

CLEAR LIQUID DIET – A GOOD BOWEL PREPARATION FOR CAPSULE ENDOSCOPY

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REZUMAT

Objective: Capsula endoscopică reprezintă procedura standard de investigare a mucoasei intestinului subțire. Prezentul studiu și-a propus evaluarea comparativă a calității vizualizării mucoasei intestinale prin capsula endoscopică, în urma pregătirii intestinului subțire cu lichide clare sau soluții de macrogol în cantități de 2 sau 4 L. **Material și metode:** Studiul a inclus un număr de 29 de pacienți împărțiți în trei grupuri. Pacienților din primul grup li s-au administrat lichide clare în ziua anterioară investigației, celor din al doilea grup 2 L de soluție de macrogol, iar celor din al treilea grup 4 L din aceeași soluție. S-au analizat următorii parametri: calitatea filmului, vizibilitatea mucoasei intestinului subțire, timpul de evacuare gastrică și timpul de tranzit la nivelul intestinului subțire a capsulei endoscopice. **Rezultate:** Nu există diferențe semnificative între timpul de evacuare gastrică și timpul de tranzit a intestinului subțire. Pregătirea intestinului a fost de o calitate excelentă la toate cele trei grupuri. **Concluzii:** Soluția de macrogol nu îmbunătățește semnificativ timpul de evacuare gastrică și timpul de tranzit intestinal. Dieta cu lichide clare realizează o pregătire suficientă pentru obținerea unei bune vizualizări a mucoasei intestinale.

Cuvinte cheie: capsula endoscopică, pregătirea intestinului, timpul de evacuare gastrică, timpul de tranzit intestinal

ABSTRACT

Objectives: To compare the effect of clear liquid diet to 2 or 4 L polyethyleneglycol solution preparation, on the quality of capsule endoscopy (CE). **Material and methods:** The study included 29 patients randomized in three groups. First group received clear liquids diet, the second group 2 L macrogol solution and the third group 4 L macrogol solution. The following parameters were assessed: the quality of the images, the visualization of small bowel mucosa, the gastric transit and small bowel transit times. **Results:** Gastric emptying and small bowel transit times were not significant different in the three groups. The quality of bowel preparation was predominantly excellent in all three groups. **Conclusions:** Macrogol solution preparation did not significantly improve gastric and small bowel transit times. Clear liquid diet is a sufficient preparation for a good quality of mucosal visualization.

Key Words: capsule endoscopy, bowel preparation, gastric transit time, small bowel transit time

INTRODUCTION

The introduction of capsule endoscopy (CE) was a significant advance in the investigation of intestinal diseases and it has become a very important tool especially for the diagnosis of small bowel disorders.

Currently, CE is the standard procedure for the evaluation of the small bowel, because it is painless and well tolerated by patients, it requires a minimal preparation of the digestive tract and usually can be performed in the ambulatory setting. On the other hand, it is a quite expensive and time-consuming procedure and therefore it requires optimal conditions for performing.

The length and the complex configuration of the small bowel make it difficult to evaluate. Two problems can limit the yield of CE: slow gastric and small bowel transit and the presence of intestinal content in the distal small bowel.¹ Slow transit increases the passage time so that the capsule batteries are spent before the entire small bowel is explored, and the presence of intestinal contents makes a good visualization of the intestinal mucosa difficult. Therefore, a good preparation before CE is essential for the successful visualization of the small bowel.

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The best small bowel preparation for CE is still controversial. There is no international consensus regarding a standard bowel preparation. Different studies have used various types of preparation: the liquid diet (CL), polyethylenglycol (PEG), sodium phosphate (PS) or prokinetics.²⁻⁴

A clear liquid diet consists of food and drinks that are transparent. This type of diet includes clear juices (apple juice, grape juice, cranberry juice, lemonade, but without the pulp), clear sodas, tea, water, soups (broths, strained vegetable broth), fruit ices without milk or fruit pieces, and plain gelatin dessert. CL diet starts after the lunch on the day before CE. After midnight, the patient is forbidden to eat or drink anything else.

PEG is an osmotic laxative not absorbable through the intestinal mucosa. In some studies, the preparation with PEG improved the visualization of small bowel mucosa, whereas in others it was unchanged.⁵⁻⁷ PS is poorly absorbable, improving the visualization in patients who did receive it.⁸

Some authors reported that both PEG and PS have a marked accelerating effect on small bowel transit time.⁴ Another study concluded that there were no differences in the gastric emptying time of the capsule or in the visualization of the mucosa between the patients with this preparation vs. those who did not receive it. The quality was significantly worse in distal small bowel segments as compared to proximal ones.⁹

In another study, the preparation with simethicone, a defoaming agent, improved the visualization due to fewer air bubbles.¹⁰ Prokinetic drugs were used to avoid incomplete small bowel examinations due to slow bowel transit of CE. It was demonstrated that domperidone shortened the gastric emptying time of the capsule.¹¹

The aim of our study was to compare the effect of clear liquid diet with that of 2 or 4 L PEG solution preparation before CE, on the quality of small bowel visualization and gastric (GTT) and small bowel transit times (SBTT).

MATERIAL AND METHODS

This prospective study included 29 CE examinations performed in Department of Gastroenterology and Hepatology, County Hospital Timisoara, between September 2006 and September 2008. Patients over 18 years referred for CE were included in our study. The exclusion criteria were: patients under 18 years, known or suspected gastrointestinal tract stricture, obstruction or fistula, recent gastrointestinal surgery, permanent cardiac pacemaker or implantable defibrillator and pregnancy.

The patients were randomized into three groups according to the type of bowel preparation. The first group included patients who ingested only clear liquids (CL) for 12 hours the day before the examination, followed by overnight fasting. The patients in the second group (MG 2L) received the same diet and in the evening before the examination they ingested 2 L macrogol solution (Fortrans; Beaufour Ipsen, France). The patients in the third group (MG 4L) received the same diet and 4 L macrogol solution the evening before the examination.

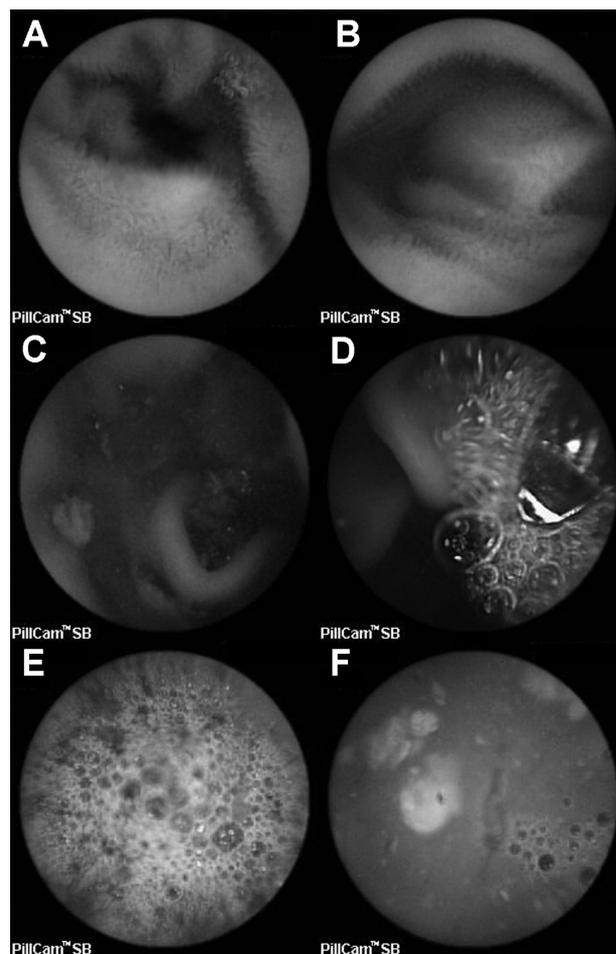


Figure 1. Image quality: A, B: excellent, C, D: moderate, E, F: poor visibility.

All the patients were allowed to drink water until 2 hours before the examination. A written informed consent was obtained from all the patients. The capsule was swallowed at 10 a.m. with 250 mL of plain water.

Two independent investigators, experienced in endoscopy, evaluated CE video recordings. All the video recordings were reviewed with the PillCam SB capsule endoscopy system (Given Imaging Ltd., Israel) using the Rapid Reader (version 3.1.11.SP2). The following parameters were assessed: the quality of the film, the visualization of the small bowel mucosa, the gastric (GTT) and small bowel transit times (SBTT).

The quality of the preparation was assessed in each case by using a three-step scale: E=excellent, M=moderate and P=poor visualization. (Fig. 1) GTT was defined as the time interval from the first gastric image to the first duodenal image and SBTT as the time interval from the first duodenal image to the first caecal image.

Data were analyzed by means of one-way ANOVA test for significant differences and chi-square tests. Values of $p \leq 0.05$ were considered statistically significant.

RESULTS

The study group included 29 patients with a mean age of 50.3 ± 18.9 years (ranging from 23-75), randomized into three groups. Eleven patients (37.9%) received CL, ten patients (34.5%) – MG 2 L, and 8 patients (27.6%) – MG 4 L. Patients' characteristics are summarized in Table 1. The main indications for CE, in all three groups, were iron-deficiency anemia (37.9%) and obscure gastrointestinal bleeding (24.1%). Other indications were suspicion of inflammatory bowel disease (IBD), small bowel polyps or cancer and chronic diarrhea of obscure cause. No difference was observed between the three groups.

Table 1. Characteristics of the study participants.

	CL n=11	MG 2L n=10	MG 4L n=8	P value
Sex (M/F)	6/5	4/6	4/4	NS
Age (years)	49.6 ± 21.2	50 ± 20.9	52 ± 19.1	NS
Indications				
Iron-deficiency anemia	4 (36.4%)	4 (40%)	3 (37.5%)	NS
Obscure gastrointestinal bleeding	3 (27.3%)	2 (20%)	2 (25%)	NS
Inflammatory bowel disease	1 (9.0%)	2 (20%)	1 (12.5%)	NS
Familial polyposis	2 (18.2%)	1 (10%)	1 (12.5%)	
Chronic diarrhea of obscure cause	1 (9.1%)	1 (10%)	1 (12.5%)	

Data are mean \pm standard deviation; NS: Not significant; CL: clear liquids diet; MG 2L: macrogol solution 2L; MG 4L: macrogol solution 4L.

Gastric transit time (GTT) and small bowel transit time (SBTT)

There were no statistically significant differences regarding the GTT of the CE between the three groups (CL: 31.5 ± 18.2 min, MG 2L: 37.1 ± 16.7 min, MG 4L: 34.9 ± 19.5 min, $p=0.08$). (Table 2) In addition, there were no statistically significant differences regarding the SBTT between the three groups (CL: 263 ± 58.1 min, MG 2L: 285 ± 45.8 min, MG 4L: 279 ± 63.3 min, $p=0.41$). (Fig. 2) The capsule visualized the caecum in 86.2% of the patients.

Table 2. Gastrointestinal transit time and quality of bowel preparation.

	CL n=11	MG 2L n=10	MG 4L n=8	P value
GTT (min)	31.5 ± 18.2	37.1 ± 16.7	34.9 ± 19.5	NS
SBTT (min)	263 ± 58.1	285 ± 45.8	279 ± 63.3	NS
Quality of preparation				
Excellent	8 (72.7%)	6 (60%)	6 (75%)	NS
Moderate	2 (18.2%)	2 (40%)	1 (12.5%)	NS
Poor	1 (9.1%)	2 (20%)	1 (12.5%)	NS

Data are mean \pm standard deviation; NS: Not significant; CL: clear liquids diet; MG 2L: macrogol solution 2L; MG 4L: macrogol solution 4L.

Quality of the video recording and of the visualization of the small bowel mucosa

The quality of bowel preparation was predominantly excellent in all three groups. (Fig. 3) Only in four cases (13.8%), the small bowel mucosa was poorly visualized due to the presence of foam and residual food. (Table 2) The quality was better in the proximal as compared to distal small bowel segments but was not significantly different in the three groups.

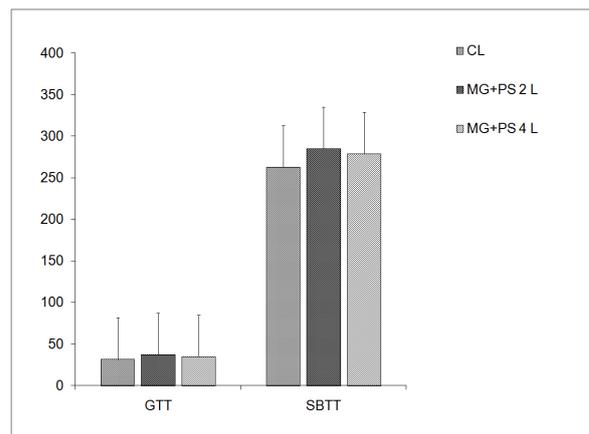


Figure 2. Gastrointestinal transit time (min) in all three groups of patients.

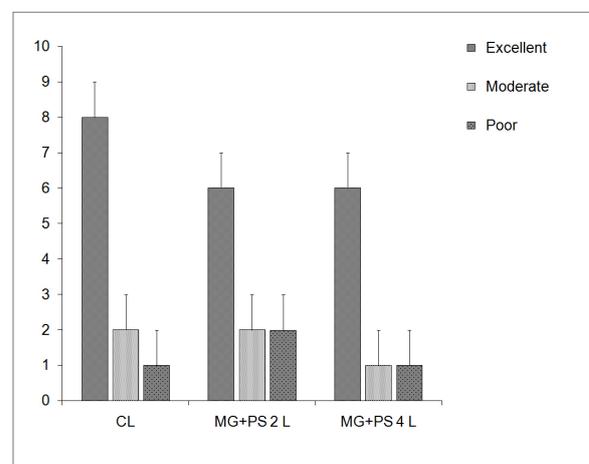


Figure 3. Quality of mucosal visualization in all three types of bowel preparations.

DISCUSSION

CE is an expensive, time consuming and usually not repeated procedure for the evaluation of the small bowel. This technique is superior to any current methods of endoscopic and radiologic investigation.¹² Therefore, it is essential to optimize the quality of visualization and minimize false results.

In our study, we compared the effects of CL to 2 or 4 L PEG solution bowel preparation on GTT, SBTT and on the quality of mucosal visualization. Our data showed no statistically significant differences regarding the GTT and SBTT of CE between the three types of preparations. These results are similar with those from a prospective, randomized trial performed by Franke et al, which demonstrated no differences regarding GTT of CE and the visualization of the mucosa between the patients who received this preparation vs. those who did not receive it.⁹

A controlled study comparing CL with PS preparation showed no difference in capsule GTT, but a better visualization due to significantly less turbid fluid in the small bowel was found in the second case.² Another study comparing CL with PEG preparation lead to the conclusion that the capsule GTT was significantly delayed by PEG.⁷

Regarding the quality of mucosal visualization, our results showed no statistically significant differences among the three groups. In contrast, Dai et al observed a better visualization during the examination with 4L PEG solution vs. 12 h fasting, due to a better intestinal cleanliness, and to an acceleration of the intestinal transit in these patients.¹³ The study performed by Ben-Soussan et al. did not find any difference between preparation with 2 L PEG solution and 12 h fasting.⁷

Another study concluded that the use of 2 L PEG solution led to a significant improvement in mucosal visualization, but did not have a significant effect on GTT, SBTT and the rate of caecum visualization.¹⁴ A recent study compared CL vs. PS administration and did not observe any difference regarding the bowel cleanliness or the mucosal visualization.¹⁵

Hiroki et al made an interesting observation. Their study concluded that the use of 500 mL PEG preparation during CE examination significantly improves the image quality, and that this effect was more pronounced in the distal ileum.¹⁶ The best bowel preparation is still debatable.

There are very few studies regarding patients adherence to different types of bowel preparation. The disadvantages of all types of preparation and the

low tolerance of patients to such procedures must not be ignored, and because of that, a standard procedure cannot be established.

CONCLUSIONS

Our study leads to the conclusion that a CL during the day before examination is a sufficient preparation for a good quality of mucosal visualization and, additionally, that this procedure is well tolerated by the patient. Further studies are needed to evaluate if this type of preparation is sufficient or it must be improved.

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