

Original Articles

Comparative study of Polyethylene Glycol versus Sodium Phosphate Enema for bowel preparation before colonoscopy: a prospective, randomized controlled trial

Dr. Deepak J. Vora*, Dr. Sharad M Patel**, Dr. Raj B. Depani***, Dr. Tirth Shah***, Dr. Shubham Patel***,

*Associate Professor, **Professor, ***Resident, Department of General Surgery, Smt. Shardaben Hospital, Smt NHL Municipal Medical College, Ahmedabad, Gujarat, India.

KEY WORDS : colonoscopy, bowel preparation, sodium phosphate enema, polyethylene glycol(PEG), randomised control trial, Ottawa bowel preparation scale

ABSTRACT

Background:

The colon should be free of fecal matter and fluid for detailed visualization of colonic mucosa and lesions over it. A patient compliant preparation is preferable for the examiner. The aim of this study was to compare efficacy of bowel preparation, patient compliance and side effects of 2 bowel cleansing regimens i.e Polyethylene glycol with electrolytes (PEG) and Enema (sodium phosphate) for diagnostic colonoscopy performed in indoor patients.

METHODS:

In this randomized, single-blind, controlled trial, 50 patients undergoing diagnostic colonoscopy were randomly administered oral PEG (n=25) and sodium phosphate enema (n=25). Patient tolerance was scored using a questionnaire. Efficacy was scored using the Ottawa bowel preparation scale.

Results:

Patients in PEG group were more satisfied with cleanout, had better Ottawa score, had lower procedure time and less complications compared to patients in Enema group.

INTRODUCTION

Colonoscopy is the method of choice to evaluate colonic mucosa. It plays an important role in screening and diagnosis of large intestinal pathologies like polyp and adenoma.

Insufficient cleaning can result in lower detection rates of incipient and advanced adenomas, flat lesions and also increases the rate of postponed procedures which increases cost, duration of procedure, risk of complications and thus lengthier hospital stay.

Bowel preparation is one of the issues that negatively influence the willingness of patients to undergo colonoscopy screening. Adherence to preparation is a key factor for improving bowel preparation. However, it has limitations due to side effects and poor tolerance among patients to the taste, which are the main reasons for avoiding the procedure

PEG electrolyte solution (PEG) was introduced by Davis et al in 1980 and consists of an isotonic oral, non-digestible and non-absorbable solution. Typically, 2-4 L

of PEG is administered; the high volume and the unpleasant taste are among the major disadvantages of this solution.

Sodium Phosphate is an osmotic purgative which retains water in the intestine, distends bowel and increases peristalsis indirectly.

METHODS

This prospective, randomised controlled trial was conducted in Smt Shardaben Hospital, Ahmedabad over a period of 6 months from 1st July 2020 to 1st January 2021. Two commonly used agents Polyethylene glycol with electrolytes (PEG) and Enema (sodium phosphate) were used.

Inclusion criteria : all adult patients coming in OPD with chronically altered bowel habits or bleeding per rectum in absence of hemorrhoid were included.

Exclusion Criteria : any patient with altered Renal Function (S.Cr >1.5) or altered electrolytes were excluded.

Correspondence Address : Dr. Deepak Vora
5, Siddhivinayak Row House, Nr. Jivrajpark Bridge, Time of India Press Road, Vejalpur,
Ahmedabad, Gujarat. • E-mail : raj.depani@gmail.com

2L of PEG was administered over 10 hours before colonoscopy and 200ml enema administered in two doses- one 18 hours before and another 2 hours before the procedure. The patients completed a questionnaire to assess their tolerance of bowel preparation. Efficacy of the preparation was scored using the Ottawa bowel preparation scale.

RESULTS

Out of 50 patients aged between 22 to 86 years, mean age was 42.9. 25(50%) patients were given enema while 25(50%) patients were given PEG. 18 (72%) patients of enema group were satisfied or very satisfied with the cleanout compared to 20 (80%) patients in the PEG group. Better colon cleanout score was found in patients in the PEG group as judged by the Ottawa score. The procedure took significantly longer time in patients in the enema group(34.28min) compared to PEG group (24.2min). The procedure in 3 (12%) patients of enema group was postponed due to improper preparation obscuring the vision. 1 (4%) patients of the enema group had some dehydration.

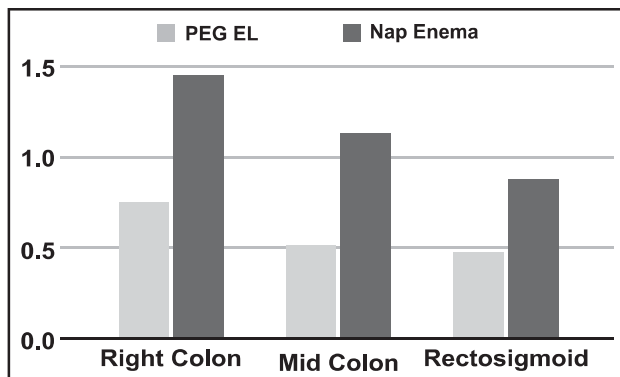
Demographics of PEG Group

	MALE	FEMALE
NUMBER	17	8
MEAN AGE	46.58	50.42
BMI	23.8	24.2

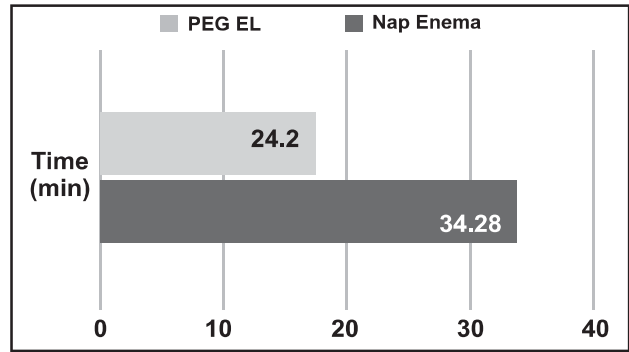
Demographics of Enema Group

	MALE	FEMALE
NUMBER	18	7
MEAN AGE	43.38	39.64
BMI	24.4	25.1

MEAN OTTAWA SCORE



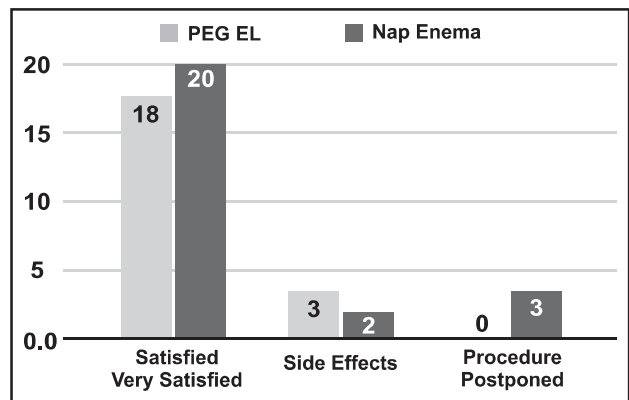
AVERAGE PROCEDURE TIME



SIDE EFFECTS RELATED TO BOWEL PREPARATION

SIDE EFFECT	PEG (no of patients)	ENEMA (no of patients)
Nausea	1	0
Vomiting	0	0
Abdominal Pain	1	0
Dizziness	0	1
Sleep Disturbance	3	1
Dehydration	0	1
TOTAL	3	2

MEAN OTTAWA SCORE



DISCUSSION

Ongoing efforts to improve the tolerability and palatability of colonoscopy bowel preparations are important from a quality improvement standpoint to ensure the adequacy of colonoscopy. Incorporating patient-specific factors and comorbidities is also an essential aspect of improving the quality of bowel preparation. Leveraging technology to better communicate with and educate patients on the bowel preparation process is likely to play a larger role in the coming years.

As true heterogeneity was present in the included studies despite the strict inclusion criteria adopted, caution for interpretation of data is recommended.

As previously known in a meta-analysis by Bucci et al, the interval time between the last drink of bowel preparation and the beginning of colonoscopy (also known as “runway time”) is a key factor for cleaning quality. When Pohl et al compared different regimens, the difference between treatment effects was increased and favored that one with the shorter “runway time”.

Statistical difference in favor of PEG was also identified in the following situations:

- bowel preparation was made on the day before (better bowel cleaning success and better tolerability);
- bowel preparation was made based on the interval time to colonoscopy (also better tolerability);
- when compared to high-volume solution of PEG (better tolerability and fewer adverse events);
- liquid diet was the option on the day before (with better bowel cleaning success and better tolerability); and
- a low residue diet was the option on the day before (fewer adverse events).

Despite its potential benefits, care should be taken with PEG. Because of the potential electrolyte shifts, plain PEG is not recommended in patients with renal insufficiency, end-stage liver disease, heart failure and electrolyte abnormalities. PEG is the product of choice for those patients as it is an inert molecule and isosmotic solution, which also induces less mucosal damage (inflammation or ulceration) when compared to enema.

CONCLUSION

Polyethylene glycol with electrolyte(PEG) has a better efficacy, safety, bowel cleansing score and shorter mean duration for colonoscopy than enema (sodium phosphate). Patient compliance and satisfaction were greater in the enema group.

REFERENCES

1. Lever EL, Walter MH, Condon SC, Balasubramaniam K, Chen YK, Mitchell RD, Herber R, Collen. Addition of enemas to oral lavage preparation for colonoscopy is not necessary. *MJGastrointest Endosc.* 1992 May-Jun; 38(3):369-72.
2. Kastenberg D, Bertiger G, Brogadir S. Bowel preparation quality scales for colonoscopy. *World J Gastroenterol.* 2018 Jul 14;24(26):2833-2843. doi: 10.3748/wjg.v24.i26.2833. PMID: 30018478; PMCID: PMC6048432.

3. Chapman W, Marshall S. Optimising bowel preparation before colonoscopy. *Br J Nurs.* 2020 Jul 7;29(Sup13):S3-S12. doi: 10.12968/bjon.2020.29.Sup13.S3. PMID: 32870720.
4. Jacobson BC, Calderwood AH. Measuring bowel preparation adequacy in colonoscopy-based research: review of key considerations. *Gastrointest Endosc.* 2020 Feb;91(2):248-256. doi: 10.1016/j.gie.2019.09.031. Epub 2019 Sep 27. PMID: 31568770.
5. Ben Chaabane N, Ben Mansour W, Hellara O, Ben Mansour I, Melki W, Loghmeri H, Bdioui F, Safer L, Saffar H. Préparation intestinale avant coloscopie [Bowel preparation before colonoscopy]. *Presse Med.* 2012 Jan;41(1):37-42. French. doi: 10.1016/j.lpm.2011.04.017. Epub 2011 Jul 26. PMID: 21795010.
6. Poon CM, Lee DW, Mak SK, Ko CW, Chan KC, Chan KW, Sin KS, Chan AC. Two liters of polyethylene glycol-electrolyte lavage solution versus sodium phosphate as bowel cleansing regimen for colonoscopy: a prospective randomized controlled trial. *Endoscopy.* 2002 Jul;34(7):560-3. doi: 10.1055/s-2002-33207. PMID: 12170410.
7. Chia Y W, Cheng L C, Goh P M. et al . Role of oral sodium phosphate and its effectiveness in large bowel preparation for outpatient colonoscopy. *JR Coll Surg Edinb.* 1995; 40 374-376
8. Curran MP, Plosker GL. Oral sodium phosphate solution: a review of its use as a colorectal cleanser. *Drugs.* 2004;64(15):1697-714. doi: 10.2165/00003495-200464150-00009. PMID: 15257632.
9. Hookey LC, Depew WT, Vanner SJ. A prospective randomized trial comparing low-dose oral sodium phosphate plus stimulant laxatives with large volume polyethylene glycol solution for colon cleansing. *Am J Gastroenterol.* 2004 Nov;99(11):2217-22. doi: 10.1111/j.1572-0241.2004.40482.x. PMID: 15555005.
10. Parra-Blanco A, Ruiz A, Alvarez-Lobos M, Amorós A, Gana JC, Ibáñez P, Ono A, Fujii T. Achieving the best bowel preparation for colonoscopy. *World J Gastroenterol.* 2014 Dec 21;20(47):17709-26. doi: 10.3748/wjg.v20.i47.17709. PMID: 25548470; PMCID: PMC4273122.
11. Rocha RSP, Ribeiro IB, de Moura DTH, et al. Sodium picosulphate or polyethylene glycol before elective colonoscopy in outpatients? A systematic review and meta-analysis. *World J Gastrointest Endosc.* 2018;10(12):422-441. doi:10.4253/wjge.v10.i12.422
12. Millien VO, Mansour NM. Bowel Preparation for Colonoscopy in 2020: A Look at the Past, Present, and Future. *Curr Gastroenterol Rep.* 2020 May 6;22(6):28. doi: 10.1007/s11894-020-00764-4. PMID: 32377915.