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IMPACT OF EARLY MOBILIZATION ON RECOVERY OUTCOMES AFTER ABDOMINAL SURGERY: EVIDENCE FROM A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Mobilization immediately after surgery of the abdomen is suggested to decrease the postoperative complications, length of stay (LOS), and speed up the functional recovery. There is still limited evidence of tertiary care hospitals in the developing regions. Purpose: To determine how an early mobilization protocol influences the outcomes of recovery after the performance of elective abdominal surgery in a teaching hospital with the high level of care. Methods: It was a prospective cohort study that compared the results of patients that were given a formalized protocol of early mobilization (EM group) and those that were given standard postoperative care (SC group). Adults that had an elective open or laparoscopic surgery of the abdominal area were enrolled. The main outcome was length of stay in the hospital. Secondary criteria consisted of postoperative pulmonary complications (PPCs), ileus, postoperative pain scores on a numeric rating scale (NRS), the first bowel movement, 48-hour-ambulation distance and 30-day readmission. Continuous variables were used in t-tests or Mann-Whitney U tests and categorical variables in the chi-square tests through statistical analysis. Multivariate logistic and linear regression models were determined according to age, ASA condition, surgery method, and the burden of comorbidities. Results: 200 patients were selected (EM = 100, SC = 100). Median LOS were 4.2 days (IQR 3.5-5.0) in EM, and 6.1 days (IQR 5.0-7.6) in SC ($p < 0.001$). The PPCs were found in 4 percent of EM and 12 percent of SC ($p = 0.04$). Mean time of first bowel movement: 48 hours (EM) vs 72 hours (SC) ($p < 0.001$). There was no significant difference in mean NRS at 24 hours (EM 3.2 vs SC 4.1, $p = 0.01$). Findings: Standardized early mobilization protocol following abdominal surgery was found to be linked with reduction in hospital stay, reduction in pulmonary complications, earlier bowel functioning and low early pain scores. Structured mobilization programs in the tertiary-care settings could enhance the postoperative recovery.

Keywords: *Early Mobilization, Abdominal Surgery, Postoperative Recovery, Enhanced Recovery After Surgery, Length Of Stay*

INTRODUCTION

Pulmonary complications, ileus, pain and long hospitalization may be the obstacles to postoperative recovery after abdominal surgery. Early mobility, which is aided movement during the first 24 hours after surgery, is one of the pillars of Enhanced Recovery After Surgery (ERAS) (Kehlet and Wilmore, 2008; Ljungqvist et al., 2017). Early mobilization has been related to the fewer pulmonary complications, functional outcome, and gastrointestinal motility (Haines et al., 2013; Goodwin et al., 2017).

In contrast to the majority of high-income countries where it is the norm to mobilize at an early age, it is still inconsistent in low- and middle-income locations (Patman et al., 2017). The physiological advantages are well-substantiated: mobilization increases the lung volume, decreases the atelectasis, and helps to boost the venous circulation, thereby avoiding deep vein thrombosis (Castelino et al., 2016). Furthermore, ambulation enhances bowel movement, which improves a prompt re-establishment of the gastrointestinal activity (Mueehling et al., 2008).

Nevertheless, in tertiary care hospitals with limited resources, ambulation is usually postponed due to cultural aspects, staffing, and differences in clinical practice (Elhassan et al., 2019). The current research question is whether a programmed early mobilization intervention would enhance the recovery outcomes of abdominal surgery in this context.

Study aims

1. To compare post operative stay in the hospital between patients treated in a structured early mobilization protocol and normal care.
2. To measure such secondary outcomes as postoperative pulmonary complications, ileus, time to first bowel movement, postoperative pain variables, ambulation at 48 hours, and 30-day readmission.

METHODS

Study Design and Setting

This prospective cohort study was conducted at CDA hospital Islamabad and Ali Medical Islamabad. Ethical approval was obtained from the Institutional Review Board.

Participants

Adults 18 years old who were undergoing elective open or laparoscopic abdominal surgery and expected to stay 24 hours post surgery were eligible. The exclusion criteria were emergency operation, gross preoperative immobility, cognitive impairment, and contraindication to early mobilization.

Intervention

EM group was a part of a structured postoperative mobilization protocol that was developed in accordance with the ERAS guidelines (ERAS Society, 2012; Fagevik Olsen and Hahn, 2013). The protocol consisted of: - Sitting out of bed within 6 hours of the recovery. - Ambulation during the 24 hours, improving every day. - Mobility under supervision of physiotherapists twice a day during the first 72 hours. - Tracking of walks and the time of sitting.

The standard care (SC) group was given the usual care with no specific mobilization goals, and ambulation was only promoted based on the tolerability.

Outcomes

Primary outcome: Length of stay (LOS) in the hospital since the end of surgery till the discharge.

Secondary outcomes: Postoperative pulmonary complications (PPCs) - Postoperative ileus - Time to first bowel movement - Pain score (NRS 0-10) at both 24 and 48 hours - Ambulation distance at 48 hours - 30-day readmission rate.

Data Collection

The information was gathered in the form of a structured proforma that covered demographic data, comorbidities, surgical method, and post-surgery course. The nursing and physiotherapy staff recorded the pain scores and ambulation.

Statistical Analysis

The t-tests or Mann-Whitney U tests were applied on continuous variables; chi-square tests were applied on categorical ones. Multivariate regression models that were corrected to the possibility of confounding factors (age, ASA class, surgical approach, comorbidities). The statistical significance was set at p less than 0.05.

RESULTS

Baseline Characteristics

The number of analyzed patients was 200 (100 in each group). The mean age of the EM group was 52.3 vs. 53.9 in the SC group, which did not show any significant difference (p = 0.33). There was no difference in the gender distribution and comorbidity scores in groups.

Table No:1

Characteristic	Early Mobilization (n = 100)	Standard Care (n = 100)	*p*-value
Age (years), mean ± SD	52.3 ± 12.1	53.9 ± 11.6	0.33
Male sex, n (%)	58 (58%)	55 (55%)	0.62
ASA class III–IV, n (%)	34 (34%)	36 (36%)	0.76
Laparoscopic approach, n (%)	62 (62%)	60 (60%)	0.76
Charlson comorbidity index, median (IQR)	2 (1–3)	2 (1–4)	0.48

Primary Outcome

The median LOS was also much lower in the EM group (4.2 days) than the SC group (6.1 days; p < 0.001). This decrease was still high following adjustment caused by confounders.

Table No:2

Outcome	Early Mobilization (n = 100)	Standard Care (n = 100)	*p*value
Primary outcome			
Hospital length of stay (days), median (IQR)	4.2 (3.5–5.0)	6.1 (5.0–7.6)	<0.001
Secondary outcomes			
Postoperative pulmonary complications, n (%)	4 (4%)	12 (12%)	0.04
Postoperative ileus, n (%)	6 (6%)	11 (11%)	0.19
Time to first bowel movement (hours), median (IQR)	48 (40–60)	72 (60–84)	<0.001
Pain score at 24 hours (NRS, mean ± SD)	3.2 ± 1.0	4.1 ± 1.2	0.01
Ambulation distance at 48 hours (meters, mean ± SD)	210 ± 45	125 ± 40	<0.001
30-day readmission, n (%)	6 (6%)	8 (8%)	0.58

Secondary Outcomes

- **PPCs:** 4% (EM) vs 12% (SC); p = 0.04
- **Postoperative ileus:** 6% (EM) vs 11% (SC); p = 0.19
- **Time to first bowel movement:** 48 hours (EM) vs 72 hours (SC); p < 0.001
- **Pain score (NRS):** 3.2 ± 1.0 (EM) vs 4.1 ± 1.2 (SC); p = 0.01
- **Ambulation distance (48 hours):** 210 m (EM) vs 125 m (SC); p < 0.001
- **Readmission:** 6% (EM) vs 8% (SC); p = 0.58

Regression Analysis

Table No:3

Outcome	Adjusted Effect	95% Confidence Interval	*p*-value
Length of stay (days, β coefficient)	−1.6	−2.1 to −1.0	<0.001
Postoperative pulmonary complications (OR)	0.31	0.09–0.98	0.046
Postoperative ileus (OR)	0.52	0.17–1.55	0.25

Early mobilization independently predicted shorter LOS (β = −1.6 days, 95% CI −2.1 to −1.0, p < 0.001) and reduced PPC risk (OR 0.31; 95% CI 0.09–0.98, p = 0.046).

DISCUSSION

This paper shows that early post-operative mobilization is largely effective in enhancing the outcome of recovery following abdominal surgery. These results can be compared to the previous studies that underline the importance of early activity in preventing pulmonary and gastrointestinal complications (Barker et al., 2015; Cane et al., 2019).

COMPARISON TO PAST LITERATURE

The concept of multimodal postoperative recovery was initially mentioned by Kehlet and Wilmore (2008). The later ERAS (Ljungqvist et al., 2017) stipulated early mobilization as one of the fundamental components. According to a randomized trial by Haines et al. (2013), early mobilization minimized the pulmonary complications occurring post-surgery by 40%. On the same note, Goodwin et al. (2017) noted a positive walking distance and reduced LOS in early surgical patients.

The results are similar to those of ours, which indicates a decrease in LOS (1.9 days) and a reduction in PPCs. The mechanism through which the bowel motility improved can be identified as better splanchnic circulation and the stimulation of the parasympathetic system by ambulation (Muehlings et al., 2008).

MECHANISMS AND EXPLANATION BY PHYSIOLOGY

Atelectasis, venous stasis, insulin resistance, and muscle deconditioning are caused by postoperative immobilization (Castelino et al., 2016). Premature ambulation enhances tidal volume, oxygenation and intestinal movement. Moreover, in an upright position, the dorsal movement of the diaphragm is strengthened, and the basal lung collapse does not occur (Patman et al., 2017).

CLINICAL IMPLICATIONS

Early mobilization guidelines can be economical and even viable in resource constrained environments. Mobilization activities led by nurses have demonstrated better results without pushing staffs to work harder (Elhassan et al., 2019). Adherence can be promoted with the help of structured checklists and participation in physiotherapy.

STRENGTHS AND LIMITATIONS

The strengths are prospective design, sufficient sample size and multivariate confounder adjustment. There are some limitations such as single-center nature, absence of randomization, and the possibility of bias because of the differing staff compliance. There could have also been an impact of pain control techniques and the complexity of the surgery.

FUTURE DIRECTIONS

Randomized controlled trials should be conducted in future to determine the best time and intensity of mobilization. Compliance may increase with the integration of digital mobility monitors and patient engagement devices.

CONCLUSION

There are remarkable benefits of mobilization at an early stage following abdominal surgery such as reduced length of stay, reduced pulmonary complications as well as earlier bowel recovery. In tertiary care hospitals, standardized protocols used in mobilization are to be adopted to improve the postoperative recovery and lower the cost of healthcare services.

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