

Enhancing Postoperative Care Pathways for Patients with Bowel Obstructions: Early Ambulation, Enteral Feeding and Comparative Outcomes

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Received: 25-06-2026 / Revised: 23-07-2026 / Accepted: 26-08-2026

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Conflict of interest: Nil

Abstract:

Background: Postoperative ileus and delayed gastrointestinal recovery are common after surgery for intestinal obstruction and may result in prolonged hospitalization, increased morbidity, and delayed functional recovery. Enhanced Recovery after Surgery (ERAS) principles emphasize early mobilization and early enteral nutrition to facilitate restoration of physiological function. This study evaluated the effectiveness of an enhanced postoperative care pathway compared with traditional postoperative management.

Aim: To assess the effectiveness of early ambulation and early enteral feeding in improving postoperative recovery and clinical outcomes among patients undergoing surgery for intestinal obstruction.

Materials and Methods: A prospective observational study was conducted over 18 months in the Department of General Surgery, Narayana Medical College and Hospital, Nellore, involving 50 patients aged ≥ 18 years undergoing elective or emergency surgery for intestinal obstruction. Patients were divided into an enhanced-care group ($n=25$), in whom ambulation was initiated within 24 hours and enteral feeding within 48 hours, and a traditional-care group ($n=25$), managed according to conventional institutional protocols. Outcomes assessed included time to ambulation and enteral feeding, return of bowel function, postoperative pain, mobility, complications, stitch removal, length of hospital stay, and patient satisfaction.

Results: The enhanced-care group achieved significantly earlier ambulation (22.16 ± 6.36 vs. 55.44 ± 10.81 hours) and initiation of enteral feeding (17.92 ± 3.94 vs. 51.80 ± 9.57 hours; both $p < 0.001$). Time to first flatus (2.23 ± 0.38 vs. 3.86 ± 0.60 days) and first stool (3.15 ± 0.51 vs. 5.00 ± 0.66 days) were significantly shorter in the enhanced-care group ($p < 0.001$). Pain scores at 24 hours were lower (3.00 ± 0.82 vs. 5.68 ± 1.14), while mobility scores were higher (8.84 ± 1.11 vs. 4.68 ± 1.14 ; $p < 0.001$). Stitch removal occurred earlier (8.04 ± 0.79 vs. 11.84 ± 1.65 days), and hospital stay was significantly reduced (7.48 ± 1.16 vs. 13.12 ± 2.47 days; $p < 0.001$). Patient satisfaction was also significantly higher (8.76 ± 1.09 vs. 5.20 ± 0.82 ; $p < 0.001$). Postoperative complication rates were comparable between groups.

Conclusion: A structured postoperative pathway incorporating early ambulation and early enteral feeding significantly accelerated functional and gastrointestinal recovery, reduced pain and hospital stay, and improved patient satisfaction without increasing postoperative complications. Protocol-driven, individualized enhanced recovery strategies may therefore be beneficial in patients undergoing surgery for intestinal obstruction.

Keywords: Intestinal Obstruction; Early Ambulation; Enteral Feeding; Enhanced Recovery.

DOI: 10.25258/ijpqa.17.9.11

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Introduction

Postoperative bowel blockage and ileus are prevalent complications following abdominal surgery, significantly contributing to extended nausea and vomiting, delayed passage of flatus and stool, prolonged hospital stays, increased expenditures, and readmissions. Conventional practices of "waiting for bowel sounds" and maintaining a "nil-by-mouth" status frequently

contribute to deconditioning, catabolism, and gastrointestinal dysmotility, particularly in patients who are already compromised by sepsis, electrolyte imbalances, nasogastric losses, and pain-induced immobility. Preventing and mitigating ileus is clinically significant due to its substantial correlation with prolonged hospital stays and delayed recovery; contemporary preventative

efforts prioritise multimodal care over singular therapies.[1–3] Augmented postoperative care protocols—specifically early ambulation and early enteral/oral feeding—are fundamental elements of Enhanced Recovery After Surgery (ERAS) principles, aimed at expediting the restoration of physiological function by diminishing insulin resistance, preserving gut mucosal integrity, minimising opioid exposure, enhancing pulmonary mechanics, lowering the risk of venous thromboembolism, and facilitating the prompt resumption of gastrointestinal motility. Current ERAS guidelines for abdominal and colorectal surgery specifically incorporate organised early mobilisation objectives and early eating as essential components, with implementation studies frequently demonstrating expedited functional recovery and a swifter restoration of bowel function when these route aspects are fulfilled.[4–6]

Nonetheless, despite many recommendations, the data about the optimal timing, quantity, and target population for early ambulation and early eating in enhancing outcomes in bowel obstruction scenarios (including postoperative intestinal obstruction or emergency cases) remains inconsistent. Reviews indicate diversity in criteria and adherence, with emergency abdominal surgery populations, where bowel obstruction is prevalent, receiving less attention than elective colorectal groups. Feasibility data indicate that early feeding may be safe following emergency gastrointestinal surgery in select patients. Meta-analytic evidence across gastrointestinal surgeries suggests that routine prolonged starvation is not advantageous compared to earlier feeding methods; however, obstruction-specific comparative outcomes require more definitive, practical assessment.[7]

A focused study assessing early ambulation combined with early enteral feeding within a standardised protocol—alongside comparative outcomes such as time to first flatus/stool, ileus duration, complication rates, NG tube reinsertion, length of stay, and readmissions—provides a compelling basis for generating actionable, context-specific evidence to enhance postoperative recovery in practice.

Aim: The aim is to assess the effectiveness of integrating early ambulation and enteral feeding strategies into postoperative care protocols, compared to traditional care pathways.

Objectives: This study is to seek the answers for the following key questions: 1-. To evaluate the impact of early ambulation on postoperative recovery, length of hospital stay, and complication

rates in patients with bowel obstruction. 2. To assess the effectiveness of enteral feeding in promoting nutritional status, wound healing, and bowel function in postoperative patients with bowel obstruction. 3. To compare outcomes between: Group A: Early ambulation initiated within 24 hours postoperatively, along with enteral feeding starting within 48 hours postoperatively. - Group B: Traditional postoperative care pathway based on standard institutional protocols. 4. Outcome Measures: - Primary outcomes: Length of hospital stay, complication rates (surgical site infection, ileus, anastomotic leak).- Secondary outcomes: Nutritional status (serum albumin levels) To those receiving traditional care pathways following surgery for bowel obstruction.

Materials and Methods

This was a prospective observational study done for 18 months in 50 patients diagnosed with intestinal blockage necessitating elective or emergency surgical intervention, admitted to the Department of General Surgery, Narayana Medical College and Hospital, Nellore.

Inclusion Criteria: Patients aged 18 years or older diagnosed with intestinal blockage necessitating surgical surgery elective or urgent surgical procedures for intestinal blockage.

Exclusion Criteria: Patients with contraindications to early ambulation or enteral nutrition, including unstable cardiovascular conditions or significant respiratory impairment. Patients have significant comorbidities that may affect surgical results, such as uncontrolled diabetes mellitus or end-stage renal disease.

Study Groups: The recruited patients were categorised into two groups according to the postoperative care route used: Group A (Enhanced Care Pathway Group): Patients in this cohort had early ambulation, commenced within 24 hours postoperatively, in conjunction with early enteral nutrition, began within 48 hours after surgery. Group B (Traditional Care Pathway Group): Patients in this cohort were treated according to conventional institutional postoperative care procedures, without obligatory early ambulation or early enteral nutrition.

Outcome Measures: Primary Outcomes: Length of hospital stay, Postoperative complication rates, including: Surgical site infection, Postoperative ileus, Anastomotic leak. Secondary Outcomes: Nutritional status, assessed using serum albumin levels.

Results

Table 1: Comparison of Age and Gender Distribution between Two Groups

Age group	Enhanced care	Traditional care
18–30	7	6
31–40	3	5
41–50	1	4
51–60	7	4
61–70	3	3
71–80	4	3
Mean $\pm$ SD	47.52 $\pm$ 18.47	46.76 $\pm$ 16.53
p-value:0.648		
Female	15	14
Male	10	11
p-value:1.000		

Table 2: Comparison of Diagnosis, Surgery Type Distribution between the Groups

Diagnosis type	Enhanced care	Traditional care
Adhesive	7	5
Hernia	2	9
Tumor	8	5
Volvulus	8	6
p-value:0.124		
Adhesiolysis	10	6
Resection	8	13
Stoma	7	6
p-value:0.322		

Table 3: Comparison of Time to First Ambulation, Initiation of Enteral Feeding Between the Groups

Group	Time to first ambulation (hours)	Time to initiation of enteral feeding (hours)
Enhanced care (n = 25)	22.16 $\pm$ 6.36	17.92 $\pm$ 3.94
Traditional care (n = 25)	55.44 $\pm$ 10.81	51.80 $\pm$ 9.57
	p-value < 0.001	p-value: < 0.001

Table 4: Comparison of Bowel Function Recovery Parameters between Enhanced Care and Traditional Care Groups

Parameter	Enhanced care	Traditional care	p-value
Time to first flatus (days)	2.23 $\pm$ 0.38	3.86 $\pm$ 0.60	< 0.001
Time to first stool (days)	3.15 $\pm$ 0.51	5.00 $\pm$ 0.66	< 0.001
Pain score (NRS) at 24 hours	3.00 $\pm$ 0.82	5.68 $\pm$ 1.14	< 0.001
Mobility score at 24 hours	8.84 $\pm$ 1.11	4.68 $\pm$ 1.14	< 0.001

Table 5: Comparison of Day of Stitch Removal between Enhanced Care and Traditional Care Groups

Group	Enhanced care (n = 25)	Traditional care (n = 25)	p-value
Day of stitch removal	8.04 $\pm$ 0.79	11.84 $\pm$ 1.65	< 0.001
Length of hospital stay (days)	7.48 $\pm$ 1.16	13.12 $\pm$ 2.47	< 0.001
Postoperative complication	Enhanced care	Traditional care	
No	15	14	1.000
Yes	10	11	
Patient satisfaction score	8.76 $\pm$ 1.09	5.20 $\pm$ 0.82	< 0.001

Discussion:

The present study evaluated an enhanced postoperative care protocol for patients undergoing surgery for intestinal obstruction and compared it with conventional postoperative management.

The enhanced pathway primarily focused on early ambulation and prompt initiation of enteral feeding, with assessment of bowel function, postoperative

pain, mobility, and timing of stitch removal, duration of hospitalisation, complications, and patient satisfaction. Patients managed according to the enhanced protocol demonstrated significantly earlier mobilisation and feeding, earlier return of bowel function, lower postoperative pain, and better mobility at 24 hours, earlier stitch removal, shorter hospital stay, and greater patient satisfaction, while postoperative complication rates

remained comparable between the groups. These findings are consistent with the contemporary concept of Enhanced Recovery after Surgery (ERAS), which emphasises multimodal perioperative care to reduce surgical stress, preserve physiological function, and accelerate recovery. ERAS Society recommendations for emergency laparotomy advocate structured postoperative pathways incorporating early mobilisation, reduction of unnecessary tubes, opioid-sparing analgesia, and early resumption of oral intake.[8,9,10] This approach is particularly relevant to intestinal obstruction, where postoperative recovery may be prolonged because of bowel manipulation, intestinal distension, fluid and electrolyte disturbances, inflammation, postoperative pain, and apprehension regarding postoperative ileus.

Baseline Comparability: An important strength of the present study was the comparable baseline characteristics between the enhanced-care and conventional-care groups. No significant differences were observed in age, sex, diagnosis, or type of operation. This reduces the likelihood that the observed differences in recovery were simply due to variations in demographic or surgical risk. Patients with intestinal obstruction may undergo diverse procedures including adhesiolysis, bowel resection, and stoma formation, and may have different underlying causes such as adhesions, hernia, tumour, or volvulus. Despite this heterogeneity, the enhanced pathway demonstrated consistent benefits. Similar baseline comparability was reported in randomised studies by Ankit Aggarwal et al. involving emergency laparotomy for acute intestinal obstruction and by Jyoti Sharma et al. evaluating ERAS in emergency laparotomy. Comparable demographic and operative characteristics were also reported in early-feeding studies such as that of Pragatheeswarane et al.[11,12,13] These observations support the possibility that protocol-driven postoperative management, rather than differences in case mix, contributed substantially to the improved recovery observed in the present study.

Early Ambulation: Early mobilisation was one of the most prominent benefits of the enhanced pathway. Patients in the enhanced-care group ambulated at 22.16 ± 6.36 hours, compared with 55.44 ± 10.81 hours in the conventional-care group, demonstrating a substantial and statistically significant reduction.

Prolonged postoperative immobilisation contributes to muscle deconditioning, venous stasis, respiratory complications, insulin resistance, and delayed functional recovery. Early ambulation may also facilitate gastrointestinal motility and improve patient confidence. The findings are consistent with the emergency intestinal obstruction study by

Aggarwal et al., in which the ERAS group demonstrated earlier ambulation and faster gastrointestinal recovery. Jönsson et al. similarly demonstrated the feasibility and importance of structured early mobilisation following high-risk abdominal surgery.[12,14]

Systematic reviews have further supported early mobilisation as an important component of enhanced recovery. Castellino et al. identified early mobilisation as an important postoperative intervention following abdominal and thoracic surgery, while Tazrean et al. reported that early mobilisation within ERAS pathways may improve functional recovery and patient-reported outcomes while reducing complications and hospital stay.[12,16] The marked difference of approximately 30 hours in the present study suggests that conventional postoperative management of intestinal obstruction may unnecessarily delay functional recovery.

Early Enteral Feeding: The present study also demonstrated significantly earlier initiation of enteral feeding in the enhanced-care group (17.92 ± 3.94 hours) compared with the conventional-care group (51.80 ± 9.57 hours). Traditionally, oral feeding following bowel surgery has frequently been delayed until bowel sounds, passage of flatus, or stool are documented. This practice is based on concerns regarding nausea, vomiting, abdominal distension, aspiration, ileus, and anastomotic complications.

Contemporary evidence increasingly supports early postoperative feeding in appropriately selected patients. Pragatheeswarane et al. demonstrated that early oral feeding following open bowel surgery resulted in earlier passage of flatus and stool and earlier discharge without an increase in major complications.[13] Reissman et al. previously established the feasibility and safety of early oral feeding following colorectal surgery, providing an important foundation for modern ERAS protocols.[17] Similarly, the meta-analysis by Zhuang et al. showed that early oral feeding reduced hospital stay and postoperative morbidity without significantly increasing anastomotic leakage, pneumonia, wound infection, vomiting, nasogastric tube reinsertion, or mortality.[18]

Evidence specific to intestinal obstruction is also increasingly supportive. Aggarwal et al. reported earlier initiation of fluids and solid diets, improved gastrointestinal recovery, and reduced need for nasogastric tube reinsertion in patients managed using an ERAS pathway.[12] Ng et al. similarly concluded that early feeding is generally well tolerated and does not increase the risk of major complications in appropriately selected patients.[19] Ashcroft et al., through a network meta-analysis, identified early feeding as an

effective strategy for reducing postoperative ileus following colorectal surgery.[20] Thus, the present findings support a shift away from routine prolonged fasting towards carefully monitored early enteral nutrition in suitable patients.

Return of Bowel Function: The enhanced-care group demonstrated significantly earlier passage of first flatus (2.23 ± 0.38 days vs. 3.86 ± 0.60 days) and first stool (3.15 ± 0.51 days vs. 5.00 ± 0.66 days). These findings provide strong evidence that the enhanced pathway facilitated genuine recovery of gastrointestinal function. Postoperative intestinal dysfunction may result from bowel manipulation, inflammation, sympathetic activation, opioid administration, intestinal oedema, and prolonged immobilisation. Early ambulation and enteral stimulation may act synergistically to restore gastrointestinal motility. Early feeding provides luminal stimulation and supports intestinal function, while mobilisation reduces the physiological consequences of prolonged bed rest.

The earlier return of bowel function observed in the present study is consistent with the findings of Aggarwal et al. and Pragatheeswarane et al.[12,13] Ashcroft et al. also demonstrated that early feeding is an effective intervention for reducing postoperative ileus.[20] These findings suggest that intestinal obstruction itself should not automatically be considered a reason for prolonged postoperative fasting when the patient is haemodynamically stable and clinically suitable for early feeding.

Postoperative Pain and Mobility: Pain at 24 hours was significantly lower in the enhanced-care group (3.00 ± 0.82) than in the conventional-care group (5.68 ± 1.14). The 24-hour mobility score was also substantially higher in the enhanced group (8.84 ± 1.11 vs. 4.68 ± 1.14).

Pain can restrict coughing, deep breathing, mobilisation, oral intake, and participation in postoperative rehabilitation. Conversely, effective pain control facilitates movement and recovery. Nimmo et al. highlighted the importance of adequate, preferably opioid-sparing, analgesia within ERAS pathways, as excessive opioid use may contribute to sedation, nausea, and postoperative ileus.[51] Sarin et al. similarly reported improved postoperative pain and reduced narcotic requirements following implementation of ERAS principles in colorectal surgery.[21]

The improved mobility observed in the present study probably reflects the combined effect of early mobilisation orders, better pain control, reduced dependence on tubes and intravenous support, and increased patient confidence. This illustrates the multimodal nature of ERAS, where several interventions work together rather than acting independently.

Earlier Stitch Removal: Stitches were removed significantly earlier in the enhanced-care group (8.04 ± 0.79 days) compared with the conventional-care group (11.84 ± 1.65 days). Although stitch-removal timing is not a commonly reported primary endpoint in ERAS studies, it may reflect the overall acceleration of postoperative recovery. However, this finding should be interpreted cautiously. Suture removal can be influenced by wound assessment, surgeon preference, discharge planning, and local practice. Therefore, earlier stitch removal should not be interpreted as direct evidence that early feeding or mobilisation independently accelerates wound healing. Importantly, the earlier removal did not appear to be associated with increased short-term postoperative complications.

Hospital Stay: A major practical benefit was the significant reduction in hospitalisation. The enhanced-care group had a mean hospital stay of 7.48 ± 1.16 days, compared with 13.12 ± 2.47 days in the conventional-care group. Reduced hospital stay is one of the most consistently demonstrated benefits of ERAS pathways. Aggarwal et al. reported approximately a three-day reduction in hospital stay among patients with acute intestinal obstruction managed using ERAS.[12] Sharma et al. similarly demonstrated reduced hospitalisation following ERAS implementation in emergency laparotomy.[11] The 2024 meta-analysis by Amir et al. further supports the effectiveness of ERAS pathways following emergency laparotomy.[22]

Early feeding, mobilisation, bowel recovery, pain reduction, and improved functional independence collectively facilitate earlier discharge. Shorter hospitalisation also has important economic implications and reduces exposure to hospital-acquired complications.

Postoperative Complications: Despite accelerated recovery, the incidence of postoperative complications was comparable between the two groups, with no statistically significant increase in the enhanced-care group. This is an important safety finding because a major concern regarding early feeding and mobilisation is the possibility of increased anastomotic complications, vomiting, aspiration, wound complications, or ileus.

The findings are consistent with Aggarwal et al., who reported improved recovery without increased morbidity or mortality in patients with intestinal obstruction managed using ERAS. Sharma et al. similarly demonstrated favourable postoperative outcomes with ERAS in emergency laparotomy.[11] Meta-analyses of early feeding have also shown no significant increase in anastomotic leakage, pneumonia, wound infection, vomiting, nasogastric tube reinsertion, or mortality.[18,19]

Patient Satisfaction: Patient satisfaction was significantly higher in the enhanced-care group (8.76 ± 1.09) than in the conventional-care group (5.20 ± 0.82). This finding highlights the importance of patient-centred outcomes in evaluating postoperative recovery. Patients who experience less pain, resume eating sooner, regain bowel function earlier, mobilise independently, and leave hospital sooner are likely to perceive greater control and confidence during recovery. Existing ERAS literature has also demonstrated improvements in patient-reported outcomes and satisfaction following enhanced recovery pathways.[23,24] This is particularly relevant in intestinal obstruction, where patients frequently experience pain, vomiting, abdominal distension, prolonged fasting, and anxiety before surgery. A structured pathway that visibly restores normal activity and nutrition may therefore provide both physical and psychological benefits.

Comparison with Existing ERAS Evidence: The findings of the present study closely correspond with the obstruction-specific randomised study by Ankit Aggarwal et al., which demonstrated earlier ambulation, earlier feeding, faster bowel recovery, reduced hospital stay, and no significant increase in morbidity following ERAS implementation.[28] Similarly, Sharma et al. demonstrated reduced hospitalisation and postoperative morbidity with ERAS in emergency laparotomy.[11]

The 2024 scoping literature on ERAS in intestinal obstruction further suggests that enhanced recovery components can accelerate recovery and reduce hospital stay, although the evidence base remains relatively limited.[10] Evidence from elective bowel surgery provides additional support. Reissman et al., Pragatheeswarane et al., and Zhuang et al. demonstrated the safety and benefits of early feeding, including earlier gastrointestinal recovery and shorter hospitalisation.[13,17,18] Thus, the present study extends established ERAS principles from elective bowel surgery into the more challenging setting of intestinal obstruction.

Mechanistic Interpretation: The benefits observed in the enhanced-care group are likely attributable to the cumulative effect of multiple interventions. Early mobilisation preserves muscle function, improves circulation, reduces the consequences of bed rest, and may stimulate gastrointestinal motility. Early enteral feeding provides luminal stimulation, supports intestinal mucosal integrity, and may promote restoration of normal gastrointestinal function. Effective analgesia facilitates mobilisation and reduces the need for excessive opioid administration.

This integrated approach reflects the fundamental principle of ERAS: recovery is accelerated through coordinated interventions rather than through a

single isolated measure.[25] The simultaneous improvement in feeding, mobility, bowel function, pain, hospital stay, and satisfaction in the present study supports this multimodal mechanism.

Clinical Implications and Limitations: The findings have practical implications for postoperative management of intestinal obstruction. Standardised pathways can establish clear targets for mobilisation, criteria for initiating enteral nutrition, appropriate analgesic strategies, reduction of unnecessary tubes, and milestone-based discharge planning. Such pathways may reduce variation in postoperative care and facilitate more consistent recovery. However, the findings should be interpreted in light of the study limitations. The sample size was relatively small, limiting statistical power for uncommon complications and subgroup analyses. Complications were assessed primarily as aggregate in-hospital outcomes, without detailed grading or comprehensive 30-day readmission and mortality data. The heterogeneous nature of intestinal obstruction also warrants larger studies comparing adhesive obstruction, volvulus, malignancy, and strangulated hernia, as well as different operative procedures. Stitch-removal timing and satisfaction scores may also be influenced by local practice patterns.

Conclusion

The study finds that an improved postoperative care protocol focused on early ambulation and early enteral nutrition provides distinct therapeutic benefits compared to traditional postoperative management in patients receiving surgery for intestinal blockage. It was linked to expedited bowel healing, enhanced pain management, improved mobility, earlier achievement of wound recovery milestones, reduced length of hospitalisation, and increased patient satisfaction, while preserving a comparable complication profile.

The findings endorse the integration of structured improved recovery protocols into standard postoperative management for intestinal obstruction surgery. Postoperative treatment should use a protocol-driven yet individualised strategy that facilitates early resumption of normal physiological function, so enhancing both clinical and patient-centered outcomes, rather than defaulting to delays in eating and mobility.

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