded, including:

- Demographics (age, gender)
- Surgical details (operative time, anesthesia type)
- Postoperative parameters (VAS score, time to oral intake, ambulation time, length of stay, cost, complications)

Method Of Test

Evaluation Parameters:

- Visual Analog Scale (VAS) for pain (immediate post-op, 6 hours, 24 hours)
- Time to oral intake and ambulation
- Total duration of hospital stay (days)
- Total cost of hospitalization (INR)
- Complication rate, re-admission, or re-surgery (if any)

Clinical examinations and investigations were performed as per protocol. Patients were followed for 7–30 days postoperatively.

Sample Size:

A total of 100 patients were included in the study, with 50 patients in each group. Sample size estimation was based on previous literature assessing differences in recovery outcomes using ERAS protocols, with a significance level of 5%, power of 80%, and precision of ±5%.

Statistical Analysis:

- Data entry and tabulation were performed using Microsoft Excel.
- Statistical analysis was carried out using SPSS Version 20.
- Descriptive statistics: Mean ± SD, median, interquartile range, frequencies, and percentages.

- **For paired data:**
- **Paired t-test** was used for normally distributed variables.
- **Wilcoxon signed-rank test** was used for non-normally distributed variables.

- **For between-group comparisons:**
- **Independent t-test** (for normal data)
- **Mann-Whitney U test** (for skewed data)
- **Chi-square test** was used for categorical variables.
- A **p-value < 0.05** was considered statistically significant.

RESULTS

Table 1: Basic Demographic Data

BASIC DATA	TOTAL GROUP (N=100)	TRADITIONAL GROUP (N=50)	ERAS GROUP (N=50)	p-value
Mean (SD) Age	50.0	49.8	50.2	0.001
Gender - Male	58	21	37	
Gender - Female	42	29	13	0.001
Mean (SD) BMI (kg/m²)	23.8	23.4	24.2	0.001
ASA Grade - ASA 1	—	4	6	
ASA Grade - ASA 2	—	21	19	

Diagnosis Distribution

DIAGNOSIS	TOTAL	TRADITIONAL GROUP	ERAS GROUP	p-value
Gallbladder stones with chronic cholecystitis	86	36	50	
Gallbladder polyps	4	4	0	
Gallstones	10	10	0	0.001

Biochemical Parameters

PARAMETER	TOTAL	TRADITIONAL GROUP	ERAS GROUP	p-value
Albumin (g/L)	3.65	3.4	3.9	0.001
AST (U/L)	32.7	32.0	33.4	0.001
ALT (U/L)	19.95	20.4	19.5	0.001
Total Bilirubin (µmol/L)	0.65	0.62	0.72	0.001

Table 2: Comparison Of Postoperative Parameters And Economic Indicators

Parameter	ERAS Group	Traditional Group	p-value
Mean (SD) Hospitalization Time (days)	2.4	3.7	0.001
Mean (SD) VAS Score (Day 1 post-surgery)	3.0	4.0	0.001
Mean (SD) Hospitalization Costs (INR)	₹1300	₹2900	0.001

Inference:

Patients managed under the ERAS protocol had significantly shorter hospital stays, lower pain scores, and markedly reduced costs compared to those under traditional care. The results were statistically significant across all measured variables ($p < 0.05$).

DISCUSSION

The implementation of Enhanced Recovery After Surgery (ERAS) protocols has demonstrated significant benefits in patients undergoing elective laparoscopic cholecystectomy.

Administration of **preoperative carbohydrate drinks** was a key intervention. Patients received 250 ml of a carbohydrate solution to alleviate hunger and anxiety, and to reduce postoperative insulin resistance. This approach is known to lower intraoperative fluid requirements and improve metabolic stability.

Intraoperative fluid restriction and the introduction of **oral fluids six hours postoperatively**, followed by a gradual return to a regular diet, supported gastrointestinal recovery. Early ambulation, encouraged within six hours post-surgery, further facilitated the recovery process by reducing complications related to immobility.

Studies have confirmed that **early oral feeding** reduces energy expenditure and is associated with fewer postoperative complications such as **nausea, vomiting, and paralytic ileus**. These findings align with the current study, where early oral intake correlated with improved outcomes in the ERAS group.

The incidence of **perioperative hypothermia**, which affects 50–90% of patients, was addressed through ERAS protocols. Older adults are more susceptible to heat loss, whereas obesity has shown to be somewhat protective. Maintaining normothermia was part of the ERAS strategy, contributing to reduced complications.

Avoidance of **nasogastric (NG) decompression** was another important factor. Patients in the ERAS group experienced an earlier return of bowel function. NG tube use is typically associated with increased rates of **fever, oropharyngeal, and pulmonary complications**, which were less prevalent in

the ERAS cohort.

In terms of pharmacological management, the **ERAS group avoided opioid analgesics** postoperatively. Instead, they received **intravenous 5-HT3 receptor antagonists** on the day following surgery to prevent **postoperative nausea and vomiting (PONV)**. This opioid-sparing approach contributed to improved patient comfort and reduced opioid-related adverse effects.

Overall, the ERAS pathway in this study led to **shorter hospital stays**, **lower VAS pain scores**, and **reduced hospitalization costs**, without increasing postoperative complications. These findings support the broader application of ERAS in laparoscopic surgeries.

CONCLUSION

The present study concludes that the implementation of Enhanced Recovery After Surgery (ERAS) protocols in elective laparoscopic cholecystectomy significantly improves patient outcomes when compared to traditional perioperative care.

Key findings indicate that ERAS protocols lead to:

- A **reduction in total hospitalization time**, allowing for earlier discharge.
- **Lower postoperative pain scores** as measured by the Visual Analog Scale (VAS).
- **Substantial reduction in hospitalization costs**, enhancing cost-effectiveness without compromising safety.

In addition, the ERAS approach promotes early oral intake, mobilization, and opioid-sparing analgesia, all of which contribute to faster recovery and greater patient satisfaction. The avoidance of nasogastric tubes and the use of preoperative carbohydrate loading further enhance physiological recovery and reduce postoperative complications.

These results support the integration of ERAS principles into routine surgical practice, particularly in minimally invasive procedures like laparoscopic cholecystectomy. Continued adoption of ERAS protocols may optimize resource utilization while maintaining high standards of patient care.

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Declarations

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Conflict Of Interest: None declared.

Ethical Approval: The study was approved by the Institutional Ethical Committee.

REFERENCES

1. Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A Review. JAMA Surg. 2017;152(3):292–8.
2. Fearon KC, Ljungqvist O, Von Meyenfeldt M, et al. Enhanced recovery after surgery: a consensus review. Clin Nutr. 2005;24(3):466–77.
3. Wilmore DW, Kehlet H. Management of patients in fast track surgery. BMJ. 2001;322(7284):473–6.
4. Miller TE, Thacker JK, White WD, et al. Reduced length of hospital stay in colorectal surgery after implementation of an enhanced recovery protocol. Anesth Analg. 2014;118(5):1052–61.
5. Thiele RH, Rea KM, Turrentine FE, et al. Standardization of care: impact of an enhanced recovery protocol on length of stay, complications, and direct costs after colorectal surgery. J Am Coll Surg. 2015;220(4):430–43.
6. Nelson G, Altman AD, Nick A, et al. Guidelines for pre- and intra-operative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Part I. Gynecol Oncol. 2016;140(2):313–22.
7. Varadhan KK, Neal KR, Dejong CH, Fearon KC, Ljungqvist O, Lobo DN. The enhanced recovery after surgery (ERAS) pathway for patients undergoing major elective open colorectal surgery: a meta-analysis of randomized controlled trials. Clin Nutr. 2010;29(4):434–40.
8. Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. BMJ. 2001;323(7316):773–6.
9. Maessen J, Dejong CH, Hausel J, et al. A protocol is not enough to implement an enhanced recovery programme for colorectal resection. Br J Surg. 2007;94(2):224–31.
10. Zhuang CL, Ye XZ, Zhang CJ, Dong QT, Chen BC, Yu Z. Enhanced recovery after surgery programs versus traditional care for colorectal surgery: a meta-analysis of randomized controlled trials. Dis Colon Rectum. 2013;56(5):667–78.
11. Joliat GR, Hübner M, Roulin D, et al. Cost-benefit analysis of the implementation of an enhanced recovery protocol for colorectal surgery. Br J Surg. 2015;102(3):291–8.