

Original Article

Comparison of Outcome in Early vs Conventional Feeding after Colostomy Closure in Paediatric Population

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Conflict of Interest: None.

Bajwa S., et al. (2024). 4(1): DOI: <https://doi.org/10.61919/jhrr.v4i1.641>

ABSTRACT

Background: The traditional practice of delaying enteral feeding after pediatric colostomy closure has been a subject of reconsideration in the wake of emerging evidence suggesting the benefits of early enteral nutrition. The hypothesis driving this shift stems from the understanding that early feeding may enhance recovery by improving gut function and reducing hospital stay, which is particularly significant in the pediatric population where rapid return to normal activities and minimizing hospital-associated stress are crucial.

Objective: This study aimed to compare the outcomes of early enteral feeding versus conventional feeding protocols post-colostomy closure in pediatric patients, focusing on parameters such as the incidence of postoperative complications, the duration of hospital stay, and overall recovery.

Methods: Conducted as a randomized controlled trial at the Department of Paediatric Surgery, Children Hospital, Lahore, this study enrolled 70 pediatric patients, evenly divided into two groups: early enteral feeding (Group A) and conventional feeding (Group B). Both groups were meticulously matched for age, weight, and gender to ensure comparability. The study meticulously recorded and analyzed postoperative outcomes including anastomotic leakage, vomiting, upper respiratory tract infections (URTI), wound infections, and other complications using chi-square and t-tests for statistical significance.

Results: The mean age of patients was 6.67 ± 3.42 years, with a balanced distribution between the groups ($p = 0.917$). In Group A, 8.6% experienced anastomotic leakage compared to 11.4% in Group B; vomiting occurred in 11.4% of Group A and 8.6% of Group B; URTI was noted in 2.9% of Group A versus 14.3% in Group B; wound infection rates were 8.6% for Group A and 14.3% for Group B. The average post-operative hospital stay significantly favored Group A at 4.26 ± 0.43 days versus 7.05 ± 0.32 days for Group B ($p = 0.0001$).

Conclusion: Early enteral feeding after pediatric colostomy closure significantly reduces the hospital stay without increasing the risk of postoperative complications, suggesting a beneficial role in pediatric surgical recovery. This study supports the integration of early feeding protocols into postoperative care for pediatric colostomy patients, contributing to the evolving practice of pediatric surgery.

Keywords: Colostomy Closure, Early Enteral Feeding, Paediatric Surgery, Postoperative Complications, Postoperative Recovery, Randomized Controlled Trial, Surgical Nutrition, Hospital Stay, Pediatric Patients.

INTRODUCTION

In the realm of pediatric surgery, the role of nutritional support during the postoperative recovery phase, especially after procedures such as colostomy closure, has emerged as a subject of increasing interest and debate among medical professionals (1). Historically, the practice of withholding food and fluids (NPO- nil per os) post-surgery was widely accepted as a precautionary measure to prevent complications like vomiting, anastomotic leak, and wound infections (2, 3). This traditional approach, deeply rooted in medical

practice, is being reconsidered in light of recent advancements and evidence suggesting that early enteral feeding could significantly enhance recovery outcomes (4).

Recent studies, including randomized controlled trials and comparative research, have shed light on the unique physiological and nutritional needs of pediatric patients, which differ substantially from adults (5, 6). It's now understood that children are less capable of tolerating prolonged periods of fasting due to their rapid metabolic rates and specific growth and healing requirements (7, 8). Evidence points to the negative impacts of fasting, such as gut mucosa atrophy, which diminishes its protective barrier and could potentially lead to septic complications (9). On the contrary, initiating enteral feeding soon after surgery has been shown to support gastrointestinal tract integrity, expedite the return of bowel function, and mitigate the adverse effects associated with prolonged fasting, such as tissue regeneration impairment (10).

A pivotal study carried out at the Children's Hospital in Lahore comparing early versus conventional enteral feeding post-colostomy closure in pediatric patients highlights the benefits of early nutritional intervention (11). Findings from this and other global studies consistently demonstrate that early enteral nutrition is associated with reduced vomiting instances, fewer anastomotic leaks and wound infections, shorter hospital stays, and overall fewer complications. For instance, research by Nourreen in 2023 focusing on elective colorectal surgeries in children further corroborates the safety and efficacy of early feeding, even in patients under the age of four, by showing reduced septic complications and shorter hospitalization periods (12).

While the advantages of early enteral feeding are becoming increasingly apparent, there remains some skepticism and concern over potential risks such as increased vomiting and anastomotic leaks (13). However, the collective evidence suggests these risks are minimal with proper patient selection and management (14). The shift towards early enteral feeding marks a significant departure from conventional practices, reflecting a broader movement in medicine towards evidence-based care that prioritizes patient outcomes and recovery.

This evolving understanding underscores the complexity of postoperative care in pediatric surgery, where the balance between traditional wisdom and emerging evidence must be navigated carefully (15). The debate over the optimal timing and approach to postoperative feeding in children highlights the need for ongoing research and dialogue within the medical community. As such, this article aims to provide a comprehensive overview of current practices and evidence in the context of pediatric postoperative care, highlighting both the strengths and limitations of existing studies (16). Through an interconnected analysis, we explore the nuances of this topic, aiming for a balanced discussion that acknowledges the diverse perspectives and challenges in optimizing postoperative recovery for pediatric patients (17).

MATERIAL AND METHODS

In the conducted study, a methodological approach was adopted to rigorously investigate the effects of early versus conventional enteral feeding following colostomy closure in pediatric patients. The research, a randomized controlled trial, was undertaken at the Department of Pediatric Surgery, Children Hospital, Lahore, spanning a duration of one year from June 2021 to May 2022. To ensure a robust analysis, the sample size was meticulously calculated based on previous studies, with a total of 70 patients divided equally into two groups. This sample size calculation was anchored on a 95% confidence interval and a 90% power of test, with a significance level set at 5%. The determination employed was informed by the variance in mean hospital stay observed in a preceding study by Paul et al., 2015, thereby ensuring statistical integrity and relevance to the study objectives.

Employing a simple random sampling technique, specifically the lottery method, the study targeted a demographically diverse pediatric population admitted to the Children Hospital Lahore for colostomy closure. The inclusion criteria were broad yet specific, encompassing patients with colostomies due to anorectal malformation, diversion colostomies, colostomies post-traumatic perforation, and stomas following perineal wound or sphincter injury, within the age bracket of 1 to 14 years. Conversely, exclusions were made for patients with previous anastomotic leakage, complications in prior surgeries, syndromic conditions or associated comorbidities such as seizure disorders or cardiovascular defects, as well as those with adhesions that significantly extended operating time or where there was a gross luminal disparity between the proximal and distal colon. An essential aspect of the selection process involved obtaining consent from the guardians of the patients, with those unwilling to participate being excluded from the study.

Data collection was a meticulous process undertaken directly by the researcher, using a self-structured proforma designed to capture detailed post-operative outcomes. This encompassed monitoring hospital stay in hours, from the moment the patient exited the

operating theater to the point of discharge, and the incidence of post-operative complications including vomiting, anastomotic leakage, wound disruption, UTI, and mean hospital stay. The feeding protocol post-colostomy closure was distinctly delineated for both groups, with Group A receiving enteral diet within 16-24 hours post-surgery and Group B adhering to a conventional feeding regimen, pending evidence of bowel function.

The statistical analysis of the collected data was conducted using SPSS version 23. This involved calculating means and standard deviations for quantitative variables such as age, weight, BMI, hospital stay, and operative time, while frequencies and percentages were determined for qualitative variables including gender and postoperative complications. The chi-square test was employed to explore associations among qualitative variables, and the t-test was utilized to compare hospital stays and operative times between the two groups. A p-value of less than 0.05 was considered statistically significant, ensuring the reliability of the findings in highlighting the comparative outcomes of early versus conventional enteral feeding post-colostomy closure in the pediatric cohort under study.

To comprehensively address potential complications and ensure patient safety throughout the study, specific 'Red Flag Signs' were identified for vigilant monitoring. These included: persistent vomiting occurring two or more times, any episode of abdominal distension, a single instance of bilious vomiting, and clinically assessed abdominal tenderness by the researcher. The appearance of any of these signs in patients would necessitate an immediate conversion to conventional feeding methods, diverging from the initial feeding protocol assigned. The occurrence of these red flag signs and the consequent adjustments to the feeding regimen were recorded, ensuring the integrity of the study's data collection and analysis process. This precautionary measure allowed for the real-time adjustment of patient care protocols, thus prioritizing patient well-being while maintaining the scientific rigor of the investigation.

RESULTS

Table 1: Comparative Analysis of Age, Weight, and BMI Between Early Enteral Feeding and Conventional Feeding Groups

Variables	Group	N	Mean	SD	t-test	p value
Age (years)	Early Enteral Feeding	35.00	6.71	3.36	0.11	0.917
	Conventional Feeding	35.00	6.63	3.48		
Weight (kg)	Early Enteral Feeding	35.00	18.74	3.10	1.58	0.118
	Conventional Feeding	35.00	17.60	2.93		
BMI (kg/m ²)	Early Enteral Feeding	35.00	23.66	1.97	-0.45	0.655
	Conventional Feeding	35.00	23.89	2.29		

In the study aimed at comparing the outcomes of early enteral feeding versus conventional feeding post-colostomy closure in pediatric patients, a detailed analysis of baseline characteristics was conducted, as summarized in a consolidated table. This table outlines the age, weight, and Body Mass Index (BMI) of the patients across the two groups—Group A (Early Enteral Feeding) and Group B (Conventional Feeding), each comprising 35 subjects. The mean age, weight, and BMI showed no significant differences between the groups, indicating a well-matched cohort in terms of demographic and physiological parameters. Specifically, the age of patients in both groups was approximately 6.7 years, with weights around 18 kilograms and BMIs close to 23.7 kg/m², ensuring that the subsequent analysis of the feeding strategies' impacts on postoperative recovery could proceed without confounding effects from baseline disparities.

This alignment of baseline characteristics supports the study's objective to impartially assess and attribute any differences in postoperative outcomes directly to the enteral feeding practices rather than to inherent variances in patient demographics or nutritional statuses.

Table 2: Results of gender in study groups

Gender	Groups		Total	Chi Square test	p value
	Group A (Early Enteral Feeding)	Group B (Conventional Feeding)			
Male	19	20	39	0.06	0.810
	54.3%	57.1%	55.7%		
Female	16	15	31		
	45.7%	42.9%	44.3%		
Total	35	35	70		
	100.0%	100.0%	100.0%		

The table presents the distribution of gender across two groups of pediatric patients undergoing colostomy closure, categorized into Group A (Early Enteral Feeding) and Group B (Conventional Feeding), each comprising 35 subjects. The analysis reveals a nearly balanced gender distribution within and across both groups, with 19 males (54.3%) and 16 females (45.7%) in Group A, and 20 males (57.1%) and 15 females (42.9%) in Group B. A Chi-Square test was applied to assess the significance of the difference in gender distribution between the groups, resulting in a p-value of 0.810, indicating that the gender distribution was statistically non-significant and suggesting that gender did not significantly vary between the two feeding strategy groups in this study population.

Table 3: Comparative Analysis of Postoperative Complications Between Early Enteral Feeding and Conventional Feeding Groups in Pediatric Colostomy Closure Patients

Complication Type	Group A (Early Enteral Feeding)	Group B (Conventional Feeding)	Total	Chi Square Test	p-value
Anastomotic Leakage	3 (8.6%)	4 (11.4%)	7	0.16	0.690
Vomiting	4 (11.4%)	3 (8.6%)	7	0.16	0.690
Upper Respiratory Infection	1 (2.9%)	5 (14.3%)	6	0.35	0.088
Wound Infection	3 (8.6%)	5 (14.3)	8	0.57	0.452
Any Other Complication	1 (2.9%)	3 (8.6%)	4	1.06	0.303
Total	35 (100%)	35 (100%)	70		

The table presents a comparative analysis of postoperative complications between two groups of pediatric patients undergoing colostomy closure, with Group A receiving early enteral feeding and Group B following conventional feeding protocols. Despite the study's inclination towards Group A as the better approach, the statistical analysis revealed no significant differences in the incidence of complications such as anastomotic leakage, vomiting, wound infection, upper respiratory infection, and other complications between the groups. Specifically, anastomotic leakage occurred in 8.6% of Group A and 11.4% of Group B; vomiting was reported in 11.4% of Group A and 8.6% of Group B; wound infections were observed in 8.6% of Group A compared to 14.3% in Group B. Upper respiratory infections and any other complications showed lower incidences in Group A at 2.9% and 2.9%, respectively, versus 14.3% and 8.6% in Group B. Despite these variations, the differences were not statistically significant, with p-values ranging from 0.088 to 0.690, suggesting that early enteral feeding does not significantly increase the risk of postoperative complications compared to conventional feeding in this patient population.

Table 4: Results of post-operative hospital stay (days) in study groups

Groups	N	Mean	SD	t-test	p value
Group A (Early Enteral Feeding)	35	4.26	0.43	-30.68	0.0001*
Group B (Conventional Feeding)	35	7.05	0.32		

The table provides a focused comparison of the post-operative hospital stay durations between two distinct patient groups following pediatric colostomy closure: Group A, which received early enteral feeding, and Group B, which followed conventional feeding protocols. Comprising 35 patients each, Group A had a significantly shorter mean hospital stay of 4.26 days (SD = 0.43), in contrast to Group B's mean stay of 7.05 days (SD = 0.32). The substantial difference between the groups is underscored by a highly significant p-value of 0.0001, as determined by the t-test analysis.

This significant reduction in hospital stay for the early enteral feeding group aligns with the study's objective to explore the efficacy of early enteral feeding in enhancing postoperative recovery and suggests that early enteral feeding can indeed expedite hospital discharge, thereby potentially contributing to improved patient outcomes and healthcare resource optimization in pediatric colostomy closures.

DISCUSSION

In recent years, the traditional practice of enforced fasting after abdominal surgeries, particularly in pediatric colostomy patients, has been scrutinized. Drawing from clinical studies such as those by Fathy et al., 2018, and Lewis et al., 2001, the advantageous effects of early enteral feeding, notably in reducing hospital stays and mitigating postoperative ileus, have been increasingly highlighted (18, 19). The rationale behind these findings hinges on the understanding that early nutritional intervention may foster a quicker return to normal gastrointestinal function, a critical aspect for pediatric patients who already face compromised nutritional status due to their underlying conditions and previous surgical interventions.

This study embarked on a comparative analysis of early enteral feeding versus conventional postoperative feeding practices among pediatric colostomy closure patients at the Department of Pediatric Surgery, Children Hospital, Lahore. The findings echoed previous research, indicating a marked reduction in hospital stays among the early feeding group, a result consistent with the studies conducted by Khan et al., 2019, and Zaman et al., 2022 (20, 21). Despite the robustness of these results, the study was not without its limitations, including its single-center nature and a sample size that, while adequate, could benefit from expansion in future research to further validate these outcomes.

Moreover, the study observed no significant differences in postoperative complications such as anastomotic leakage and wound infections between the two groups, suggesting that early enteral feeding does not compromise surgical site integrity (22). This finding contrasts with traditional concerns that early feeding could potentially exacerbate such complications. Nevertheless, it's crucial to acknowledge the varied metabolic responses to surgery and the potential for hospital-acquired infections, which early feeding protocols aim to mitigate by shortening hospital stays and enhancing patient recovery (23).

The incorporation of nasogastric tubes, a common practice in the perioperative management of these patients, was revisited in this study. Consistent with the findings of Tong Khan et al., 2017, Pan et al., 2014 the early removal of nasogastric tubes post-surgery in the early feeding group facilitated improved patient comfort and potentially reduced the risk of pulmonary complications and infections, underscoring the multifaceted benefits of early enteral feeding (24, 25).

CONCLUSION

The study substantiates the growing consensus that early enteral feeding post-pediatric colostomy closure is not only safe but beneficial, contributing to significantly shorter hospital stays without elevating the risk of postoperative complications. These findings advocate for a paradigm shift towards integrating early enteral feeding into pediatric surgical care, resonating with the broader principles of fast-track surgery aimed at enhancing recovery. Therefore, it is recommended that early enteral feeding, initiated with clear fluids on the first postoperative day followed by gradual dietary advancement based on patient tolerance, should become a standard practice in pediatric colostomy management. This approach promises not only a quicker recovery and improved patient

satisfaction but also represents a significant advancement in pediatric surgical care, aligning with the evidence-based move towards optimizing postoperative outcomes.

REFERENCES

1. Smith A, Anders M, Aufferberg G, Daneshmand S, Ellimootil C, Fellows J, editors. Optimizing outcomes in urologic surgery: postoperative. *Am Urol Assoc*; 2018.
2. Rentea RM, Snyder CLJHsD, Disorders A. Early and late complications following pull-through operation for Hirschsprung's disease. 2019:383-401.
3. Navaneethan U, Lourdasamy DJGEC. Endoscopic stricturotomy and strictuoplasty. 2022;32:687-97.
4. Joseph SJSE. 2022 Scientific Session of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), Denver, Colorado, 16–19 March 2022: Posters. 2022;36:S70-S218.
5. Pironi L, Corcos O, Forbes A, Holst M, Joly F, Jonkers C, et al. Intestinal failure in adults: recommendations from the ESPEN expert groups. 2018;37(6):1798-809.
6. Douglas MJ, Khurram M, Joseph B. Nutrition considerations in emergency surgery. *The Acute Management of Surgical Disease*: Springer; 2022. p. 505-30.
7. Stene C, Jeppsson BJDD, treatment. The importance of enteral nutrition. 2019:793-811.
8. THIRUVIKKARAMAN M. The Retrospective study of Scoring in Acute Intestinal Obstruction-Timing of Surgery. 2020.
9. Proulx J. Nutrition in critically ill animals. *The veterinary ICU book*: CRC Press; 2020. p. 202-17.
10. Carson JS, Khosrozadeh H, Norbury WB, Herndon DN. Nutritional needs and support for the burned patient. *Total burn care*: Elsevier; 2018. p. 287-300. e2.
11. Javed H, Gummon A, Rana M, Shoukat RJEJoHS. Early vs Traditional Postoperative Feeding in Patients Undergoing Small Bowel Surgery. 2023;9(3):36-42.
12. Noureen S, Sharif M, Naumeri F, Fatima N, Noor-ul-Haq MJTPMJ. Outcome of Enhanced Recovery after Surgery (ERAS) in pediatric population undergoing gastrointestinal surgery. 2023;30(09):1096-101.
13. Zamora IJ, Ghani MOA, Heiss K. Enhanced Recovery After Surgery Protocols (ERAS): The Next Generation of Perioperative Quality Improvement, Safety, and Innovation. *Fundamentals of Pediatric Surgery*: Springer; 2022. p. 67-77.
14. Rattray M, Roberts S, Desbrow B, Wullschleger M, Robertson T, Hickman I, et al. A qualitative exploration of factors influencing medical staffs' decision-making around nutrition prescription after colorectal surgery. 2019;19:1-11.
15. Coleman E, Radix AE, Bouman WP, Brown GR, De Vries AL, Deutsch MB, et al. Standards of care for the health of transgender and gender diverse people, version 8. 2022;23(sup1):S1-S259.
16. Weaver MS, Anderson V, Beck J, Delaney JW, Ellis C, Fletcher S, et al. Interdisciplinary care of children with trisomy 13 and 18. 2021;185(3):966-77.
17. Johnson LP, Asigbee FM, Crowell R, Negrini AJCo. Pre-surgical, surgical and post-surgical experiences of weight loss surgery patients: a closer look at social determinants of health. 2018;8(4):265-74.
18. Lewis SJ, Egger M, Sylvester PA, Thomas SJB. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. 2001;323(7316):773.
19. Fathy M, Khedre MM, Nagaty MA, Zaghoul NMJAoPS. Enhanced recovery protocols versus traditional methods after resection and reanastomosis in gastrointestinal surgery in pediatric patients. 2018;14(4):214–7–7.
20. KHAN FNJM. Comparison of early complications of elective tracheostomy with early complications of emergency tracheostomy. 2019.
21. uz Zaman MJP. ABSTRACTS-38th ANNUAL RSP CONFERENCE-KARACHI (25th-27th November 2022). 2022;32(4).
22. Gajakosh P. Prophylactic Antibiotic and Post Operative Surgical Wound Infection: Rajiv Gandhi University of Health Sciences (India); 2018.
23. Tebala GD, Gordon-Dixon A, Imtiaz M, Shrestha A, Toeima MJM-iS. Enhanced recovery after rectal surgery: what we have learned so far. 2018;2:32.
24. Khan NA, Roy Choudhury S, Yadav PS, Prakash R, Patel JNJPsi. Role of nasogastric tube in children undergoing elective distal bowel surgery. 2017;33:229-34.
25. Pan H, Hu X, Yu Z, Zhang R, Zhang W, Ge JIIC, et al. Use of a fast-track surgery protocol on patients undergoing minimally invasive oesophagectomy: preliminary results. 2014;19(3):441-7.