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The Cathartic Effect of Bowel Preparation on Endoscopic Appearance and Biopsy of patients with Normal Colonic mucosa and Inflammatory Bowel Diseases

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Abstract:

Objective: Adequate preparation of the bowel is essential for accurate colonoscopic examination. To determine whether purgatives (castor oil) and tap water enemas alter the sigmoidoscopic and histologic appearances of the mucosa of rectum and sigmoid colon.

Methods: One hundred-four patients were prospectively assigned to do lower endoscopy with different indications, the following preparation method was used: five days on liquid diet. Castor oil and tapwater enemas two days before endoscopic examination. Two groups included in the study; Group-A 78/104 patients with normal looking colon, and Group-B 26/104 patients with clinical evidences of ulcerative colitis. The rectum and sigmoid were assessed endoscopically and histopathologically before and after bowel preparation (B.P) in the two groups of patients studied. The endoscopic and histologic inflammatory grades were examined according to recognized criteria's. A single pathologist who was blinded to the diagnosis, examined the biopsies to overcome pathological bias which may be met in such patients.

Results: Fifty patients of group-A (64%) showed increase in the mean of endoscopic inflammatory grades from 1 ± 0 to 1.07 ± 0.98 ($P < 0.001$). Fifteen patients of group-B (58%) showed increase in the mean of endoscopic inflammatory grades mean from 2 ± 0.98 before BP to 2.537 ± 0.81 ($P = 0.3$ not significant). The rectal biopsies in 52 patients (67%) of group-A after BP showed evidences of more acute inflammatory changes; of these 73% showed CMC infiltration, 54% showed vascular congestion. All of them were statistically significant. Twenty patients of group -B showed more acute inflammatory changes of rectal and sigmoidal biopsies after BP, especially chronic mononuclear cell infiltration and surface ulceration. All of them are statistically insignificant.

Conclusion: There are a high incidence of endoscopic and histologic changes that occur in the rectal and to a lesser extent in the sigmoidal mucosa which are induced by B.P in both normal looking mucosa and patients with Inflammatory Bowel Diseases.

Keywords: cathartic Colon, Bowel preparation Colonic histopathology

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Introduction:

Sigmoidoscopy is a very useful tool in assessment of the macroscopic appearances, so adequate preparation of the bowel is essential for accurate colonoscopic examination (1,2,3,4,5). The optimal bowel preparation regimen must be fast, inexpensive, and easy (3, 5). There are currently two widely accepted regimens in use:

1. Purgation and enemas.
2. Oral lavage regimens.

Purgation and enemas are standard preparatory procedure; purges like castor oil (30-40 ml), Senna preparation, (stimulant laxatives), and osmotic purges such as magnesium salts can also be effective with repeated 1-2 hourly doses and high fluid intake. Most endoscopist recommended enemas, whether tapwater, isotonic saline or purgatives (bisacodyl supp. or oxyphenisatin)(6,7).

Oral lavage regimens have supplanted the traditional purge plus enema approach in most practices because they are more effective, cause no pain, can be fully prepared in 4-6 hours (8,9).

Although there are no macroscopic changes of the colon following lavage solutions as in mannitol or polyethylene glycol (PEG), hyperemia and obliteration of the vascular pattern can follow many stimulant laxatives and bisacodyl, fleet's, tap water, soap enemas (10,11).

There are great observer variability and pathological bias in reporting abnormal rectal biopsy specimen especially in mild changes (12,13, 14,15,16,17,18).

Aim of the study:

In this prospective study we try to evaluate the endoscopic and histopathologic changes tried as reported by single pathologist for patients with normal looking mucosa and patients with chronic Inflammatory bowel diseases before and after standard bowel preparation.

Patients and methods:

Study design:

One hundred four patients scheduled for elective lower endoscopy participated in the study (61 males, 43 females), with the following exclusion criteria's known renal insufficiency, symptomatic congestive heart failure, recent myocardial infarction, and chronic medications like NSAID or cathartics and/or enema abuse.

All patients were evaluated through history, physical examination, general stool examination, and flexible sigmoidoscopy with rectal and sigmoidal biopsies

All patients were evaluated through history, physical examination, general stool examination, and flexible sigmoidoscopy with rectal and sigmoidal biopsies before and after bowel preparation.

Flexible sigmoidoscopy was carried by one-endoscopist with two biopsies taken from rectum and sigmoid colon at 12cm and 25cm respectively. The examination was repeated after seven days from the initial base line examination done by the same endoscopist plus two observers unaware for the type and state of bowel preparation. In the presence of great observer variation, a convenient grading used (Baron et al., 1964)(13).

Inflammatory Grades Macroscopic Appearances of the Colon

- O - Normal mucosa
- I - Loss of vascular pattern
- II - Oedema, hyperemia, granularity
- III - Friability
- IV - Spontaneous bleeding, Ulceration

The rectal and sigmoidoscopic biopsies were repeated and taken from the same site, send to single pathologist blinded to the diagnosis, type, and state of bowel preparation.

Preparation instructions:

Each patient was given written preparation instructions. All patient were instructed to begin a liquid diet for five days, and to take 50cc castor oil two days prior to the endoscopic examination and to do around 10 tapwater enemas the day before and early morning of the examination. Mean scores for macroscopic inflammatory grades and severity of chronic mononuclear cell infiltration of the lamina propria was compared using the Mann-Whitney test. Other results were compared using the χ^2 test.

Results:

One hundred four patients were studied (61 males, 43 females, m/f ratio=1.4, their ages ranged between 7-92 years, mean age was 39 years).

The total 104 patients were categorized into two groups: -

1. Group-A: 78/104 patients (75%), 46 males, 32 females M/F ratio =1.4; mean age 39 years with normal looking colon endoscopically.
2. Group-B: 26/104 patient (25%), 15 males, 11 females M/F ratio =1.36; mean age was 30 years with abnormal looking mucosa endoscopically with a clinical diagnosis of ulcerative colitis.

Main indications for colonoscopy for the 104 patient examined were evaluated (Table-1).

Group-A Patients (78/104) initially before bowel

with abnormal looking mucosa endoscopically with a clinical diagnosis of ulcerative colitis. Main indications for colonoscopy for the 104 patient examined were evaluated (Table-1).

Table-1
Main indications for colonoscopy

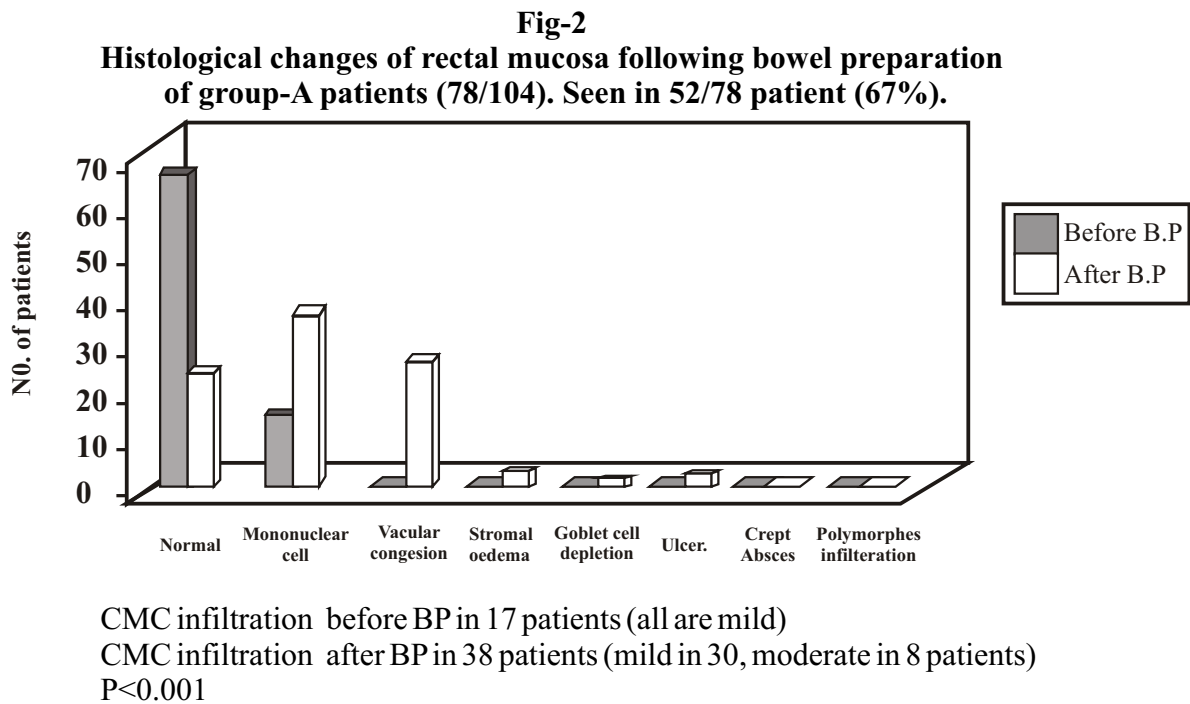
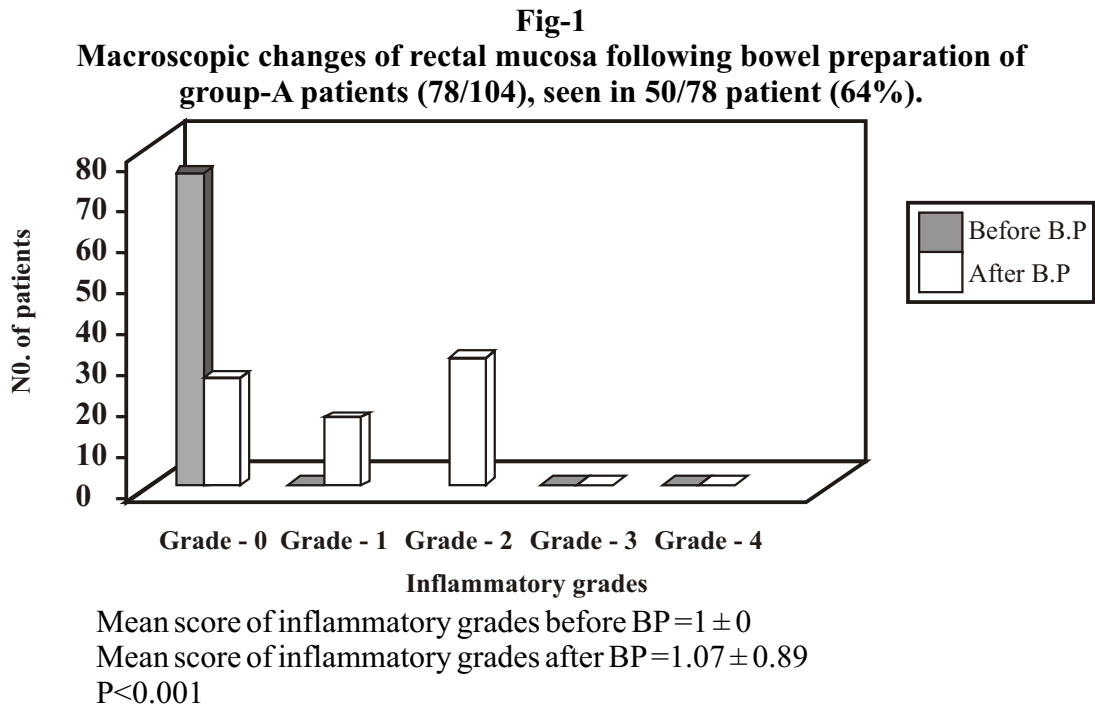
DIAGNOSIS	NO. OF PATIENTS	PERCENT
Rectal bleeding	28/104	
27%		
Abdominal pain	25/104	
24%		
Diarrhea with blood	19/104	
18%		
Change in bowel habits	15/104	
14%		
Follow-up in IBD*	6/104	
6%		

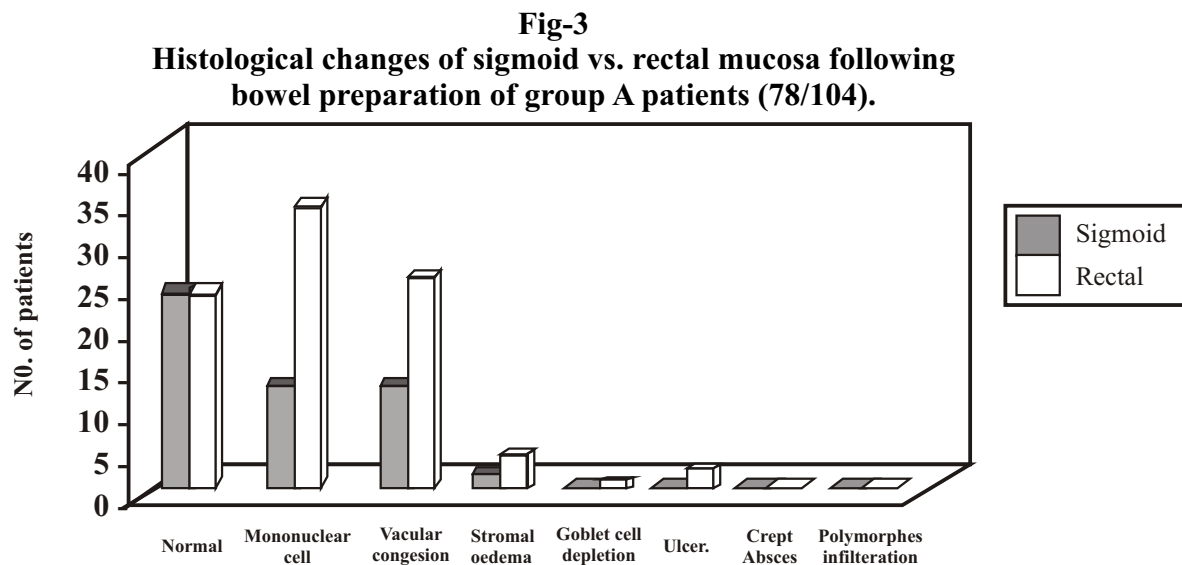
Group-A Patients (78/104) initially before bowel preparation showed normal looking colonic mucosa endoscopically of the rectum and sigmoid (grade-0). After bowel preparation the rectal mucosa lost its normal vascular pattern partially or completely with the development of an isolated finding or in combinations hyperemia, oedema, and granularity in 50/78 patients (64%); with a mean score equal to 1.07 ± 0.89 (mean \pm SD) ($p < 0.001$). The above macroscopic changes were confined to rectum without affecting the sigmoid mucosa in the group (A) patients (Fig-1).

The biopsy results of group-A patients before bowel preparation were normal histologically in 61/78 patients (78%) and showed only mild chronic mononuclear cells infiltration (CMC) of the lamina propria in the remaining 17/78 patients (22%). The rectal biopsies after bowel preparation in 52/78 patient (67%) showed evidences of acute inflammatory changes, of these affected rectal biopsies 38/52 patients (73%) showed chronic mononuclear cells infiltration, Vascular congestion was present in 28/52 patient (54%), six patients (11%) showed stromal oedema, and three patients (6%) showed surface ulceration ($P < 0.001$) (Fig-2). Although there are no endoscopic changes, the effect of bowel

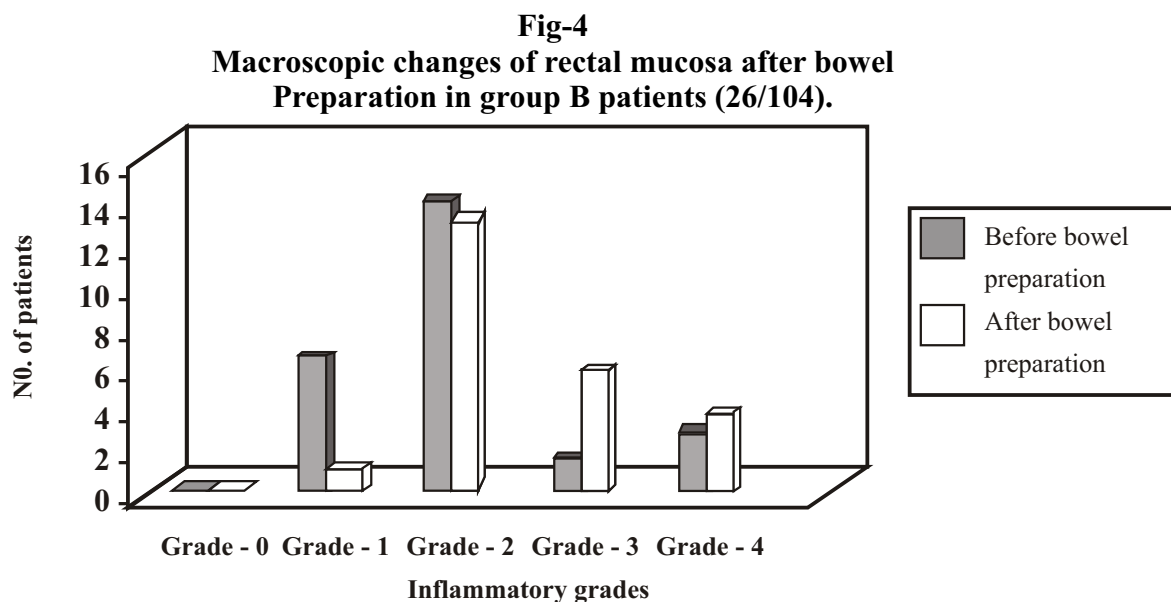
preparation on histology of sigmoid mucosa for those who had inflammatory changes in the rectum was identical except in 25/52 patients (48%), which showed less inflammatory changes. ($P < 0.05$) (Fig-3).

Group - B patients included 26 (25%) of total patients before bowel preparation showed abnormal looking mucosa endoscopically of the rectum and sigmoid with a clinical diagnosis of ulcerative colitis; 7/26 patients showed grade-1, 15/26 patients showed grade-2, one patient showed grade-3. Three patients showed grade-4 mucosal inflammation with a mean score equal to 2 ± 0.89 (mean \pm SD). After bowel preparation more acute inflammatory changes developed in the mucosa of rectum and sigmoid in 15/26 patients (58%) vs. 11/26 patients (42%) who remained in the same grade endoscopically with a mean score equal to 2.537 ± 0.81 (mean \pm SD), ($P = 0.3$ not significant) (Fig-4).





Group-B patients showed more acute inflammatory changes in 20/26 (77%) patients. Regarding inflammatory cells infiltration of unprepared rectal mucosa, (before bowel preparation), Chronic mononuclear cells infiltration were found in 18/26, and polymorphonuclear cells were present in 2/26; while after bowel preparation, rectal mucosa showed chronic mononuclear cells infiltration in 21/26 ($P=0.5$ not significant), and polymorphonuclear cells were present in 7/26 patients ($P>0.05$ not significant) (Fig-5).

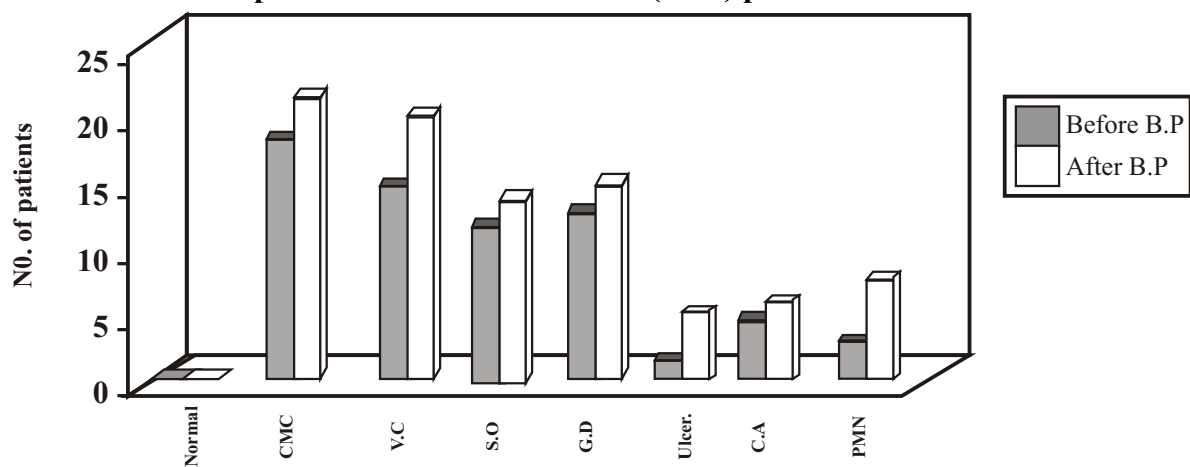


Mean score of inflammatory grades before BP = 2 ± 0.89

Mean score of inflammatory grades after BP = 2.537 ± 0.81

$P = 0.3$ not significant

Fig-5
Histologic changes of rectal mucosa after bowel preparation in Group-B
patients 26/104 seen in 20/26 (77%) patients



CMC infiltration before B.P in 18 patients (mild in 4, moderate in 14 patients)

CMC infiltration after B.P in 21 patients (mild in 5, moderate in 8, severe in 8 patients)

$P > 0.05$ **not** significant to all histological changes

Discussion:

Meisel et al. 1976, studied ten adult volunteers at weekly intervals. Proctoscopic appearances were unchanged following mannitol orally and saline 0.9% enemas, while fleet's phospho-Soda enema caused loss of normal vascular pattern in all subjects studied in addition to one subject developed mucosal friability (11). In this study we found that bowel preparation affect the rectum only of Group- A patients with normal looking colon macroscopically as shown by sigmoidoscopy in 64% causing mucosal inflammation; 16 patients developed loss of vascular pattern, and 34 patients developed hyperemia, edema, and granularity in addition as shown in (Fig-1).

Group-B patients with inflamed colonic mucosa showed more grading of inflammation in 58% after bowel preparation as shown in (Fig-4).

Gorkom et al 1998 studied 40 patients with normal colon, using sennoside in 19 patients vs. 21 prepared patients without sennoside. A marked increase of mononuclear infiltrate in the lamina propria was observed in sennoside compared to non-sennoside ($P < 0.0005$ significant) (15).

Meisel et al. 1977 noticed no change in the rectal mucosa following mannitol or saline 0.9% enema.

23/25 (92%) patients used bisacodyl rectally and 17/25 (68%) patients used fleet's Phospho-Soda enemas had alteration and distortion in the superficial epithelium, diminished goblet cells, and polymorphonuclear leukocyte in the epithelia and lumina of crypts (11,18).

Through evaluation of the two groups studied microscopically before and after bowel preparation; we found that 67% of group-A patients showing alternation in their rectal biopsies. The major histological changes were mild chronic mononuclear cell infiltration and vascular congestion in 58% and 54% respectively. (Fig-2).

Group-B Patients who already have rectal and sigmoidal biopsies that showed evidences of colitis before bowel preparation; the biopsies showed evidences of more acute changes after bowel preparation in 77% of patients.

Conclusions:

1. Our study suggest that purges and enemas using castor oil, tap water enemas and fluid diet, as a standard way for bowel preparation are tolerable and effective especially in patients without Inflammatory Bowel Diseases.
2. There is a high incidence of endoscopic and histological changes that occur in the rectal

mucosa and to a lesser extent in sigmoidal mucosa which is induced by bowel preparation in both normal looking mucosa and patients with IBD. Therefore endoscopic and microscopic evaluation of these patients should consider these possible changes before labeling patients as having IBD.

3. Using other ways of bowel preparation might lessen the endoscopic and microscopic changes that follow preparation like colonic lavage solutions (saline, mannitol, polyethylene glycol, and electrolyte solutions and non-irritative saline enemas) but these needs verification by further studies.

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