Effects of Abdominal Massage for Preventing Acute Postoperative Constipation in Hip Fractures: A Prospective Interventional Study

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Background: This prospective randomized controlled study aimed to determine the effects of abdominal massage on constipation management in elderly patients with hip fractures.

Methods: From August 2017 to December 2018, patients aged above 65 years with hip fractures (n = 88) were randomly assigned to a massage group that received a bowel massage (n = 48) or a control group that did not receive a bowel massage (n = 40). Patients in the bowel massage group received a bowel massage from a trained caregiver after breakfast at approximately 9:00 AM for an hour. On admission, 5 days after surgery, and on the day of discharge, the patient's normal and actual defecation pattern, stool consistency, and any problems with defecation were assessed through a structured interview. The questionnaire comprising the Bristol Stool Scale, patient assessment of constipation, time to defecation, medication for defecations, failure to defecate, cause of admission, admission period, and date of surgery were recorded. Statistical analyses were performed 5 days after surgery and on the day of discharge.

Results: The mean age of the study cohort was 81.4 years (range, 65–99 years). The number of constipation remedies was significantly lower in the massage group than in the control group on postoperative day (POD) 5 and at discharge (9 vs. 15, $p = 0.049$ and 6 vs. 11, $p = 0.039$, respectively). The number of defecation failures was significantly lower in the massage group than in the control group (10 vs. 17, $p = 0.028$) on POD 5. However, the number of defecation failures at discharge was not significantly different between the two groups ($p = 0.131$). The development of postoperative ileus ($p = 0.271$) and length of hospital stay ($p = 0.576$) were not different between the groups.

Conclusions: The number of constipation remedies was significantly lower in the massage group than in the control group on POD 5 and discharge, and the number of defecation failures was significantly lower in the massage group than in the control group on POD 5. Therefore, abdominal massage may be considered as an independent nursing initiative for constipation management.

Keywords: *Massage, Constipation, Hip fracture, Postoperative complication*

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Constipation is a common problem in aged individuals with hip fractures owing to immobility, opioid prescription, and lack of privacy.[1,2] Several factors can contribute to constipation in critically ill patients, including immobility, dehydration, and the use of sedatives, opioids, and vasopressors.[3-5] The prevalence of constipation varies from 4.1% to 84%.[1,6-12] A prevalence study conducted in an adult orthopedic setting demonstrated that 50% of the patients experienced constipation after orthopedic surgery.[13] Additionally, 71.7% of patients with femur neck fractures exhibited constipation in the orthopedic department.[14]

Constipation in elderly patients with hip fractures is frequently overlooked in perioperative patient care and increases the risk of postoperative complications that can prolong hospital stay and increase inpatient charge.[15,16] There are several methods used for the management of constipation.[17-19] Methods suggested for preventing or treating constipation in older populations include fiber supplements,[18] laxative agents,[19] and nonpharmacological management including abdominal massage.[17]

To minimize the heterogeneity caused by different types of diagnoses, we decided to select patients who underwent internal fixation or arthroplasty for hip fracture. This prospective randomized controlled study aimed to determine the effects of abdominal massage on constipation management in elderly patients with hip fractures.

METHODS

The study was approved by Institutional Review Board of Chung-Ang University Hospital (No. 1730-001-272). All patients were provided with written and oral information regarding the study and participated after giving their written consent. Participation in the study was fully voluntary, and the patients were able to withdraw any time during the study.

Study Design

This prospective randomized controlled study comprised 165 patients aged above 65 years who were admitted to the orthopedic department for surgery and possibly had constipation[4,14] between August 2017 and December 2018. Of the 165 patients, 16 who were discharged within 5 days after surgery and 61 who took laxatives during the admission period were excluded. The remaining 88 patients were randomly assigned to a massage group that received a bowel massage (n = 48) or a control group that did not receive a bowel massage (n = 40).

In this randomized, single-blinded study, random-ization into one of the two study groups was performed using Microsoft Excel (Microsoft) to generate random numbers. Group allocations were made by a statistician who did not otherwise participate in the study and was unknown to the investigators and patients. The allocations were placed in a set of sealed envelopes. One hour before surgery, the appropriately numbered envelope was opened and the card inside determined the group allocation.

Demographics and Complications Questionnaire

A data collection form was developed by the researchers and was composed of patient characteristics including demographics, preoperative activity using Koval's categories,[20] body mass index (BMI), previous abdominal surgery, diabetes mellitus, smoking history (active, smoking in the past year, and nonsmoker), preoperative chronic opioid use (> 1 month), type of anesthesia, and American Society of Anesthesiologists (ASA) score. Intraoperative data included the operation time, estimated blood loss, and the total amount of transfusion. Postoperative data included the use of opioid patient-controlled analgesia (PCA), the volume of oral intake, time for passage of flatus, time to defecations, and length of postoperative stay.

Intervention

Prior to starting the intervention, personal caregivers or patient's family members were educated to standardize abdominal massage. Patients in the bowel massage group received a bowel massage from a trained caregiver after breakfast at approximately 9:00 AM for an hour. On admission, 5 days after surgery, and on the day of discharge, the patient's normal and actual defecation pattern, stool consistency, and any problems with defecation were assessed through a structured interview. The questionnaire comprising the Bristol Stool Scale, patient assessment of constipation-symptoms (PAC-SYM), time to defecation, medication for defecation, defecation failure (defined as failure to defecate although the patient tries to defecate for more than 30 minutes), cause of admission, admission period, and date of surgery were recorded.

Measurements

The primary outcome was a change in the scores, including Bristol Stool Scale, PAC, constipation remedy for defecation including laxatives and/or enemas, and defecation failure in the two groups. Postoperative ileus and duration of hospitalization were also assessed and compared between the two groups during the same period to investigate whether bowel massage prevented constipation.

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Table 1. Demographic Data

Variable	Massage group (n = 48)	Control group (n = 40)	p-value
Age (yr)	81.3 ± 7.0	81.5 ± 7.5	0.902
Sex (male : female)	17 : 31	10 : 30	0.291
BMI (kg/m^2)	21.5 ± 3.1	23.7 ± 4.2	0.100
History of constipation	12	14	0.784
Previous abdominal surgery	8	4	0.364
Diabetes	18	12	0.460
Smoking history			
Active smoker	12	3	0.094
Chronic opioid use	0	0	-
PAC	4.8 ± 7.2	4.7 ± 5.6	0.919
Time to defecation (min)	7.5 ± 8.4	10.1 ± 7.6	0.131
Constipation remedy	8	10	0.412
Defecation failure	13	13	0.155
Preoperative physical activity (Koval Grade)			0.899
Outdoor ambulation (grade 1 − 3)	44	4	
Indoor ambulation (grade 4 − 7)	34	6	
ASA score			0.533
2	26	22	
3	22	17	
4	0	1	
Diagnosis			0.057
Neck fracture	21	10	
Intertrochanteric fracture	23	29	
Subtrochanteric fracture	4	1	
Type of operation			0.478
Internal fixation	14	9	
Arthroplasty	34	31	

Table 1. Continued

Variable	Massage group (n = 48)	Control group (n = 40)	p-value
Anesthesia			0.968
General	19	16	
Spinal	29	24	
Surgery time (min)	64.4 ± 26.8	64.8 ± 14.5	0.921
Postoperative PCA	48	40	1.000

Values are presented as mean ± standard deviation or number.
BMI: body mass index, PAC: patient assessment of constipation, ASA: American Society of Anesthesiologists, PCA: patient-controlled analgesia.

Statistics

Based on previous research results,[21] the number of subjects was calculated using G power 3.1.9 (Franz Faul; University of Kiel). The sample size was calculated by setting effect size of 0.65, α error (two-sided) of 5%, and statistical power of 80% (β error = 0.20). The sample size was 30 patients per group and a total of 60 patients were required. Considering a drop-out rate of 30%, the sample size was determined to be 40 per group.

For the statistical analysis of the data, descriptive statistics were performed to evaluate the demographic and clinical characteristics of the patients. Independent t-tests and chi-square tests were performed to evaluate the homogeneity of the two groups. The McNemar test and t-tests were used to compare the dependent variables. Statistical significance was set at $p < 0.05$. For statistical analyses, we used IBM SPSS ver. 22.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Participant Characteristics

The demographic characteristics of the study cohort are shown in Table 1. The mean age of the study cohort was 81.4 years (range, 65–99 years). Both groups were balanced in terms of sex, BMI, and smoking history. Both groups were comparable for other baseline characteristics including indications for surgery, type of anesthesia, operation time, PAC-SYM, time to defecation, medication for defecation, failure to defecate, ASA, intraoperative surgical variables, and the use of postoperative PCA.

Comparisons of the PAC, Time to Defecation, Constipation Remedy, and Defecation Failure between the Two Groups

As primary outcomes, although PAC and time to defecation showed improved trends in the massage group, there were no significant differences between the two groups on postoperative day (POD) 5 and at discharge. The number of constipation remedy was significantly lower in the massage group than in the control group on POD 5 and at discharge (9 vs. 15, $p = 0.049$ and 6 vs. 11, $p = 0.039$, respec-

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tively). The number of defecation failures was significantly lower in the massage group than in the control group (10 vs. 17, $p = 0.028$) on POD 5. However, the number of defecation failures at discharge was not significantly different between the two groups ($p = 0.131$). The Bristol Stool Scale score showed no statistically significant differences between the two groups during the study period. Additionally, the development of postoperative ileus ($p = 0.271$) and length of hospital stay ($p = 0.576$) were not statistically significantly different between the groups (Table 2).

DISCUSSION

Constipation is a common problem and important causal factor for hospitalization in elderly patients with hip fractures. This prospective randomized controlled study aimed to determine the effectiveness of abdominal massage in such patients. The number of constipation remedies was significantly lower in the massage group than in the control group on POD 5 and at discharge, and the number of defecation failures was significantly lower in the massage group than in the control group on POD 5.

Nonpharmacological clinical effectiveness in constipation is still controversial and requires evidence-based data.[22] Birimoglu Okuyan and Bilgili[23] performed a randomized control group pre-test–post-test design study to assess the efficacy of abdominal massage for alleviating constipation in 35 participants. They reported that abdominal massage was effective in constipation management ($p < 0.005$). Moreover, the difference between the experimental and control groups was statistically significant ($p < 0.001$) in terms of Constipation Quality of Life Scale post-test scores.[23] Additionally, Yildirim et al.[21] performed a randomized controlled study involving 204 patients and reported that abdominal massage decreased the severity of constipation, feeling of incomplete bowel emptying, severity of straining, severity of anal pain, and bloating ($p < 0.05$); it also provided better stool consistency ($p < 0.05$), and increased the number of defecations and the quality of life scores ($p < 0.05$). The current study results are consistent with those of previous studies.[21-23] In our study, the number of constipation remedies was significantly lower in the massage group than in the control group on POD 5 and at discharge, and the number of defecation failures was significantly lower in the massage group than in the control group on POD 5.

The methods and times of abdominal massage are quite different and possible methods include massage by patients themselves after education, by researchers, and by caregivers after education.[17,21] In the current study, we had

caregivers to perform abdominal massage after training. Although a comparison of the efficacy of these abdominal massage methods has not been reported, abdominal mas-

Table 2. Postoperative Outcomes after Bowel Massage in the Two Groups

Variable	Massage group (n = 48)	Control group (n = 40)	p-value
Preoperative 5 days			
PAC	4.5 ± 5.3	5.7 ± 4.5	0.242
Time to defecation (min)	9.6 ± 8.3	9.9 ± 8.7	0.873
Constipation remedy	9	15	0.049
Defecation failure	10	17	0.028
Bristol Stool Scale			0.518
Type 1	8	7	
Type 2	11	8	
Type 3	11	5	
Type 4	5	11	
Type 5	6	4	
Type 6	5	4	
Type 7	2	1	
At discharge			
PAC	2.9 ± 4.3	3.5 ± 5.9	0.539
Time to defecation (min)	8.4 ± 4.8	9.3 ± 7.6	0.544
Rescue medication	5	11	0.039
Defecation failure	6	10	0.130
Bristol Stool Scale			0.640
Type 1	5	2	
Type 2	6	3	
Type 3	15	16	
Type 4	13	15	
Type 5	5	3	
Type 6	3	1	
Type 7	1	0	
Postoperative ileus	0	1	0.271
Hospitalization (day)	10.8 ± 3.7 (6–28)	11.1 ± 3.2 (7–29)	0.576

Values are presented as mean ± standard deviation (SD), number, or mean ± SD (range).
PAC: patient assessment of constipation.

sage in elderly patients might decrease the frequency of defecation failure.

This study has several limitations. First, it was conducted on 88 elderly patients with hip fractures and concerns of constipation at a single tertiary university hospital; therefore, it might not be sufficient to draw concrete conclusions. Second, the method and times of abdominal massage were not the same as and were difficult to compare with those from other studies.[17,21] In addition, although the patients' caregivers were educated, individual differences in the massage technique might have influenced the effects of massage. Despite these differences, it is worthwhile to consider abdominal massage to reduce the frequency of constipation in elderly patients with hip fractures. Third, patient's usual defecation status or habit before the surgery might have influenced the outcomes. Fourth, although the number of constipation remedies and the number of defecation failures were significantly lower in the massage group than in the control group, there were no significant statistical differences in critical endpoints such as PAC and time to defecation. As such, it might be difficult to draw convincible outcomes for readers to implement a new protocol for their patients. Fifth, the reason for choosing POD 5 was based on the report that absence of defecation was tolerated for up to 5 days unless symptoms of obstipation were present[24] and patients who had acute stage complications such as pneumonia, thromboembolism, and cardiovascular events were excluded within POD 5. Finally, we focused on the early postoperative period. However, we did not anticipate any differences between the groups after discharge. Additional studies are required to determine whether there is a decrease in the incidence and severity of chronic constipation.

In conclusion, this prospective randomized controlled study aimed to determine the effectiveness of abdominal massage in elderly patients with hip fractures. The number of constipation remedies was significantly lower in the massage group than in the control group on POD 5, and the number of defecation failures was significantly lower in the massage group than in the control group on POD 5. Therefore, abdominal massage may be considered as an independent nursing initiative for constipation management.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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REFERENCES

1. Gandell D, Straus SE, Bundookwala M, Tsui V, Alibhai SM. Treatment of constipation in older people. CMAJ. 2013; 185(8):663-70.

2. Marciniak CM, Toledo S, Lee J, et al. Lubiprostone vs Senna in postoperative orthopedic surgery patients with opioid-induced constipation: a double-blind, active-comparator trial. World J Gastroenterol. 2014;20(43):16323-33.

3. Mostafa SM, Bhandari S, Ritchie G, Gratton N, Wenstone R. Constipation and its implications in the critically ill patient. Br J Anaesth. 2003;91(6):815-9.

4. Nassar AP, da Silva FM, de Cleva R. Constipation in intensive care unit: incidence and risk factors. J Crit Care. 2009; 24(4):630.e9-12.

5. van der Spoel JI, Schultz MJ, van der Voort PH, de Jonge E. Influence of severity of illness, medication and selective decontamination on defecation. Intensive Care Med. 2006;32(6):875-80.

6. Dorman BP, Hill C, McGrath M, et al. Bowel management in the intensive care unit. Intensive Crit Care Nurs. 2004; 20(6):320-9.

7. Guerra TL, Mendonça SS, Marshall NG. Incidence of constipation in an intensive care unit. Rev Bras Ter Intensiva. 2013;25(2):87-92.

8. Knowles S, McInnes E, Elliott D, Hardy J, Middleton S. Evaluation of the implementation of a bowel management protocol in intensive care: effect on clinician practices and patient outcomes. J Clin Nurs. 2014;23(5-6):716-30.

9. Locke GR, Pemberton JH, Phillips SF. American Gastroenterological Association Medical Position Statement: guidelines on constipation. Gastroenterology. 2000;119(6):1761-6.

10. Orejana Martin M, Torrente Vela S, Murillo Perez MA, et al. Analysis of constipation in severe trauma patients. Enferm Intensiva. 2014;25(2):46-51.

11. Schmidt FM, Santos VL. Prevalence of constipation in the general adult population: an integrative review. J Wound Ostomy Continence Nurs. 2014;41(1):70-6.

12. Trexler ST, Lundy JB, Chung KK, et al. Prevalence and impact of late defecation in the critically ill, thermally injured adult patient. J Burn Care Res. 2014;35(4):e224-9.

13. Rasmussen LS, Pedersen PU. Constipation and defecation pattern the first 30 days after thoracic surgery. Scand J Caring Sci. 2010;24(2):244-50.

14. Davies EC, Green CF, Mottram DR, Pirmohamed M. The use of opioids and laxatives, and incidence of constipation, in patients requiring neck-of-femur (NOF) surgery: a pilot study. J Clin Pharm Ther. 2008;33(5):561-6.

15. Sendir M, Buyukiylmaz F, Asti T, Gurpınar S, Yazgan I. Postoperative constipation risk assessment in Turkish orthopedic patients. Gastroenterol Nurs. 2012;35(2):106-13.

16. Stienen MN, Smoll NR, Hildebrandt G, Schaller K, Tessitore E, Gautschi OP. Constipation after thoraco-lumbar fusion surgery. Clin Neurol Neurosurg. 2014;126:137-42.

17. Dehghan M, Malakoutikhah A, Ghaedi Heidari F, Zakeri MA. The effect of abdominal massage on gastrointestinal functions: a systematic review. Complement Ther Med. 2020;54:102553.

18. Kacmaz Z, Kasici M. Effectiveness of bran supplement in older orthopaedic patients with constipation. J Clin Nurs. 2007;16(5):928-36.

19. Sonneborn O, Bui T. Opioid induced constipation management in orthopaedic and trauma patients: treatment and the potential of nurse-initiated management. Int J Orthop Trauma Nurs. 2019;34:16-20.

20. Koval KJ, Aharonoff GB, Rosenberg AD, Bernstein RL, Zuckerman JD. Functional outcome after hip fracture: effect of general versus regional anesthesia. Clin Orthop Relat Res. 1998;(348):37-41.

21. Yildirim D, Can G, Koknel Talu G. The efficacy of abdominal massage in managing opioid-induced constipation. Eur J Oncol Nurs. 2019;41:110-9.

22. Pinto CF, Oliveira PD, Fernandes OM, et al. Nonpharmacological clinical effective interventions in constipation: a systematic review. J Nurs Scholarsh. 2020;52(3):261-9.

23. Birimoglu Okuyan C, Bilgili N. Effect of abdominal massage on constipation and quality of life in older adults: a randomized controlled trial. Complement Ther Med. 2019;47:102219.

24. de Azevedo RP, Freitas FG, Ferreira EM, Pontes de Azevedo LC, Machado FR. Daily laxative therapy reduces organ dysfunction in mechanically ventilated patients: a phase II randomized controlled trial. Crit Care. 2015;19(1):329.