

Investigating the Impact of Enhanced Recovery after Surgery (ERAS) Protocols on the Quality of Life and Patient Satisfaction after Elective Abdominal Surgery: A Randomized Controlled Trial

Hossam Hosny Taha Salem, MSc;¹ Mohamed Ahmed Helmi, MD;² Mohammad Ahmad Abd-erRazik, MD;² Mohamed ElAzazy, MD²

¹Department of General Surgery, Ahmed Maher Teaching Hospital, Cairo, Egypt

²Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Introduction: Major abdominal surgeries often entail prolonged hospital stays due to outdated perioperative care protocols. Enhanced Recovery After Surgery (ERAS) programs, integrating multidisciplinary, and scientific-based measures, have been developed to address this issue by improving postoperative recovery.

Aim of work: This study aimed to evaluate the impact of ERAS protocols on postoperative pain, analgesic use, and quality of life following elective abdominal surgeries.

Patients and methods: A randomized controlled trial was conducted involving 100 patients undergoing elective abdominal surgery at Ain Shams University and Ahmed Maher Teaching Hospitals. Patients were randomly allocated into two groups: ERAS Group (n=50) and Traditional Group (n=50). The ERAS Group followed specific care procedures outlined in the ERAS protocols, while the Traditional Group adhered to conventional protocols based on surgeon preferences.

Results: There were no significant differences between groups in age, gender, BMI, comorbidities, operative time, or intraoperative blood loss. The ERAS Group showed significantly lower pain scores, using Visual Analog Scale, on the first postoperative day (mean 3.8 ± 1.1) compared to the Traditional Group (mean 5.5 ± 0.95 , $p < 0.0001$). The ERAS Group also required fewer analgesics postoperatively (90% vs. 30%, $p < 0.00001$). Hospital stays were significantly shorter for the ERAS Group (Mean 3.1 ± 1.14 days) compared to the Traditional Group (mean 4.2 ± 1.3 days, $p < 0.0001$). No significant differences were observed in postoperative quality of life between the two groups (mean scores: ERAS 83.9 ± 8.05 vs. Traditional 81.9 ± 8.07 , $p = 0.22$).

Conclusion: The ERAS protocols significantly improve postoperative outcomes, reducing pain and hospital stay durations without increasing complications, however no remarkable impact on postoperative quality of life was observed. Further multicenter studies with larger cohorts are needed to confirm these findings and optimize ERAS implementation.

Key words: Enhanced recovery after surgery, ERAS, quality of life, postoperative pain, elective abdominal surgeries.

Introduction

Major abdominal surgeries often result in extended hospital stays due to outdated care protocols that fail to incorporate advancements in perioperative management. Inadequate pain control, intestinal dysfunction, and limited mobility are among the factors contributing to delayed postoperative recovery.¹ To address these issues, enhanced recovery programs (ERAS) were developed. These evidence-based, multidisciplinary protocols are designed to improve recovery following major abdominal surgery by integrating a series of measures into a multimodal recovery program.²

Successful implementation of the ERAS protocol necessitates a collaborative team which includes Operating surgeons, an ERAS moderator (Often a Physician Associate or nurse), anesthesiologists, and other healthcare professionals involved in the care of surgical patients. The core principles

of ERAS encompass various crucial components, including thorough preoperative consolation, suspension of bowel preparation, refraining from sedative premedication, shortening the duration of preoperative fasting, intake of preoperative carbohydrates, individualized anesthesia techniques, and carefully regulated administration of intravenous fluids throughout the perioperative period, non-opioid pain control, selectively using drains and nasogastric tubes, initiating postoperative nutrition early, ensuring early removal of the urinary catheter, and promoting early mobilization.^{3,4}

The adoption of ERAS has shown significant cost reduction and improvements in clinical outcomes across diverse surgical areas. Nevertheless, there remain unexplored areas and challenges that require additional research and discussion for further advancements.⁵

This study evaluated the impact of Enhanced Recovery After Surgery (ERAS) protocols on

postoperative pain, analgesic use, and quality of life following elective abdominal surgeries.

Patients and methods

This randomized controlled trial was conducted in the General Surgery Department, Faculty of Medicine, Ain Shams University, and Ahmed Maher Teaching Hospital. A total of 100 patients were randomly allocated, using the closed envelop method, in a 1:1 ratio, within 2 groups: the ERAS Group (50 patients) and the Traditional Group (50 patients).

This study was approved by the Research Ethics Committee (REC), General Surgery Department, Ain-Shams University (IRB 00006379). Informed consent was acquired from all participants before participating in the study. Patients received comprehensive details regarding the study's objectives, processes, possible risks, and advantages. Participation was voluntary, and patients were guaranteed the freedom to withdraw from the study at any point without affecting their standard care.

All patients were subjected to the standard diagnostic steps and decision-making protocols appropriate for each diagnosis.

In the ERAS Group specific care procedures for the preoperative, intraoperative, and postoperative stages were taken:

- Preoperative Stage: Pre-admission education, early discharge planning, reduced fasting duration, and carbohydrate loading through drinks. Thromboembolism and antibiotic prophylaxis are recommended, while selective bowel preparation is not required.
- Intraoperative Stage: Active warming, prevention of postoperative ileus through epidural analgesia, and prevention of fluid overload. The use of nasogastric tubes and surgical drains is selective, as they may hinder mobilization.
- Postoperative Stage: Good hydration, early oral intake, adequate analgesia, nausea and vomiting prevention, nutritional support, prompt mobilization, and urinary catheter removal and peritoneal drains. Discharge criteria were clearly defined.

In contrast, traditional protocols prioritize the optimization of comorbidities, mechanical and chemical bowel preparation, and surgeon preference for antibiotic prophylaxis. Nasogastric tubes and surgical drains are used according to the surgeon's preference. Postoperative care includes hydration, oral intake, analgesia, and nutritional support based

on surgeon preference.

All patients were followed up for at least four weeks. The study evaluated several outcome measures, including hospital stay length, postoperative complications (such as wound infection, hemorrhage, sepsis, thrombosis, embolism, and anastomotic leakage), postoperative ileus, pain assessment using visual analog scales (VAS), early readmission rates, and quality of life, which was measured using a scale developed by Urbach.⁶

Results

The ages of patients ranged from 29 to 79 years old and the difference between the two groups was not statistically significant. Also, there were no statistical differences regarding gender, BMI, and comorbidities. **(Table 1)**. The diagnoses of the enrolled patients are represented in **(Table 2)**.

The mean operative time was nearly the same in both groups 78 ± 31 and 79 ± 30 minutes respectively. The average blood loss in the ERAS Group was 195 ± 136 ml, while in the Traditional Group, it was 196 ± 133 ml. Drains were used in all patients, but in the ERAS Group, 98% had a single drain while only 39% of the patients had a single drain and 22% had two drains, and this was significantly different, **(Table 3)**.

There is less reported pain and need for post-operative analgesic medication in the ERAS Group. Regarding the postoperative pain, there was a statistically significant difference between groups in pain scores on the first day post-operative, but no statistically significant difference was observed in the following three days' post-operative, **(Table 4)**. Also, there was a statistically significant difference between the two groups regarding the need for analgesic medication and the need for narcotics (Nalbuphine) in the postoperative period, **(Table 5)**.

Regarding the length of hospital stay, in the ERAS Group, hospital stay ranged from 2 to 5 days with a mean of 3.1 ± 1.14 , versus a range from 3 to 7 days with a mean of 4.2 ± 1.3 in the Traditional Group. This difference was a significant difference, **(Table 6)**. Less post-operative ileus and wound infections were reported in the ERAS Group, **(Fig. 1)**.

Regarding Post-Operative Quality of Life assessment for the enrolled patients, the difference between the two groups was not statistically significant. In the ERAS Group, the questionnaire score ranged from 71 to 93 with a mean \pm SD of 83.9 ± 8.05 ; while in the Traditional Group, the questionnaire score ranged from 68 to 94 with a mean \pm SD of 81.9 ± 8.07 . **(Table 7)**.

POSTOPERATIVE COMPLICATION

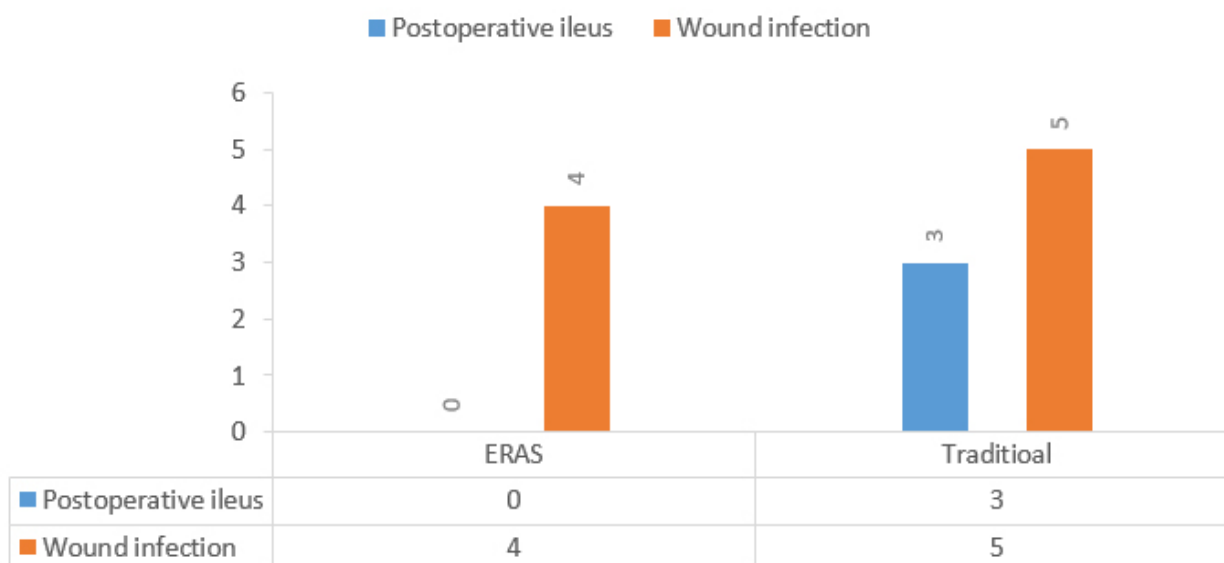


Fig 1: Comparison between studied groups regarding postoperative complication.

Table 1: Features of the study participants

Variables	ERAS Group N=50	Traditional group N=50	P
Gender n (%)			
Females	36(72.0%)	34(68.0%)	0.66
Males	14(28.0%)	16(32.0%)	
Age per years			
Mean \pm SD	47.16 \pm 13.84	46.56 \pm 13.9	0.829
Range	29-74	27-79	
BMI			
Mean \pm SD	25.77 \pm 2.87	25.79 \pm 2.9	0.978
Range	21-37	21-37	
Hypertension	14 (28.0%)	11 (22.0%)	0.49
DM	11 (22.0%)	13 (26.0%)	0.81
Anemia	2 (4.0%)	2 (4.0%)	1

SD: Standard Deviation, BMI: Body Mass Index.

Table 2: Diagnoses of studied groups

Diagnosis	ERAS Group N=50	Traditional group N=50	P
	N (%)	N (%)	
Chronic cholecystitis	20(40.0)	22(44.0)	0.69
Incisional hernia	15(30.0)	12(24.0)	0.42
Colon caner	7(14.0)	7(14.0)	1
PUH	3(6.0)	4(8.0)	0.99
Rectal adenocarcinoma	2(4.0)	4(8.0)	0.67
Renal mass	1(2.0)	1(2.0)	1
Jejunal caner	1(2.0)	0	0.99
Rectosigmoid mass	1(2.0)	0	0.99

PUH: Para Umbilical Hernia.

Table 3: Distribution of using drains, NGT, and urinary catheters of studied groups

Variables	ERAS Group N=50	Traditional group N=50	P
	N (%)	N (%)	
Number of drains			
One	49(98.0)	39(78.0)	.002*
Two	1(2.0)	11(22.0)	.002*
NGT	5(10.0)	11(22.0)	0.102
Urinary catheter	6(12.0)	10(20.0)	0.275

NGT: Nasogastric Tube. *: Significant Difference.

Table 4: Post-operative pain analog scale (VAS) of studied groups

Variables	ERAS Group N=50	Traditional group N=50	p
VAS on the first day			
Mean ±SD	3.8±1.1	5.5±0.95	0.0001*
Median(Range)	4(3-5)	6(4-7)	
VAS on the second day			
Mean ±SD	3.7±1	3.6±0.97	0.828
Median(Range)	4(2-5)	4(2-5)	
VAS on the third day			
Mean ±SD	2.6±0.94	2.7±0.93	0.886
Median(Range)	3(1-4)	3(1-4)	
VAS on the fourth day			
Mean ±SD	2.35±1.1	2.4±1.04	0.785
Median range	2(1-4)	2(1-4)	

VAS: Visual Analog Scales, *: Significant Difference.

Table 5: Comparison between studied groups regarding type of analgesic

Variables	ERAS Group N=50	Traditional group N=50	P
	N (%)	N (%)	
Patients need postoperative analgesic	45(90.0)	15(30.0)	<0.00001
Type of analgesic			
• Nalbuphine	41(82.0)	12(24.0)	<0.00001
• Epidural	4(8.0)	3(6.0)	0.99

*: Significant Difference.

Table 6: Hospital stay of studied groups

Variable	ERAS Group N=50	Traditional group N=50	P
Hospital stay (days)			
Mean ±SD	3.1 ±1.14	4.2±1.3	0.0001*
Median(Range)	3(2-5)	4(3-7)	

*: Significant Difference.

Table 7: Post-operative Quality of life for studied groups

Variable	ERAS Group N=50	Traditional group N=50	p
Quality of life			
Mean ±SD	83.9±8.05	81.9±8.07	0.22
Median(Range)	(71 -93)	(68-94)	

Discussion

The Enhanced Recovery After Surgery (ERAS) protocol is commonly reported to be safe, and without increasing intraoperative or postoperative complications compared to standard protocols.^{7,8} However, the implementation of ERAS protocols often encounters resistance due to the need for high-level coordination among healthcare teams. A dedicated resident and nurse to supervise the procedure is crucial. Resistance arises not only from the need for teamwork but also because many ERAS procedures significantly differ from current clinical practices.⁹ The key to successfully implementing such protocols lies in enhancing knowledge, which leads to better decision-making, and improving team performance through the development of non-technical skills.¹⁰

This randomized controlled trial evaluated the use of ERAS with elective abdominal surgeries. There was no statistically significant difference between the two groups regarding age, gender, co-morbid conditions, diagnoses, operative time, intraoperative blood loss, or postoperative complications.

The postoperative pain, as measured by the Visual Analog Scale (VAS), was significantly lower in the ERAS group on the first postoperative day. However, this difference disappears on the following days. This pattern was also reported in a Randomized Clinical Trials (RCT) conducted by Marie et al.¹¹ This reduction in early postoperative pain led to significantly lower demand for analgesics and Nalbuphine in the ERAS Group, consistent with the results of a cross-sectional study involving 1,452 patients undergoing various surgical procedures.¹²

The hospital stay was significantly shorter in the ERAS Group, with a mean of 3.1 ± 1.14 days compared to 4.2 ± 1.3 days in the Traditional Group. Both RCTs and meta-analyses assessing the use of ERAS programs have similarly reported shorter hospital stays for ERAS groups.¹³⁻¹⁵

This study also revealed no significant difference between the two groups regarding postoperative quality of life. Forsmo et al. conducted a study on adult patients eligible for colorectal resection with planned stomas and found no significant differences in postoperative quality of life between the ERAS and standard care groups.¹⁶ Additionally, a meta-analysis reviewing the existing literature on satisfaction and quality of life post-colorectal surgery found that patients treated under ERAS protocols did not experience a decline in quality of life.¹⁷ Other studies have also reported no decline in patient satisfaction with the use of ERAS,^{17,18} and some have noted greater satisfaction among patients enrolled in ERAS protocols.¹⁹

While this study demonstrates some significant benefits of ERAS protocols in improving postoperative

outcomes for elective abdominal surgeries, it is crucial to acknowledge the practical challenges associated with their implementation. These challenges include the need for comprehensive training of healthcare teams, allocation of resources to support protocol adherence, and overcoming potential resistance to change within clinical settings. Understanding and addressing these implementation barriers are essential steps toward optimizing the adoption of ERAS protocols across diverse surgical environments.

Limitations

Despite the promising results of ERAS protocols in enhancing postoperative recovery, this study has several limitations. The limited sample size and single-center design restrict the general applicability of our findings. Additionally, variability in the implementation of ERAS protocols among different surgical teams could influence the outcomes. Our study did not account for differences in surgeon experience and adherence to ERAS guidelines, which may affect patient outcomes. The short follow-up period also limited the assessment of long-term effects.

Conclusion

This randomized controlled trial demonstrates that the application of Enhanced Recovery After Surgery (ERAS) protocols for elective abdominal surgeries significantly improves postoperative outcomes, particularly in reducing postoperative pain on the first day, decreasing analgesic requirements, and shortening hospital stays, without increasing intraoperative or postoperative complications. The study revealed no significant differences in postoperative quality of life between the ERAS and traditional care groups, aligning with existing literature. Future multicenter studies with larger sample sizes and standardized ERAS implementation are essential to validate these findings and optimize patient care in surgical settings.

Conflict of interest: None

References

1. Ramírez JM, Blasco JA, Roig JV, Maeso-Martínez S, Casal JE, Esteban F, et al: Enhanced recovery in colorectal surgery: A multicentre study. *BMC Surg.* 2011; 11.
2. Wei IH, Pappou EP, Smith JJ, Widmar M, Nash GM, Weiser MR, et al: Monitoring an ongoing enhanced recovery after surgery (ERAS) Program: Adherence improves clinical outcomes in a comparison of three thousand colorectal cases. *Clin Surg.* 2020; 5.
3. Ljungqvist O, Scott M, Fearon KC: Enhanced recovery after surgery: A review. *JAMA Surg.* 2017; 152(3): 292-8.

4. Chong CCN, Chung WY, Cheung YS, Fung AKY, Fong AKW, Lok HT, et al: Enhanced recovery after surgery for liver resection. *Hong Kong Med J*. 2019; 25(2): 94–101.
5. Jain SN, Lamture Y, Krishna M: Enhanced recovery after surgery: Exploring the advances and strategies. *Cureus*. 2023; 15(10).
6. Urbach DR: Measuring quality of life after surgery. *Surg Innov*. 2005; 12(2): 161–5.
7. Shoeib MS, Yassin MM, Tolba MK, Mohamed AMM: Enhanced recovery after surgery (ERAS) Protocols versus standard care in perioperative management of radical cystectomy with urinary diversion. *QJM: An International Journal of Medicine*. 2020; 113(Supplement_1).
8. Abadir AF, Benjamine FM, Aziz AHF: A Comparative study between traditional care program and enhanced recovery after surgery (ERAS) Program in general surgery. *QJM: An International Journal of Medicine*. 2020; 113(Supplement_1).
9. Abdelrazik AN, Sanad AS: Implementation of enhanced recovery after surgery in gynecological operations: A randomized controlled trial. *Ain-Shams Journal of Anesthesiology*. 2020; 12(1): 70.
10. Avellaneda N, Al Masri M, Baimakhanov A, Balasubramaniam D, Bhangu A, Bouchagier K, et al: Evaluation of a quality improvement intervention to reduce anastomotic leak following right colectomy (EAGLE): Pragmatic, batched stepped-wedge, cluster-randomized trial in 64 countries. *British Journal of Surgery*. 2024; 111(1).
11. Mari GM, Costanzi A, Maggioni D, Origi M, Ferrari GC, De Martini P, et al: Fast-track versus standard care in laparoscopic high anterior resection: A prospective randomized-controlled trial. *Surg Laparosc Endosc Percutan Tech [Internet]*. 2024; 24(2): 118–21.
12. Aleid A, Alyaseen EM, Alfurayji RS, Alanazi BS, Alquraish FA, Al Mutair A, et al: Enhanced recovery after surgery (ERAS) in Saudi Arabian surgical practice: A Comprehensive analysis of surgical outcomes, patient satisfaction, and cost-effectiveness. *Cureus*. 2023; 15(11).
13. Zhuang C Le, Ye XZ, Zhang XD, 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.
14. Lau CSM, Chamberlain RS: Enhanced recovery after surgery programs improve patient outcomes and recovery: A meta-analysis. *World J Surg*. 2017; 41(4): 899–913.
15. Hanna HH, Abdelhalim S, Khairy A, Al-Abbasi RMA: Enhanced recovery after colo-rectal surgeries (ERAS) V.S conventional care a systematic review and meta-analysis. *QJM: An International Journal of Medicine*. 2021; 114(Supplement_1).
16. Forsmo HM, Pfeffer F, Rasdal A, Sintonen H, Körner H, Erichsen C: Pre- and postoperative stoma education and guidance within an enhanced recovery after surgery (ERAS) programme reduces length of hospital stay in colorectal surgery. *Int J Surg*. 2016; 36(Pt A): 121–6.
17. Li D, Jensen CC: Patient satisfaction and quality of life with enhanced recovery protocols. *Clin Colon Rectal Surg*. 2019; 32(2): 138–44.
18. Vlug MS, Wind J, Hollmann MW, Ubbink DT, Cense HA, Engel AF, et al: Laparoscopy in combination with fast track multimodal management is the best perioperative strategy in patients undergoing colonic surgery: A randomized clinical trial (LAFA-study). *Ann Surg*. 2011; 254(6): 868–75.
19. Thiele RH, Rea KM, Turrentine FE, Friel CM, Hassinger TE, Goudreau BJ, 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.