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# EFFECTIVENESS OF PRE-OPERATIVE BOWEL PREPARATION VS NO BOWEL PREPARATION ON OUTCOMES OF PEDIATRIC COLORECTAL SURGERIES

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**ABSTRACT**

**Objective:** To compare the effectiveness of pre-operative bowel preparation vs no bowel preparation on outcomes of pediatric colorectal surgeries.

**Study Design:** Randomized control trial

**Place and duration of study:** The study was conducted at the Department of Pediatric Surgery, Holy Family Hospital, Rawalpindi in the duration from 30 August, 2024 to 22 June, 2025.

**Methodology:** After approval from the ethical committee, 62 patients fulfilling the inclusion criteria were enrolled in this study from outpatient department. All participants were examined physically in person by the primary investigator. After which the patients were divided randomly into two groups A and B, 31 patients in each group. Group A patients were undergone bowel preparation while group B patients were not undergone bowel preparation. All patients were operated by a single consultant pediatric surgeon with more than 10 years of experience. Patients were called for follow up weekly till 6 weeks. Hospital stay was noted at the time of discharge. Wound infection rate was assessed till 30th post-operative day while anastomotic leak was ruled out on clinical and radiologic exam if symptoms were present. All the data of this study were analyzed in SPSS version 26.

**Results:** We found mean age of patients was 7.18±3.09 years with 48.4% patients were male and 51.6% patients were female. We also found mean hospital stay in bowel preparation group and no bowl preparation group was (6.16±1.57 days vs 5.77±1.43, p=0.315), surgical site infection (16.1% vs 12.9%, p=0.718) and also the anastomotic leak found as (6.5% vs 3.2%, p=0.554). Both groups

were showed non-significant results.
**Conclusion:** We concluded that there is no significant difference in surgical outcomes between the group receiving the bowel preparation versus the group not receiving the bowel preparation in terms of surgical site infection rate, anastomotic leak and length of hospital stay.

**Trial Registration:** The study is registered with Clinical Trials
and registration number is NCT06745505
Registration Date: 20/12/2024

**INTRODUCTION:**

Preoperative bowel preparation before colorectal surgeries has been deemed unnecessary in adults after the conclusion drawn by various RCTs, meta-analyses and systematic reviews. Previously bowel preparation was considered essential to reduce fecal load and contamination as well as surgical sight infections and anastomotic leak as it was considered to have been a potential cause of bacteremia. Its role in pediatric colorectal surgery is still unclear due to scarcity of data available.[1]

According to the latest census 13-25% children suffer from surgical site infection after colorectal surgeries which leads to increased morbidity patterns and delay in discharge causing a significant financial burden on the hospital budget.[2]

There has been a change in practices of the MBP "mechanical bowel preparation" used by different pediatric surgeons around the globe in last decade. Since the implementation of ERAS (Early Recovery after Surgery) protocols in this domain as well. Various methods are being under investigation which can lead to decrease in operative time, admission time, hospital stay, post-operative surgical complications.[3]

According to Heather et al., study results about 142(55.5%) out of 257 surgeons have already using the ERAS protocol in terms of minimizing the use of bowel preparation.[3] The recent systemic review and meta-analysis by Janssen et al., concluded that the incidence for anastomotic leakage, intrabdominal infection and wound infection was 4.8%, 7.1%, 16.7% in MBP group versus 2.9%, 5.9%, 14.7% in the no MBP group respectively.[4]

The meta-analysis of the retrospective cohort studies suggested that there was no significant difference in both the groups who received vs who didn't receive mechanical bowel preparation. The statistics showed the incidence rate for anastomotic leak, intra-abdominal infection and wound infection to be 3.2%, 0.7% and 6.6% in mechanical bowel preparation group while it ranges to 4.7%, 0.8% and 3.9% in no mechanical bowel preparation group respectively.[4]

A retrospective cohort study by Guillermo et al., compared three pediatric groups: group 1 received no preparation, group 2 underwent mechanical bowel preparation with polyethylene glycol, and group 3 received mechanical bowel preparation along with additional oral antibiotics. In univariate analysis, the occurrence of surgical complications was greater in the no preparation group at 235 (23.3%) compared to 14.2% in the mechanical bowel preparation group and 23 (15.9%) in the mechanical bowel preparation with oral antibiotics group ($P<0.001$). Conversely, the median length of stay was reduced in the no preparation group

relative to the other two groups. P < 0.001.[5]

Carpenter et al., have concluded in their study that there was no significant difference in complication rate among both groups (14.1% versus 10.5%, P 0.46). Worth noting was the fact of higher rates of wound dehiscence in patients who received mechanical bowel preparation undergoing perineal anoplasty as compared to those who didn't receive bowel preparation. (33.3% versus 3.3%, P<0.05).[2]

Another trial by Liang et al., compared the two groups in patients of Hirschsprung disease specifically. The intra-abdominal infection (18.2% *vs.* 29.0%), wound infection (9.1% *vs.* 16.1%), anastomotic leak (0 *vs.* 0) were found to be statistically insignificant.[6]

There was yet another recent study by Eric et al., which focused on comparison of two groups viz those receiving mechanical bowel preparation and those not receiving the preparation specifically in those patients who underwent colostomy reversal amongst other colorectal surgeries showed that there was no statistically significant difference between surgical site infection, intra-abdominal infection, and anastomotic leak. The length of stay was statistically significant among the two groups.[7]

The scarcity of randomized controlled trials comparing the two groups warranted further research into the subject to establish the importance of minimizing the use bowel preparation before colorectal surgery.

Not only will it help the patients in terms of less physical discomfort but also save the parents from mental turmoil which they undergo because their child is subjected to such invasive intervention before a major surgical procedure. If the bowel preparation can be safely omitted during routine colorectal surgeries, it significantly decreases time to surgery and length of hospital stay which in turns positively effects the fiscal status of the hospital. It will lead to preservation of resources of the hospital which might eventually be used in the treatment of more patients.

**METHODOLOGY:**

After approval from the ethical committee, 62 patients fulfilling the inclusion criteria were enrolled in this study from outpatient department. All participants were examined physically in person by the primary investigator. After which the patients were divided randomly into two groups A and B, 31 patients in each group. Group A patients were undergone bowel preparation while group B patients were not undergone bowel preparation. Bowl preparation consist of administrating of polyethylene glycol solution in the volume of two liter at least 48 hours prior to surgery followed by distal loop wash by normal saline till clear fluid is expressed. Serum electrolytes were ordered before and after the bowel preparation.

**Inclusion criteria:**

Patients with congenital condition such as Hirschsprung disease, anorectal malformation requiring pull through with or without covering colostomy.

Patients with anorectal malformation requiring anorectoplasty with or without covering colostomy.

Ileostomy/colostomy acquired due to intestinal perforation, intestinal obstruction, and trauma admitted for reversal.

Age up to 12 years.

Patients of both genders.

**Exclusion criteria:**

Any associated congenital morbid anomaly having Meningomyelocoele, Muscular dystrophy (were assessed on clinical examination)

- Patients with behavior disorders such as autism (were assessed during psychiatric history and clinical examination)
- Patients with behavioral disorder are difficult to counsel and follow up.

All patients were operated by a single consultant pediatric surgeon with more than 10 years of experience. Patients were called for follow up weekly till 6 weeks. Hospital stay was noted at the time of discharge. Wound infection rate was assessed till 30th post-operative day while anastomotic leak was ruled out on clinical and radiologic exam if symptoms were present.

All the data of this study were analyzed in SPSS version 26. The qualitative data such as gender, wound infection, anastomotic leak was presented as frequency distribution. Quantitative data in the study like age and hospital stay was presented in form mean ± S.D. Outcome data were compared between two groups using chi square and independent sample t-test method. It was stratified for age, gender, hospital stay using chi square and independent sample t-test method. P value < 0.05 was taken as significant.

**Trial Registration:**

The study is registered with Clinical Trials and registration number is NCT06745505
Registration Date: 20/12/2024

**RESULTS:**

We enrolled 62 patients in current study with 31 patients in each group. The mean age of patients in bowel preparation group was 7.52±3.18 and in no bowel preparation group mean age was 6.84±3.01 years with p value (p=0.393). Most of the patients i.e. 67.7% were from greater than 6 years age group. The detailed results of gender was given in Table-1. Both age and gender results in both groups were similar.

**Table-1: Results of demographic variables**

| Variables | | Study Groups | | Total | p value |
|---|---|---|---|---|---|
| | | Group A (Bowel preparation) | Group B (No bowel preparation) | | |
| **Age (mean±SD), years** | | 7.52±3.18 | 6.84±3.01 | 7.18±3.09 | 0.393 |
| Age Groups | ≤5 years | 8 | 12 | 20 | 0.277 |
| | | 25.8% | 38.7% | 32.3% | |
| | ≥6 years | 23 | 19 | 42 | |
| | | 74.2% | 61.3% | 67.7% | |
| Gender | Male | 12 | 18 | 30 | 0.127 |
| | | 38.7% | 58.1% | 48.4% | |
| | Female | 19 | 13 | 32 | |
| | | 61.3% | 41.9% | 51.6% | |

In outcome variables we found mean hospital stay in bowel preparation group was 6.16±1.57 days and in no bowl preparation group it was found 5.77±1.43 while the p value was non-significant. Similarly in bowel preparation group 5(16.1%) patients had surgical site infection and in no bowl preparation

group 4(12.9%) patients had bowl preparation group with p value (p=0.718). Also in bowel preparation group 2(6.5%) patients had anastomotic leak and in no bowl preparation group 1(3.2%) patients had anastomotic leak with p value (p=0.554). Both groups were showed similar results in outcome variables.

**Table-2: Results of outcome variables**

| Outcome variables | | Study Groups | | Total | p value |
|---|---|---|---|---|---|
| | | Group A (Bowel preparation) | Group B (No Bowel Preparation) | | |
| Length of hospital stay (days) | | 6.16±1.57 | 5.77±1.43 | 5.97±1.50 | 0.315 |
| Surgical site infection | Yes | 5 | 4 | 9 | 0.718 |
| | | 16.1% | 12.9% | 14.5% | |
| | No | 26 | 27 | 53 | |
| | | 83.9% | 87.1% | 85.5% | |
| Anastomotic leak | Yes | 2 | 1 | 3 | 0.554 |
| | | 6.5% | 3.2% | 4.8% | |
| | No | 29 | 30 | 59 | |
| | | 93.5% | 96.8% | 95.2% | |

The stratification results of age and gender with surgical site infection and anastomotic leak were also found non-significant. The detailed results were given in Table-3 and Table-4.

**Table-3: Stratification results of age and gender with surgical site infection**

| Variables | | Surgical site infection | Study Groups | | Total | p value |
|---|---|---|---|---|---|---|
| | | | Group A (Bowel preparation) | Group B (No Bowel Preparation) | | |
| Age Group | <5 years | No | 8 | 12 | 20 | |
| | | | 100.0% | 100.0% | 100.0% | |
| | >6 years | Yes | 5 | 4 | 9 | 0.957 |
| | | | 21.7% | 21.1% | 21.4% | |
| | | No | 18 | 15 | 33 | |
| | | | 78.3% | 78.9% | 78.6% | |
| Gender | Male | Yes | 2 | 4 | 6 | 0.709 |
| | | | 16.7% | 22.2% | 20.0% | |
| | | No | 10 | 14 | 24 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 83.3% | 77.8% | 80.0% | |
| | Female | Yes | 3 | 0 | 3 | 0.132 |
| | | | 15.8% | 0.0% | 9.4% | |
| | | No | 16 | 13 | 29 | |
| | | | 84.2% | 100.0% | 90.6% | |

***Significant (p value < 0.05)**

**Table-4: Stratification results of age and gender with anastomotic leak**

| Variables | | Anastomotic leak | Study Groups | | Total | p value |
|---|---|---|---|---|---|---|
| | | | Group A (Bowel preparation) | Group B (No Bowel Preparation) | | |
| Age Groups | <5 years | No | 8 | 12 | 20 | 0.667 |
| | | | 100.0% | 100.0% | 100.0% | |
| | >6 years | Yes | 2 | 1 | 3 | |
| | | | 8.7% | 5.3% | 7.1% | |
| | | No | 21 | 18 | 39 | |
| | | | 91.3% | 94.7% | 92.9% | |
| Gender | Male | Yes | 1 | 0 | 1 | 0.213 |
| | | | 8.3% | 0.0% | 3.3% | |
| | | No | 11 | 18 | 29 | |
| | | | 91.7% | 100.0% | 96.7% | |
| | Female | Yes | 1 | 1 | 2 | 0.780 |
| | | | 5.3% | 7.7% | 6.3% | |
| | | No | 18 | 12 | 30 | |
| | | | 94.7% | 92.3% | 93.8% | |

***Significant (p value < 0.05)**

**DISCUSSION:**

Bowel preparation is extensively utilized globally in pediatric colorectal surgeries, despite scientific evidence questioning its advantages and the potential for severe responses. So we compared two groups with and without bowl preparation in surgical outcomes in terms of surgical site infection rate, anastomotic leak and length of hospital stay that which one is better.

We found mean age of patients was 7.18±3.09 years with 48.4% patients were male and 51.6% patients were female. Shah et al.,[8] found in their study mean age of patients was 7.10±6.5 years with 56.3% patients were male and 43.1% patients were female. They found mean length of hospital stay was 5.3±3.9 days and we found 5.97±1.50 days. These results support the findings of current study.

We found mean hospital stay in bowel preparation group and no bowl preparation group was (6.16±1.57 days vs

5.77±1.43, p=0.315), surgical site infection (16.1% vs 12.9%, p=0.718) and also the anastomotic leak found as (6.5% vs 3.2%, p=0.554). Both groups were showed non-significant results. Shah et al.,[8] found surgical site infection in bowel preparation group and no bowl preparation group was as (11.1%% vs 21.4%, p>0.05) and also the anastomotic leak found as (5.6% vs 0%, p>0.05). There was no significant difference in complications like our findings of study.

Fernandez-Portilla et al[9] found demographics of both groups were similar like our study findings. Statistical analysis demonstrated comparable safety outcomes (SSI, 22.5% vs 15.3%, p = 0.420); no anastomotic leakage was detected in any group. The secondary outcomes, including fasting duration and postoperative hospital length of stay, were comparable amongst the groups. Patients who received MBP were admitted two days before to surgery.

Panja et al.,[10] found duration of hospital stay in bowel preparation group and no bowl preparation group was (12.88±9.48 days vs 9.16±7.12, p=0.004), surgical site infection (20.0% vs 16.0%, p=0.713) and also the anastomotic leak found as (12.0% vs 8.0%, p=0.637). Both groups were showed non-significant results like our findings except length of hospital stay.

The absence of difference in results between individuals undergoing bowel preparation and those not doing it is possibly noteworthy. A clear liquid diet exclusively prior to surgery offers distinct advantages in terms of convenience, safety, and cost-effectiveness. Patients who forgo preoperative bowel preparation can effectively adhere to a clear liquid diet at home, eliminating the necessity for hospital admission the day prior to surgery.[11]

Moreover, we found that most of our patients could not endure the oral bowel preparation, requiring the insertion of a nasogastric tube. The removal of bowel preparation alleviates this inconvenience, while also conserving time and financial resources for families by circumventing preoperative hospital admissions.[12] Moreover, while Golytely has been demonstrated to be safe for infants and children, there remains an increased risk of dehydration and electrolyte imbalance associated with bowel preparation. Removing the preoperative intestinal preparation mitigates the risk of iatrogenic problems linked to the preparation process.[13, 14,15]. The findings of our study indicated that in the contemporary context of enhanced recovery after surgery (ERAS), enhanced perioperative care, advanced surgical techniques, and the availability of broad-spectrum antibiotics, elective colorectal surgery can be conducted safely without bowel preparation. However, preparation may be warranted in specific instances where intraoperative colonoscopy is required or where colon palpation is critical, such as in the case of polypoid lesions.

**CONCLUSION:**

Our extensive investigation on perioperative bowel preparation in pediatric colorectal surgeries provides substantial evidence that bowl preparation elevates the occurrence of postoperative problems relative to no preparation. Therefore, bowl preparation should not be routinely supplied before colorectal surgeries in pediatric.

So we concluded that that there is no significant difference in surgical outcomes between the group receiving the bowel preparation versus the group not receiving the bowel preparation in terms of surgical site infection rate, anastomotic leak and length of hospital stay.

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