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Original Research Article

EFFECTIVENESS OF A BOWEL MANAGEMENT PROGRAM IN TREATING FECAL INCONTINENCE IN POST OPERATIVE PEDIATRIC POPULATION

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Abstract: *Fecal incontinence in pediatric patients post-surgery can significantly impair quality of life. Effective management strategies are critical for these patients, particularly those recovering from surgeries such as Anorectal Malformation (ARM) repair, Hirschsprung's disease corrections, spine surgeries, or other perineal procedures.* ***Objective:*** *To evaluate the effectiveness of a bowel management program (BMP) in reducing fecal incontinence as measured by the Cleveland Score in postoperative pediatric patients.* ***Methods:*** *This prospective observational study was conducted at the Department of Pediatric Surgery, The Children Hospital, PIMS Islamabad, from July 2023 to April 2024. Seventy pediatric patients who had undergone surgery for ARM, Hirschsprung's disease, spine surgery, or other perineal surgeries and were experiencing fecal incontinence were enrolled. Patients were selected based on clinical history diagnosed by a consultant pediatric surgeon. The parents of these patients were educated about and enrolled in the BMP. Clinical evaluations using the Cleveland Score were recorded at the program's initiation and one month after its conclusion. Statistical significance was assessed using paired t-tests.* ***Results:*** *Initial mean Cleveland Scores were significantly reduced from 12.99 ± 3.15 at the start of the BMP to 6.56 ± 2.89 one month post-intervention ($p < 0.001$). 75.7% of the patients achieved a Cleveland Score of less than 5, indicating a substantial reduction in fecal incontinence.* ***Conclusion:*** *The bowel management program proved highly effective in managing fecal incontinence in postoperative pediatric patients, particularly those undergoing ARM surgery. This intervention significantly improved the Cleveland Scores and, consequently, the quality of life in affected children.*

Keywords: Anorectal Malformation; Bowel Management; Constipation; Enemas; Fecal Incontinence; Laxatives

Introduction

Fecal incontinence, the involuntary loss of bowel control, is a distressing condition affecting individuals of all ages. In the postoperative pediatric population, fecal incontinence can significantly impact the quality of life and psychosocial well-being of affected children and their families. Almost 25% of patients undergoing surgery for Anorectal malformation are affected with fecal incontinence (1). Similarly, though relatively small (<5%) but still a significant number of post-operative patients of Hirschsprung's disease also suffer from postop fecal incontinence (2). A comprehensive strategy considering targeted therapies and conservative measures is needed to address fecal incontinence. Over the past few years, numerous authors have reported the benefits of manually emptying the colon using antegrade enemas or trans-anal (retrograde) irrigations (3, 4).

Among these approaches, a bowel management program has emerged as a promising strategy for improving continence outcomes (5, 6). The paradigm of a bowel management program is to decrease the frequency of incontinence episodes by keeping the colon mechanically clean with the help of enemas, laxatives or diet modification and improving quality of life in these patients. The quantity and composition of enemas are tailored according to the individual patient, who is advised after a one-week trial and error-based administration of enemas and evaluation of the clinical and radiological response. Owing to its promising results in managing fecal incontinence, multiple facilities worldwide are implementing a dedicated and thorough bowel management program. While several studies have acclaimed the successful short-term results with BMP (7, 8), reports on long-term results are relatively few.

In Pakistan, though multiple pediatric centres have adhered to the principles of bowel management programs in managing pediatric fecal incontinence, data suggesting its outcome in postoperative patients is scarce. As a result, we believed it was critical to look at the results in order to comprehend the significance of this intensive intervention in managing the postoperative pediatric population presenting with fecal incontinence.

Methodology

This prospective observational study was conducted at the Department of Pediatric Surgery, The Children Hospital, PIMS Islamabad, from July 2023 to April 2024, with ethical approval from the Ethical Committee. The sample size of 70 was calculated using the WHO Sample Size Calculator, with a confidence level of 95%, a population mean of 2.60±1.83, and an absolute precision of 0.45. A nonprobability consecutive sampling technique was employed to gather the sample.

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Patients aged 4 to 18 years of either gender, presenting with faecal incontinence and having recently undergone surgery for Anorectal Malformation (ARM), Hirschsprung's disease, spine surgery, or any other perineal surgery, as confirmed by clinical history, were included. Exclusion criteria encompassed patients under four years of age, those requiring reoperation (assessed through complete clinical examination and nerve stimulation test), and patients lost to follow-up or unable to provide feedback after one month. Patient registration was conducted at the outpatient department, and written and informed consent was obtained from all participants after a comprehensive study description.

Faecal incontinence was defined according to ROME IV criteria: the recurrent uncontrolled passage of faecal material in individuals with a developmental age of at least four years, fulfilling criteria for the last three months with 2-4 episodes over four weeks. Parents of eligible patients were enrolled in a bowel management program (BMP), a week-long outpatient program designed to treat constipation and fecal incontinence. The program included regular clinic visits, five consecutive days of abdominal X-rays, and daily patient reports in person or by phone.

Detailed patient history and thorough examinations were conducted before BMP initiation. A contrast study was performed for each patient, categorizing them into two groups: hypo-motile colon and hyper-motile colon. A consultant pediatric surgeon gave Parents a thorough briefing on the program's process. Clinical evaluations were conducted using the Cleveland Score to assess fecal incontinence severity (ranging from 0 to 20, with higher values indicating more severe incontinence). Scores were recorded at the program's start and one month after its conclusion. Effectiveness was defined as achieving a Cleveland Score of less than five at the end of the program. Daily saline enemas were administered to each patient, and the enema composition included normal saline and a stimulant (liquid glycerine or castile soap). The normal saline and stimulant volume were adjusted individually, starting from a minimum of 200 normal saline with 10cc glycerine. Parents were instructed on the position, method, and timing of enema administration and advised to record bowel movements and soiling episodes over the next 24 hours. Abdominal radiographs were taken daily for five days to assess the fecal load, with enema quantities adjusted according to radiographic and clinical responses. After one week, tailored enema compositions were prescribed for daily home use. Patients with intact sphincters and no stool burden on radiography received a laxative trial. Cleveland Scores were recalculated during a follow-up visit or via phone after one month.

Statistical analysis was performed using SPSS version 23.0. Quantitative variables were summarised as mean±SD, while frequencies and percentages were calculated for qualitative variables. Paired t-tests and chi-square tests were applied to evaluate differences between pre-and post-BMP Cleveland Scores and to assess the association of effectiveness with the type of disease and bowel management regime, with significance set at p-values < 0.05.

Results

A total of seventy patients were included in this study. out of 70, 50(71.4%) were post operative patients of anorectal malformations, 15(21.4%) patients had undergone surgery for Hirschsprung's disease, 3(4.3%) patients were operated for spinal abnormalities and 2(2.9%) patients had perineal surgeries for other reasons(acquired an cutaneous fistula and perianal abscess). Demographic characteristics of patients are mentioned in Table I. Contrast enema showed the hyper motile type of colon in 24(34.3%) patients, while 46(65.7%) had the hypomotile type of colon. Of all the 70 patients, eight were given a trial of laxative after one week of BMP, while 62 patients continued on enemas.

Regarding effectiveness, 53 (75.7%) patients successfully achieved the effectiveness criteria for the bowel management program. The mean Cleveland score before the initiation of the bowel management program and after one month of the bowel management program was 12.99+3.155 and 6.56+2.897, respectively, with p-value < 0.001 calculated using paired T-test. (Table I).

44(88%) of 50 patients who were enrolled with anorectal malformation fulfilled the effectiveness criteria. Six (40%) patients with Hirschsprung's disease 15 showed improvement in fecal incontinence. Patients with anorectal malformation (ARM) responded significantly to the bowel management program, with a p-value of 0.002 (Table II).

16/24(66.66%) patients with hyper motile colons fulfilled the effectiveness criteria; on the contrary, 37(80.4%) out of 46 patients with hypomotile colons showed improved fecal incontinence as per the criteria. The P value calculated using the chi-squared test was 0.202.

Table 1: Cleveland Fecal Incontinence Score

Type Of Incontinence	Frequency				
	Never	Rarely	Sometimes	Usually	Always
SOLID	0	1	2	3	4
LIQUID	0	1	2	3	4
GAS	0	1	2	3	4
WEARS PAD	0	1	2	3	4
LIFESTYLE ALTERATION	0	1	2	3	4
NEVER= 0, RARELY IS < 1/MONTH, SOMETIMES IS <1/WEEK BUT ≥1/MONTH, USUALLY IS < 1/DAY BUT ≥ 1/WEEK, ALWAYS IS ≥ 1/DAY					

Table 2: Demographic and Clinical Characteristics of Patients (n=70)

Quantitative Variables	Mean+SD	p-value
Age (Years)	7.071+2.52 Years	
Cleveland Score before initiation of BMP	12.99±3.155	< 0.001
Cleveland Score after the conclusion of BMP	6.56±2.897	

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Qualitative Variables	
Age Groups	n (%)
• ≤ 8 Years	56 (80%)
• > 8 Years	14 (20%)
Gender Groups	n (%)
• Male	44 (62.9%)
• Female	26 (37.1%)
Effectiveness	n (%)
• Yes	53 (75.7%)
• No	17 (24.3%)

Table 3: Association of Effectiveness with Disease of Patients (n=70)

		Disease				**Total**
		Anorectal malformation (ARM)	**Hirschsprung's disease**	**Spine Surgery**	**Any Other**	
Effectiveness	Yes	44	6	2	1	53
		62.86	8.57%	2.85%	1.42%	75.7%
	No	6	9	1	1	17
		8.57%	12.85%	1.4%	1.42%	24.2%
Total		50	15	3	2	70
		71.4%	21.4%	4.3%	2.9%	100.0%

Fig-1: Before One Week of Enema/Laxatives

Fig-2: After One Week of Enema/Laxatives

Discussion

The bowel management program is now being implemented in multiple facilities around the globe to manage fecal incontinence and functional constipation. Management of fecal incontinence in low to middle-income countries is an arduous task as it places a significant burden on not only patients and caregivers but also on the health system (11). Tertiary care pediatric surgery centres in Pakistan experience a lot of additional challenges in the management of fecal incontinence in terms of excessive turnout of patients, limited resources, low literacy rates, poor compliance, etc. As the number of surgeries being performed surpasses the available resources, so is the number of patients presenting with fecal incontinence post-operatively. In Pakistan, multiple tertiary care pediatric centres are now adhering to basic principles of bowel management programs. Though one study has reported its significance in functional constipation (12), there is a shortage of data documenting its effectiveness in fecal incontinence. The target population in this study was the postoperative pediatric population presenting with fecal incontinence. According to results, 75.7% of patients reported improved fecal incontinence in terms of decreased

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Cleveland score; though the result is statistically significant, previous studies have reported up to 95% success rates (5 ,6). However, most of these studies have reported short-term outcomes over a week. Also, no standardized definition or criteria for success was defined. This study measured the outcome after one month, and predetermined criteria (drop in Cleveland score ≥5) were set to determine effectiveness. Few publications that have reported long-term outcomes of BMP in fecal incontinence over 1 and 2 years have shown 70 to 75% success rates, which is entirely to the above result (8,13). The fact that 24.3% of patients could not achieve adequate cleanliness is a primary concern and needs additional effort. Also, the disparity of results in studies reporting short-term outcomes compared to long-term results warrants further work for the sustainability of results, including frequent follow-ups (14).

Cleveland score was utilized for measuring effectiveness. The rationale for choosing Cleveland score was its comprehensive questionnaire with easy-to-answer questions. As per the result, the Score was significantly dropped after one month of BMP (12.99+3.155 to 6.56±2.897); although slightly higher drop rates have been observed in earlier studies that used the Wexner scale, it is essential to note that their before-intervention score was also different (7,15). Nonetheless, given the score's inherent limitations, the outcome of the intervention can be somewhat underestimated (16).

Most commonly enrolled patients in this study were of anorectal malformation (50/70). Most patients (44/50) responded significantly to BMP with a P value of 0.002. Out of 50, 8 patients were given a trial of laxatives considering the diagnosis of low-lying anorectal malformation and intact sphincter mechanisms along with no associated spinal abnormality On examination. All 8 of them showed satisfactory response to treatment. The remaining patients continued on enemas, and most showed improvement in soiling with improved social life in terms of decreased use of pads. In 2021, a study conducted by Wood et al. followed 222 patients with anorectal malformation on BMP over one year and reported 70% success rates at completion of 1 year8. In 2023, an article published as part of the manuscript series on the bowel management protocol for colorectal patients reviewed available literature on ARM and response to BMP, and they reported a 90% success rate after one week, which goes to 70% at 1 and 2 years, respectively (17). Multiple other studies have also supported the above results. On the contrary, the outcome of patients who presented with Hirschsprung's disease in this study was subpar, as only 6 out of 15 patients achieved satisfactory cleanliness. Universally, the data suggesting the outcome of BMP in Hirschsprung's disease is also scarce. A publication on long-term outcomes of BMP in colorectal patients was published by Kilpatrick et al. in 2020. That included 41 patients of Hirschsprung's disease; results showed that after one week of BMP, 86-89% of patients were clean on enemas and laxatives while at six months, the follow-up success rate fell to 45%, which then was slightly improved at one year follow up. However, Kilpatrick reported no significant difference in the outcome of bowel management programs among patients with different primary diagnoses (13). A possible explanation for the unsatisfactory result of BMP in Hirschsprung's disease in this study could be the small sample size, as only 15 patients of HPD were included, and the type of Hirschsprung's disease was not considered. Nevertheless, patients with Hirschsprung's disease need regular follow-ups with time-to-time adjustment of enema regime depending upon the clinical condition. Also, strict adherence to BMP protocols is paramount (18).

Every patient enrolled in the BMP program was advised to use a contrast enema, and patients were divided into two groups based on the findings of the enema. Patients with gross fecal loading and dilated colon, in contrast, enema, were labelled as hypomotile colon type, and patients whose colon showed minimal to no fecal loading were categorised as a hypermotile type of colon. Though the effectiveness of BMP was slightly better in patients with hypomotile colon than in hypermotile colon, it was found to be statistically insignificant (P value 0.202). Previous studies have also reported no significant difference in the effectiveness of bowel management programs among both groups (15). In 1998. A study published by Alberto Pena in New York reported a 93% success rate of BMP in patients with dilated colon, while in patients with non-dilated colon, the success rate was 88%; BMP was effective in both groups. The reported outcome in this study in both groups is comparatively less than previously reported. Still, it is worth mentioning that the criteria for success were also defined differently in the previous survey. Nevertheless, BMP resulted in significant improvement in fecal incontinence in both groups.

This study has certain limitations, including a small sample size compared to the country's total population. Also, it was a single-centre study; hence, the results could not be generalised. Wexner Score was used in the study to describe effectiveness, which is a questionnaire; therefore, recall biasedness could not be avoided, and also, it can be associated with underestimation of response as few patients continued using pads secondary to urinary incontinence or out of habit, resulting in false higher scores. Patients were followed for a shorter duration of 1 month period. In the future, larger-scale, multi-centre studies will be required with long-term follow-up and the use of clinical methods as a measure of success to define the role of BMP. However, this study suggests that sustained accessibility and guidance and slight adjustments to the regimen may be necessary to sustain favourable results.

The study has limitations due to its small sample size, short follow-up period, and inclusion of only post-operative pediatric patients. The Cleveland Score, a subjective measure, may be influenced by factors such as patient compliance and stool consistency. These limitations should be considered when interpreting the results. Further research with larger sample sizes and more extended follow-up periods is needed to confirm the effectiveness of bowel management programs in treating pediatric faecal incontinence.

Conclusion

This study provided robust evidence of the effectiveness of the bowel management program, as evidenced by a significant improvement in Cleveland Scores, especially patients with anorectal malformation (ARM) who responded significantly to the bowel management program, thus improving the quality of life of the affected children.

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However, further research and potentially larger-scale studies may be needed to confirm these findings and explore factors that could enhance the program's effectiveness.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval
Approved by the department concerned. (IRBEC/PIMSISB-0826 dated 2-1-22)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

MEHTAB JAMEEL (Postgraduate Trainee)
Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
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Coordination of collaborative efforts.
CHANDNI (Postgraduate Trainee)
Conception of Study, Final approval of manuscript. Study Design, Review of Literature.
AYESHA (Postgraduate Trainee)
Data entry and Data analysis, drafting article.

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