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Colonoscopy Preparation: Polyethylene Glycol with Gatorade is as Safe and Efficacious as 4 Liters of Polyethylene Glycol with Balanced Electrolytes

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Abstract

Background—Four liters of polyethylene glycol 3350 with balanced electrolytes for colonoscopy preparation has had poor acceptance. Another approach is the use of electrolyte-free PEG combined with 1.9L of Gatorade. Despite its widespread use, there are no data on metabolic safety and minimal data on efficacy. Our aim was to assess the efficacy and electrolyte safety of these two PEG-based preparations.

Methods—This was a prospective, randomized, single-blind, non-inferiority trial. Patients were randomized to 238g PEG + 1.9L Gatorade or 4L of PEG-ELS containing 236g PEG. Split dosing was not performed. On procedure day blood was drawn for basic chemistries. The primary outcome was preparation quality from procedure photos using the Boston Bowel Preparation Scale.

Results—We randomized 136 patients (66 PEG + Gatorade, 70 PEG-ELS). There were no differences in preparation scores between the two agents in the ITT analysis (7.2 ± 1.9 for PEG-ELS and 7.0 ± 2.1 for PEG + Gatorade; p = 0.45). BBPS scores were identical for those who completed the preparation and dietary instructions as directed (7.4 ± 1.7 for PEG-ELS, and 7.4 ± 1.8 for PEG + Gatorade; p = 0.98). There were no statistical differences in serum electrolytes between the two preparations. Patients who received PEG + Gatorade gave higher overall satisfaction scores for the preparation experience (p = 0.001), and had fewer adverse effects.

Conclusions—Use of 238g PEG + 1.9L Gatorade appears to be safe, better tolerated, and non-inferior to 4L PEG-ELS. This preparation may be especially useful for patients who previously tolerated PEG-ELS poorly.

Keywords

polyethylene glycol 3350; colonoscopy; electrolytes; Gatorade

Introduction

High quality bowel preparation is essential for effective visualization and removal of adenomatous polyps during colonoscopy. Suboptimal preparation occurs in up to 25% of cases.[1] Suboptimal preparation is associated with missed diagnoses and increased costs

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secondary to prolonged procedure times and need for repeat exams.[2] The ideal preparation should be effective, safe, and well-tolerated as a colon cleansing agent. Polyethylene glycol 3350 (PEG) solutions represent the most frequently used forms of cleaning preparations for colonoscopy in Western countries.[3] However, four liters of PEG with a balanced electrolyte solution (PEG-ELS) is often poorly tolerated due to the large volume and poor palatability. Although not FDA approved as a colonoscopy preparation, PEG 3350 without electrolytes (e.g. MiraLAX®, Schering-Plough, Memphis, TN, USA) is available over the counter and has been gaining in popularity as an alternative solution when mixed with 64 ounces (1.9 liters) of a sport drink (e.g. Gatorade™, PepsiCo, Inc., Purchase, NY). It was identified as an acceptable bowel regimen in adults by a recent multi-society task force. [4] However, there still remains conflicting data on the efficacy of PEG + Gatorade and limited data on safety. [5–8]

Our aim was to evaluate whether the efficacy of PEG + 1.9 liters of Gatorade is not inferior as a colonoscopy preparation to PEG-ELS. We were also interested in identifying whether the use of PEG + Gatorade leads to a higher frequency of electrolyte abnormalities. Additional aims of this study were to compare patient tolerability, procedure times, and adenoma detection rates.

Methods

Study Patients and Randomization

This prospective, randomized, single-blind study included outpatient adults referred for colonoscopy at our Digestive Disease Center between December 2009 and June 2011. Patients were evaluated for eligibility and excluded if they had known diabetes mellitus, renal dysfunction (creatinine = 1.5), or functional constipation as defined by Rome III criteria. (9) Patients with inflammatory bowel disease, those undergoing colonoscopy for the evaluation of diarrhea, and patients with a history of colonic resection were not eligible for participation. All eligible patients gave written informed consent. Assignment was then made using opaque envelopes containing a computer-generated randomization list. Randomization was performed in a 1:1 manner to the two treatment groups without further stratification. The study and consent were approved by the Institutional Review Board of Temple University Hospital. The trial was registered at Clinical Trials.gov (NCT01170754). The study was not funded and was written in entirety by the listed authors.

Study Medications and Instructions

We exclusively used Golytely® (Braintree Laboratories Inc., Braintree, MA) as our PEG-ELS preparation. Golytely powder contains 236g polyethylene glycol 3350, 22.74g sodium sulfate (anhydrous), 6.74g sodium bicarbonate, 5.86g sodium chloride and 2.97g potassium chloride. When dissolved in four liters of water, the solution is isotonic and has a salty taste. Patients were given packets of lemon flavoring to improve the taste. For the comparator arm we used 238g of MiraLAX combined with 64 ounces (1.9 liters) of Gatorade: Thirst Quencher Lemon-Lime Sports Drink®. This product contains 400 calories, 880mg sodium, 240 mg potassium, and 112g sugar and has an osmolality of approximately 300 mOsm.

Instructions

After randomization, patients in both groups were given written instructions to drink only clear liquids the entire day prior to their procedure. The patients in the 4L PEG-ELS arm were instructed to prepare the mixture in the morning and begin drinking it at 8pm at a rate of 8 ounces every 10–15 minutes until the bottle was empty. Patients in the PEG + Gatorade group were instructed to mix the 238g bottle of medication with 64 ounces (1.9 L) of Gatorade. They were also instructed to begin drinking at 8pm at a rate of 8 ounces every 10–

15 minutes until the bottle was empty. Both groups were allowed to continue drinking clear liquids until midnight and then were to remain NPO until their procedure the following day. Patients taking diuretics, angiotensin converting enzyme inhibitors, and angiotensin receptor blockers were instructed to discontinue these medicines only on the morning of the procedure.

Data Collection

Demographics—Information regarding the patients' basic demographics was recorded, including gender, race, and age. We also recorded whether the patient was prescribed any medication that could potentially alter electrolytes with the preparation including diuretics, angiotensin converting enzyme inhibitors, and angiotensin receptor blockers. The indication for colonoscopy was recorded. On the day of the procedure, patients were given a short questionnaire to complete. This questionnaire was provided courtesy of B. Enestvedt, Oregon Health & Science University. The survey included questions regarding whether they followed the preparation instructions properly. Specifically they were asked to estimate whether they drank 25%, 50%, 75%, or 100% of the preparation. They were also asked whether they adhered to a clear liquid diet. If possible this information was confirmed by an individual with potential knowledge of the truthfulness of these responses (e.g. spouse). Patients reported adverse effects from the preparation (e.g. bloating, nausea, poor taste). The patients' overall experience with the preparation was graded on a 5-point Likert scale from 0–4 with higher scores for a better experience.

Laboratory Analysis—A single vial of blood was collected and sent to the laboratory for analysis of basic metabolic, magnesium, calcium and phosphorus levels.

Colonoscopy—All examinations were performed in the morning before noon. Exams were performed using Evis Exera II Olympus CF-H180 high definition colonoscopes (Olympus America, Inc., Center Valley, PA). During the colonoscopy, 5–10 representative pictures from each segment of the colon were taken after cleansing maneuvers. Patients whose preparation was considered inadequate for polyp detection were rescheduled for repeat exams, however, only the data collected from the initial procedure were included in the results. The start time of the procedure, time required to reach the cecum, and withdrawal time for all patients were recorded. The pathology results were also reviewed to determine the adenoma detection rate for both groups.

Preparation Efficacy—At the conclusion of the study, all exams were analyzed according to the Boston Bowel Preparation Scale (BBPS) to assess the efficacy of the bowel preparation. The BBPS has previously been validated as a reliable instrument for colonoscopy-oriented research. [10–12] A score of 0–3 is given to each of the three segments of the colon (right, including cecum and ascending colon; transverse, including the hepatic and splenic flexures; and left, including the descending colon, sigmoid, and rectum.) A score of 0 is defined as unprepared with solid stool that cannot be cleared.; 1 as a portion of mucosa seen, but other areas not well seen because of staining, residual stool, and/or opaque liquid; 2 as a minor amount of residual staining, small fragments of stool and/or opaque liquid, but mucosa of segment well seen; 3 as the entire mucosa of segment seen well with no residual staining, small fragments of stool, or opaque liquid. For cases in which the colon is essentially unprepared and the proximal colon cannot be reached, an overall score of 0 is given. [10,11]

Two experienced endoscopists were trained in the BBPS scoring system.[10,11] The BBPS was easily adopted by the reviewers as a 4-point rank scale of "excellent", "good", "fair", and "poor/unacceptable" has been required for our colonoscopy reports for many years.

Blinded to preparation assignment and patient name (as was the colonoscopist), they independently reviewed a minimum of 15 representative images from throughout the colon, graded the colon segments, and gave an overall score of the sum of the three segments from 0–9. The images were enlarged to 7.4 x 8.5 cm prior to printing on a HP Color LaserJet 4700n printer (Hewlett-Packard, Palo Alto, CA). The correlation coefficient for inter-observer reliability was 0.76 for overall scores. The final score for each segment and overall score represented the averages submitted by the two reviewers.

Statistical Analysis

We used independent samples t-test to compare mean values between study groups. We used Pearson's χ^2 to compare differences in proportions between categorical variables. We utilized the mean score for our Boston Bowel Preparation Scale scoring; this represented the average of the scores given by the two independent graders. We performed separate analyses including an intention to treat and per protocol analysis. All patients taking the preparation and arrived for colonoscopy were included in the ITT analysis. The sub-group of individuals who drank > 75% of the preparation and adhered to a clear liquid diet were considered to have followed the intended protocol (PP). These criteria were developed prior to data analysis. All 2-tailed P values less than 0.05 were considered statistically significant. All statistical calculations were performed using IBM SPSS Statistics 19 (IBM, Somers, NY).

Sample Size Calculation

The study was designed as a non-inferiority trial. That is, our purpose was to assess whether PEG + Gatorade was not inferior to PEG-ELS as a preparation for colonoscopy. We initially calculated our sample size based on the presumption that the mean preparation score (average score for two reviewers) for Golytely would be 6.2 with a standard deviation of 1.5 based on one of the largest studies to date. [10] We conservatively revised upward our predicted average BBPS score for Golytely to 7.3 ± 1.5 based on the results from the paper by Enestvedt and others.(7) We believed that PEG + Gatorade could be considered inferior to PEG-ELS if the overall BBPS score was = 10% lower. With a = 0.025 and equal variances assumed, group sample sizes of 66 and 66 achieve an 80% power to detect non-inferiority of PEG + Gatorade using a one-sided, two-sample t-test.[13] This was calculated based on a margin for equivalence set at −.73 or −10% and the standard deviation preserved at 1.5. That is, non-inferiority would be demonstrated if the BBPS for PEG + Gatorade preparation was no more than 0.73 points lower than PEG-ELS.

Results

Over the course of the study we identified 162 eligible outpatients to participate in the study. Many screened patients did not qualify because they had underlying constipation, or less commonly, diarrhea. Approximately 10% (n=33) of subjects did not speak English. Also, 15% (n=51) of screened subjects had diabetes and were thus excluded. As can be seen in Figure 1, we recruited 70 patients in the PEG-ELS arm and 66 patients in the PEG + Gatorade arm. In the PEG-ELS arm 54/70 (77.1%) adhered to the preparation protocol while 50/66 (75.8%) adhered in the PEG + Gatorade arm. The groups were well balanced for age, ethnicity, and procedure indication (Table 1). There were also no statistical differences in the proportion taking diuretics or drugs which affect the renin-angiotensin system. However, there was an imbalance in gender as more females were included in the PEG-ELS arm (62.9% vs. 45.5%, p= 0.04)

Boston Bowel Preparation Scale Scores

Figure 2 demonstrates the results of the ITT BBPS results. For the ITT, the mean score for the two reviewers was 7.2 ± 1.9 for PEG-ELS and 7.0 ± 2.1 for PEG + Gatorade (95% CI =

−0.8–1.1 for the difference). This was well within the threshold set for non-inferiority. For those individuals who followed the instructions (PP analysis), the BBPS scores were nearly identical. The average BBPS score for PEG-ELS was 7.4 ± 1.7 while the score for PEG + Gatorade was 7.4 ± 1.8 (95% CI= −0.2–0.3 for the difference). Therefore, the primary endpoint of non-inferiority was met under both analyses. We considered a BBPS score = 6 as a good preparation. The proportion of individuals with a score ≥ 6 was 84.3% for PEG-ELS and 81.8% for PEG+ Gatorade (p = 0.70). Likewise, we considered a score < 5 as inadequate and would require a repeat examination. The proportion of individuals with scores below this threshold was 12.9% vs.15.2% (p = 0.71) respectively.

Electrolyte Safety

Table 2 compares the electrolytes measured on the morning of exam. There were no significant differences overall between the two preparations. Electrolytes were not obtained in two patients in each arm either due to oversight or inability to complete the venipuncture. In one PEG-ELS patient the specimen was grossly hemolyzed and the results were not used. The minimum cutoff for normal potassium in our hospital's lab is 3.5 mmol/dl. There were eight patients who had potassium levels between 3.0 and 3.4 mmol/dl. There were four in each preparation group. None of the patients had a potassium level less than 3.0 mmol/dl.

Colonoscopy Results

As shown in Table 3, there was no statistical difference in time to the cecum or withdrawal time. The withdrawal time on average was above the six minute threshold.[14] Importantly, the adenoma detection rate was well within the expected frequency considering the age of patients and indications for the exam. [15]

Preparation Experience

The overall experience (0–4 scale) in preparing for colonoscopy was significantly better for PEG + Gatorade arm compared to PEG-ELS (3.50; IQR 2.90–3.80 vs. 3.0; IQR 1.90–3.2; p = 0.001) (Figure 3). In addition, the proportion of patients who stated they would be willing to consume the same preparation for a future colonoscopy was far higher for PEG + Gatorade (93.8% vs. 72.5%; p = 0.001). Table 4 reviews the frequency of the most common symptoms experienced by participants. Overall fewer patients randomized to PEG + Gatorade experienced any side effects. For both preparations the most common adverse effects were bloating and nausea.

Discussion

Our prospective, blinded, randomized trial demonstrated that 238g PEG + 1.9 L Gatorade is not inferior to 4L PEG-ELS as a preparation for colonoscopy. Using the validated Boston Bowel Preparation Scale which uses a 0–9 scoring system, the average preparation quality score from two reviewers was 7.2 ± 1.9 for PEG-ELS vs. 7.0 ± 2.1 for PEG+ Gatorade (p = 0.45). For those participants who drank ≥ 75% of their assigned preparation and strictly adhered to a clear liquid diet the day prior, preparation scores were nearly identical (PEG-ELS 7.4 ± 1.7 vs. PEG + Gatorade 7.4 ± 1.8; p = 0.98).

This study is the largest study to date comparing basic metabolic data between these two preparations and we found no significant differences in serum electrolyte levels. Since PEG 3350 without electrolytes became commercially available many gastroenterologists have chosen to combine this powder with an electrolyte sport drink. There has been concern that this combination does not provide enough electrolytes to replenish intestinal losses. In 66 patients randomized to PEG + Gatorade we found four cases of mild hypokalemia, similar to that seen in the PEG-ELS arm. The largest study previous to ours was performed in 29

children, finding that a 4 day colon preparation using weight-based electrolyte free PEG 3350 did not result in significant changes in baseline electrolytes.[5] Similarly, Stratton et al reported on the use of MiraLAX in 29 adults undergoing screening colonoscopy.[6] Serum electrolytes did not change significantly secondary to the preparation which could include 64 ounces of either an artificial lemonade drink, apple juice, or a sports drink. [6] It is not surprising that electrolyte abnormalities were rare in this healthy study group. Electrolyte abnormalities with PEG-ELS are exceedingly rare and primarily at the level of case reports. [16] These include hyponatremia, hypernatremia, and hypokalemia. A large retrospective study found the prevalence of hypokalemia (due to fecal losses and elevated aldosterone levels) to be 9.6% in a population of elderly patients with underlying cardiac and/or renal disorders.[17] Hyponatremia is due to increased ADH levels in response to hypovolemia, and again, primarily occurs in the elderly. [18,19] Gatorade has considerably less sodium and potassium than PEG-ELS and therefore, in elderly patients and those with underlying cardiac or renal disease, the risk for electrolytes is likely to be substantially increased. Clearly larger studies are necessary to confirm the metabolic safety data reported in this paper before widespread use can be recommended.

Participants strongly favored the experience with PEG + Gatorade ($p = 0.001$) and were much more willing to use this preparation for future exams ($p = 0.001$). This is likely due to the improved taste and reduced volume. The mixture of Gatorade + Miralax tastes very close to Gatorade alone. Despite lemon flavoring, PEG-ELS can be unpalatable for many. Reduced volume has consistently been associated with patient preference and willingness to use the same agent for future studies.[20] For those physicians using 4L of PEG-ELS, splitting the dose is preferred by most patients over ingestion at a single time point.[21]

Our findings differ from the conclusions of two recent randomized trials. In the study by Hjelkrem and colleagues, PEG-ELS achieved a lower (better) Ottawa Preparation Score than PEG+ Gatorade (5.1 vs. 6.9; $p < 0.001$) and the proportion of patients with an excellent preparation was far higher in the PEG-ELS arm (49% vs. 15%). [8] Likewise, in a recent study by Enestvedt and others, the proportion of patients with a good preparation (Boston Bowel Preparation Scale score = 7) was significantly higher with PEG-ELS compared to 238 g PEG + 1.9 L Gatorade + bisacodyl 20 mg (83% vs. 68%; $p = 0.02$). [7]

The different results found in our study may be due to the preparation protocol. In our study, both colon preparations were given as a single dose over 2 hours beginning at 8PM the evening prior to exam. We did not use split dosing as in previous trials.[22] We performed all colonoscopy exams before noon and therefore minimized the need for split dosing. In our practice we only use split dosing for colonoscopy exams performed in the afternoon due to our anesthesia department's requirement for 6 hours NPO before propofol sedation. Our results agree with the study by Stratton in which PEG+ Gatorade was successfully given as a single dose the evening before colonoscopy. [6]

A second reason we found no difference between the two preparations could be the methodology used in our study for blinding and preparation grading. We chose, a priori, to grade the preparation from enlarged high quality photos taken from throughout the colon which were de-identified. After reviewing the BBPS literature, both reviewers had a high initial level of agreement. In fact, the inter-observer correlation coefficient of 0.76 is nearly identical to the value (0.74) of the largest paper to date validating the BBPS. [10] This methodology differs from the technique used in the papers by the Hjelkrem and Enestvedt groups in which the endoscopist graded the preparation.

Our study found no difference in the length of procedure insertion or withdrawal time. The adenoma detection rate (ADR) was also similar in the two groups. This demonstrates that

our randomization process was successful and the two arms were composed of patients with similar characteristics. It also indirectly confirms the comparability of the preparation for both groups. This is because it has been recognized, not surprisingly, that the quality of preparation affects the ADR especially for small polyps.[2] Our decision to perform all cases in the AM was important as ADR appear to be better for morning cases.[23]

Our study has several noteworthy limitations. Our sample size was relatively small at 136 patients. Even with this modest number needed, recruitment still required 18 months as many subjects declined participation. This number may have been too small to detect electrolyte abnormalities which are thought to be uncommon with Gatorade-based preparations. In addition to the small size, the population studied was generally healthy, middle-aged, and without significant medical conditions including diabetes and renal insufficiency. Therefore the general applicability of our findings is limited. Further studies would need to be performed to evaluate the safety of PEG + Gatorade in populations at higher risk of electrolyte complications such as the elderly who may be at risk from the electrolyte-free solution. [24]

A major limitation to the widespread acceptance of colonoscopy as a procedure to screen for colorectal cancer is the laxative preparation. [25] Phosphate-based preparations are now used on a limited basis because of their known association with renal injury. [26–28] The use of high dose bisacodyl (e.g. 20 mg) should be discouraged due to the risk of ischemic colitis and the frequency of abdominal cramping. [29,30] PEG-ELS is not very palatable due to the electrolyte additives which include sodium sulfate. Sulfate-free formulations are somewhat better tolerated but the overall volume can still be troublesome. Fortunately there are several promising FDA-approved products which offer improved taste and lower volumes without sacrificing efficacy. [31–33]

In conclusion we found that colonoscopy preparation with 238 g PEG + 1.9 L Gatorade was not inferior to 4L PEG-ELS. Moreover, we found that the reduced volume preparation did not result in serious electrolyte abnormalities, lengthen procedure times, or reduce adenoma detection rates. Patients preferred this preparation significantly more than PEG-ELS. Future studies are needed to assess the safety of PEG + Gatorade in different populations including the elderly, those with diabetes and renal dysfunction. This preparation is not FDA-approved and we strongly advocate discussing this point with patients.

Acknowledgments

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Abbreviations

ADR	adenoma detection rate
BBPS	Boston Bowel Preparation Scale
ITT	intention to treat
PEG	polyethylene glycol
PP	per protocol

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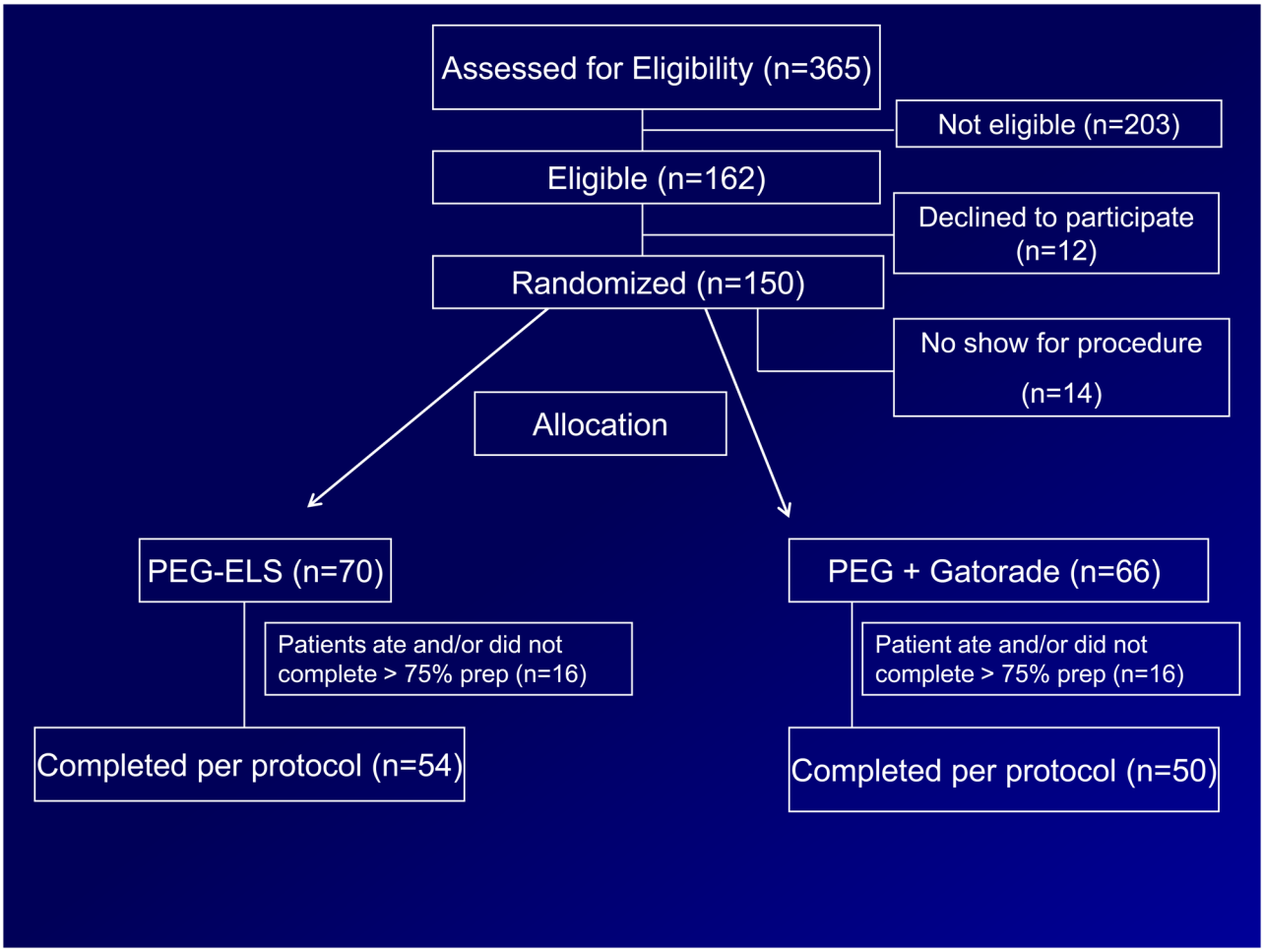

Figure 1.
Study flowchart.

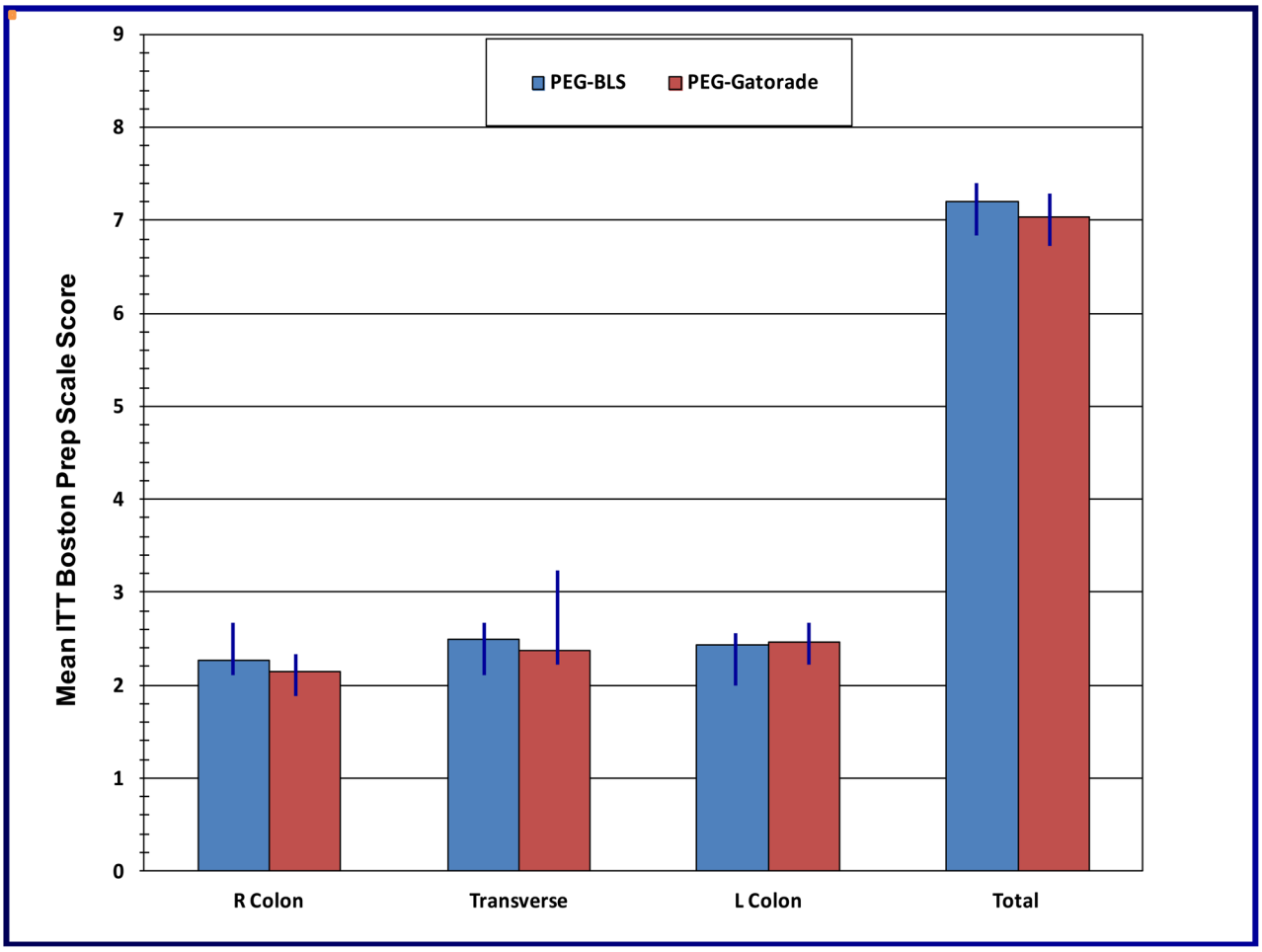

Figure 2.
Mean intention to treat Boston Bowel Preparation Scale Scores from two reviewers.

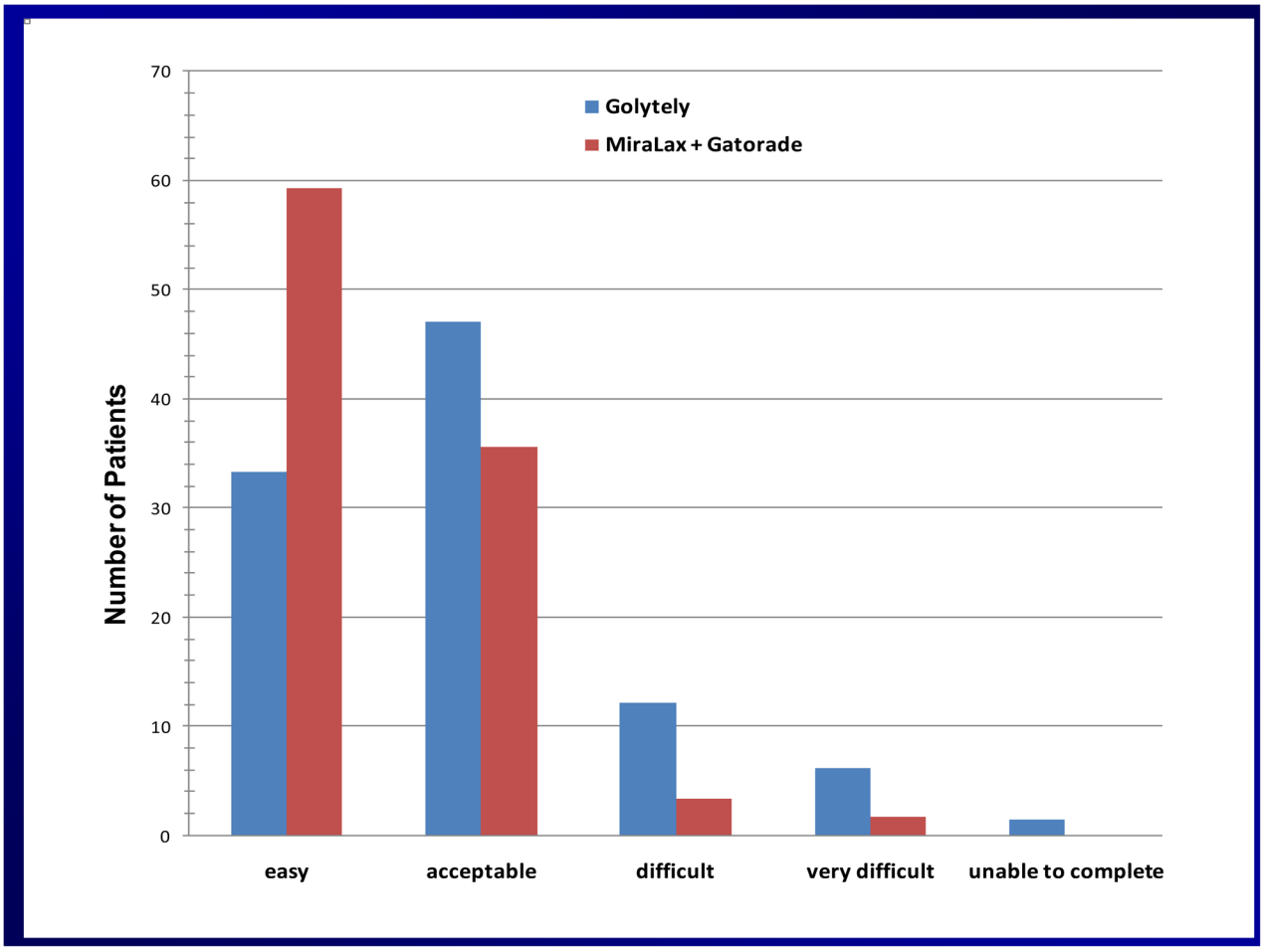

Figure 3.
Global report of preparation experience by patients.

Table 1

Characteristics of the study patients.

	PEG-ELS (n=70)	PEG + Gatorade (n=66)	p
Age (y, SD)	56.7 (7.0)	56.3 (8.4)	0.71
Female, n (%)	44 (62.9)	30 (45.5)	0.04
Race			0.09
White, n (%)	2 (2.9)	7 (10.6)	
Black, n (%)	58 (82.9)	47 (71.2)	
Hispanic, n (%)	8 (11.4)	12 (18.2)	
Other, n (%)	2 (2.9)	0 (0)	
ACE/ARB, n (%)	21 (30.0)	13 (19.7)	0.17
Diuretic, n (%)	20 (28.6)	15 (22.7)	0.44
Indication, n (%)			0.08
CRC Screening	64 (91.4)	54 (81.8)	
Guaiac Positive	2 (2.9)	0 (0.0)	
Rectal Bleeding	2 (2.9)	8 (12.1)	
Polyp Surveillance	2 (2.9)	4 (6.1)	

PEG – polyethylene glycol 3350

ELS – balanced electrolyte solution

ACE- angiotensin converting enzyme inhibitor

ARB – angiotensin receptor blocker

Table 2

Electrolyte results from morning of colonoscopy after preparation.

	Normal Range	PEG-ELS	PEG + Gatorade	p
Sodium	135–146 mmol/L	139.3 (2.4)	138.8 (2.4)	0.13
Potassium	3.5–5.3 mmol/L	3.9 (3.5)	4.0 (3.2)	0.31
Chloride	98–110 mmol/L	104.2 (3.2)	104.1 (2.6)	0.87
Bicarbonate	21–33 mmol/L	25.9 (2.5)	26.4 (2.5)	0.25
BUN	7–25 mg/dl	9.5 (4.0)	9.0 (3.4)	0.47
Creatinine	0.78–1.34 mg/dl	1.1 (2.0)	0.9 (0.19)	0.34
Glucose	65–99 mg/dl	93.7 (21.5)	98.2 (12.2)	0.18
Calcium	8.6–10.2 mg/dl	9.3 (0.46)	9.3 (0.35)	0.75
Magnesium	1.5–2.5 mg/dl	2.1 (0.26)	2.1 (0.20)	0.92
Phosphorus	2.5–4.5 mg/dl	3.5 (0.60)	3.4 (0.52)	0.60

BUN – blood urea nitrogen

Table 3

Procedure times and adenoma detection.

	PEG-ELS (n=70)	PEG + Gatorade (n=66)	p
AM Start Time (SD)	10:08 (0:17)	10:09 (0:16)	0.98
Insertion Time, min (SD)	8.8 (5.5)	9.6 (6.2)	0.50
Withdrawal Time, min (SD)	12.6 (5.4)	13.9 (6.1)	0.23
Adenoma detected, n (%)	23 (32.9)	18 (27.3)	0.48

Insertion time – from introduction of scope into rectum after sedation to recognition of appendiceal orifice and ileocecal valve.

Withdrawal time - commences after inspection of cecum until scope out.

Table 4

Side effects related to colon preparations.
Frequency of the most common symptoms experienced by participants.

		PEG-ELS	PEG + Gatorade	Total
None	n	25	32	57
	%	39.7%	54.2%	46.7%
Cramps	n	2	4	6
	%	3.2%	6.8%	4.9%
Nausea	n	6	6	12
	%	9.5%	10.2%	9.8%
Bloating	n	16	12	28
	%	25.4%	20.3%	23.0%
Poor Taste	n	7	0	7
	%	11.1%	.0%	5.7%
Insomnia	n	4	1	5
	%	6.3%	1.7%	4.1%
Headache	n	1	3	4
	%	1.6%	5.1%	3.3%
Other	n	2	1	3
	%	3.2%	1.7%	2.5%