

Field report

Effect of reduced daily magnesium oxide doses on laxative effect: a single-center retrospective study

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Abstract

Objective: To investigate the laxative effect of reducing the number of daily doses of magnesium oxide (MgO), while maintaining the total daily dose of MgO in patients with good bowel movements.

Patients and Methods: The retrospective analysis involved 11 patients with regular bowel movements who were prescribed MgO for constipation upon admission to a nursing care facility accompanied by home visits by a pharmacist. This investigation was conducted before and after reducing the number of daily doses from three to two, or from two to one, over a two-week period.

Results: The number of bowel movements was 7.6 ± 3.4 and 6.6 ± 4.0 times for two weeks before and after the change in dosage frequency, respectively. The difference was not statistically significant ($P=0.09$). The Bristol Stool Form Scale was 3.9 ± 0.9 and 4.0 ± 0.9 two weeks before and after the change, respectively, which was not significant ($P=0.93$). Two weeks after the change, the MgO regimen remained unchanged and no on-demand laxatives were administered.

Conclusions: The results suggest that reducing the number of daily doses of MgO does not affect its laxative action.

Key words: constipation, magnesium oxide, number of doses per day, nursing home

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Introduction

Magnesium oxide (MgO) is widely used as an osmotic laxative to promote stool softening and increase bowel movements¹⁾. The MgO package insert²⁾ states that “Generally, 2 g per day for adults should be orally administered in three doses before or after meals, or once before bedtime; the dosage may be adjusted according to the symptoms”. The daily dose of MgO is adjusted using the Bristol Stool Form Scale (BSFS) to normalize the stool form³⁾. However, no studies have examined the laxative effects of changing the number of MgO doses per day while maintaining a daily dose of MgO.

This study retrospectively investigated the effect of re-

ducing the number of MgO doses per day, while maintaining the daily dose of MgO, on the laxative effect in nursing home patients with good bowel movements due to MgO use.

Patients and Methods

Subjects

From April 2020 to March 2022, we targeted 11 patients who had good bowel movements after being prescribed MgO for constipation upon admission to a nursing care facility, in which a pharmacist had accompanied the home visits. For all 11 patients, regular administration of laxatives, including MgO, was maintained for at least 14 days, and no laxatives had been used indefinitely, the number of doses per day of MgO was changed from three to two, or from two to one, and constipation was not due to organic disease.

Survey method

Based on the drug history of the patient, we surveyed the age, sex, primary disease, performance status, estimated glomerular filtration rate (eGFR), daily dose of MgO, changes in stool consistency based on the number of bowel movement in two weeks and BSFS, and abdominal symptoms that included abdominal pain, bloating, nausea, and vomiting.

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Statistical analysis

The numbers of bowel movements for two weeks before and after the change in the number of doses per day are represented as mean ± standard deviation. Stool consistency data are represented the mean ± standard deviation of the median. Changes in the number of bowel movements and stool consistency were analyzed using a paired t-test and Wilcoxon signed-rank test, respectively, at a significance level of 5%. All statistical analyses were performed with EZR version 1.54 (Saitama Medical Center, Jichi Medical University, Saitama, Japan), which is a graphical user interface for R (The R Foundation for Statistical Computing, Vienna, Austria)⁴⁾. EZR is a modified version of R commander that was designed to add statistical functions frequently used in biostatistics.

Results

Patient backgrounds

Table 1 shows the backgrounds of the 11 patients included in this study. The total daily MgO was 821.8 ± 162.8 mg. The number of doses per day was changed from three to two in two patients and from two to one in nine patients. Concomitant use of H₂ receptor antagonists and proton pump inhibitors, which may attenuate the laxative effects of MgO, was not allowed. Two weeks after changing the daily dose of MgO, the regimen of regularly administered laxatives, including MgO, remained unchanged, and no on-demand laxatives were administered.

Changes in the number of bowel movements and stool consistency two weeks before and after changing the number of daily MgO doses

Figure 1 shows the changes in the number of bowel movements and stool consistency for two weeks before and after changing the number of MgO doses per day. The number of bowel movements was 7.6 ± 3.4 and 6.6 ± 4.0 for two weeks before and after the change, respectively, with no significant difference (*P*=0.09). The stool consistency was 3.9

Table 1 Backgrounds of the 11 patients

Age (years)	85.6 ± 6.1
Sex (male/female)	3/8
Main disease	
Dementia of the Alzheimer type	8
Cerebral infarction	1
Heart failure	1
Spinal canal stenosis	1
Performance status (0/1/2/3/4)	0/0/5/6/0
eGFR(mL/min/1.73m ²)*	73.3 ± 31.3
Magnesium oxide (mg/day)	821.8 ± 162.8
Dosing regimen	
Change from three to two times a day	2
Change from two to one time a day	9
Concomitant use of laxatives other than magnesium oxide (yes/no)	4/7
Pantethine/linacotide	4/1

eGFR: estimated glomerular filtration rate.

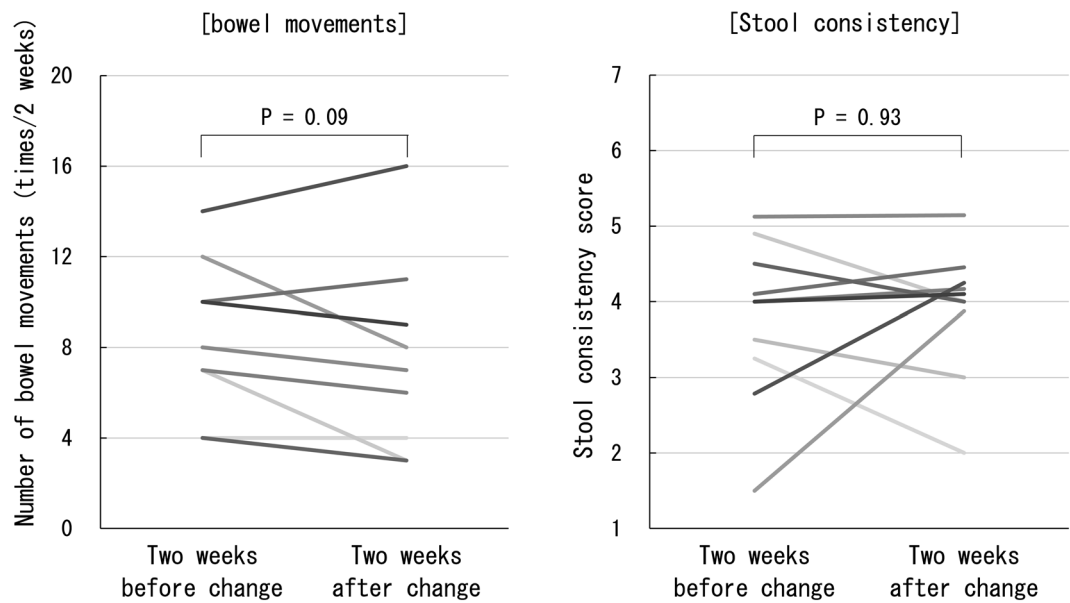


Figure 1 Changes in the number of bowel movements and stool consistency two weeks before and after changing the number of doses of MgO per day in the 11 patients. The number of bowel movements and stool consistency two weeks before and after the change in the number of doses per day did not change significantly (*P*=0.09, paired t-test; *P*=0.93, Wilcoxon signed-rank test, respectively).

± 0.9 and 4.0 ± 0.9 two weeks before and after the change, respectively, with no significant difference ($P=0.93$).

Abdominal symptoms two weeks before and after changing the number of daily doses of MgO

No abdominal symptoms were reported during the two weeks before and after the change in the number of doses per day.

Discussion

In Japan, reports indicate that the prevalence of constipation increases with age. Against this backdrop, the osmotic laxative MgO is widely used because it is low-cost and non-addictive, even when administered over the long-term¹⁾.

The MgO package insert²⁾ states that “Generally, 2 g per day for adults should be orally administered in three doses before or after meals, or once before bedtime; the dosage may be adjusted according to the symptoms”. However, in clinical practice, prescriptions are often divided into two or three doses per day, with concerns that medication adherence will decrease³⁾ and the burden of caregiver assistance will increase⁶⁾ as the number of doses per day increases. This study retrospectively investigated the effects of reducing the number of doses per day while maintaining the total daily dose of MgO. Since it takes several days for MgO to take effect⁷⁾, we investigated the effect of these changes on the laxative effect for two weeks before and after changing the number of doses per day. Reducing the number of doses while maintaining the total daily dose of MgO did not significantly affect bowel movement or stool consistency. Furthermore, two weeks after the change in the number of daily doses of MgO, the regimen of regularly administered laxatives, including MgO or on-demand laxatives, did not change, and abdominal symptoms were not observed. These findings indicate that reducing the number of daily doses of MgO while maintaining the same daily dosage may not have a marked influence on the laxative effect.

Administering MgO to elderly patients with renal dysfunction can cause hypermagnesemia. Concern has arisen regarding the adverse outcomes that may accompany administration of MgO to constipated patients with abnormal renal function, even at lower than normal doses^{2, 8)}.

In this study, the mean serum magnesium levels of 2.4 ± 0.2 mg/dL measured in four patients were within the normal range. Serum magnesium levels were not measured in the

remaining seven patients. When MgO is used for nursing home residents, pharmacists should proactively intervene to detect hypermagnesemia at an early stage.

The limitation of this study was the potential for selection bias owing to the limited number of cases due to the retrospective single-center design, and many factors leading to constipation. Multicenter prospective equivalence studies should be performed.

Conclusion

The study findings suggest that reducing the number of doses while maintaining the daily total dose of MgO does not affect the laxative effects. The caregiver burden associated with medication assistance may be reduced by continuously evaluating bowel movement status and proposing a prescription that entails a reduction in the number of doses per day while maintaining the total daily dosage for nursing home residents prescribed MgO two to three times a day by a pharmacist.

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