e-ISSN: 0976-822X

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2022; 14(3); 205-211

Original Research Article

The Effect of Early Ambulation on Recovery after Abdominal Surgery

Bandhan Bahal

Assistant Professor, Department of General Surgery, N.C. Medical College & Hospital, Israna, Panipat, Haryana

Received: 30-04-2022 / Revised: 12-05-2022 / Accepted: 20-05-2022
Corresponding author: Dr. Bandhan Bahal
Conflict of interest: Nil

Abstract

Introduction: Abdominal surgery is commonly associated with postoperative pain, delayed bowel recovery, pulmonary complications, and prolonged hospital stay. Early ambulation is an important component of postoperative care that may improve recovery and reduce complications.

Materials and Methods: This prospective observational study included 90 patients undergoing abdominal surgery. Patients were divided into early ambulation (within 24 hours) and delayed ambulation (after 24 hours) groups. Postoperative pain, bowel recovery, complications, hospital stay, and return to normal activities were assessed.

Result: Of the 90 patients, 48 (53.3%) underwent early ambulation and 42 (46.7%) had delayed ambulation. The early ambulation group had lower pain scores (3.8 ± 1.1 vs 5.2 ± 1.4), earlier return of bowel sounds (18.6 ± 4.2 vs 26.4 ± 5.8 hours), shorter hospital stay (5.1 ± 1.4 vs 8.3 ± 2.1 days), and earlier return to normal activities (12.8 ± 3.5 vs 18.9 ± 4.6 days). Postoperative complications such as atelectasis, pneumonia, deep vein thrombosis, and ileus were also less common in the early ambulation group.

Conclusion: Early ambulation after abdominal surgery improved postoperative recovery, reduced complications, shortened hospital stay, and promoted earlier return to normal activities.

Keywords: Early ambulation, abdominal surgery, postoperative recovery, hospital stay, postoperative complications.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0) and the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/read), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

INTRODUCTION

Abdominal surgery is commonly associated with significant postoperative pain, fatigue, restricted mobility, delayed gastrointestinal recovery, pulmonary complications, and prolonged hospital stay. Traditionally, patients were advised prolonged bed rest after abdominal procedures to prevent wound disruption and facilitate healing. However, prolonged immobilization has been shown to increase the risk of postoperative complications such as atelectasis, pneumonia, deep vein thrombosis, pulmonary embolism, muscle weakness, urinary retention, constipation, and delayed return of bowel function. These complications may further contribute to prolonged hospitalization, increased healthcare costs, and delayed return to normal daily activities. Early ambulation has therefore emerged as an important aspect of modern postoperative care. [1,2] Early ambulation refers to the practice of encouraging patients to sit, stand, and walk within the first 24 hours

after surgery, depending upon their clinical stability. It is considered one of the essential elements of Enhanced Recovery after Surgery protocols. [3,4] Early mobilization improves blood circulation, enhances pulmonary ventilation, promotes bowel motility, preserves muscle strength, and reduces the risk of venous stasis. It also helps in maintaining functional independence and improving patient confidence during the postoperative period. Studies have shown that mobilization shortly after abdominal surgery is safe and feasible without increasing the risk of wound-related complications. [4,5]

Several studies have demonstrated the beneficial effects of early ambulation after abdominal surgery. Early mobilization has been associated with a faster return of bowel sounds, earlier passage of flatus and stool, earlier oral intake, and shorter duration of postoperative ileus. [2,6] Structured ambulation protocols initiated immediately after surgery have been shown to improve the time to first flatus and overall quality of recovery. [7]

Early ambulation has also been found to reduce postoperative pulmonary complications and thromboembolic events. Mobilized patients have shown lower rates of pneumonia, atelectasis, deep vein thrombosis, pulmonary embolism, and urinary tract infections compared to patients who remained bedridden for longer durations. [1,2] In addition, early mobilization is associated with shorter hospital stay, reduced postoperative pain scores, improved functional capacity, and better quality of life after discharge. Patients who ambulate within 24 hours after abdominal surgery have been reported to experience fewer severe complications and faster overall recovery. [4,8]

Despite its proven benefits, early ambulation is not uniformly practiced in many healthcare settings. Several barriers such as inadequate pain control, dizziness, fear of wound dehiscence, fatigue, presence of drains or catheters, lack of staff support, and absence of standard postoperative mobilization protocols may prevent patients from mobilizing early after surgery. Previous studies have reported that delayed ambulation remains common among abdominal surgery patients, particularly after major open procedures. [1,9]

Therefore, understanding the role of early ambulation and evaluating its impact on postoperative recovery is important for improving patient outcomes and optimizing postoperative care pathways. [10]The present study was undertaken to evaluate the effect of early ambulation on recovery after abdominal surgery, with particular emphasis on postoperative pain, bowel function, pulmonary complications, duration of hospital stay, and return to normal activities.

Materials and Methods

This hospital-based prospective observational study was conducted in the Department of General Surgery of a tertiary care teaching hospital over a period of 12 months. The study was undertaken to evaluate the effect of early ambulation on postoperative recovery among patients undergoing abdominal surgery. The study included adult patients who underwent elective or emergency abdominal surgery during the study period. A total of 90 patients were enrolled in the study.

Inclusion Criteria

- Patients aged 18 years and above
- Patients undergoing elective or emergency abdominal surgery
- Patients who were hemodynamically stable after surgery
- Patients willing to participate in the study and provide informed consent

Exclusion Criteria

- Patients requiring prolonged postoperative ventilatory support

- Patients admitted to intensive care unit for more than 48 hours after surgery
- Patients with severe cardiopulmonary disease limiting ambulation
- Patients with lower limb fractures, paralysis, or neurological disorders affecting mobility
- Patients with postoperative complications requiring re-exploration within 24 hours
- Pregnant women

Detailed demographic and clinical information of all patients was recorded, including age, sex, body mass index, diagnosis, type of abdominal surgery, duration of surgery, type of anesthesia, and comorbidities. Postoperative ambulation status was assessed for all patients.

Patients were divided into two groups based on the timing of ambulation after surgery:

- Early ambulation group: Patients who were mobilized within 24 hours after surgery (n=48)
- Delayed ambulation group: Patients who were mobilized after 24 hours of surgery (n=42)

Early ambulation included sitting on the bed, dangling legs, standing with support, and walking for a short distance as tolerated by the patient.

The ambulation schedule was gradually increased according to the patient's clinical condition and pain tolerance.

Outcome Measures

The following postoperative recovery parameters were assessed:

- Postoperative pain score using Visual Analogue Scale (VAS)
- Time to return of bowel sounds
- Time to first passage of flatus
- Time to first bowel movement
- Time to initiation of oral feeding
- Occurrence of pulmonary complications such as atelectasis and pneumonia
- Occurrence of thromboembolic complications such as deep vein thrombosis
- Duration of hospital stay
- Time taken to return to normal daily activities

Data Collection: All relevant perioperative and postoperative data were collected using a predesigned proforma. Patients were monitored daily during hospital stay until discharge. Follow-up information regarding return to normal activities was obtained during postoperative outpatient visits or telephonic interview.

Statistical Analysis: The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequency and percentage. Independent t-test was used for comparison of continuous variables between the two groups. Chi-square test or Fisher's exact test was used for comparison of categorical variables. A p-value of less than 0.05 was considered statistically significant.

Result

A total of 90 patients undergoing abdominal surgery were included in the study. Among them, 48 patients (53.3%) were mobilized within 24 hours after surgery and were included in the early ambulation group, while 42 patients (46.7%) were mobilized after 24 hours and were included in the delayed ambulation group. The baseline demographic and clinical characteristics of the study population are shown in Table 1. The mean age of patients in the early ambulation group was 45.9 ± 12.8 years, while the delayed ambulation group had a mean age of 47.8 ± 13.7 years. The overall mean age of the study population was 46.8 ± 13.2 years. Male patients constituted 54.2% of the early ambulation group and

57.1% of the delayed ambulation group, whereas females constituted 45.8% and 42.9%, respectively. The distribution of body mass index, diabetes mellitus, hypertension, smoking history, and duration of surgery was comparable between the two groups, and no statistically significant difference was observed for any of these baseline characteristics (Table 1).The distribution of abdominal surgeries performed among the two groups is presented in Table 2. Appendicectomy was the most common procedure and was performed in 22 patients (24.4%), followed by cholecystectomy in 18 patients (20.0%), intestinal obstruction surgery in 15 patients (16.7%), hernia repair in 14 patients (15.6%), bowel resection in 12 patients (13.3%), and other abdominal procedures in 9 patients (10.0%). Appendicectomy was more common in the early ambulation group (29.2%) compared to the delayed ambulation group (19.0%). Intestinal obstruction surgery and bowel resection were slightly more frequent in the delayed ambulation group. However, the difference in the distribution of surgical procedures between the two groups was not statistically significant (Table 2).

The postoperative recovery outcomes and complications observed among the two groups are summarized in Table 3. Patients in the early ambulation group had significantly lower postoperative pain scores compared to the delayed ambulation group (3.8 ± 1.1 vs 5.2 ± 1.4, $p < 0.001$). The return of bowel sounds occurred earlier in the early ambulation group (18.6 ± 4.2 hours) compared to the delayed ambulation group (26.4 ± 5.8 hours). Similarly, the first passage of flatus occurred significantly earlier in patients who ambulated early (30.5 ± 6.3 hours) than in those who ambulated later (42.8 ± 8.1 hours). The first bowel movement was also achieved earlier in the early ambulation group (45.2 ± 8.5 hours) compared to the delayed ambulation group (60.7 ± 10.3 hours). The time to initiation of oral feeding was shorter among early ambulated patients (20.4 ± 5.1 hours) compared to delayed ambulated patients (31.2 ± 6.7 hours), and this difference was statistically significant. The duration of hospital stay was significantly shorter in the early ambulation group, with a mean stay of 5.1 ± 1.4 days compared to 8.3 ± 2.1 days in the delayed ambulation group. Furthermore, patients in the early ambulation group returned to normal daily activities earlier than patients in the delayed ambulation group (12.8 ± 3.5 days vs 18.9 ± 4.6 days, $p < 0.001$).With regard to postoperative complications, atelectasis was observed in 2 patients (4.2%) in the early ambulation group and 8 patients (19.0%) in the delayed ambulation group, which was statistically significant ($p = 0.028$). Pneumonia occurred in 1 patient (2.1%) in the early ambulation group and 5 patients (11.9%) in the delayed ambulation group. Deep vein thrombosis was not observed in any patient in the early ambulation group, whereas 3 patients (7.1%) in the delayed ambulation group developed deep vein thrombosis.

Postoperative ileus was also more frequent in the delayed ambulation group, occurring in 12 patients (28.6%) compared to 4 patients (8.3%) in the early ambulation group. These findings suggest that early ambulation was associated with better postoperative recovery and fewer complications after abdominal surgery (Table 3).

Table 1: Baseline Demographic and Clinical Characteristics of Study Population (n = 90)

Variable	Early Ambulation Group (n = 48)	Delayed Ambulation Group (n = 42)	Total (n = 90)	p-value
Age (years), Mean ± SD	45.9 ± 12.8	47.8 ± 13.7	46.8 ± 13.2	0.482
Male Sex, n (%)	26 (54.2%)	24 (57.1%)	50 (55.6%)	0.781
Female Sex, n (%)	22 (45.8%)	18 (42.9%)	40 (44.4%)	0.781
BMI (kg/m²), Mean ± SD	24.6 ± 3.1	25.2 ± 3.5	24.9 ± 3.3	0.394
Diabetes Mellitus, n (%)	10 (20.8%)	11 (26.2%)	21 (23.3%)	0.547
Hypertension, n (%)	12 (25.0%)	10 (23.8%)	22 (24.4%)	0.894
Smoking History, n (%)	9 (18.8%)	11 (26.2%)	20 (22.2%)	0.401
Duration of Surgery (minutes), Mean ± SD	92.4 ± 28.6	98.7 ± 31.4	95.3 ± 29.9	0.326

Table 2: Distribution of Type of Abdominal Surgery among Study Groups

Type of Surgery	Early Ambulation Group (n = 48)	Delayed Ambulation Group (n = 42)	Total (n = 90)	p-value
Appendicectomy	14 (29.2%)	8 (19.0%)	22 (24.4%)	0.311
Cholecystectomy	11 (22.9%)	7 (16.7%)	18 (20.0%)	0.458
Intestinal Obstruction Surgery	6 (12.5%)	9 (21.4%)	15 (16.7%)	0.258
Hernia Repair	8 (16.7%)	6 (14.3%)	14 (15.6%)	0.758
Bowel Resection	5 (10.4%)	7 (16.7%)	12 (13.3%)	0.389
Others	4 (8.3%)	5 (11.9%)	9 (10.0%)	0.571

Table 3: Comparison of Recovery Outcomes and Complications between Early and Delayed Ambulation Groups

Variable	Early Ambulation Group (n = 48)	Delayed Ambulation Group (n = 42)	p-value
Postoperative Pain Score (VAS)	3.8 ± 1.1	5.2 ± 1.4	<0.001
Return of Bowel Sounds (hours)	18.6 ± 4.2	26.4 ± 5.8	<0.001
First Passage of Flatus (hours)	30.5 ± 6.3	42.8 ± 8.1	<0.001
First Bowel Movement (hours)	45.2 ± 8.5	60.7 ± 10.3	<0.001
Initiation of Oral Feeding (hours)	20.4 ± 5.1	31.2 ± 6.7	<0.001
Duration of Hospital Stay (days)	5.1 ± 1.4	8.3 ± 2.1	<0.001
Return to Normal Activities (days)	12.8 ± 3.5	18.9 ± 4.6	<0.001
Atelectasis, n (%)	2 (4.2%)	8 (19.0%)	0.028
Pneumonia, n (%)	1 (2.1%)	5 (11.9%)	0.084
Deep Vein Thrombosis, n (%)	0 (0.0%)	3 (7.1%)	0.046
Postoperative Ileus, n (%)	4 (8.3%)	12 (28.6%)	0.013

Discussion

In the present study, the mean age of the study population was 46.8 ± 13.2 years, with comparable ages in the early ambulation group (45.9 ± 12.8 years) and delayed ambulation group (47.8 ± 13.7 years). Males constituted 55.6% of the study population, while females accounted for 44.4%. Diabetes mellitus, hypertension, and smoking history were observed in 23.3%, 24.4%, and 22.2% of patients, respectively.

The baseline characteristics were similar in both groups. Khoo et al. (2007) [11] also reported comparable demographic characteristics between the multimodal care and conventional care groups, with median ages of 69.3 years and 73.0 years, respectively. In the present study, the postoperative pain score was significantly lower in the early ambulation group compared to the delayed ambulation group (3.8 ± 1.1 vs 5.2 ± 1.4, $p < 0.001$). Gastrointestinal recovery was also faster in the early ambulation group. Return of bowel sounds occurred at 18.6 ± 4.2 hours compared to 26.4 ± 5.8 hours in the delayed ambulation group. The first passage of flatus occurred at 30.5 ± 6.3 hours versus 42.8 ± 8.1 hours, while the first bowel movement occurred at 45.2 ± 8.5 hours compared to 60.7 ± 10.3 hours. Wang et al. (2011) [12] reported similar findings, with the first passage of flatus occurring at 31 hours in the fast-track group compared to 38 hours in the conventional group. The first bowel movement occurred at 55 hours versus 64 hours, respectively. Lv et al. (2012) [13] also found that ERAS pathways significantly improved bowel recovery and reduced postoperative ileus. In the present study, the duration of hospital stay was significantly shorter in the early ambulation group than in the delayed ambulation group (5.1 ± 1.4 days vs 8.3 ± 2.1 days, $p < 0.001$).

Patients in the early ambulation group also returned to normal daily activities earlier (12.8 ± 3.5 days vs 18.9 ± 4.6 days).Khoo et al. (2007) [11] found that hospital stay was significantly shorter in the multimodal care group than in the conventional care group (5 days vs 7 days). Muller et al. (2009) [14] similarly reported a median hospital stay of 5 days in the fast-track group compared to 9 days in the standard care group. In the present study, postoperative complications were less common in the early ambulation group. Atelectasis occurred in 4.2% of patients in the early ambulation group compared to 19.0% in the delayed ambulation group. Pneumonia was observed in 2.1% versus 11.9%, while deep vein thrombosis occurred only in the delayed ambulation group (7.1%). Postoperative ileus was also lower in the early ambulation group (8.3% vs 28.6%).Muller et al. (2009) [14] found that postoperative complications occurred in 21.1% of patients in the fast-track group compared to 49.3% in the standard care group. Wang et al. (2011) [15] also reported a lower overall complication rate in the fast-track group compared to the conventional care group (5.0% vs 21.1%).

Limitation

The present study had certain limitations. It was conducted at a single center with a relatively small sample size of 90 patients, which may limit the generalizability of the findings. Different types of abdominal surgeries were included, which could have influenced postoperative recovery outcomes. In addition, long-term outcomes were not assessed, and factors such as patient motivation, pain tolerance, and staff support for ambulation were not evaluated separately.

Conclusion

Early ambulation after abdominal surgery was associated with lower postoperative pain, faster return of bowel function, fewer pulmonary and thromboembolic complications, shorter hospital stay, and earlier return to normal daily activities. Patients who ambulated within 24 hours after surgery showed significantly better recovery outcomes compared to those with delayed ambulation. Overall findings suggest that early ambulation is a safe, feasible, and effective strategy for improving postoperative recovery after abdominal surgery.

References

1. Haines KJ, Skinner EH, Berney S. Association of postoperative pulmonary complications with delayed

mobilisation following major abdominal surgery: an observational cohort study. Physiotherapy. 2013;99 (2):119-125.
2. Castelino T, Fiore JF Jr, Niculiseanu P, Landry T, Augustin B, Feldman LS. The effect of early mobilization protocols on postoperative outcomes following abdominal and thoracic surgery: A systematic review. Surgery. 2016;159(4):991-1003.
3. Zutshi M, Delaney CP, Senagore AJ, Mekhail N, Lewis B, Connor JT, et al. Randomized controlled trial comparing the controlled rehabilitation with early ambulation and diet pathway versus the controlled rehabilitation with early ambulation and diet with preemptive epidural anesthesia/analgesia after laparotomy and intestinal resection. Am J Surg. 2005;189(3):268-272.
4. Schaller SJ, Anstey M, Blobner M, Edrich T, Grabitz SD, Gradwohl-Matis I, et al. Early, goal-directed mobilisation in the surgical intensive care unit: a randomised controlled trial. Lancet. 2016;388(10052):1377-1388.
5. Lee L, Mata J, Ghitulescu GA, Boutros M, Charlebois P, Stein B, et al. Cost-effectiveness of enhanced recovery versus conventional perioperative management for colorectal surgery. Ann Surg. 2015;262(6):1026-1033.
6. Gustafsson UO, Scott MJ, Schwenk W, Demartines N, Roulin D, Francis N, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. World J Surg. 2013;37(2):259-284.
7. Fiore JF Jr, Castelino T, Pecorelli N, Niculiseanu P, Balvardi S, Hershorn O, et al. Ensuring early mobilization within an enhanced recovery program for colorectal surgery: a randomized controlled trial. Ann Surg. 2017;266(2):223-231.
8. Gillis C, Li C, Lee L, Awasthi R, Augustin B, Gamsa A, et al. Prehabilitation versus rehabilitation: a randomized control trial in patients undergoing colorectal resection for cancer. Anesthesiology. 2014;121(5): 937-947.
9. Smart NJ, White P, Allison AS, Ockrim JB, Kennedy RH, Francis NK. Deviation and failure of enhanced recovery after surgery following laparoscopic colorectal surgery: early prediction model. Colorectal Dis. 2012;14(10):e727-e734.
10. Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A review. JAMA Surg. 2017;152(3):292-298.
11. Khoo CK, Vickery CJ, Forsyth N, Vinall NS, Eyre-Brook IA. A prospective randomized controlled trial of multimodal perioperative management protocol in patients undergoing elective colorectal resection for cancer. Ann Surg. 2007;245(6):867-872.
12. Wang G, Jiang ZW, Xu J, Gong JF, Bao Y, Xie LF, et al. Fast-track rehabilitation program vs conventional care after colorectal resection: a randomized clinical trial. World J Gastroenterol. 2011;17(5):671-676.
13. Lv L, Shao YF, Zhou YB. The enhanced recovery after surgery (ERAS) pathway for patients undergoing colorectal surgery: an update of meta-analysis of randomized controlled trials. Int J Colorectal Dis. 2012;27(12):1549-1554.
14. Muller S, Zalunardo MP, Hubner M, Clavien PA, Demartines N. A fast-track program reduces complications and length of hospital stay after open colonic surgery. Gastroenterology. 2009;136(3):842-847.