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FACTORS AFFECTING BOWEL MOTILITY FOLLOWING ABDOMINAL SURGERY: A CLINICAL STUDY

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Abstract

Background: Postoperative ileus (POI) is a common complication following abdominal surgery, characterized by delayed bowel motility. This study aimed to identify factors influencing bowel motility post-abdominal surgery and evaluate their impact on patient recovery.

Methods: This prospective observational study was conducted at the Department of Surgery, LN Medical College and associated JK Hospital, Bhopal. A total of 198 patients undergoing elective and emergency abdominal surgeries were included. Patients were categorized into four groups based on the time to regain bowel motility: within 24 hours (Group 1), 24-48 hours (Group 2), 48-72 hours (Group 3), and more than 72 hours (Group 4). Data on the type and duration of surgery, serum electrolyte levels, and postoperative recovery were collected and analyzed.

Results: The majority of patients (77.77%) regained bowel motility within 24 hours post-surgery. The type of surgery significantly influenced recovery, with all patients undergoing laparoscopic cholecystectomy regaining bowel motility within 24 hours. In contrast, patients undergoing laparotomy experienced the most significant delays, with only 67.65% regaining motility within 24-48 hours and 17.65% after more than 72 hours. The duration of surgery was also a critical factor, with mean durations of 58 minutes in Group 1, 76 minutes in Group 2, 91 minutes in Group 3, and 97.5 minutes in Group 4 ($P < 0.05$). Higher serum sodium and potassium levels were associated with faster recovery.

Conclusions: Minimally invasive surgical techniques and shorter surgery durations are associated with quicker recovery of bowel function following abdominal surgery. Maintaining optimal serum electrolyte levels is also crucial. These findings underscore the importance of efficient surgical practices and comprehensive perioperative care to enhance postoperative recovery and reduce the incidence of prolonged postoperative ileus.

Keywords: Postoperative ileus, bowel motility, abdominal surgery, laparoscopic surgery, serum electrolytes, surgical duration.

Introduction:

Postoperative bowel motility is a critical factor influencing recovery and overall outcomes in patients undergoing abdominal surgery. Disruption of normal bowel function, commonly referred to as

postoperative ileus (POI), is a frequent complication that can prolong hospital stays, increase healthcare costs, and adversely affect patient comfort and recovery[1]. The pathophysiology of POI is multifactorial, involving surgical trauma, opioid analgesia, inflammation, and autonomic dysfunction. Abdominal surgery, by its very nature, poses a substantial risk to bowel motility[2]. Surgical manipulation of the intestines can induce an inflammatory response, while postoperative pain management, often relying on opioid medications, further compounds motility issues by inhibiting gastrointestinal peristalsis[3]. Additionally, patient-specific factors such as age, comorbidities, and preoperative nutritional status can significantly influence postoperative bowel function[4].
Despite advances in surgical techniques and perioperative care, the incidence of POI remains significant. Understanding the various factors that affect bowel motility following abdominal surgery is crucial for developing effective strategies to prevent and manage this condition. This clinical study, conducted at the Department of Surgery, LN Medical College and associated JK Hospital, Bhopal, aims to identify and analyze the key factors impacting bowel motility in patients undergoing abdominal surgery. By examining these factors, the study seeks to provide insights that can enhance postoperative care and improve patient outcomes.

Material and Methods:

- **Study Design:** This was a prospective observational study conducted at the Department of Surgery, LN Medical College and associated JK Hospital, Bhopal. The study aimed to document the incidence of postoperative ileus (POI) and identify factors affecting bowel motility following abdominal surgery.
- **Study Population:** The study included 198 patients who underwent elective and emergency abdominal surgery. The inclusion and exclusion criteria were as follows:
- **Inclusion Criteria:** Patients undergoing elective and emergency abdominal surgery, irrespective of the cause.
- **Exclusion Criteria:**
  i. Patients aged below 18 years.
  ii. Patients with serious co-existing injuries besides gastrointestinal injuries that could contribute to increased morbidity and mortality.
- **Data Collection:** Data were collected preoperatively, intraoperatively, and postoperatively. The key variables recorded included:
- **Preoperative Data:** Patient demographics (age, gender); Medical history; Nutritional status; Comorbidities; Intraoperative Data; Type of surgery; Duration of surgery; Handling of bowel; Intraoperative fluid management
- **Postoperative Data:** Time to appearance of peristaltic sounds Time to passage of flatus and stool; Tolerance of oral feeds; Use of prokinetic agents; Serum electrolyte levels (sodium, potassium)
- **Postoperative complications** (e.g., infections, anastomotic leaks); Length of hospital stay; Assessment of Bowel Motility

The return of bowel function was assessed based on: Appearance of peristaltic sounds; Passage of flatus and stool; Tolerance of oral feeds
Clinical diagnosis of POI was established based on symptoms including worsened postoperative pain, nausea, vomiting, anorexia, abdominal bloating, abdominal distension, and lack of passage of flatus or stool. This diagnosis was further confirmed with an abdominal X-ray in erect and supine positions showing generalized distension of the bowels with the presence of air shadows in the distal colon/rectum.

- **Patient Grouping:** Patients were divided into four groups based on the time to appearance of bowel motility:

- Group 1: Within 24 hours
- Group 2: 24-48 hours
- Group 3: 48-72 hours

- Group 4: More than 72 hours

- **Statistical Analysis:** Data were analyzed using descriptive statistics to summarize patient characteristics and clinical outcomes. The association between various factors and postoperative bowel motility outcomes was assessed using Chi-square tests for categorical variables. One-way ANOVA or Kruskal-Wallis tests for continuous variables. A p-value of <0.05 was considered statistically significant for all analyses.
- **Ethical Considerations:** The study was conducted in accordance with the ethical standards of the Institutional Ethics Committee of LN Medical College and associated JK Hospital, Bhopal. Informed consent was obtained from all participants, and patient confidentiality was maintained throughout the study. Data were anonymized for analysis.

Results:

A total of 198 patients were included in the present study: 94 female (47.7%) and remaining 104 (52.3%) were male. The majority of female patients were in the 36–50-year age group (21.2%), followed by the 51-65 year age group (15.7%), and the 18-35 year age group (10.6%). Among male patients, the highest number of patients were in the 36–50-year age group (24.2%), followed by the 51–65-year age group (16.2%), and the 18-35 year age group (12.1%).

Table 1: Study Groups (n =198)

GROUP	Appearance of bowel motility	NUMBER OF PATIENTS	PERCENTAGE
GROUP 1	Within 24 hours	154	77.77%
GROUP 2	24-48 hours	32	16.16%
GROUP 3	48-72 hours	6	3.03%
GROUP 4	> 72 hours	6	3.03%

The study evaluated the time to appearance of bowel motility in 198 patients undergoing abdominal surgery. The distribution of patients based on the appearance of bowel motility is summarized in the table below: The findings in Table 1 indicate that the majority of patients (77.77%) had a rapid return of bowel motility within the first 24 hours following abdominal surgery, suggesting effective surgical and postoperative management in most cases. However, a small but significant percentage of patients experienced delayed bowel motility, highlighting the need for further investigation into the factors contributing to prolonged recovery times in these cases.

Type of Surgery

All patients who underwent laparoscopic cholecystectomy (45 patients) experienced the return of bowel motility within 24 hours, accounting for 100% of such cases. Among patients who underwent open cholecystectomy, 75% (6 out of 8 patients) regained bowel motility within 24 hours. For open appendectomy, 94.44% (34 out of 36 patients) regained bowel motility within 24 hours. **Laparoscopic Appendectomy:** 96.88% (31 out of 32 patients) experienced the return of bowel motility within 24 hours. **Ventral Wall Hernia:** 92.11% (35 out of 38 patients) regained bowel motility within 24 hours. A significant number of patients who underwent laparotomy experienced delayed bowel motility. None of the patients (0%) regained bowel motility within 24 hours. However, 67.65% (23 out of 34 patients) regained bowel motility between 24-48 hours, 14.71% (5 patients) between 48-72 hours, and 17.65% (6 patients) after more than 72 hours. These findings suggest that minimally invasive procedures are associated with faster recovery of bowel function compared to open surgeries, particularly laparotomy, which had the most significant delays in the return of bowel motility.

Table 2: Duration of Surgery (in minutes)

GROUP	MEAN	Range

GROUP 1	58	32-94
GROUP 2	76*	45-104
GROUP 3	91*	58-120
GROUP 4	97.5*	72-123
*- P-value < 0.05		

The findings given in table 2 indicate a clear trend where longer durations of surgery are associated with delayed bowel motility. The shortest surgery durations were observed in Group 1, while the longest durations were observed in Group 4. This suggests that minimizing the duration of surgery may contribute to quicker recovery of bowel function postoperatively.

Table 3: Serum Electrolyte in study groups

GROUP	SR. SODIUM	SR. POTASSIUM
GROUP 1	139.02+/- 2.02	4.2+/- 0.7
GROUP 2	139.82+/- 2.10	4.0+/- 0.9
GROUP 3	138.8+/- 1.05	4.1+/- 0.8
GROUP 4	137.57+/- 3.37	3.8+/- 1.02

The study evaluated serum sodium and potassium levels in patients undergoing abdominal surgery, categorized by the time to appearance of bowel motility. The findings given in Table 3 indicate that lower serum sodium and potassium levels are associated with delayed bowel motility. Patients with the quickest return of bowel function (Group 1) had higher levels of both electrolytes compared to those with prolonged postoperative ileus (Group 4). This suggests that maintaining optimal serum electrolyte levels may be beneficial for faster recovery of bowel function following abdominal surgery.

Discussion:

The findings from this study provide important insights into the factors influencing bowel motility following abdominal surgery. The analysis reveals a significant association between the type of surgery, duration of surgery, serum electrolyte levels, and the time to regain bowel motility postoperatively.

The type of surgical procedure was found to have a considerable impact on postoperative bowel motility. Laparoscopic procedures, particularly laparoscopic cholecystectomy, demonstrated a notably faster recovery of bowel function, with all patients (100%) regaining bowel motility within 24 hours. This is consistent with existing literature that highlights the benefits of minimally invasive techniques in reducing postoperative recovery times and complications[5–7].

In contrast, open surgeries exhibited varying outcomes. While a majority of patients undergoing open appendectomy (94.44%) and open cholecystectomy (75%) regained bowel motility within 24 hours, there were still delays observed in a subset of these patients. The most significant delays were observed in patients undergoing laparotomy, where none of the patients regained bowel motility within 24 hours. The delayed recovery in laparotomy patients, with 67.65% regaining motility between 24-48 hours and 17.65% after more than 72 hours, underscores the extensive impact of open surgical techniques on bowel function.

The study findings provide significant insights into the relationship between the duration of surgery and postoperative bowel motility in patients undergoing abdominal surgery. The analysis reveals a clear trend where longer durations of surgery are associated with delayed recovery of bowel function. The statistically significant differences in mean surgery durations between the groups (P-value < 0.05) suggest that longer surgical times are correlated with delayed postoperative bowel motility. This correlation underscores the importance of minimizing the duration of surgery to enhance postoperative recovery[1,8,9].

Group 1, which regained bowel motility within 24 hours, had surgery durations ranging from 32 to 94 minutes. In contrast, Group 4, which experienced the most delayed recovery, had the longest surgery durations, ranging from 72 to 123 minutes. This finding aligns with the hypothesis that longer surgical times may contribute to increased stress and trauma to the bowel, thereby prolonging the recovery period[10,11]. The findings of this study highlight the need for surgical teams to focus on efficiency and precision during abdominal procedures to reduce the duration of surgery[12–14]. Shorter surgical times not only minimize trauma to the bowel but also reduce the overall stress on the patient's body, thereby facilitating quicker recovery of bowel function.

Several mechanisms may explain the observed relationship between longer surgery durations and delayed bowel motility: Longer surgeries may involve more extensive handling of the bowel, leading to increased inflammation and stress responses that inhibit bowel motility[3,4,15]. Extended exposure to anesthetic agents can affect autonomic nervous system function, further delaying the return of normal gastrointestinal motility[8,9]. Longer surgeries often require more extensive fluid management, which can disrupt electrolyte balance and impact bowel function postoperatively.

Serum electrolyte levels, particularly sodium and potassium, were found to be significantly associated with the time to regain bowel motility[2,6]. Higher serum sodium and potassium levels were observed in patients with quicker recovery times. Group 1 had mean serum sodium and potassium levels of 139.02 ± 2.02 mEq/L and 4.2 ± 0.7 mEq/L, respectively. In contrast, Group 4, which had the most delayed recovery, exhibited lower mean levels of 137.57 ± 3.37 mEq/L for sodium and 3.8 ± 1.02 mEq/L for potassium. These results suggest that maintaining optimal electrolyte balance is essential for facilitating quicker recovery of bowel function post-surgery.

The study's findings highlight the importance of minimally invasive surgical techniques, shorter surgery durations, and maintaining optimal serum electrolyte levels to enhance postoperative bowel motility. Surgeons and healthcare providers should consider these factors when planning and managing abdominal surgeries to minimize the risk of prolonged postoperative ileus and improve patient outcomes[16–19].

Limitations: While this study provides valuable insights, it is essential to acknowledge its limitations. The study was conducted at a single institution, which may limit the generalizability of the findings. Additionally, the observational nature of the study precludes establishing causation. Future studies with larger, multicentric cohorts and randomized controlled trials are needed to validate these findings and further elucidate the mechanisms underlying postoperative bowel motility.

In conclusion, the study underscores the significant impact of surgical technique, duration, and electrolyte balance on bowel motility following abdominal surgery. By optimizing these factors, healthcare providers can enhance postoperative recovery and reduce the incidence of prolonged postoperative ileus.

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Conflict of Interest: None

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