

The bowel cleansing for colonoscopy. A randomized trial comparing three methods



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INTRODUCTION: Colonoscopy is the procedure of choice for the detection and ablation of small lesions of the colonic mucosa. A proper bowel cleansing is mandatory. So far several regimens have been proposed but rather none has shown a clear-cut advantage over the others. Aim of this study was to compare cleansing ability and patients' compliance of three oral regimens.

PATIENTS AND METHODS: Two-hundred and seventy-three patients were block randomised into three groups. Group A (92 patients) received tablets containing senna 12mg and Magnesium Sulphate 15mg the day before colonoscopy. Group B (98 patients) received a Polyethylene Glycol-based solution of two litres plus 4 tablets of Bisacodyl the day before the exam. Group C (83 patients) received Sodium Phosphate 40 milliliters the day before and the day of colonoscopy. Results of 265 patients were available for the analysis. Eight patients were excluded because inability to follow prescription. The lower incidence of constipation in group C was not significant. The other parameters were homogeneously distributed in the three groups.

RESULTS: The 79 patients of the group C achieved a better bowel cleansing as compared with the 90 of group A ($p=0.0003$) and the 96 of group B ($p=0.034$). Constipated patients had a significantly better cleansing with Sodium Phosphate preparation compared with senna plus Magnesium Sulphate ($p=0.017$), but not significantly better compared with Golytely solution. Compliance and rate of total colonoscopy performed were not statistically different in the three groups.

CONCLUSIONS: Sodium Phosphate solution gave better bowel preparation, with the same compliance, than either senna or Polyethylene solution. In constipated patients Sodium Phosphate showed good efficacy resulting in good cleansing rates similar to that of non-constipated patients. The poor results obtained by Polyethylene were related to the little amount of solution taken even if associated to Bisacodyl.

KEY WORDS: Bowel cleansing, Colonoscopy.

Introduction

Colonoscopy is commonly used as the procedure of choice for the detection and treatment of small lesions of the colonic mucosa. Without proper bowel cleansing, small lesions may be covered by stools and missed.

In our country a regimen involving senna in analogy to the preparation used for Rx double contrast enema¹ has been commonly used also for bowel cleansing before

colonoscopy. Three to four liters of the osmotically balanced Polyethylene Glycol-based Electrolyte solution (PEG) are also used to prepare bowel both for surgery and colonoscopy. However, this large amount of liquid is often not well tolerated especially by elderly people and those who are unable to drink.

As a consequence other preparations such as low volumes of PEG² or Sodium Phosphate solution (NaP)³⁻⁸ have been proposed to achieve adequate cleansing of the bowel without major inconvenience for the patients and the comparison has been studied without a sure preference between one of them⁹.

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Abbreviation used: PEG (Polyethylene Glycol-based electrolyte solution). NaP (Sodium Phosphate solution).

Aim of this study was to compare the cleansing ability and patients' compliance to three oral regimens alternatively involving senna tablets, NaP or a low dose (two liters) of PEG.

Methodology

Between January 2002 and June 2002, at the time of scheduling colonoscopy, previous an informed consent, 273 patients were randomized into three groups. The exclusion criteria were pregnancy, age older than 75yr (for prevedible poor compliance), previous operation on small and large bowel, the inability to follow cleansing prescription, renal failure, known electrolyte disorders, heart failure or liver disease with ascites¹⁰. Results of 265 patients (141 male, 124 female) were analyzed.

All patients were asked to avoid food with seeds for three days before colonoscopy. On the day before the examination patients were asked to avoid solid foods after noon. Patients took one of the following preparations, according to a block random list:

- GROUP A: 12 tablets each containing senna 12mg (Pursennid®, Sandoz) at 10 a.m. and Magnesium Sulphate 15mg melted in 200milliliters (mL) of water at 5 p.m. the day before colonoscopy.
- GROUP B: PEG of only 2 liters (L), consisting of Polyethylene Glycole-based 4000 116.6 grams (g), Sodium Sulphate Anhydrous 11.4g, Sodium Bicarbonate 3.4g, Sodium Chloride 3.0g and Potassium Chloride 1.4g (Selg®, Promefarm), at 6 p.m. plus 4 tablets of Bisacodyl at 10 p.m. the day before colonoscopy.
- Group C: 40mL of NaP (Phospho-lax®, Sofar), each containing Sodium Phosphate Monobasic 19.2g and Sodium Phosphate Dibasic 7.2g, at 6 p.m. the day before colonoscopy and at 6 a.m. the day of colonoscopy. Colonoscopy was performed after 11 a.m. in all cases casually by one of the three endoscopists involved in this study. Before colonoscopy the nurse asked the patient to define the tolerance to the preparation as "good" (no symptoms, fair palatability), "medium" (nausea and abdominal pain, nasty palatability) or "low" (vomiting, severe abdominal pain, or severe diarrhea, awful palatability). Patients were also asked if they suffered from constipation (one movement every three or more days and other forms as defined by Rome II criteria).

After each colonoscopy one the three endoscopists blindly scored cleansing according to three classes: "good" (no stools, mucosa well visible all over in the bowel), "fair" (small quantities, mostly fluid and aspirable stools) or "poor" (massive fluid or solid stools all over the bowel). He was also supposed to define whether diagnostic value of examination was "good" or had to be repeated.

Chi-square method (χ^2) was used to assess the differences in proportions, using Fisher's exact test when groups considered were particularly small.

Results

Two hundred and seventy-three patients were randomized, but only 265 patients entered the study: eight were excluded because of inability to follow prescription. Two of them belonged to Group A, two to Group B and four to Group C, with statistically not significant differences ($\chi^2=1.499$; $P=0.473$).

Characteristics of the patients enrolled in each group, i.e. age, gender and constipation, are shown in Table I. There was a not significant lower incidence of constipation in Group C ($\chi^2=2.051$; $P=0.359$), while other parameters were found to be homogeneously distributed. Results of bowel cleansing are indicated in Table II. There was significant difference among the 3 Groups in the overall test ($\chi^2=13.497$; $P=0.001$). The difference between Group A and B was not significant ($P=0.169$). More patients in Group C achieved a "good" cleansing as compared to both Group A ($\chi^2=12.295$; $P=0.0003$) and Group B ($\chi^2=4.509$; $P=0.034$).

Also analyzing the subgroups of constipated patients it was possible to demonstrate significant differences among the 3 subgroups in the overall test ($\chi^2=6.425$; $P=0.04$): 60% obtained a "good" preparation in Group C, significantly higher than Group A (28%; $P=0.017$) but if not significantly higher than Group B (45%; $P=0.31$).

No significant difference was found in the overall test among the three groups when compliance ($\chi^2=2.66$; $P=0.264$) and rate of total colonoscopy performed ($\chi^2=0.488$; $P=0.784$) were taken into consideration (Tab. III).

TABLE I – Characteristics of the patients enrolled in each group.

Groups	N. patients	Age (yrs.)	M/F	Constipation
A	90	61.4±12.0	51/39	36 (40.0%)
B	96	60.5±10.9	52/44	40 (41.7%)
C	79	61.9±12.6	38/41	25 (31.7%)

Group A: Senna tablets and Magnesium Sulphate; Group B: Polyethylene-Glycole based solution and Bisacodyl tablets; Group C: Sodium Phosphate solution.

Discussion

The present study shows that the administration of NaP gave a better preparation than either the senna or the PEG. Despite the small number of patients enrolled, differences were statistically significant, confirming the data from previous studies^{2-8,11}. In particular NaP showed good efficacy in constipated patients, resulting in "good" and "fair" cleansing rates similar to that of non-constipated patients.

Administration of senna tablets and Magnesium Sulphate is a common, traditional preparation for radiological examination of large bowel with double contrast enema in

TABLE II – Comparison of cleansing rate of different preparations in 3 groups of patients.

Groups	N. patients	Cleansing (%)			Constipation (%)	
		Good	Fair	Poor	Frequency	Good cleansing
A	90	35 (38.8)	32 (35.6)	23 (25.6)	36 (40.0)	10 (27.8)
B	96	48 (50.0)	26 (27.1)	22 (22.9)	40 (41.7)	18 (45.0)
C	79	53 (67.1)	21 (26.6)	5 (6.3)	25 (31.7)	15 (60.0)
Total	265	136 (51.3)	79 (29.8)	50 (18.9)	101 (38.1)	43 (42.6)

Groups A: Senna tablets and Magnesium Sulphate solution; group B: PEG and Bisacodyl tablets; group C: Sodium Phosphate solution. In the right column the results obtained in constipated patients are reported.

TABLE III – Rate of complete examination performed and compliance of the patients in the three groups.

Groups	N. patients	Tot. Colonoscopy performed (%)		Compliance (%)		
		yes	no	good	fair	low
A	90	86 (95.6)	4 (4.4)	78 (86.7)	9 (10.0)	3 (3.3)
B	96	92 (95.8)	4 (4.2)	81 (84.3)	9 (9.4)	6 (6.3)
C	79	77 (97.5)	2 (2.5)	73 (92.4)	5 (6.3)	1 (1.3)
Total	265	255 (96.2)	10 (3.8)	232 (87.5)	23 (8.7)	10 (3.8)

Italy and it is often used also for colonoscopy. This preparation, although effective, is, however, not so largely prescribed because of cramping abdominal pain induced and the risk of perforation in case of stenosis or diverticular disease. Moreover, this preparation has lower cleansing power in comparison with NaP.

The poor result of the small volume PEG used in this study is related, in our opinion, to the little amount of solution taken (50% of that recommended from the manufactures), even when associated to Bisacodyl tablets, as suggested by others^{1,12,13}. The smaller amount of liquid to be drunk is preferred by the patients in comparison to the standard three to four liters of PEG¹⁴⁻¹⁶ but, unfortunately, it is unable to adequately clean the intestine.

The importance of timing of bowel preparation for colonoscopy has also been recently stressed by several Authors¹⁷. Our precedent experience confirmed those obtained by Frommer¹³ showing that two doses of NaP given separately on the day before and early in the morning of the day of colonoscopy were superior to the two doses both given on the day preceding the exam. Similar good results have been obtained by Church¹⁷ and Vanner⁵ with PEG when four liters of solution were consumed starting at 8 a.m. on the day of colonoscopy. However he reports that 20% of those patients were unable to complete their preparation.

Even if Martinek⁹ described a better cleansing of golytely than of NaP, our results obtained in terms of cleansing were confirmed by the analysis of feasibility of examination that was considered “good” after NaP in a higher rate than in other groups. No examination had to be repeated in this group of patients, even if demonstrating a statistically non-significant advantage.

Tolerance is obviously dependent on subjectivity of

patients’ response. Nevertheless, a statistically non-significant advantage for NaP was demonstrated when it was compared to the other preparations. Although PEG has, in our study, the disadvantage of a too large volume of solution to be consumed, the compliance of patients among groups proved quite homogeneous.

It has been questioned whether NaP, as well as PEG, might cause hypovolemia and hypocalcemia. Deaths following these complications have been reported in elderly people because of severe electrolyte abnormalities and dehydration. We did not take blood sampling into consideration as previous studies have already demonstrated that these modifications have no clinical significance in patients not at risk¹¹. Similarly we did not observe any clinical symptom, which might raise the suspicion of hypovolemia or hypocalcemia. Moreover, other complications such as colorectal ulcers reported with NaP catharsis¹⁸ were not observed.

In conclusion the regimen in two doses for NaP preparation in appropriate patients gives good bowel cleansing with high patient compliance, without major discomfort because of its small volume of liquid taken.

Riassunto

INTRODUZIONE: La colonscopia è la procedura di scelta per il riconoscimento e la asportazione di piccole lesioni della mucosa colica. È imperativo per l’esecuzione dell’esame una preparazione meccanica intestinale. Fino ad oggi sono state proposte differenti tipi di tali preparazioni ma nessuna ha mostrato un netto vantaggio sulle altre. Scopo di tale studio è quello di paragonare l’efficacia di tre differenti metodi di preparazione orale e la

tolleranza dei pazienti nei confronti di tali preparazioni. PAZIENTI E METODI: Duecentosettantatre pazienti furono randomizzati in tre differenti gruppi. Il gruppo A (92 pazienti) ricevette compresse contenenti senna (12 mg) e Magnesio Solfato (15 mg) il giorno precedente la colonscopia. Il gruppo B (98 pazienti) ricevette una soluzione a base di polietilen-glicolo (due litri) e 4 compresse di Bisacodyl il giorno precedente l'esame. Il gruppo C (83 pazienti) ricevette Sodio Fosfato 40 ml il giorno precedente ed il giorno della colonscopia. Si sono resi disponibili per l'analisi i risultati di 265 pazienti. Otto pazienti sono stati esclusi per l'incapacità di seguire le prescrizioni. La più bassa incidenza di costipazione nel gruppo C non era significativa. Gli altri parametri erano omogeneamente distribuiti nei tre gruppi.

RISULTATI: I 79 pazienti del gruppo C raggiunsero una migliore preparazione comparati con i 90 del gruppo A ($p=0.0003$) ed i 96 del gruppo B ($p=0.034$). I pazienti costipati raggiunsero una migliore preparazione con il Sodio Fosfato rispetto alla preparazione con Senna e Magnesio Solfato ($p=0.017$) ma non significativamente migliore in paragone con la soluzione a base di Polietilen-glicolo. La tolleranza e la percentuale di colonscopie portate a termine non fu statisticamente significativa nei tre gruppi.

CONCLUSIONI: La soluzione con Sodio Fosfato diede una migliore preparazione intestinale, a parità di tollerabilità, sia della Senna sia della soluzione con Polietilen-glicolo. Nei pazienti costipati il Sodio Fosfato mostrò la stessa efficacia risultando una percentuale di buone preparazioni simile a quella dei pazienti non costipati. I cattivi risultati ottenuti con il polietilene glicolo erano correlabili con la scarsa quantità di soluzione assunta anche se associata al Bisacod.

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Commento

Commentary

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Una pulizia ottimale del colon è requisito fondamentale per eseguire una corretta esplorazione endoscopica dell'organo. La somministrazione di polietilenglicole, considerata in ambito gastroenterologico la metodica di preparazione standard, spesso non viene tollerata dai pazienti. Per tale motivo è stato riproposto recentemente l'impiego del fosfato di Na che può rendersi però responsabile, anche se raramente, di effetti collaterali molto gravi. Lo studio di Di Salvo, condotto in maniera prospettica randomizzata, mette a raffronto tre diverse tecniche di pulizia del colon : solfato di Mg vs. polietilenglicole+Bisacodyl vs. fosfato di Na.

L'analisi dei risultati evidenzia che l'impiego del fosfato di Na assicura una buona preparazione intestinale unitamente ad una buona compliance e tollerabilità da parte dei pazienti senza comparsa di effetti collaterali. Conclusioni simili sono state riportate in uno studio condotto su pazienti preparati per essere sottoposti a colonoscopia virtuale 1 mentre in due altre indagini 2,3 è stato messo l'accento sui potenziali effetti collaterali che possono manifestarsi in presenza di malattie renali occulte o più generalmente nei casi in cui esiste un precario equilibrio idroelettrolitico. Una terza indagine retrospettiva focalizza inoltre l'attenzione sulla possibile comparsa, dopo somministrazione di fosfato di Na, di alterazioni mucose che mimano l'aspetto delle lesioni proprie delle IDB o di quelle che insorgono in corso di terapia con FANS 4. I dati analizzati fanno ritenere che il fosfato di Na debba essere utilizzato solo dopo una attenta selezione dei pazienti, soprattutto se anziani, per cui il suo impiego trova delle limitazioni in un sistema di "open access endoscopy".

An optimal colon cleaning it is mandatory to perform a good colonoscopy. Unfortunately sometimes the administration of polietilenglicole, standard preparation for this procedure, it is not well tolerated. Recently it is been readopted the use of sodium phosphate that rarely can have strong side effects. Di Salvo et al in their randomised prospective study compared three different colon cleaning methods: magnesium sulphate vs polietilenglicole plus Bisacodyl vs sodium phosphate. The study results showed that sodium phosphate assures a good intestinal cleaning associated with a good patient compliance and tolerability without side effects. Similar results have been reported in a study conducted in patients that were going to undergo a virtual colonoscopy 1. In two others studies 2,3 is been underlined how it could be quiet dangerous using the sodium phosphate in patients with occult renal disease or with previous hydroelectrolytic problems. Another retrospective study showed how sodium phosphate can mimic the typical IBD or FANS lesions 4 . All these results suggest that sodium phosphate should be used only after a good patient selection, particularly with elderly patients. For these reasons, the use of sodium phosphate, in an open access endoscopy system, has some limitations.

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