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Surgery

ELECTIVE COLORECTAL SURGERY WITH OR WITHOUT MECHANICAL BOWEL PREPARATION: A COMPARATIVE STUDY

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ABSTRACT

Background- The process of preparing the colon for an elective operation has traditionally involved two factors: purging the faecal contents (mechanical preparation) and administration of antibiotics effective against colonic bacteria. Recent experience with primary repair of colonic injuries by trauma surgeons, along with reports from European surgeons describing elective operations conducted safely without the use of preoperative purging, have caused reconsideration concerning the true value of purging the colon before colonic surgery.

AIM- To assess whether elective colon and rectal surgery can be safely performed without preoperative mechanical bowel preparation.

Materials- All the patients undergoing elective colorectal anastomosis.

Results- 42 patients were included in the study, 19 in group 1 and 23 in group 2. Demographic characteristics, indications for surgery, and type of surgical procedure did not significantly differ between the two groups. There was no significant difference in the rate of surgical infectious complications between the two groups. Wound infection, anastomotic leak, and intra-abdominal abscess occurred in 26.13%, 15.78%, and 5.26% versus 17.39%, 13.04%, and 4.34%, respectively.

Conclusion- These results suggest that elective colon and rectal surgery may be safely performed without mechanical preparation.

KEYWORDS : Anastomosis, Bowel Preparation, Colorectal Surgery

INTRODUCTION

Purging the faeces and reducing the concentration of colonic intraluminal bacteria before operations on the colon have long been basic tenets of surgery. The normal, or autochthonous, microbial organisms in the colon comprise up to 90% of the dry weight of faeces, reaching concentrations up to 10^9 organism/mL of faeces. The anaerobic Bacteroides is the most common colonic microbe, whereas Escherichia coli is the most common aerobe. Pseudomonas, Enterococcus, Proteus, Klebsiella, and Streptococcus species are also present in large numbers.

The process of preparing the colon for an elective operation has traditionally involved two factors: purging the faecal contents (mechanical preparation) and administration of antibiotics effective against colonic bacteria. Tradition has held that an unprepared colon (i.e., one that contains intraluminal faeces) poses an unacceptably high rate of failure of the anastomosis to heal. However, recent experience with primary repair of colonic injuries by trauma surgeons, along with reports from European surgeons describing elective operations conducted safely without the use of preoperative purging, have caused reconsideration concerning the true value of purging the colon before colonic surgery. Because the colonocytes receive nutrition from intraluminal free fatty acids produced by fermentation from colonic bacteria, there areconcerns that purging may actually be detrimental to the healing of a colonic anastomosis.

Mechanical bowel cleansing methods are used for colonoscopy and elective surgery. Complete bowel obstruction and free perforation are absolute contraindications to bowel preparation. For colonoscopy, properties of various preparations are judged by safety, patient tolerance, and efficacy or preparation quality.

In the present study we have randomized patients in two groups for elective colorectal surgery. Group 1 patients were operated without preoperative mechanical bowel preparation (MBP), whereas group 2 patients were operated after preoperative MBP with polyethylene glycol (PEG) solution. And the aim of this study is to assess whether elective colon and rectal surgery can be safely performed without preoperative mechanical bowel preparation.

AIMS AND OBJECTIVES

To assess whether elective colon and rectal surgery can be safely performed without preoperative mechanical bowel preparation.

SPECIFIC OBJECTIVES: To evaluate postoperative outcomes in terms of:

Anastomotic leak.
Intra abdominal infection
Wound complications.
Mortality
Hospital stay

MATERIALS AND METHODS

This study was conducted in the Department of Surgery for one year at a tertiary care teaching hospital. Prior clearance by the college ethical committee was obtained.

Inclusion Criteria:- All the patients undergoing elective colorectal anastomosis

Exclusion Criteria:-

- Patients, requiring diverting stoma.
- Annular stenosing lesion
- Patients with abdominal abscess at the time of surgery
- Preoperative Hemoglobin level (<10 gm/dl)
- Preoperative Albumin Level (<3 mg/dl)
- Uncontrolled diabetes mellitus
- Uncontrolled uremia

Sample Size: 42 patients

All indoor patients admitted for colorectal surgery during the study period have been divided into two groups (1 and 2)

- Group 1:- Colorectal surgery without Preoperative mechanical bowel preparation
- Group 2:- Colorectal surgery with preoperative mechanical bowel preparation

Study design:-

- A single institution-based prospective interventional comparative study
- Parameters to Be Studied
- The following parameters of the study sample have been studied to compare the outcome of colorectal surgery with or without mechanical bowel preparation.

Demographic Characteristics

- a) age b) sex
- Diagnosis of disease
- Wound Infection
- Anastomotic Leak
- Intra Abdominal Infections
- Diarrhoea
- Pulmonary complication
- Sepsis

Methods

- Patients undergone elective colorectal surgery with primary anastomosis were divided into two groups(1&2).
- All patients gave their informed consent before randomization in the study.
- Group 1 had their surgery without preoperative mechanical bowel preparation, and group 2 had mechanical bowel preparation with polyethylene glycol before surgery.
- Patients from both the group recommended only clear liquid on the day prior to surgery.
- Bowel preparation of group 2 patients were done by 4 litres of polyethylene glycol solution, which was allowed to drink 16 hrs. before surgery.
- Patients from both the group were given enema per rectally 16 hrs. before surgery.
- Patients from group 1 were given Tablet Sodium Picosulphate (10 mg.) 12 hrs. before surgery.
- From each unit one visiting surgeon was selected to follow the same anastomotic procedure using particular suture material in my all studied patients i.e single layer extramucosal anastomosis with PDS 3-0 was done.
- In both the groups abdominal drain were given during surgery.
- Data relative to patient's demographic and clinical characteristics, operative procedures and findings, and 30-day postoperative follow-up were prospectively entered in a Microsoft Access database, and main end point entry was rechecked for accuracy. The main outcome was the rate of postoperative infectious complications, such as wound infection, anastomotic leak, and intra-abdominal abscess.
- Statistical analysis was performed using the Chi- square test or unpaired t test, as appropriate, and probability values of less than 0.05 were considered significant.

RESULTS AND ANALYSIS

54 patients were entered into the study period of 1 year. 5 patients were excluded due to preoperative exclusion criteria i.e 3 patients had refractory anemia due to persistence blood loss and 2 patients had low albumin level. 7 patients were excluded due to intraoperative exclusion criteria i.e 5 patients had diverting stoma , 1 patient had annular stenosing lesion and 1 patient had intra abdominal abscess .

- 19 patients had their surgery without preoperative mechanical bowel preparation, while 23 had mechanical bowel preparation.
- Demographic characteristics, indication for surgery and type of surgery did not significantly differ between two groups.
- There was no significant difference in the rate of postoperative complications between two groups.

Mean age of group 1 is 51.47 & group 2 is 47.26. And p value is not significant, hence age is not a confounding factor between two groups.

Table1 – Gender Distribution

	Group 1	Group 2	P value
Male	9 (47.36%)	13 (56.52%)	0.554
Female	10 (52.63%)	10 (43.47%)	
Total	19	23	

P value of sex distribution between two groups is not statistically significant, hence sex is not a confounding factor.

Table 2: Spectrum of Pathologies/diseases

Diagnosis	Group 1	Group 2
Carcinoma colon	8(42.10%)	11 (47.82%)
Carcinoma rectum	3(15.78%)	4(17.39%)
Ileocecal TB	2(10.52%)	1(4.34%)
Inflammatory bowel disease	1(5.26%)	1(4.34%)
Sigmoid volvulus	2(10.52%)	1(4.34%)
Hartman's procedure	1(5.26%)	2(8.69%)
Others	2(10.52%)	3(13.04%)
Total	19	23

In both the groups diagnosis of disease are comparable i.e carcinoma colon is the most common diagnosis in both the groups (group 1: 42.10% & group 2: 47.82%).

Operative procedures in both the groups are comparable as we can see from above table that most of the patients in both the groups undergone right colectomy (group 1: 42.10% &group 2: 47.82%).

Table 3- Operative Procedures done

Procedures	Group 1	Group 2
Right colectomy	8(42.10%)	11(47.82%)
Left colectomy	3(15.78%)	3(13.04%)
Sigmoidectomy	4(26.31%)	2(8.69%)
Anterior resection	3(15.78%)	4(17.39%)
Closure of Hartman's	1(5.26%)	2(8.69%)
Total proctocolectomy with J-pouch	0	1(4.34%)
Total	19	23

Intra operative finding of bowel content shows that about 42% of patients in both the group had clean bowel. About 26% of group 1 patients had solid content and about 34% of group 2 patients had liquid content. Liquid content in group 2 is much more than group 1.

Table 4-Bowel cleansing assessment

Bowel content	Group 1	Group 1
Clean	8(42.10%)	10(42.47%)
Liquid	2(10.52%)	8(34.78%)
Semisolid	4(21.05%)	3(13.04%)
Solid	5(26.31%)	2(8.69%)
Total	19	23

Spillage of bowel content in group 2 is much more than group 2, as there is more liquid content in group 2 patients, i.e 17.39% in group 2 as compared to 5.26% in group 1 patients.

Wound infection is slightly more in non preparation group, p value is 0.483, which is statistically not significant.

In each group one patient had only wound erythema and oedema and managed with antibiotics. 4 patients from group 1 and 3 patients from group 2 developed pus collection in the wound and wound was opened and pus culture sensitivity done.

Pus culture report shows growth of above organism and antibiotics were given according to sensitivity and daily wound dressing was done and later secondary suturing were given.

Anastomotic leak is slightly more in non-preparative group, where p value is 0.800, which is statistically insignificant. Three patients from each group shows feculent collection in abdominal drain in postoperative period and suspected to had anastomotic leakage and demonstrated by USG abdomen. One patient from each group managed conservatively by keeping NPM and giving antibiotics. Two patients from each group needed re-exploratory laparotomy, anastomotic leak were found and diverting stoma were done.

Intra-abdominal abscess occur in one patient from each group, and p value is statistically not significant.

One patient from group 1 had pelvic abscess in post operative period, USG guided aspiration was done, but later patient developed sepsis and died. One patient from group 2 had pelvic abscess with anastomotic leak, USG abdomen shows huge intra abdominal collection and pelvic abscess. This patient was undergone re-

exploratory laparotomy and diverting stoma was done, but later patient died.

Pulmonary complication occur in 10.52% patients from group 1 and 13 .04% of group 2 and p value is statistically not significant. In these patients x-ray chest were done in post operative period and managed with chest specific antibiotics and aggressive chest physiotherapy along with nebulisation.

Diarrhoea occur in 8.69% of patients from group 2 in early post operative period and none of the group 1 patients developed diarrhoea in the post operative period and here p value is 0.188.

From each group 1 patient was having sepsis and p value is statistically not significant.

Clinically patients of septicaemia were having raised temperature, tachycardia and abdominal tenderness with decreased bowel movement. Laboratory investigation shows increased leukocyte count and raised C-reactive protein (CRP) level.

Statistically there is no significant time difference in appearance of 1st bowel movement between two groups.

Length of hospital stay between 2 groups is not significantly different i.e mean value of hospital stay in both the groups are comparable (group 1: 12.89 & group 2: 12.52).

From each group one patient died and p value is not statistically significant.

Patient of group 1 died due to postoperative pelvic abscess with sepsis and patient from group 2 died due to sepsis with intra abdominal abscess and anastomotic leak.

DISCUSSION

Preparation for elective colon and rectal surgery with mechanical cleansing agent, in conjunction with improved surgical techniques and advances in perioperative care, served to reduce the rate of infectious complications in colorectal surgery. Although mechanical bowel preparation before elective colorectal surgery has become a surgical dogma, there is a paucity of scientific evidence demonstrating the efficacy of this practice in reducing the rate of infectious complications.

Few series suggested that anastomosis between the small bowel and the colon, as performed in right or subtotal colectomy, may be safe without mechanical preparation, [1,2] since this type of anastomosis avoids the stool column proximal to the anastomosis. In a multicentric trial, [3] 97 patients with malignant left colonic obstruction were randomized to have either a segmental colon resection with on-table bowel lavage or a subtotal colectomy. The rates of intra-abdominal sepsis and anastomotic leaks did not significantly differ between the two groups. Other authors have suggested that colo-colonic anastomosis may also be safe in an unprepared bowel in the face of an obstructed colon. [1, 4, 5] Recently, Naraynsingh et al. [6] reported a prospective series of 58 unselected patients with left colonic obstruction. All underwent segmental colon resection with primary colo-colonic anastomosis, without a proximal diverting stoma. There was one case of anastomotic leak and one mortality unrelated to infection.

Few published studies [7-10] have prospectively randomized patients undergoing elective colon and rectal surgery to having mechanical bowel preparation or no mechanical preparation. They also failed to show a benefit to mechanical bowel preparation in reducing the rate of infectious complications and anastomotic leaks.

Mechanical bowel preparation is not harmless. It almost invariably causes significant discomfort to the patient, including nausea, abdominal bloating, and diarrhoea.[11-13]

Mechanical bowel preparation is also associated with electrolyte imbalance and dehydration. [14-16]

In our study group 1 patients were operated without preoperative mechanical bowel preparation, whereas group 2 patients operated after mechanical bowel preparation with strong cathartic agent like polyethylene glycol (PEG).

Demographic characteristics like age and sex are not significantly different in two groups, hence these are not confounding factors. Mean age of group 1patient is 51.47 years and group 2 patient is 47.26 years. Group 1 patients consist of 47.36% male and 52.63% female, whereas group 2 patients consist of 56.52% male and 43.47% female.

In our study most of the patients had colorectal carcinoma. Patients had carcinoma colon in group 1 and 2 are 42.10% and 47.82% respectively. Patients had carcinoma rectum in group 1 and 2 are 15.78% and 17.39% respectively. Thus diagnosis of disease in two groups are comparable.

Operative procedure done in two groups are also comparable i.e maximum procedure done in two groups are right colectomy (42.10% in group 1 and 47.82% in group 2).

Intra operative bowel assessment was done and found that 34.78% patients from group 2 had liquid content in compared to 10.52% in group 1. And hence spillage of bowel content was more in group 2 than group 1(17.39% in group 2 and 5.26% in group 1)

In our study post operative complications like wound infection, anastomotic leak, intra abdominal abscess, pulmonary complication, diarrhoea and sepsis were studied and analysed.

Wound infection occurred in 5 (26.13%) patients from group 1 and 4 (17.39%) patients from group 2, which is not significantly different. One patient from each group had only wound erythema and oedema and managed with antibiotics. Other patients had pus collection in the wound and wound were opened and pus culture sensitivity done and managed with antibiotics and daily dressing of wound and later secondary suturing was done.

Three patients from each group had anastomotic leak (15.78% from group 1 and 13.04% from group 2). Anastomotic leak were suspected clinically by observing pus or feculent collection in the perianastomotic drain with clinical features of abdominal distension, raised temperature and tachycardia. Later imaging like USG abdomen done and managed accordingly.

One patient from each group developed pelvic abscess in post operative period. In patient of group 1 USG guided aspiration of abscess was done. Patient of group 2 also had anastomotic leak and sepsis and re-exploratory laparotomy was done and followed by drainage of abscess and diverting stoma.

Post operative pulmonary complication like respiratory distress with chest infection occurred in 10.52% and 13.04% of patients from group 1 and 2 respectively and confirmed by x-ray chest and managed with chest specific antibiotics chest physiotherapy.

In post operative period 2 patients (8.69%) from group 2 (MBP group) developed diarrhoea, whereas no patient from group 1 reported diarrhoea. Thus it can be concluded that diarrhoea is much more in MBP group.

One patient from each group developed sepsis and clinically they had raised temperature, tachycardia, and abdominal distension with tenderness and decreased bowel movement. On laboratory investigation in both of them leukocyte count were increased and CRP were raised.

Mean day of 1st bowel movement in both the group are comparable i.e 3.32 in group 1 and 3.09 in group 2.

Mortality data shows no significant difference in both the groups. From each group one patient was died. Group 1 had 5.26% mortality and group 2 shows 4.34% mortality. One patient from group 1 died due to post-operative pelvic abscess and sepsis and group 2 patient was died due to anastomotic leak with intra-abdominal abscess and ultimately sepsis.

Mean days of Hospital stay were not significantly different in two groups and the value is 12.89 in group 1 and 12.52 in group 2.

In 2005, Bucher and colleagues reported a randomized trial comparing

MBP versus no MBP in elective left-sided colorectal surgery. [17] In 153 patients randomized to either arm, this study demonstrated a leak rate of 6% in the MBP group compared with 1% in the no MBP group (p=0.021). This study also showed higher overall rates of abdominal infectious complications, extraabdominal morbidity, and hospital stays in the MBP group, differences that were all statistically significant. These findings prompted the authors to opine that elective left-sided colorectal surgery without MBP is safe and is associated with reduced postoperative morbidity.

In 2007, Jung and colleagues from Sweden published a multicenter randomized trial assessing the benefits of preoperative MBP in elective colonic surgery. [18] The authors evaluated a total of 1343 patients between the MBP and no MBP groups, with each arm sharing similar demographics, indications for operation, perioperative antibiotic prophylaxis, and type/level of anastomosis. The overwhelming majority of patients in the MBP arm received either polyethylene glycol or sodium phosphate preparation. This study showed no significant differences between the two arms in terms of cardiovascular complications, general infectious complications, surgical site infections, and overall complications. The authors concluded that complication rates are not lowered by MBP and that MBP can therefore be omitted before elective colonic resection.

The most thorough and current meta-analysis on the subject was recently published by Pineda and colleagues from Stanford, who completed a systematic review of the literature through early 2008 and found 13 prospective trials available with a total of 4601 patients, the largest number of patients available to date. [19] In this meta-analysis, the authors analyzed two primary outcomes—anastomotic leaks and wound infections. They found no statistically significant difference between 2304 patients receiving MBP compared with 2297 patients receiving no MBP in either outcome. Anastomotic leaks were reported in 97 patients (4.2%) with MBP and 81 patients (3.5%) without MBP (p=0.206). Wound infections occurred in 9.9% versus 8.8% (p=0.155). This lack of any statistically significant difference between the two arms in the largest meta-analysis yet performed prompted the authors to conclude that MBP is of no benefit to patients undergoing elective colorectal resection.

CONCLUSION

There is no significant difference in post operative complications or other outcomes between two groups.

These results suggest that elective colon and rectal surgery may be safely performed without mechanical preparation.

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