Original Article

Enhanced Recovery after Surgery in Patients Following Minimally Invasive Colorectal Surgery: Experience of a Regional Hospital

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Key Words
Colorectal surgery;
ERAS;
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Purpose. The implementation of Enhanced Recovery after Surgery (ERAS) guidelines in standalone institutions worldwide has demonstrated improved outcomes for colorectal surgery. In this study, we evaluated the impact of the modified ERAS guidelines at a single regional hospital on patients undergoing minimally invasive colorectal surgery.

Methods. This retrospective review analyzed 87 patients who underwent minimally invasive colorectal surgery between September 2023 and August 2024. Patients requiring intensive care, emergency surgery, or having any comorbidities necessitating multiorgan procedures were excluded from further analyses. Data on the length of hospital stay, days to the resumption of a soft diet, time to removal of drainage tubes and Foley catheters, first passage of flatus, and mobilization were collected. Postoperative complications were graded with reference to the Clavien-Dindo classification, and the readmission rates within 14 days were assessed.

Results. The subjects were assigned to the ERAS group (n = 33) and the non-ERAS group (n = 54). Both groups were similar in demographics and baseline characteristics, including mean age, body mass index, American Society of Anesthesiologists (ASA) scores, and serum albumin levels.

The ERAS group demonstrated shorter hospital stays, faster resumption of a soft diet, and earlier removal of the drainage tubes and Foley catheters. The time to first flatus, first stool, and mobilization were also significantly shorter in the ERAS group. Postoperative day 3 pain scores were found to be lower in the ERAS group.

Postoperative complications (Clavien-Dindo grade ≥ II) were recorded in 15.15% of the ERAS patients compared to 20.37% of the non-ERAS patients. Among the complications, the grade II rates were 6.06% in the ERAS group and 7.4% in the non-ERAS group, while grade IV complications occurred in 3% of the ERAS patients and no non-ERAS patients. The 30-day readmission rate was similar between the groups.

Conclusion. The adoption of ERAS protocols in minimally invasive colorectal surgeries offers the advantages of shorter hospital stays, faster recovery milestones, and comparable complication rates. These findings underscore the benefits of ERAS in optimizing the perioperative care for colorectal surgery patients.

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Minimally invasive colorectal surgery and the implementation of various treatment strategies have gained worldwide popularity as a means to accelerate postoperative recovery. In 2012, Gustafsson et al. introduced the Enhanced Recovery after Surgery (ERAS) protocol, specifically for colorectal surgery. This protocol has undergone several updates, with the most recent version released in 2018.[1-3]

ERAS was introduced by Danish surgeon Henry Kehlet in 1997, aiming to reduce physiological and psychological stress after surgery and promote faster recovery. The core strategies of ERAS include preoperative nutritional support, minimally invasive intraoperative techniques, and postoperative early mobilization and feeding. These protocols have improved patient outcomes by reducing surgical stress, shortening recovery times, and minimizing hospital stays. Initially applied in colorectal surgery, ERAS has since expanded to various surgical fields, with practices such as minimal fasting, optimized pain control, and early mobilization. Studies have shown that ERAS protocols can reduce hospital stays by 1-3.75 days and lower complication rates, leading to faster recovery without increasing readmission rates.[4-7]

The implementation of ERAS protocols has seen widespread adoption across various healthcare settings worldwide, including in resource-limited and regional centers. Recent studies highlight that ERAS strategies effectively promote faster recovery, with patients returning to baseline functional status more quickly, experiencing shorter hospital stays, and having fewer complications. This demonstrates that ERAS can be successfully integrated into different healthcare systems, offering benefits regardless of the level of resources available. The adaptability and positive outcomes of ERAS make it a valuable approach for improving patient recovery across diverse clinical environments.[8-10]

At our hospital, the ERAS protocol was initially applied to some select patients in 2023, and, since then, its application has gradually expanded to include more numbers of individuals scheduled for minimally invasive colorectal surgery. This study aimed to evaluate the clinical benefits of ERAS in minimally invasive colorectal surgery at a single regional hospital.

Materials and Methods

Patient selection

This retrospective study was conducted at the Department of Surgery of Chia-Yi Christian Hospital. All surgeries were conducted by colorectal subspecialists at the Division of Colon and Rectal Surgery. All patients were followed up at the outpatient department after their surgeries for 30 days after the surgery. In total, 87 patients with colorectal disease who underwent elective minimally invasive colorectal surgery between September 2023 and August 2024 were enrolled in this study.

The inclusion criterion was having received minimally invasive colorectal surgery for colorectal disease. The patients were assigned into two groups: non-ERAS (n = 54) and ERAS (n = 33). The exclusion criteria were individuals with a surgical emergency, having received open surgery or surgery on more than one visceral, anesthesiologist (ASA) grade > 3, and those with diverting stoma.

The following data were collected for each patient: their age, sex, body mass index, blood albumin level, the American Society of Anesthesiologist (ASA) grade, type of operation, operation time, the length of postoperative stay, days to drainage tube removal, days to Foley catheter removal, days to resume a soft diet, days to first flatus and stool, days to get out of bed, postoperative pain score, postoperative nausea and vomiting (PONV) rate, complications, and 30-day readmission rate.

The blood albumin level was tested in preoperatively. The preoperative risk evaluation was performed by an experienced anesthesiologist on patients with a coexisting medical disease. All possible efforts were undertaken to correct and treat comorbid conditions before the surgery. A preoperative cardiopulmonary examination was performed as advised by the anesthesiologist. The postoperative pain score was measured by using a numerical rating scale on postoperative day 3. PONV was defined as nausea and/or vomiting that occurred within 24 h after the operation. Postoperative complications were defined as those occurring on the day of surgery until the day of dis-

charge from the hospital. The 30-day readmissions excluded admissions for follow-up treatments, such as that for chemotherapy.

At our hospital, the ERAS protocol is implemented based on a modified version of the 2018 guidelines. Thirty-three patients undergoing minimally invasive surgery (MIS) adhered to the ERAS protocol. The protocol consists of four stages: preadmission, preoperative, intraoperative, and postoperative items.

Preadmission items

The first step is the preoperative ERAS assessment, which includes a surgical risk evaluation and a cardiopulmonary function assessment. If necessary, further inpatient evaluations such as echocardiography or pulmonary function tests are performed. Anemia screening is conducted preoperatively, and if anemia is present, treatment is provided based on the patient's condition, including oral iron supplements or blood transfusions. Additionally, the patient's consent for cloud-based medication history inquiry is confirmed, and the cloud medication history is downloaded.

Next, preadmission educational consultations are carried out by an ERAS case manager. This includes explaining the ERAS protocol and performing preoperative nutritional screening using the Malnutrition Universal Screening Tool (MUST) scale, with referral to a nutritionist for scores above 2 or a 10% weight loss within three months, immune nutrition education, smoking cessation, alcohol abstinence counseling, referral to a physical therapist, and identifying any medication counseling needs.

Furthermore, a medication assessment is performed, wherein the pharmacist inquires about the patient's current medications and dietary supplements. If necessary, the pharmacist provides medication evaluations.

Pulmonary prehabilitation is another key element, involving preoperative rehabilitation intervention, functional assessment of daily activities, and providing education on incentive spirometry use.

Preoperative anesthesia assessment and risk evaluation are essential components. Perioperative nutritional care is provided: if the patient scores above 2 on the MUST scale, a nutritionist is consulted for a nutritional assessment and intervention, guiding the patient on preoperative, intraoperative, and postoperative dietary management.

Preoperative items

Before surgery, the rehabilitation department is notified, and physical therapists provide preoperative and postoperative rehabilitation instructions, including pulmonary prehabilitation. Preemptive analgesia with medications such as Gabapentin (Neurontin) 300 mg, Celecoxib (Celebrex) 200 mg, and Acetaminophen (APAP) 500 mg is administered two hours before surgery. Routine use of benzodiazepines (BZDs) is avoided to minimize anxiety and reduce medication-related side effects that may impede postoperative recovery.

Preventive antibiotics and the choice of skin antiseptic solution are also essential components. For skin disinfection, we use Chlorhexidine–alcohol, and prophylactic antibiotics are administered within 60 minutes prior to the skin incision. Hair removal is done with an electric razor before disinfection if necessary.

For bowel preparation, no routine mechanical bowel preparation (MBP) and routine oral antibiotics (OAB) are used for colon surgery. In rectal surgery, routine MBP and OAB is considered complete. We also avoid routine preoperative intravenous fluids and encourage oral intake.

The fasting protocol is as follows: clear liquids are withheld for 2 hours prior to surgery, and solid foods are withheld for 6 hours. Patients consume a preload carbohydrate beverage (50 g glucose powder in 400 ml water) in two doses: 800 ml the night before surgery and 400 ml 2-4 hours preoperatively. If the patient has type 1 diabetes or an HbA1c > 7%, the preoperative carbohydrate beverage is omitted.

Intraoperative items

In the intraoperative items, short-acting anesthetics are used. Entropy or SedLine monitoring is employed to assess the EEG, and Train-of-Four (TOF) is used to evaluate the depth of neuromuscular blockade.

Sugammadex is utilized to rapidly reverse neuromuscular blockade.

For postoperative nausea and vomiting (PONV) prevention, the Apfel score is used for preoperative risk assessment. If necessary, Total Intravenous Anesthesia (TIVA), Dexamethasone, Droperidol, granisetron (Kytril) or palonosetron (Aloxi) are administered. If PONV occurs postoperatively, Kytril 1 mg is given every 6 hours as needed.

Intraoperative fluid management adheres to the principles of goal-directed fluid therapy (GDFT). Advanced hemodynamic monitoring is implemented using an A-line with ProAQT or Flowtrac. If additional fluids are needed, balanced crystalloids are used. If hypotension occurs during surgery, vasopressors are administered, and fluid intake is minimized to achieve a zero fluid balance.

To prevent hypothermia during surgery, oral temperature measurement is employed, and active warming using thermal blankets is used until the patient leaves the operating room. The temperature of the irrigation fluid is maintained at 38-40 °C. After the patient is covered with a warming blanket and the wound is dressed, the air conditioning temperature is adjusted to 21 °C.

Surgical access is achieved using MIS, which includes 3D laparoscopic assistance or robotic assistance with the Da Vinci Surgical System. The ERAS protocol recommends no routine placement of drainage in the peritoneal cavity and pelvis, and no cases in our hospital have met this requirement.

Thromboprophylaxis, initiated with compression stockings preoperatively, continues until the patient is discharged from the recovery room. Blood glucose levels are monitored at both the start and end of the anesthesia.

Postoperative items

In the postoperative items, a nasogastric tube is inserted before surgery and removed at the end of the procedure.

In terms of multimodal analgesia, if two or more of the following drugs are used, the goal is considered achieved: epidural patient-controlled analgesia (PCA), spinal morphine, intravenous PCA, intravenous opioid, intravenous ketorolac, propacetamol, parecoxib (subsequently changed to oral celecoxib), and acetaminophen (subsequently changed to oral acetaminophen).

Postoperative fluid and electrolyte therapy involves the use of balanced crystalloid solutions, aiming for zero fluid balance and early removal of the intravenous catheter within 3 days. For colonic cancer patients, urinary catheters are removed within 1 to 3 days postoperatively, while for rectal cancer patients or those with a history of benign prostatic hyperplasia, removal occurs on the third day.

To prevent postoperative ileus, oral Magnesium oxide or Bisacodyl is administered. For diabetic patients, postoperative glycemic control is maintained, adjusting measurement frequency based on blood glucose levels.

Nutritional consultation is performed postoperatively, and a dietician educates the patient on postoperative dietary guidelines. The dietitian also evaluates whether additional nutritional supplements or immunonutrition are needed.

Early resumption of oral intake is the primary goal. The target is for the patient to have a clear liquid diet on the first postoperative day and a low-residual soft diet on the second day.

Early mobilization involves encouraging the patient to stand at the bedside on postoperative day 1 and walk 50 meters on day 2, while continuing with incentive spirometry and postoperative physical therapy. Exceptions are made for patients who were unable to walk prior to surgery.

Within a month of discharge, we conducted follow-up telephone interviews to assess the patient's post-discharge conditions.

The above-mentioned modifications were the results of decisions made during the ERAS team meetings.

Statistical analysis

All data are described as the mean ± SD for continuous variables and as the numbers and percentages for categorical variables. Comparisons of continuous

data between the groups were evaluated by Student's *t*-test, and the comparisons of the categorical data were made with the χ^2-test or Fisher's exact test, as deemed appropriate. Statistical analysis was performed using the SPSS for Windows version 28.0 (IBM Corp., Armonk, NY, USA). $p < 0.05$ was considered to indicate statistical significance.

Results

Clinical characteristics

During the 1-year study period, 87 patients with clinical diagnoses of colorectal diseases who underwent minimally invasive surgery in our hospital were retrospectively analyzed. The data on colorectal diseases collected in our study included those on colorectal cancer, diverticulosis, diverticulitis, rectal prolapse, adenomatous polyposis, endometriosis, and lymphangioma.

Among these patients, 54 patients were treated with the non-ERAS protocol and 33 were treated with the ERAS protocol. Table 1 lists the patient demographic characteristics, namely age, sex, BMI, albumin level, ASA classification, operation method, and operation time. Between the two groups, a significant difference was noted in the age ($p = 0.015$) and operation time ($p < 0.001$).

Between the non-ERAS and ERAS groups, significant differences were observed in terms of several postoperative outcomes (Table 2). For example, the postoperative length of hospital stay was 7.74 ± 1.38 days in the non-ERAS group compared to 5.94 ± 2.14 days in the ERAS group ($p < 0.001$). The mean time of drainage tube removal was 7.11 ± 0.98 days for the non-ERAS group and 5.79 ± 2.03 days for the ERAS group ($p < 0.001$). Foley catheter removal occurred at 4.32 ± 1.19 days in the non-ERAS group versus 1.74 ± 0.77 days in the ERAS group ($p < 0.001$).

The time to resume a soft diet was 5.43 ± 0.90 days in the non-ERAS group compared to 2.33 ± 0.48 days in the ERAS group ($p < 0.001$). The time to first flatus was recorded at 2.72 ± 0.92 days in the non-

Table 1. Patient demographic characteristics

Demographic data			
Group	Non-ERAS	ERAS	*p*-value
Patient number	54	33	
Age (mean ± SD)	68.00 ± 14.11	60.42 ± 13.11	0.015
Sex			0.364
Male	28 (51.85)	13 (39.39)	
Female	26 (48.15)	20 (60.61)	
Body mass index (mean ± SD)	24.09 ± 3.35	24.83 ± 3.30	0.314
Blood albumin level (mean ± SD)	3.98 ± 0.53	4.17 ± 0.57	0.119
ASA classification (mean ± SD)	2.06 ± 0.49	2.06 ± 0.43	0.961
Staging			0.315
I	10 (18.52)	8 (24.24)	
II	14 (25.93)	6 (18.18)	
III	14 (25.93)	10 (30.30)	
IV	8 (14.81)	1 (3.03)	
N/A	8 (14.81)	8 (24.24)	
Operation method			0.832
Right hemicolectomy	16 (29.63)	12 (37.50)	
Left hemicolectomy	8 (14.81)	5 (15.62)	
Anterior resection	18 (33.33)	8 (25.00)	
Lower anterior resection	11 (20.37)	7 (21.88)	
Others	1 (1.85)	0 (0.00)	
Operation time (min) (mean ± SD)	171.67 ± 48.30	241.58 ± 47.80	< 0.001

Table 2. Postoperative outcomes

Group	Non-ERAS	ERAS	*p*-value
Patient number	54	33	
Postoperative length of hospital stay (days) (mean ± SD)	7.74 ± 1.38	5.94 ± 2.14	< 0.001
Drainage tube removal (days) (mean ± SD)	7.11 ± 0.98	5.79 ± 2.03	< 0.001
Foley catheter removal (days) (mean ± SD)	4.32 ± 1.19	1.74 ± 0.77	< 0.001
Time to soft diet (days) (mean ± SD)	5.43 ± 0.90	2.33 ± 0.48	< 0.001
Time to first flatus (days) (mean ± SD)	2.72 ± 0.92	2.15 ± 1.15	0.013
Time to first stool (days) (mean ± SD)	4.20 ± 1.56	2.15 ± 1.15	< 0.001
Time to first out of bed (days) (mean ± SD)	3.65 ± 1.73	1.00 ± 0.00	< 0.001
Postoperative day 3 pain score (Numerical Rating Scale) (mean ± SD)	2.50 ± 0.86	1.39 ± 0.70	< 0.001
Postoperative nausea and vomiting (%)	2 (3.70%)	2 (6.06%)	1
Postoperative complication rate (%)	11 (20.37%)	5 (15.15%)	0.746
Clavien-Dindo classification Class 2 or above			0.429
II	4 (7.4%)	2 (6.06%)	
III	0 (0%)	0 (0%)	
IV	0 (0%)	1 (3%)	
30-day readmission rate (%)	5 (9.26%)	2 (6.06%)	0.9

ERAS group and 2.15 ± 1.15 days in the ERAS group ($p = 0.013$), whereas the time to first stool was 4.20 ± 1.56 days in the non-ERAS group compared to 2.15 ± 1.15 days in the ERAS group ($p < 0.001$).

For the first out-of-bed activity, the mean duration was 3.65 ± 1.73 days for the non-ERAS group and 1.00 ± 0.00 days for the ERAS group ($p < 0.001$). The postoperative pain scores on day 3 were 2.50 ± 0.86 in the non-ERAS group versus 1.39 ± 0.70 in the ERAS group ($p < 0.001$).

The rate of postoperative nausea and vomiting was 3.70% in the non-ERAS group and 6.06% in the ERAS group ($p = 1$). The overall postoperative complication rate was 20.37% in the non-ERAS group and 15.15% in the ERAS group ($p = 0.746$).

For complications classified as Clavien-Dindo Class ≥ II, no differences were observed between the groups ($p = 0.429$), with Class II complications noted in 7.4% of the non-ERAS group and 6.06% in the ERAS group, along with one Class IV complication in the ERAS group.

In terms of Clavien-Dindo classification ≥ II, there were 4 patients in the non-ERAS group with a Clavien-Dindo classification of II, 3 of whom experienced postoperative anastomotic bleeding and received blood transfusion treatment and 1 experienced postoperative ileus that required nasogastric (NG) tube decompression. In the ERAS group, 2 patients had a Clavien-Dindo classification of II — one developed postoperative bacteremia and received antibiotic treatment, while the other experienced postoperative ileus that required NG tube decompression.

In addition, in the ERAS group, one patient with a Clavien-Dindo classification of IV developed an anastomotic leak after undergoing low anterior resection for low rectal cancer and required reoperation for the same.

In the non-ERAS group, 5 patients were readmitted within 30 days: 1 due to a urinary tract infection, 1 due to a stroke 20 days postoperatively, 1 due to ileus, and 2 due to severe diarrhea. In the ERAS group, 2 patients were readmitted within 30 days: 1 due to ileus and 1 due to an anastomotic leak.

Discussion

Our findings suggest that the adoption of the ERAS protocol in minimally invasive colorectal surgeries has enhanced postoperative outcomes, as demonstrated by shorter hospital stays and faster recovery milestones. Particularly, the patients in the ERAS group experienced significantly reduced hospitalization times compared to those in the non-ERAS group. This reduction is likely associated with the relatively earlier removal of drainage tubes and Foley

catheters, faster mobilization, and a quicker transition to a soft diet. According to our discharge criteria, patients were required to show restored gastrointestinal function and have all drainage tubes removed before their discharge. Specifically, early soft diet intake is a pivotal factor in shortening hospital stays, as it promotes faster bowel function recovery without increasing any complication rates.

The ERAS protocol incorporates a range of perioperative interventions that distinguish it from conventional care and contribute to improved morbidity and shorter hospital stays. Preoperatively, ERAS case managers conducted patient education, including nutritional screening using the MUST, smoking and alcohol cessation counseling, and referral for pulmonary prehabilitation. Pharmacists performed medication assessments, and physical therapists instructed patients on lung rehabilitation techniques, such as incentive spirometry coaching. Additional preoperative strategies included the administration of prophylactic analgesics two hours before surgery, avoidance of routine benzodiazepine use, minimization of mechanical bowel preparation, restriction of routine intravenous fluid administration, and carbohydrate loading two to four hours before surgery. Intraoperative management focused on using short-acting anesthetics, neuromuscular blockade depth monitoring via train-of-four stimulation, electroencephalographic monitoring (e.g., entropy or SedLine), rapid reversal of neuromuscular blockade with sugammadex, and goal-directed fluid therapy. Postoperatively, multimodal analgesia was employed alongside zero-balance fluid management. Patients were encouraged to resume oral intake early, with a target of clear liquid consumption on postoperative day 1 and low-residue soft food on postoperative day 2. Early mobilization was also emphasized, aiming for bedside standing on postoperative day 1 and ambulation of at least 50 meters on postoperative day 2. Additionally, continued lung rehabilitation and physical therapy were implemented. These interventions, which were routinely applied in the ERAS group but not consistently achieved in the non-ERAS group, likely contributed to the observed improvements in clinical outcomes.

Importantly, our study considered the management of preoperative anemia, which is an important factor in surgical outcomes. We set a hemoglobin threshold of < 9 g/dL for intervention, with management strategies varying among attending physicians. Generally, oral iron supplements were initiated after the implementation of ERAS. Hemoglobin levels were reassessed upon hospital admission before surgery. If hemoglobin remained < 8 g/dL and the patient was elderly or had multiple chronic conditions, blood transfusion was performed to raise hemoglobin to approximately 9 g/dL. The timing of the blood transfusion will avoid the day before surgery and the day of surgery. Although guidelines recommend avoiding transfusion due to potential long-term effects and suggest intravenous iron supplementation instead, our hospital currently does not have intravenous iron available. These variations in anemia management may have influenced perioperative outcomes and warrant further investigation.

In addition, we believe that the extended duration of surgeries is attributable to more time-intensive preoperative preparations, which include epidural analgesia placement, setup of advanced anesthesia monitoring, incomplete preoperative bowel preparation, and a greater proportion of patients in the ERAS group undergoing robot-assisted surgeries. Notably, a higher proportion of patients in the ERAS group underwent right hemicolectomy. Because we began incorporating intracorporeal anastomosis for these cases and the non-ERAS group had more numbers of patients undergoing anterior resection, we believe that these factors contributed to the difference in the surgical duration. Although the meta-analysis by Feroci et al. revealed no statistically significant differences in the operating time, we continue to attempt to reduce the time required for this technique. Among all the procedures, anterior resection consistently showed the shortest operating time.[11]

In our study, we observed that the ERAS protocol significantly improved several key postoperative outcomes in patients undergoing minimally invasive colorectal surgery. For example, the ERAS group experienced a notably shorter length of hospital stay, quicker removal of drainage tubes and Foley catheters, faster resumption of a soft diet, earlier first out-of-bed activ-

ity, and lower postoperative pain scores on day 3 of surgery. Past studies have shown that ERAS facilitates recovery from major abdominal surgeries through early extubation, early oral intake, mobilization, and multimodal-balanced analgesia, which further supports our findings.[12-15] These improvements align with the ERAS protocol objectives that emphasize early mobilization, optimized pain management, and a gradual return to normal gastrointestinal functioning. Our findings suggest that the adoption of the ERAS protocol may promote faster recovery and reduce the burden on healthcare resources by decreasing the duration of hospitalization.

This detail highlights the differences in the readmission reasons between the ERAS and non-ERAS groups, which is relevant for understanding the potential impact of ERAS protocols on postoperative complications. The non-ERAS group showed a wider range of complications, suggesting that the ERAS protocol may help reduce some of these risks, particularly those related to gastrointestinal recovery. In addition, both groups included patients who were readmitted for ileus, indicating that, while ERAS can reduce the frequency of certain complications, it may not completely prevent issues such as postoperative ileus, which is a common complication in abdominal surgery.

Overall, analyses of these readmission causes helped identify the postoperative issues that may still need further attention in the ERAS protocol settings.

This study has several limitations. First, this study was a nonrandomized retrospective study conducted in a single institute with a small sample size; hence, it was associated with the risk of selection bias. Specifically, the assignment of patients to the Non-ERAS or ERAS groups was not randomized but determined preoperatively based on a comprehensive evaluation of factors such as economic status, physical activity level, compliance with medical instructions, and postoperative gastrointestinal recovery capacity. As a result, older patients were more likely to be assigned to the Non-ERAS group due to these considerations, introducing a preoperative selection bias that may have influenced the outcomes. Second, our follow-up period was extremely short; therefore, data about the long-term outcomes were limited. Further large-scale multicenter randomized trials are warranted to verify our results.

Conclusion

The present results of our study highlight the effectiveness of the ERAS protocol in improving recovery following minimally invasive colorectal surgery. Patients in the ERAS group had shorter hospital stays, reached their recovery milestones more quickly, and experienced less postoperative pain, all of these without any increase in the rates of complications or readmissions. These findings affirm the value of ERAS as a significant advancement in surgical care, thereby offering a practical framework to enhance patient outcomes and streamline perioperative management.

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原　著

實施手術後早期恢復 (ERAS) 在微創大腸直腸手術：單一區域醫院的經驗

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引言　加速康復外科 (ERAS) 指導方針已證實可改善結直腸手術預後。本研究評估本院院修改後的 ERAS 方案對微創大腸直腸手術患者的影響。

方法　本回顧性研究分析 2023 年 9 月至 2024 年 8 月間接受微創大腸直腸手術的 87 名患者，排除需入住加護病房、緊急手術及多器官手術者。收集數據包括住院天數、恢復飲食時間、引流管及導尿管拔除時間、首次排氣及下床活動時間等。術後併發症依 Clavien-Dindo 分級評估，並分析術後 14 天內再入院率。

結果　研究對象分為 ERAS 組 (n = 33) 與非 ERAS 組 (n = 54)，兩組在人口學與基礎特徵上無顯著差異。結果顯示，ERAS 組患者的住院時間明顯較短，術後恢復軟質飲食的時間提前，引流管與導尿管的拔除時間也較早，首次排氣、排便及下床活動的時間均顯著縮短。此外，ERAS 組術後第 3 天的疼痛評分明顯較低。術後併發症方面，ERAS 組 Clavien-Dindo 分級 ≥ II 的併發症率為 15.15%，非 ERAS 組為 20.37%。其中，II 級併發症率在 ERAS 組為 6.06%，非 ERAS 組為 7.4%，而 IV 級併發症的發生率在 ERAS 組為 3%，非 ERAS 組則無 IV 級併發症。兩組的 30 天內再入院率則相似，未見顯著差異。

結論　ERAS 方案在微創大腸直腸手術中能縮短住院時間，加速術後康復，且不增加術後併發症率，證實其優化圍手術期護理的益處。

關鍵詞　大腸直腸手術、ERAS、短期術後結果。