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ENHANCED RECOVERY IN COLORECTAL SURGERY: OUR EXPERIENCE WITH A SERIES OF 170 CASES

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Abstract

Introduction: Colorectal surgery can lead to surgical complications as well as side effects that can increase medical morbidity and postoperative mortality. To address this, Enhanced Recovery after Surgery (ERAS) is a therapeutic approach that involves a protocol aimed at quickly rehabilitating the patient, thereby reducing morbidity, mortality, and length of hospital stay. Its objective is to return the patient to their normal state as early as possible. **Materials and methods**: Our prospective study aimed to evaluate the feasibility of an ERAS program after colorectal surgery in a group of 170 patients operated on for colorectal pathology and treated according to a "FAST-TRACK" protocol. Evaluation criteria included adherence to the program, duration of postoperative stay, morbidity, mortality, readmission rates, and impact on postoperative comfort of patients who underwent these procedures. **Results:** The protocol adherence rate was 83.8%, and the average length of stay after colorectal surgery was 4 days. The overall morbidity rate was 14.1%, with medical and surgical morbidity rates of 5.9% and 8.3%, respectively. There were no deaths, and the readmission rate was 4.7%. Postoperative comfort was well managed with a higher rate of pain control EVA < 3 in 96.3% of patients, good management of nausea and vomiting in 85.9% of cases, early feeding in 94.1% of patients, and early mobilization in 91.8% of patients. **Conclusions:** Enhanced Recovery after Colorectal Surgery is feasible and safe. It offers a reduction in length of stay and complications as well as rapid functional recovery of the patient, at the cost of multidisciplinary collaboration.

Keywords: Enhanced Recovery, Surgery, ERAS, Colon, Rectum, Postoperative

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INTRODUCTION

Enhanced Recovery after Colorectal Surgery (ERAS) aims to promote rapid and early recovery of patients in their physical and psychological capacities comparable to those before their interventions by reducing anxiogenic factors that cause surgical stress. This stress not only increases postoperative morbidity but also leads to unpleasant effects such as pain, nausea, vomiting, ileus, and fatigue, commonly encountered by postoperative patients [1].

These challenges are proportional to the complexity of surgical procedures, which often involve resecting a significant portion of one or more digestive structures, as is often the case in colorectal surgery. Additionally, there is the burden of medical morbidity, which can potentiate fatalities.

Recent data estimate that mortality associated with this surgery is 3.4%, and complication rates range from 25 to 35% depending on the studies, with average postoperative lengths of stay estimated at 18 days [2]. Our study will first aim to demonstrate the feasibility of the enhanced recovery program in colorectal surgery and the challenges encountered in its implementation. Secondly, it will evaluate the potential impact of this program on postoperative lengths of stay, morbidity, mortality, readmission rates, and postoperative comfort of patients operated on for colorectal pathologies.

MATERIALS AND METHODS

In our study, 170 patients aged between 16 and 75 years, scored ASA III, requiring scheduled colonic or rectal surgery for any pathology, and consenting to be part of the study group, were included. Patients enrolled in the program received care according to the rehabilitation protocol, the measures of which are inspired by the French recommendations of good practices jointly developed by the SFAR and the SFCD [3] and recommendations issued by the ERAS® group [4].

The management protocol covers the entire perioperative period (patient information, immunonutrition, no anxiolytic premedication, no mechanical bowel preparation in colonic procedures, fasting not exceeding 6 hours for solids and 2 hours for liquids, preoperative carbohydrate intake, systematic prevention of hypothermia, no nasogastric tube, fluid restriction, volume optimization, systematic antibiotic prophylaxis and thromboprophylaxis, minimally invasive surgery, no systematic peritoneal drainage, multimodal analgesia preferring non-morphine agents and/or regional analgesia technique, limited catheterization, prevention of postoperative nausea and vomiting, and postoperative ileus, early mobilization and feeding, non-morphine multimodal.

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Table 1: Demographic and Medical Characteristics

Population Characteristics.	
Age:	45.4 ± 16.3 [14 - 75]
Gender:	88M/82F (51.8% / 48.2%)
ASA :	
I	104 (61.2%)
II	50 (29.4%)
III	16 (9.4%)
Smoking:	16 (9.4%)
BMI:	24.6 ± 6.4 [12.1- 37.1]
Hb:	11.4 ± 2.1 [6.2 – 15.8]
Anemia:	74 (43.5%)
Albumin:	39.2 ± 5.78 [27 - 57]
Apfel :	
I	110 (64.7%)
II	42 (24.7%)
III	16 (9.4%)
Cancer:	90 (52.9%)
Inflm Bowel Disease:	80 (47.1%)
Neoadjuvant Treat :	8 (4.7%)

Statistical analysis was conducted involving comparison of percentages, calculation of means, RR, and chi-square test with a 95% confidence interval. This analysis covered the characteristics of the study population, surgical procedures performed, adherence to the protocol, length of hospital stay, morbidity, mortality, analgesia, resumption of oral intake, early mobilization, return of bowel function, and postoperative comfort.

RESULTS

In the study group, the conditions treated were varied (Figure 1), with 52.9% being cancerous or tumor-related pathologies and 47.1% inflammatory bowel diseases (Crohn's disease and ulcerative colitis).

Procedures included 38.8% ileocecal resections, 20.0% right hemicolectomies, 20.0% left colectomies, 8.2% restoration of colonic continuity, 2.4% transverse colectomies, 7.1% anterior rectal resections, one abdominoperineal amputation, and 2.4% total proctocolectomies with ileoanal anastomosis using an ileal J pouch.

The average number of recommendations implemented per patient was 16.8 [range: 14 to 19]. The majority of patients agreed to adhere to the ERAS program after being informed about the protocol. Immunonutrition was initiated in 84 patients (98.8%). In accordance with good practice recommendations for colonic preparations, 89.4% of colonic procedures were not prepared.

No premedication with anxiolytics was prescribed for any patients, and a 2-hour fasting period was respected, with all patients receiving 50g of carbohydrates in a clear beverage 2 hours before surgery. All patients received antibiotic prophylaxis and systematic

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thromboprophylaxis. Intraoperative warming was possible in 97.6% of cases using forced-air warming blankets. Nasogastric tubes were avoided in 91.8% of cases. Multimodal analgesia with opioid sparing was used in 100% of the group, including intravenous lidocaine combined with a multi-perforated epidural catheter in 84.7% of cases, thoracic epidural in 14.1%, and a single surgical incision catheter for local analgesia in 1.2% of cases. Intravenous fluid optimization throughout the surgical procedure was achieved in 51.8% of cases.

All patients had short-term urinary catheterization for 24 hours, followed by removal the day after surgery. No laparoscopic procedures were performed; 91.8% of patients were approached via laparotomy and 8.2% electively. Peritoneal drainage was avoided in 54.1% of cases, although all rectal interventions were drained. Early oral feeding, initiated on the evening of surgery at 8:00 PM, was undertaken in 98.8% of patients, and early mobilization was possible in 91.7% of them.

Postoperative pain control was achieved in 100% of the group using multimodal analgesia with lidocaine, paracetamol, nefopam, and local analgesia via an incision catheter or thoracic epidural, maintained for 24 to 48 hours. However, NSAIDs were prescribed in only 2.4% of cases. Chewing gum chewing was possible in 63.6% of cases. All patients received preventive medication for postoperative nausea and vomiting with 4 mg ondansetron. This led to a protocol compliance rate of 83.8%.

The average length of postoperative hospital stay was 4.3 ± 2.3 [range: 2-16] days. Upon subgroup analysis, it was found that 55.3% of patients had a 4-day stay, 24.7% had a 3-day stay, 11.8% had a 5-day stay, and only 7.1% of patients remained hospitalized beyond the 6th day, mainly due to surgical complications (Figure 2).

The overall morbidity rate up to postoperative day 30 was 14.1% (n=24), with 8.3% (n=14) being surgical complications, of which 5.8% (n=10) were classified as Clavien-Dindo grade IIIb (2 postoperative peritonitis, 2 deep abscesses, and one anastomotic hemorrhage). The remaining complications (5.8%, n=10) were minor medical complications, predominantly infectious. There were no postoperative deaths. Regarding readmissions, 8 patients (4.7%) were readmitted after discharge, mainly due to parietal hematoma, low-output fistula, anastomotic hemorrhage, and urinary retention (Figure 3).

Postoperative comfort was assessed using several parameters: Pain control, evaluated using the visual analog scale (VAS) during mobilization, had an average score of 2.6 ± 1.1 [range: 1-6] on postoperative day 1, 1.9 ± 0.9 [range: 1-5] on day 2, and 1.4 ± 0.7 [range: 1-4] on day 3. Bowel function recovery, in the form of gas or stool passage, occurred on average at 1.3 ± 0.7 days [range: 1-4 days]. Nausea and vomiting were well controlled in 85.9% of patients. Early mobilization was achieved in 91.8% of patients.

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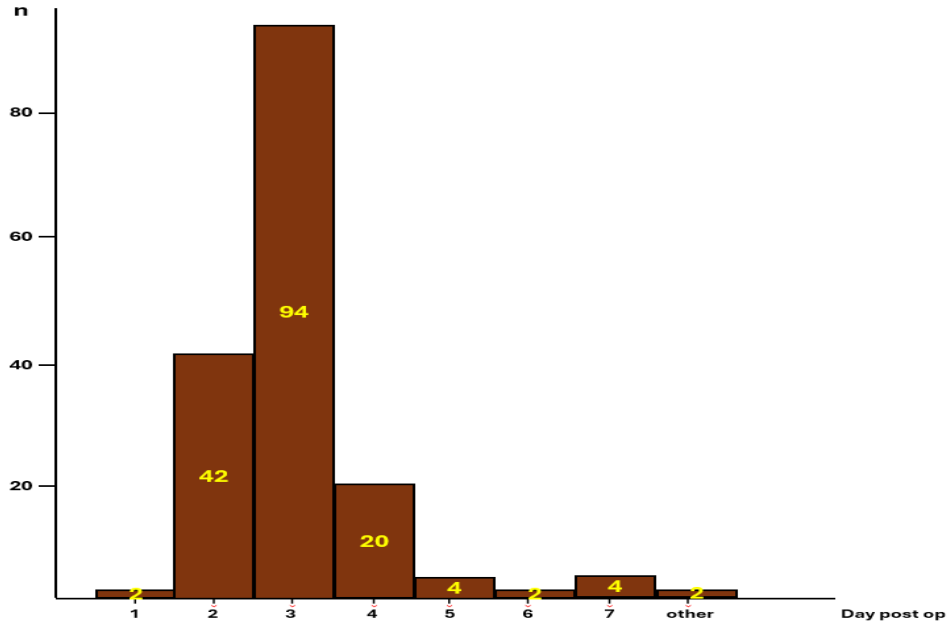

Figure 2: postoperative hospital stay

Clavien-Dindo	n	%
I	4	2,4
II	10	5,8
III - a - b	10	5,8
IV	0	0
V	0	0
Total	24	14,1

Figure 3: Classification of complications according to Clavien-Dindo

DISCUSSION

Since its implementation in 1995 by the Danish team of H. Kehlet [5], Enhanced Recovery after Surgery (ERAS) has seen considerable growth worldwide and in scientific communities, leading to improvements throughout its evolution. Its practice is multidisciplinary, requiring combined efforts from all medical teams (anesthesiologists, surgeons, nurses, nursing assistants), as well as a supportive organizational environment. This pathway is carefully considered at each stage from the perspective of optimizing patient care to improve comfort and outcomes. Its aim is to significantly reduce mortality and morbidity, and consequently reduce hospital stays, which is important to note is not the primary goal of ERAS but rather the result of improved perioperative care, leading to faster physical and psychological recovery, as well as a reduction in complications. However, it remains the best indicator of program success, towards which all results converge.

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The results we have gathered in our study clearly demonstrate that ERAS could have a direct impact on reducing length of stay (LOS = 4.3 days), with an estimated gain of -3.7 days as patients operated on in the department for colorectal pathologies typically stayed an average of 8 [6-10] days without any complications (Figure 2). This hypothesis appears to be confirmed in numerous studies published in the literature. A meta-analysis of good methodological quality [6], comparing management within an ERAS protocol with traditional management in patients undergoing colorectal surgery, including no less than 13 randomized trials where a minimum of 50% of the protocol recommendations were applied, with a total of 1910 patients analyzed for their lengths of stay, shows with a good level of evidence that ERAS in colorectal surgery significantly reduces the average postoperative length of stay by 2.4 days, 95% CI [-3.06; -1.83] days ($p<0.00001$).

However, the only weakness of this meta-analysis is that it presents overall results, encompassing both colonic and rectal surgeries without subgroup analysis, knowing that surgical procedures in rectal pathologies may have their own specificities whose outcomes could differ from those of the colon. Another more recent meta-analysis [7], evaluating 2595 patients managed in an ERAS program against 2646 managed in a standard program, found a significant reduction in LOS of -2.25 days, [-2.93, -1.58]; $p <0.001$. Other studies have compared laparoscopic to open surgery within an ERAS approach and arrive at the same conclusions regarding the direct impact of ERAS on lengths of stay. However, these results may be subject to debate, as the concept of ERAS often does not distinguish between surgical approaches (laparoscopy or laparotomy) [8-10]. Although minimally invasive approaches are recommended, open surgery or even conversion may not be inconsistent with ERAS, as they only evaluate one measure of the protocol among many others. The overall morbidity assessed up to Day 30 was 14.1% in our group, which is significantly lower than what is reported in the literature.

This reduction seems to be more pronounced for medical complications rather than surgical ones, due to the very low rates observed in our results in terms of cardiovascular, bronchopulmonary, renal, thromboembolic, or infectious complications. This effect could be justified by the hypothesis already advocated by Kehlet in his work, regarding the impact that rehabilitation can have on improving the immune system. On one hand, it enables the immune system to counteract the inflammatory state induced by surgical stress, which could be the cause of the often observed polyvisceral failures in the postoperative period. On the other hand, it improves defense capabilities, which are often weakened by surgical procedures, making patients more vulnerable to infections. This enhanced immunological activity by ERAS would allow patients to have a solid foundation, enabling them to effectively defend against postoperative infections or those related to care [11].

On this aspect, the results of published trials all converge to the same conclusions. A meta-analysis [12], including 16 randomized controlled studies, concluded that ERAS was associated with a reduction in overall morbidity RR=0.60 [0.46-0.76] $p<0.0001$. This reduction particularly concerns non-surgical complications, RR=0.40 [0.27-0.61]

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p<0.0001, while the reduction in surgical complications, although noted, does not appear to be significant, RR = 0.76 [0.54 -1.08]; p = 0.13. Grant in a trial [13] was able to demonstrate this advantage significantly, after observing a reduction in respiratory infections by 62%; p < 0.0001, a reduction of 58% in urinary infections, p=0.004, as well as a reduction of 25% in surgical site infections, p=0.04. Another study [7], arrived at the same conclusions, after observing a reduction in overall morbidity of 37% in patients undergoing an ERAS protocol in colorectal surgery compared to those who did not benefit from it RR = 0.634; [0.542–0.741], p<0.001.

This essentially translated into a reduction in bronchopulmonary medical complications by 57.3%, p<0.001), a reduction in cardiovascular complications by 52.7% p = 0.002, as well as a reduction in surgical site infections by 27.2% p = 0.018, while the rate of postoperative surgical complications was almost the same in both groups, RR = 0.806; p = 0.308. Mortality in colorectal surgery is usually estimated at 3.4% [2]. Although no deaths (n = 0) were observed in our group, we cannot claim that mortality is reduced compared to standard care, since we did not compare it with a control group.

This is duly reported in most studies that have assessed the effect of enhanced recovery after surgery (ERAS) on early mortality (up to the 30th postoperative day), generally indicating no real impact of ERAS on mortality [6, 7]. A new perspective seems to emerge regarding the potential effect of ERAS on long-term survival in cancer pathologies. Gustafsson, in his study [14], focuses on this subject, where the analysis of data leads to the conclusion that there is a significant difference in 5-year cancer-related survival (85.4 vs. 78.7%, p = 0.02) in favor of patients who underwent surgical management within an ERAS protocol, provided that there is at least 70% compliance with the recommendations. This same study also advances the hypothesis that after adjustment for certain similar factors (age, sex, BMI, ASA score, colon or rectal cancer, TNM stage), the risk of cancer-related death could be reduced by 42% (HR = 0.58 [0.58–0.88]).

Curtis [15], who also evaluated the effect of laparoscopic approach with enhanced recovery, concludes that there seems to be benefits on long-term survival after colorectal resection 78 vs. 68 p < 0.007 HR 1.55 [1.16–2.06] p = 0.002. This cause-and-effect relationship is actually related to surgical stress implicated in the release of pro-inflammatory cytokines and chemokines (IL1, IL6, and TNF-alpha), which promote the proliferation and adhesion of cancer cells. Enhanced recovery, by minimizing the effect of stress, contributes to reducing this cellular or humoral immune deficit, allowing the patients' biological defenses to remain intact after surgery [16, 17]. However, more studies evaluating these perspectives would be necessary before confirming or refuting the benefits ERAS might have on long-term survival in cancer patients. The readmission rate observed in our study (4.7%) appears to be lower than in conventionally managed patients. However, tested ERAS programs seem to have no impact on any potential increase or decrease in readmission rates, as demonstrated in several studies, including Lei's [18], RR: 1.33 [0.79 - 2.22] p = 0.28.

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This lack of difference in readmissions still serves as a significant measure of the safety and non-dangerousness of rehabilitation programs, as has often been assumed previously. As for the impact of ERAS on postoperative comfort, it seems to be undeniable. Regarding analgesia, the goal of the pain management protocol developed during the drafting of our protocol was to target a pain score (EVA) of ≤ 3 out of 10 throughout the postoperative stay. This goal was achieved in 164 patients (96.5%), thanks to effective analgesia provided either by thoracic epidural anesthesia or by multimodal analgesia combining IV lidocaine and scar multi-perforated drains. The advantages of epidural analgesia in colorectal surgery have been reported both in open surgery within an ERAS program versus conventional treatment in laparoscopic colorectal surgery [19], where the effects of epidural analgesia had an impact on the length of stay even outside of an ERAS program.

Similarly, in a randomized study, it was reported that epidural analgesia did not affect the length of hospitalization in laparoscopic colorectal surgery [20]. It is worth noting that pain rebounds, known as "analgesic gaps," may occur immediately after epidural discontinuation, as observed in one of our patients. This effect can be anticipated and prevented by providing coverage with usual non-morphine analgesics of the first and second tier even before discontinuing the epidural, thereby bridging this analgesic gap. As for IV lidocaine, its perioperative administration was associated with a reduction in postoperative pain and opioid consumption, and it may even be associated with a quicker return of intestinal function. Our results confirm the benefits of ERAS on the time to recovery of bowel function.

The median time to passage of flatus was on average 1.3 ± 0.7 [1 - 4] days. Unlike the Kehlet protocol, we chose not to use intestinal motility stimulants. Chewing gum, due to its safety, had a rightful place in our protocol with an adherence rate of 63.6%. Several studies [7] confirm the advantage that ERAS provides in reducing the time to recovery of bowel function, which is significantly shorter compared to patients managed in a conventional protocol. The estimated gains are -28.2 hours, $p < 0.001$ for the first flatus and -33.9 hours, $p < 0.001$ for bowel movements. Early mobilization is a good indicator that reflects the quality and effectiveness of analgesia, allowing 94.1% of patients to get up on the evening of the surgery.

The benefit of the rehabilitation program on the ability to tolerate early feeding seems certain, as demonstrated in our results, where 94.1% of our patients were able to eat normally from the first day. This effect is likely the result of the effective measures to prevent postoperative nausea and vomiting (PONV) deployed in an ERAS protocol, such as avoiding risk factors that contribute to these discomforts (nasogastric tube and morphine) and the effectiveness of medications to prevent them. These measures, working synergistically and complementarily, certainly contribute to better patient comfort.

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CONCLUSION

Enhanced Recovery after Colorectal Surgery (ERAS) is a revolutionary approach that has surpassed the stage of clinical research. Our study, like other published studies, clearly demonstrates the feasibility, safety, and effectiveness of ERAS. Its foundation based on proven scientific data makes it increasingly becoming an essential standard of care for the benefits it can provide to patients in terms of morbidity and postoperative comfort.

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