



Colon Surgery with & without Mechanical Bowel Preparation: A Comparative Study

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ABSTRACT

Mechanical bowel cleansing is part of routine preoperative preparation of patients planned for colectomy worldwide. The commonly used bowel preparation agent is polyethylene glycol, but this drug causes severe morbidity. We conducted a non-randomized interventional study to assess whether colonic surgery can be safely performed without mechanical bowel preparation. In this study 50 patients planned for elective colectomy were divided into two groups of 25 each. Group A was given mechanical bowel preparation in the form of 2000 ml of polyethylene glycol (Peglec, Tablets India Ltd) while Group B was not given mechanical bowel preparation. In both these groups outcome was noted in terms of wound infection & anastomotic leak. Wound infection was defined as a wound requiring partial or complete opening for drainage of purulent collection, or erythema requiring initiation of antibiotic treatment. Anastomotic leak was identified if demonstrated by imaging or documented in surgery, or if feculent drainage was evident through a perianastomotic drain. Out of the 25 patients in Group A, 15 developed wound infection & 11 out of 25 developed wound infection in Group B. There was no statistical difference between the two groups in this regard. Similarly 3 out of 25 in Group A & nil patients in Group B developed anastomotic leak, the difference was not statistically significant. Other parameters such as return of bowel sound & post-operative hospital stay were found to be similar. Passage of flatus post-operatively was found to be significantly earlier in Group B.

INTRODUCTION

Mechanical Bowel Preparation is a ubiquitous part of preoperative preparation of patients planned for colonic surgery worldwide, but over the past few years a series of contrary evidence has been published regarding its use^{1, 2, and 3}. Nonetheless

Indian surgeons still consider it to be an essential part of colorectal surgery & the arguments they put forward are that lesser intestinal residue makes surgery easier & reduce risk of surgical site infection & anastomotic leak. We conducted this study to disprove the above arguments & have

gone a step further by evaluating the effect of mechanical bowel preparation on post-operative bowel motility & hospital stay.

MATERIALS & METHODS

This was a single centre non randomized trial. We enrolled a consecutive series of patients who underwent open elective colonic resection & anastomosis in our institution between April 2012 & November 2013. The exclusion criteria were as follows

1. Patients who required a diverting stoma proximal to the anastomosis.
2. Those who were found to have an abdominal abscess at the time of surgery were excluded from the data analysis.
3. Patients with pre-existing medical conditions aggravating morbidity.
4. Patients needing multiple anastomoses at sites other than the colon.
5. Patients in whom the malignancy could not be resected.

Patients were split into two groups, Group A & Group B. Patients in Group A (the "prep" group) received mechanical bowel preparation with administration of 2000 ml of polyethylene glycol (Peglec; Tablets India Limited) 12 to 16 hours before surgery, and Group B (the "non-prep" group) had no preoperative mechanical bowel preparation. All patients were kept nil per oral from the night prior to surgery. Open surgery was done through a midline laparotomy. Anastomosis in all patients was done using hand sewn technique. The surgeries were performed by Surgeons in the Department of General Surgery &

Department of Surgical Gastroenterology. For prophylaxis in all patients, the institute antibiotic protocol was administered.

Possible complications were recorded daily after surgery. The main outcome was the rate of postoperative infectious complications, such as wound infection and anastomotic leak. Wound infection was defined as a wound requiring partial or complete opening for drainage of purulent collection, or erythema requiring initiation of antibiotic treatment. Anastomotic leak was identified if demonstrated by imaging or documented in surgery, or if faecal drainage was evident through a perianastomotic drain. All patients were followed up till discharge.

The statistical analysis to compare the prevalence of post-operative complications was done using Pearson Chi Square test & Fischer's exact t test. $P < 0.05$ was considered significant & all analysis were done using SPSS version 20.

The study protocol was approved by the Institutional Ethics Committee of Government Medical College, Kozhikode, India. Written informed consent was taken from all patients.

RESULTS

Characteristics of patients:

We enrolled a total of 50 patients in the study. All between the age of 20 – 85 years without significant medical comorbidities. Patients in both groups underwent left sided colonic procedures more than right. The general characteristics of patients are listed in Table 1. The P value was calculated using Chi Square test.

Table 1: Characteristics of patients

Patient Characteristics	Total	MBP	No MBP	P value
Age (<50yrs : > 50yrs)	20:30	7:18	13:12	0.083
Sex (M:F)	27:23	14:11	13:12	0.777
Albumin (<3.5mg%:>3.5mg%)	15:35	7:18	8:17	0.758
Surgical Time (<90min:>90 min)	16:34	8:17	8:17	1.000

MBP: Mechanical Bowel Preparation

Postoperative Complications:

Post operatively the primary end points taken into consideration were wound infection & anastomotic leak. Besides these we also recorded the first day bowel sounds were heard postoperatively, the first day of flatus passage post operatively & the duration of hospital stay. The P

value was calculated using chi square test for wound infection & for all other parameters Fischer's exact t test was used. The cut offs were based on previous post-operative data recorded in our institution over the past few years. The results are noted in Table 2.

Table 2: Primary & Secondary end points of the study

Parameters	Total	MBP	No MBP	P value
Wound Infection (Y:N)	26:24	15:10	11:14	0.258
Anastomotic leak (Y:N)	3:47	3:22	0:25	0.117
Reappearance of bowel sounds (<3d:>3d)	40:10	18:7	22:3	0.145
Passage of flatus (<4d:>4d)	39:11	16:9	23:2	0.019
Post op hospital stay (<10d:>10d)	26:24	11:14	15:10	0.258

MBP: Mechanical Bowel Preparation

DISCUSSION

Role of mechanical bowel preparation in colonic surgery has been a bone of contention for quite some time now with mounting evidence⁴ disproving its use & this study adds to this body of evidence. While reviewing our results we found that post-operative complications, long claimed to be reduced by mechanical bowel preparation are not impacted significantly by avoiding mechanical bowel preparation. In fact the incidence of anastomotic leakage in the mechanical bowel preparation group was 3/25 compared to nil in non mechanical bowel preparation group although this

difference was not found to be statistically significant. A recent study published by S.R.Brown et al⁵ showed that mechanical bowel preparation has a detrimental effect on colon mucosa. They proved that preparation reduces mucosal cellular proliferation by PCNA & immunohistochemical staining with an additional decrease in the butyrate transport protein within the colonic mucosa. This study was done in rats & is yet to be validated in humans.

We used post-operative reappearance of bowel sounds & passage of flatus as surrogate makers for bowel motility. It has been reported that

mechanical bowel preparation reduces bowel motility thereby prolonging the time to bowel emptying. Jung et al⁶ published a study showing that mechanical bowel preparation delayed post-operative bowel movement in open colon surgery. Bucher et al⁷ showed that bowel preparation delayed bowel emptying in left sided colon surgeries. The reasons for bowel hypomotility due to bowel preparation are unclear but there are some theories as to its cause, Bingol Kologulu M⁸ et al showed in rats that polyethylene glycol increases bile production & induces congestion, edema & inflammation in small & large bowels but not the stomach. Moreover McKenna et al⁹ showed that even a small volume of polyethylene glycol causes small bowel dilatation for many hours although its effect on post-operative bowel movement recovery is yet to be validated. There are no published studies yet seeking to identify cause of bowel hypomotility in humans. The significance of bowel hypomotility lies in the fact that early recovery from postoperative bowel dymotility enables early enteral feeding thereby reducing the incidence of a host of complications¹⁰. This is one of the cardinal reasons why mechanical bowel preparation has been omitted from enhanced recovery protocols being practised currently worldwide. In our study we noted that most of our patients had return of bowel sounds within 3 days post operatively some as early as post-operative day 1. There was no statistically significant difference between both groups in this regard. The passage of flatus postoperatively occurred within 4 days in majority of our patients, but there was a statistically

significant difference between both groups in favour of the no bowel preparation group in this regard (P value 0.019 Fischer's exact t test).

There was no difference in operating time between both groups thereby debunking the theory that bowel preparation makes surgery easier & faster. Postoperative hospital stay was prolonged in bowel preparation group but the difference was not statistically significant. The study findings are similar to findings noted elsewhere. Avoiding bowel preparation has no effect on anastomotic site leakage^{1,2,3,11,12}, prevalence of surgical site infection^{1,2,11,12} & operative times^{1,2,11,13}. Bowel preparation also delays post-operative intestinal emptying^{6,7}.

Our study had several limitations. First & foremost was that it was a non randomized trial. Secondly we had a small study sample to work with & thirdly there were different surgical teams involved in the treatment of these patients, but despite these limitations our findings were largely in line with studies done elsewhere.

CONCLUSION

With our study we were able to demonstrate that colonic surgery can be done safely without mechanical bowel preparation thereby saving the patient from its morbidity. We proved that there is no statistically significant difference between preparing & not preparing the bowel in terms of wound infection & anastomotic leak & that there is a statistically significant difference in favour of no preparation in terms of post-operative passage of flatus. Both these findings favour avoiding bowel preparation for colon surgeries.

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