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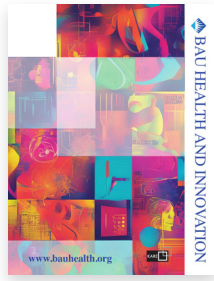

Original Article

Investigation of the effect of post-operative mobilization on bowel movements in neurosurgery patients; The case of Uludağ University faculty of medicine hospital

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Abstract

Objectives: Post-operative gastrointestinal dysfunction is common after neurosurgical procedures and may prolong hospitalization. Early mobilization is a key intervention in enhanced recovery after surgery-based nursing care to facilitate the timely return of bowel activity. Objective: The aim of the study was to examine the association between post-operative mobilization timing and recovery of bowel function (first bowel sound, first flatus, and first defecation) in neurosurgical patients.

Methods: This descriptive correlational study was conducted at a tertiary neurosurgical center between August 02, 2023, and February 02, 2024. A total of 178 adults who underwent brain or spinal surgery and met the inclusion criteria were included in the study. Data were collected using a semi-structured form covering demographics, perioperative variables, time to first mobilization, and bowel function indicators. Normality was assessed; due to non-normal distributions, Mann–Whitney U, Kruskal–Wallis, and Spearman correlation tests were used (IBM the Statistical Package for the Social Sciences 25.0). The significance level was set at $p<0.05$.

Results: The mean time to first mobilization was 18.94±19.09 h. The mean times to the first bowel sound, first flatus, and first defecation were 6.83±2.11 h, 13.30±7.21 h, and 34.30±20.67 h, respectively. Early mobilization was significantly associated with shorter bowel recovery times across outcomes ($p<0.001$ for all non-parametric comparisons). Correlation analyses confirmed significant associations between mobilization timing and each bowel function indicator.

Conclusion: The findings support the integration of structured early mobilization into routine post-operative nursing care for neurosurgical patients to accelerate gastrointestinal recovery and potentially reduce post-operative complications.

Keywords: Bowel movement, early mobilization, enhanced recovery after surgery, neurosurgery, nursing, post-operative.

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Post-operative gastrointestinal dysfunction is a common complication, especially in patients undergoing neurosurgery. This condition negatively affects patient comfort and prolongs the length of hospital stay required. Early mobilization, a key step in enhanced recovery after surgery (ERAS) protocols aimed at accelerating post-operative recovery, increases the effectiveness of the respiratory and circulatory systems and raises intra-

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abdominal pressure, stimulating the parasympathetic system and accelerating peristaltic movements.[1,2] In this context, many studies have indicated that early mobilization speeds up the onset of post-operative bowel movements and leads to earlier passage of gas and stools. Despite this, mobilization in neurosurgery patients is often delayed due to post-operative pain, changes in neurological status, or nurse shortages contribute to this situation. Prolonged immobility increases the risk of constipation and bowel inactivity, reduces patient comfort, and leads to complications.[1–3]

Early mobilization, defined as initiating movement within the first 24 h after surgery, tailored to the patient's physical and neurological status, is now considered a cornerstone of post-operative nursing care.[4,5] Moving soon after surgery benefits multiple systems: It improves respiratory and circulatory efficiency, stimulates peristaltic activity through abdominal pressure changes, and supports parasympathetic activation.[6,7] A consistent body of evidence suggests that patients who begin moving earlier tend to regain bowel sounds, pass flatus, and defecate sooner than those who experience delayed mobilization.[8–10]

Despite this evidence, mobilization is often postponed after neurosurgical operations. Factors such as pain, neurological instability, and lack of nursing personnel can contribute to this delay.[11] However, prolonged immobility may worsen constipation and other gastrointestinal disturbances, reducing comfort and slowing recovery.[12–14] Previous studies have reported that constipation affects 15–85% of neurosurgical patients, depending on factors such as age, comorbidities, and medication use.[15–17]

Because nurses spend the most time with post-operative patients, their role is vital in ensuring that mobilization occurs safely and effectively. Through regular assessments and encouragement, nurses help patients regain bowel activity and prevent related complications.[18,19] Incorporating evidence-based practices such as early mobilization has been shown to improve both physical recovery and emotional well-being, enhancing the overall quality of care.[20]

The present study investigated how the timing of post-operative mobilization relates to the recovery of bowel function in neurosurgical patients. By identifying these relationships, we aim to highlight the value of structured nursing interventions within ERAS-based post-operative care.

Materials and Methods

Study Design and Setting

This research was conducted as a descriptive and correlational study aimed at examining how early post-operative mobilization influences the recovery of bowel movements in patients who underwent brain or neurosurgical procedures. This study focused on evaluating the contribution of early mobilization to the normalization of gastrointestinal system function during the post-operative period. Data were collected at a tertiary health institution in Türkiye between August 02, 2023, and February 02, 2024.

Ethical Considerations

Ethical approval for this study was obtained from a university medical faculty ethics committee in Türkiye (Decision No: 2023-16/15, dated August 01, 2023). Written informed consent was obtained from all participants before data collection. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Participants

The study population consisted of adult patients who underwent surgery at the neurosurgery clinic during the specified dates. As a result of the sample size calculation, at least 203 patients were determined; however, during the study period, 178 patients who met the inclusion criteria participated in the study. Participation was based on voluntariness, and individuals who were ≥18 years of age, had undergone brain or spinal cord surgery, did not have any gastrointestinal system diseases, and did not use laxatives were included in the study.

Although 203 patients initially met the eligibility criteria, 25 were excluded from the analysis. Of these, 11 declined to participate, five had incomplete post-operative bowel function records, four required reoperation during the post-operative period, and five developed complications that prevented safe mobilization. The final sample consisted of 178 patients who met all the inclusion criteria and completed the data collection process.

Data Collection

The data were collected using the "Patient Information Form" prepared by the researcher. This form included information such as demographic details, pre-operative and post-operative clinical data, time of first mobilization, first bowel sound, first passage of gas, and time of first defecation.

Early mobilization after surgery was initiated by explaining it to the patient before the procedure. Initially, patients were seated at the edge of the bed and then assisted to stand with the support of healthcare personnel. The duration and distance of mobilization were gradually increased according to the patient endurance. Mobilization was planned in 3-min intervals and implemented safely. In

the assessment of post-operative bowel function, the times of the first bowel sound, first passage of gas, and first bowel movement were recorded.

Early mobilization was planned in accordance with the ERAS recommendations for neurosurgical patients. The ERAS guidelines emphasize initiating mobilization within the first 24 h postoperatively, unless contraindicated. A progressive mobilization protocol was followed, beginning with sitting at the edge of the bed, followed by assisted standing and ambulating. This structured progression aligns with evidence-based ERAS practices aimed at improving post-operative gastrointestinal recovery outcomes.

The patient information form was developed by the researchers based on the ERAS guidelines, previous studies, and neurosurgical nursing practice standards. To ensure content validity, the form was reviewed by three experts in neurosurgical nursing and post-operative care, and minor revisions were made based on their feedback. Since the form consists of objective clinical variables rather than Likert-type scale items, internal consistency reliability analyses such as Cronbach's alpha were not applicable.

Statistical Analysis

IBM Statistical Package for the Social Sciences Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA) software was used for data analysis. Descriptive statistics (mean, standard deviation, percentage, and frequency) were calculated, and the assumption of normal distribution was evaluated using the Shapiro–Wilk test. Since the data were found not to be normally distributed, Mann–Whitney U, Kruskal–Wallis, and Spearman correlation analyses were applied. The level of statistical significance was set at $p<0.05$.

Results

The data obtained from the study showed that 51.7% of the patients were female, 85.6% were married, and 88.6% had a high school education or below. The average age was 55.09 ± 14.74 years, and the average body mass index (BMI) was 29.53 ± 16.65. It was observed that 57.3% of the patients participating in the study had a chronic illness, and 56.7% regularly used medication. When patients were evaluated according to the type of surgery they underwent, 50.6% had spinal surgery and 98.3% had open surgical procedures (Table 1).

Before surgery, 57.9% of the patients reported regular daily bowel movements, whereas 33.7% defecated every 2–3 days. The mean pre-operative fasting time was 7.21±2.00 h, and the mean intravenous (IV) fluid administered preoperatively was 429.49±443.90 mL (Table 2).

Table 1. Demographic and clinical characteristics of the patients (n=178)

Variables	Categories	n (%)/mean±SD
Gender	Female/male	92 (51.7)/86 (48.3)
Marital status	Married/single	155 (85.6)/26 (14.4)
Education level	Illiterate/≤ High school/ ≥ University	6 (3.4)/152 (85.4)/ 20 (11.2)
Chronic disease	Yes/No	102 (57.3)/76 (42.7)
Regular medication	Yes/No	101 (56.7)/77 (43.3)
Type of surgery	Spinal/ıntracranial	90 (50.6)/88 (49.4)
Surgical method	Open/laparoscopic	175 (98.3)/3 (1.7)
Mean age (years)	—	55.09±14.74 (19–88)
BMI (kg/m^2)	—	29.53±16.65 (17–42)

SD: Standard deviation, BMI: Body mass index

Table 2. Pre-operative bowel habits and health characteristics (n=178)

Variables	Categories/ mean±SD	n (%)/range
Routine defecation	Daily	103 (57.9)
	Every 2–3 days	60 (33.7)
	Every 4–5 days	15 (8.4)
Pre-operative fasting time (h)	7.21±2.00	4–14
IV fluid before surgery (mL)	429.49±443.90	0–1500

SD: Standard deviation, IV: Intravenous

Table 3. Post-operative bowel function and mobilization data (n=178)

Variable	Mean±SD	Min-Max
IV fluid during surgery (mL)	1937.64±755.57	100–4000
Duration of surgery (h)	2.3±2.2	0.5–6
Time to first mobilization (h)	18.94±19.09	2–72
Time to first flatus (h)	13.30±7.21	3–40
Time to first bowel sound (h)	6.83±2.11	4–24
Time to first defecation (h)	34.30±20.67	4–96

SD: Standard deviation. All values are expressed as mean±SD (min–max). Lower values indicate a faster recovery

Post-operative Mobilization and Bowel Function Findings

The mean intraoperative IV fluid volume was 1937.64±755.57 mL, and the mean surgery duration was 2.3±2.2 h. Postoperatively, the mean time to first mobilization was 18.94±19.09 h, the first passage of flatus occurred at 13.30±7.21 h, the first bowel sound at 6.83±2.11 h, and the first defecation at 34.30±20.67 h (Table 3).

Table 4. Normality test results for mobilization time

Variable	Skewness	Kurtosis	Kolmogorov–Smirnov p
Time to first mobilization	1.394	1.418	<0.001

Interpretation: Data were non-normally distributed, and non-parametric tests were applied

Table 5. Comparison of mobilization time by flatus passage time (n=178)

Flatus passage time	n	Mean rank	p
≤12 h	105	75.09	<0.001
>12 h	73	110.23	

Spearman ρ=0.333, p<0.005 – weak positive correlation

Table 6. Relationship between mobilization time and bowel sound

Bowel sound time	Test statistic	p	Correlation (r)
≤6 h/7–12 h/≥12 h	χ^2=2.00	<0.001	–0.370

Spearman ρ=–0.370, p<0.005–moderate negative correlation

Table 7. Relationship between mobilization and defecation times

Variable	Correlation (r)	p
Mobilization ↔ defecation	0.779	<0.005

Spearman ρ=0.779, p<0.005–Strong positive correlation

Normality and Correlation Analysis

According to the Kolmogorov–Smirnov test and skewness–kurtosis values, the data were not normally distributed (p<0.001). Therefore, non-parametric analyses were performed (Table 4).

Relationship between Mobilization Time and Bowel Recovery

A statistically significant relationship was observed between mobilization time and all bowel function variables. Patients who were mobilized earlier experienced earlier gas passage, bowel sounds, and defecation.

A weak positive correlation was found between mobilization time and time to first flatus (r=0.333, p<0.005) (Table 5). Similarly, a significant relationship was identified between mobilization time and time to first bowel sound (p<0.001), with a moderate negative correlation (r=-0.370, p<0.005) (Table 6).

Finally, mobilization time was strongly positively correlated with time to the first defecation (r=0.779, p<0.005). Patients mobilized within the first 24 h after surgery achieved earlier defecation than those mobilized later (p<0.001) (Table 7).

Discussion

According to the findings of the study, the gender distribution of the participants was quite balanced (51.7% female, 48.3% male), with the majority being married (85.6) and having a high school education or lower (88.8%). The average age of the participants was determined to be 55.09±14.74 years, and their BMI was 29.53±16.65. It was found that 57.3% of the participants had a chronic illness, and 56.7% used medication regularly. These findings are consistent with previous studies reporting that surgical patients are typically middle-aged, have a higher BMI, and frequently present with chronic diseases.[5,9,11] Although chronic diseases are generally considered a factor that increases the risk of post-operative complications, this study found that they did not have a statistically significant effect on bowel functions. Durgun and Avcı (2020) also indicated that chronic diseases do not have a noticeable effect on bowel functions.[14] This finding shows that in parallel with the literature, the evaluation of bowel functions in terms of complications in individuals with chronic diseases is similar when early mobilization is applied.

Within the scope of the study, when the patients' pre-operative bowel habits were examined, it was found that the majority had a daily bowel movement (57.9%), the average pre-operative fasting period was 7.21±2.00 h, and the amount of IV fluid administered during surgery was 1937.64±755.57 mL. A significant relationship was found between the time to early post-operative mobilization and the time for bowel functions (first passage of gas, first bowel sound, and first defecation) to return. This finding is consistent with other studies in the literature. Kırtıl and Kanan (2021) stated that early mobilization stimulates gastrointestinal system functions and accelerates peristaltic movements.[9] Similarly, Terzioğlu (2013) demonstrated that early mobilization shortens the time to the first post-operative passage of gas and speeds up the patients' recovery process.[15]

In the study, a weak positive correlation was found between the time to first mobilization and the time to first passage of gas; a moderate negative correlation was found between the time to first mobilization and the time to first bowel sounds; and a strong positive correlation was found with the time to first defecation. These results are consistent with the findings of a study that reported that early mobilization increases bowel activity.[10] In another study, it was noted that patients mobilized within 4 h after surgery experienced earlier defecation and accelerated

gastrointestinal motility.[16,21] This indicates that early mobilization plays an important role in the normalization of post-operative bowel functions.

According to the results in the literature, early mobilization has been shown to not only improve physiological recovery but also enhance patient comfort and quality of care. Nurses play a key role in ensuring the safe implementation of early mobilization and motivating patients in the post-operative period.[5,16,19,20] Therefore, early mobilization should be planned as a standard nursing practice in the post-operative care of neurosurgery patients.

Limitations

Although the study was initially planned to include 203 participants, data could be collected from 178 individuals, which may have slightly reduced the statistical power of the findings. Since the study was conducted in a single center, the generalizability of the results is limited. Moreover, mobilization was evaluated as a single ERAS component; other multimodal interventions such as early oral hydration, chewing gum, or analgesia optimization were not assessed. The lack of a standardized institutional mobilization protocol may also have introduced variability in clinical practice. As this was a descriptive study, controlled or comparative analyses (e.g., ERAS vs. non-ERAS groups or early vs. delayed mobilization groups) could not be performed. Future randomized or controlled studies with standardized mobilization pathways and comprehensive ERAS components are recommended to better evaluate causal effects and to obtain more comparable post-operative outcomes. In addition, close monitoring of clinical indicators such as flatus, stool passage, defecation frequency, oral fluid intake, nausea, vomiting, and abdominal distension remains crucial for accurately supporting postoperative gastrointestinal recovery.

Conclusion

This research demonstrates that initiating mobilization soon after neurosurgical procedures significantly accelerates the return of bowel activity. The results emphasize that the timing of the first mobilization, rather than chronic comorbidities, is the primary factor affecting post-operative bowel recovery. Integrating structured early mobilization into nursing care not only promotes physiological recovery but also enhances patient comfort and reduces potential complications.

Based on the study findings, it is recommended that nurses assess patients' neurological and hemodynamic status early after surgery and initiate progressive mobilization within the first 24 h when clinically appropriate. Nurses should regularly monitor bowel sounds, flatus, abdominal distension, and fluid intake/output as indicators of gastrointestinal recovery. Mobilization should be individualized according to patient tolerance, and all sessions should be documented in a standardized manner. Providing patient education regarding the benefits of early mobilization and offering psychological support may also enhance adherence and improve postoperative outcomes.

Encouraging patients to ambulate as early as their clinical condition allows should be considered a standard component of postoperative nursing practice. Consistent implementation of ERAS-based mobilization protocols may shorten hospital stays, improve patient satisfaction, and contribute to safer and more effective surgical recovery.

Disclosures

Ethics Committee Approval: The study was approved by the Bursa Uludağ University Faculty of Medicine Ethics Committee (no: 2023-16/15, date: 01/08/2023).

Informed Consent: Written informed consent was obtained from all participants before data collection.

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