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Comparison of Postoperative Outcomes with and Without Enhanced Recovery after Surgery (ERAS) Protocols in Patients Undergoing Laparoscopic Cholecystectomy

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ABSTRACT

Background: The application of ERAS protocols has revolutionized perioperative care but their role in laparoscopic cholecystectomy (LC) remains underexplored in many settings. **Objective:** Comparing the postoperative results of patients having laparoscopic cholecystectomy with and without the use of ERAS protocols. **Study Design:** Randomized controlled trial. **Settings:** Department of Surgery, Allied Hospital, Faisalabad Pakistan. **Duration:** 01-12-2024 to 31-07-2025 (eight months). **Results:** 160 patients, 51 Male and 109 female patients participated. In Group A, only one patient was placed on a drain, while in Group B, 49 patients had a drain. Pain score mean in Group A was 2.4 after 04hrs,2.3 after 08 hrs,1.6 after 12 hrs,1.1 after 24 hrs. Pain score mean in Group B was 3.7 after four hrs., 3.1 after 08 hrs., 2.8 after 12 hrs., 2.2 after 24 hrs. Activity score mean in Group A was 1.6 after four hrs.,2.3 after 08 hrs,2.8 after 12 hrs,3.8 after 24 hrs. Activity score mean in Group B was 0.86 after four hrs., 0.86 after 08 hrs., 1.6 after 12 hrs., 2.3 after 24 hrs. Rescue analgesia mean is 0.17 (0.44) and 2.3 (SD = 0.62)in groups A and B, respectively. Mean postoperative hospital stay was 1.1 and 1.7 in groups A and B, respectively. Mean postoperative ileus was 2 and 1.9 in groups A and B, respectively. **Conclusion:** The application of ERAS protocols resulted in less postoperative pain, earlier mobility, and the ability to perform routine activities, a reduced need for rescue analgesia, and an earlier oral-free status, as well as earlier discharge from the hospital.

Keywords: *Cholecystectomy, Laparoscopic, ERAS protocols, Pain, Postoperative activity.*

INTRODUCTION

The laparoscopic cholecystectomy (LC), a minimally invasive procedure, is the most effective treatment for symptomatic gallstone disease. It offers benefits such as quick healing, reduced discomfort, and minimal bleeding. The 1990s saw the development of the improved recovery after surgery (ERAS) concept [1,2]. After being initially implemented in colorectal surgery, ERAS protocols are currently being used for a variety of operations. In order to lessen the physiological stress of surgery and encourage a speedy recovery, ERAS uses multimodal, evidence-based perioperative care techniques. Combining ERAS with minimally invasive laparoscopic surgery, where technically possible, has the potential to improve patient outcomes significantly and is rapidly gaining traction.

It has been published in a wide range of subspecialties, including thoracic, vascular, hepatobiliary, colorectal, urology, and gynecology, after its usefulness in several surgical disciplines was demonstrated in the literature. A multidisciplinary and multimodal approach to perioperative treatment is made possible by ERAS, which improves patient outcomes and speeds up recovery. The usefulness of ERAS protocols in laparoscopic

cholecystectomy remains questionable, despite thorough research in large-scale procedures.[1,2,3]

The term ERAS refers to a group of procedures used to maximize perioperative care in order to improve surgical results. Fundamentally, ERAS reduces surgical stress on the body resulting from either "Direct Injury" (tissue manipulation) or "Indirect Injury" (blood pressure dynamics, microvascular alterations). It also improves preoperative organ functionality. Preoperative counseling, nutrition maximization, standardized anesthesia, preemptive analgesia, prevention of postoperative nausea and vomiting, analgesic regimes, and early mobilization are the primary components of perioperative protocols, although there are many other types. High patient satisfaction and a reduction in hospital stays and problems have resulted from the successful application of these strategies. Pressure to shorten hospital stays while also enhancing the patient experience has arisen as healthcare expenses have increased. It has been shown that ERAS protocols improve overall patient satisfaction while lowering healthcare costs.[4,5]

The study objective is to examine the improvements in patient outcomes when ERAS protocols are used in routine surgery as opposed to conventional perioperative procedures. It has a compelling outcome and should be used frequently to enhance patient outcomes.

Objective: Comparing the postoperative results of patients having laparoscopic cholecystectomy with and without the use of ERAS protocols.

Operational Definitions

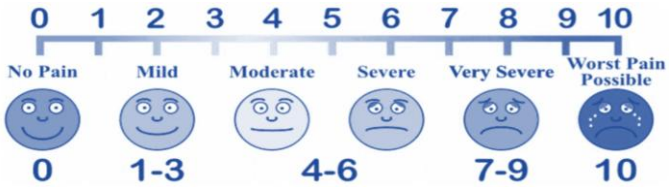
ERAS Protocols: Enhanced recovery after surgery protocols help optimize inpatient care and minimize discomfort.

Pre-emptive analgesia: Introducing an analgesic regimen before surgical incision.

Rescue Analgesia: The first time an analgesic agent is administered post-operatively to make the patient pain-free, on the request of the patient.

Primary outcome:

A. **Pain:** The Primary outcome will be the measurement of pain and demand for analgesia. It will be assessed by the Visual Analogue pain score.



Pain score after surgery VAS 4hours,8hours,12hours, 24hours.

B. Postoperative activity scale:

0	**Unable to turn, sit, or stand**
1	Turn yourself into bed
2	Sit comfortably
3	Can stand for 01 min /Shift to chair
4	Can walk comfortably

Activity score after surgery after 4hours,8hours,12hours, 24hours.

Secondary outcomes

A. **First oral intake after surgery:** will be calculated as first oral intake score as 1: <12 hrs.,2: 12-24, 3: >24
B. **Postoperative ileus /abdominal distension:** Score of 1: Yes,2: No
C. **Rescue analgesia:** It will be calculated as the number of rescue analgesia needed as score 0:0,1:1,2:2,3:>2
D. **Hospital Stay:** It will be labeled as the score of 1:<24 hrs. ,2:24-48 hrs,3:>48hrs.

Table 1: Modified ERAS protocol for laparoscopic cholecystectomy

Time	Components
Pre-operative	Patient counseling session by the operating team Preoperative carbohydrate loading -2 drinks 2 hours before surgery Prophylactic antibiotic treatment at the time of anesthesia induction. Prevention of nausea and vomiting after surgery using the Apfel scale Pre-emptive analgesia: Port-site infiltration with Bupivacaine 0.5%, 20 ml
Intraoperative	Diclofenac rectal suppository 100mg before the start of surgery Limited intravenous fluids (1L crystalloids) Laparoscopic surgery by a consultant Avoidance of routine drains
Immediate & Early Postoperative period	IV Painkiller (NSAIDs), Avoiding opioids Oral fluids six hours following surgery Active mobility 4-8 hours postoperatively
Postoperative Day 1 & Discharge	Start oral painkiller Advancement of full diet Discharge criteria: No surgical complications, no fever, pain managed with oral analgesics, independent walking, tolerating a full oral diet, passing flatus, Satisfactory support at home
Follow-up	Patients are given a contact number Telephone monitoring for 48 hrs. by Nursing staff Follow-up outpatient clinic visits within 07 days of discharge

METHODS

This randomized controlled trial was conducted at afiliated hospitals of Faisalabad Medical University, Faisalabad. Duration of the study was eight months from 01-12-2024 to 31-07-2025.

Sample size was calculated using the WHO sample size calculator based on detecting a 0.5-point difference in postoperative pain (VAS)[1] between groups with a standard deviation of 1.1, a confidence level of 95%, and power of 80%. The estimated sample size was 76 per group, increased to 80 to account for attrition (total 160). Non-probability consecutive sampling technique was used.

Symptomatic cholelithiasis between 15-50 yrs, elective laparoscopic cholecystectomy and ASA I–II status was included in the study.

Acute cholecystitis/Empyema of GB, conversion to open surgery, significant co-morbidities (cardiac, renal, hepatic) and patients refusing consent was excluded from the study.

Following ERC approval (vide letter number 48/ERC/FMU/2023-24/532 issued on 16-11-2024) and informed consent, patients who fit the inclusion criteria will be registered, ERAS protocols will be put into place during the pre-operative phase, and the patient will then be sent to the operating room. The patient will be randomly assigned to either group A or group B.Group A (ERAS group): Received care based on ERAS principles, and Group B (Traditional group): Received standard perioperative care. 05 minutes before the port site incisions, Group 1 patients will receive preemptive analgesia (local infiltration of 10ml of 0.25% bupivacaine) in addition to the general anesthetic. A 3/4 port laparoscopic cholecystectomy will be performed by a consultant only. After surgery, the patient will be sent to the recovery area for prompt postoperative treatment. Analgesic use, postoperative mobilization, PONV, hospital stay, and complaints of postoperative discomfort will all be used to assess the patient. At predetermined intervals, the Visual Analogue Scale (VAS) will be used to measure pain. The accurate medical records of every patient will be documented on a proforma.

SPSS version 25.0 will be used to analyze all of the data. We will assess and compare quantitative factors like the quantity of injectable analgesics needed, the VAS score, and the activity score. Stratification will be used to control for effect modifiers such as age, postoperative pain, analgesic use, and the timing of first mobilization. The chi-square test will be used after stratification. A P-value < 0.05 will be considered significant.

RESULTS

1. **Sex distribution**: In our study, male patients were 51 and female patients were 109.

Table 1: Sex distribution

	Group A	Group B	Total
Male	28	23	51
Female	52	57	109
Total	80	80	160

2. **Age distribution:** Age of 10 patients was 15-25 yrs ,126 were 26-40 yrs and 24 were of 41-50 yrs.

Table 2: Age distribution

	Group A	Group B	Total
15-25 years	4	6	10
26-40 years	66	60	126
41-50 years	10	14	24
Total	80	80	160

3. **Drain group:** In group A, only one patient was placed on a drain, while in group B, 49 patients had a drain.

Table 3: Drain group

	Group A	Group B	Total
Yes	1	49	50
No	79	31	110
Total	80	80	160

4. **Primary and Secondary outcomes of the study**

5. **Pain score:** Mean in Group A was 2.4 after four hours, 2.3 after eight hrs,1.6 after twelve hrs,1.1 after twenty-four hrs. In Group B mean was 3.7 after four hrs., 3.1 after eight hrs., 2.8 after twelve hrs., and 2.2 after twenty-four hrs.

6. **Activity score:** In Group A mean was 1.6 after four hrs.,2.3 after eight hrs,2.8 after twelve hrs., and 3.8 after twenty-four hrs. In Group B mean was 0.86 after four hrs., 0.86 after eight hrs., 1.6 after twelve hrs., and 2.3 after twenty-four hrs.

7. **Rescue analgesia is needed Postoperatively:** In group A mean is 0.17, while in Group B it means 2.3.

8. **Postoperative hospital stay:** In group A it meant 1.1(Sd-.15), while in group B it was 1.7(Sd-.46)

9. **Postoperative ileus:** Mean score was 2(sd-.00) in group A while it was 1.9(sd- .24) in group B.

Table 4: Group statistics

Parameters		Mean	Std. Deviation	Significance
Pain Score after 04 hours	Group-A	2.4	0.52	0.000
	Group-B	3.7	0.65	
Pain Score after 08 hours	Group-A	2.3	0.43	0.000
	Group-B	3.1	0.33	
Pain Score after 12 hours	Group-A	1.6	0.53	0.000
	Group-B	2.8	0.44	
Pain Score after 24 hours	Group-A	1.1	0.28	0.000
	Group-B	2.2	0.41	
Activity score after 04 hours	Group-A	1.6	0.51	0.000
	Group-B	.08	0.28	
Activity score after 08 hours	Group-A	2.3	0.49	0.000
	Group-B	.86	0.47	
Activity score after 12 hours	Group-A	2.8	0.47	0.000
	Group-B	1.6	0.48	
Activity score after 24 hours	Group-A	3.8	0.38	0.000
	Group-B	2.3	0.46	
Postoperative Oral Intake in hours	Group-A	1.1	0.11	0.000
	Group-B	2.3	0.47	
Rescue analgesia needed postoperatively	Group-A	.17	0.44	0.000
	Group-B	2.3	0.62	
Postoperative hospital Stay in hours	Group-A	1.1	0.15	0.000
	Group-B	1.7	0.46	
Postoperative ileus	Group-A	2.0	0.00	0.023
	Group-B	1.9	0.24	

DISCUSSION

This study demonstrated the advantage of applying ERAS principles in laparoscopic cholecystectomy. The reduction in postoperative pain, earlier feeding and ambulation, and shorter hospital stays align with findings from previous ERAS-related studies in colorectal and hepatobiliary surgery. The baseline characteristics, such as mean age and gender distribution, showed no significant differences between the two groups; however, drain placement was not routinely considered in group A. Postoperative outcomes were significantly different in both groups.

The mean Pain score in Group A was significantly better than that of Group B. It is explained by regular use of preemptive analgesia as a part of ERAS protocols. It desensitizes the nerve endings before their stimulation, leading to less release of local mediators, which cause pain postoperatively. This finding is in line with research by Rajareddy GV *et al*,[6] which focused on particular clinical outcomes, including pain control and shorter hospital stays for patients undergoing laparoscopic cholecystectomy.

The Mean Activity score in Group A was significantly better than in Group B. This effect is also explained by less postoperative pain, along with preoperative measures to keep the patient motivated. The optimization of postoperative care in compliance with these ERAS guidelines results in improved outcomes, decreased operational trauma and postoperative stress, less surgical pain, fewer complications, and a shorter hospital stay. According to Garmpis N. *et al*.[7] review, the goal of evidence-based standards called ERAS is to standardize postoperative medical care, improve patient outcomes and reduce healthcare costs.

The need for rescue analgesia was significantly lower in group A than in group B. It is explained by better care and use of the preemptive analgesia technique as part of the ERAS Protocol. Udayasankar M *et al*.[8] assessed a patient's recuperation after an elective laparoscopic cholecystectomy by contrasting it with the conventional perioperative procedure and ERAS guidelines. Both before and six hours after the treatment, they reported that the ERAS group felt less anxious. Additionally, a more positive overall perioperative experience decreased fatigue, thirst, and hunger. They concluded that the ERAS approach enhances overall perioperative comfort in patients undergoing laparoscopic cholecystectomy. The impact of ERAS on various surgical procedures was investigated by Kamel RK *et al*.[9], and they emphasized the significance of following ERAS protocols.

In group A, the, the mean postoperative hospital stay was less than in group B. It demonstrated the significant economic benefit of ERAS**.** According to El-Shakhs S *et al*.[10] the ERAS program has been demonstrated to be safe in terms of improving patient recovery as well as reducing postoperative hospital stay and morbidity. Akhtar MS *et al*.[11] highlighted the financial advantages of ERAS, showing decreases in hospital stays and expenses, which is consistent with current efficiency findings but offers a more comprehensive economic viewpoint.

Incidence of postoperative ileus was also significantly lower in group A than in group B. In a study comparing ERAS guidelines and standard perioperative care for laparoscopic gastrointestinal (GI) procedures, Ni X *et al*.[12] found that the ERAS group experienced a significantly shorter postoperative hospital stay and a lower incidence of postoperative complications. Duration to first flatus and time to pass stools were also considerably lower than those of the conventional group.

CONCLUSION

The postoperative recovery of individuals having laparoscopic cholecystectomy is greatly improved by

ERAS protocols. They reduce pain, nausea, hospital stay, and time to return to normal activity without increasing complications. Integration of ERAS pathways should be encouraged. Surgeons must play a leadership role, with anesthesiologists, nurses, and nutritionists aligning their practices with ERAS recommendations

LIMITATIONS

The study is limited by its small sample size and single center**.**

SUGGESTIONS / RECOMMENDATIONS

It is recommended to conduct larger-scale multicenter studies to confirm and validate these findings.

CONFLICT OF INTEREST / DISCLOSURE

None.

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REFERENCES

1. Iqbal MS, Rashid S, Choudry ZA, Khan IA, Randhawa SR, Rahman MH. Comparison of post-operative outcome with and without application of ERAS protocols in patients of acute appendicitis. Annals Punjab Med Coll (APMC). 2024;18(3):179–84. doi:10.29054/apmc/2024.1555
2. Kumar BP, Kumar SV, Sendhil Sudarsan S, Ganesh Babu CP. Comparison of enhanced recovery after surgery (ERAS) protocol versus conventional approach for laparoscopic cholecystectomy: An interventional study. J Clin Diagn Res. 2024.
3. Geng Y, Guo H. Enhanced recovery nursing versus conventional care in laparoscopic cholecystectomy. Asian J Surg. 2025.
4. Paduraru M, Ponchietti L, Casas IM. ERAS protocols in laparoscopic surgery: Review of literature. Surg Res Pract. 2020;2020:5892105.
5. Zhang N, Wu G, Zhou Y, Liao Z, Guo J, Liu Y, et al. Use of enhanced recovery after surgery (ERAS) in laparoscopic cholecystectomy combined with laparoscopic common bile duct exploration: A cohort study. Med Sci Monit. 2020;26:e924946.
6. Rajareddy GV, Shetty AB, Santhosh CS, Kumar P, Kumar S, Manangi M. A randomized controlled trial to assess the impact of ERAS (enhanced recovery after surgery) on laparoscopic cholecystectomy. Int J Surg Med. 2023;9(1):15.
7. Garmpis N, Dimitroulis D, Garmpi A, Diamantis E, Spartalis E, Schizas D, et al. Enhanced recovery after surgery: Is it time to change our strategy regarding laparoscopic colectomy? In Vivo. 2019;33(3):669–74.
8. Udayasankar M, Udupi S, Shenoy A. Comparison of perioperative patient comfort with enhanced recovery after surgery (ERAS) approach versus traditional approach for elective laparoscopic cholecystectomy. Indian J Anaesth. 2020;64(4):316–21.
9. Kamel RK, Abdelwahab MM, Abdalazem ES. Enhanced recovery after surgery programs versus traditional perioperative care in laparoscopic and open cholecystectomy. Benha J Appl Sci. 2021;6(3):83–91.
10. El-Shakhs S, El-Sisy A, Eskander A, Gaber A, Elshafey E. A study on enhanced recovery after abdominal surgery. Menoufia Med J. 2015;28(4):923.
11. Akhtar MS, Khan N, Qayyum A, Khan SZ. Cost difference of enhanced recovery after surgery pathway vs conventional care in elective laparoscopic cholecystectomy. J Ayub Med Coll Abbottabad. 2020;32(4):470–5. PMID: 33225646
12. Ni X, Jia D, Guo Y, Sun X, Suo J. The efficacy and safety of enhanced recovery after surgery (ERAS) program in laparoscopic digestive system surgery: A meta-analysis of randomized controlled trials. Int J Surg. 2019;69:108–15.