Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Study on the Role and Timing of Postoperative Oral Feeding Following Intestinal Anastomosis in Infants

Han Wang
Children's Hospital of Nanjing Medical University
Xiaofeng Lv
Children's Hospital of Nanjing Medical University
Peng Wang
Children's Hospital of Nanjing Medical University
Zhang Jie
Children's Hospital of Nanjing Medical University
Chen Huan
Children's Hospital of Nanjing Medical University
Jiang Weiwei
wwjiang@njmu.edu.cn

Children's Hospital of Nanjing Medical University

Research Article

Keywords: Neonatal surgery, Early feeding, Oral feeding, Enhanced Recovery After Surgery (ERAS)

Posted Date: November 10th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11220521/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Study on the Role and Timing of Postoperative Oral Feeding Following Intestinal Anastomosis in Infants

Wang Han[1,2], Lv Xiaofeng[1], Wang Peng[1], Zhang Jie[1], Chen Huan[1,2*], Jiang Weiwei[1*]

Department of Neonatal Surgery, Children's Hospital of Nanjing Medical University, Nanjing 210008, China

*Corresponding Authors: Jiang Weiwei, Email: wwjiang@njmu.edu.cn; Tel: +86-13815400136. Chen Huan, Email: 1933258744@qq.com;Tel: +86-15951894195.

[1]Department of Neonatal Surgery, Children's Hospital of Nanjing Medical University, Nanjing 210008, China.[2]These authors contributed equally: Wang Han, Chen Huan.

Abstract

Objective:To investigate the effect of the timing of postoperative oral feeding on the postoperative recovery of infants undergoing intestinal anastomosis.

Methods: A retrospective analysis was conducted on the clinical data of 701 pediatric patients who underwent intestinal anastomosis in the Children's Hospital of Nanjing Medical University from May 2018 to January 2026. The subjects were categorized into four groups based on disease type: the primary anastomosis group (n=132, including intestinal stenosis, Meckel's diverticulum, intestinal duplication, and intestinal atresia), the secondary anastomosis group (n=243, comprising various stoma closures excluding those for imperforate anus), the tertiary anastomosis group (n=102, representing stage III stoma closure for imperforate anus), and the biliary surgery group (n=224, including choledochal cyst and biliary atresia). Clinical variables collected included surgical procedure, time to initiation of postoperative oral feeding, body weight at surgery,

preoperative nutritional indicators (e.g., serum albumin), time to first postoperative enteral nutrition (feeding initiation), total length of hospital stay, incidence of postoperative feeding intolerance (e.g., vomiting, abdominal distension), and gastrointestinal decompression drainage volume from postoperative days 1 to 7. SPSS statistical software was utilized for correlation and survival analyses to evaluate the impact of the timing of feeding initiation on postoperative recovery outcomes.

Results:

The overall average time to first postoperative enteral feeding for the 701 cases in the total sample was 68.36 ± 35.06h. The primary anastomosis group (92.04 ± 41.50h) and the secondary anastomosis group (86.12 ± 31.94h) were significantly later than the tertiary anastomosis group (45.31 ± 11.54h) and the biliary surgery group (45.63 ± 15.54h). Surgical weight was significantly negatively correlated with the postoperative time to feeding initiation ($r = -0.387$, $P < 0.001$), as were preoperative albumin levels (overall $r = -0.751$, $P < 0.001$) ; moreover, intestinal anastomoses spanning multiple segments were associated with later feeding initiation, while simple high-position or ultra-low-position anastomoses allowed for earlier feeding. A significant positive correlation was observed between the time to first postoperative feeding and the length of hospital stay ($r = 0.559$, $P < 0.001$), and the overall incidence of postoperative feeding intolerance was 1.57% (11/701). Statistical analysis of gastrointestinal decompression drainage volume from postoperative days 1 to 7 showed that the tertiary anastomosis and biliary surgery groups peaked on day 2 and showed a significant decline on day 3, whereas the primary and secondary anastomosis groups peaked on day 3 and experienced a precipitous drop on day 4.

Conclusion: Early enteral nutrition after gastrointestinal surgery

in infants is safe and feasible. It is recommended to initiate feeding 24–48 hours postoperatively for tertiary anastomosis and biliary surgery, whereas for complex primary and secondary anastomoses, feeding should ideally commence at 72–96 hours postoperatively. Implementing individualized and proactive feeding strategies in clinical practice is suggested to accelerate patient recovery.

Keywords: Neonatal surgery; Early feeding; Oral feeding; Enhanced Recovery After Surgery (ERAS)

What is Known

Traditional postoperative management following infant intestinal anastomosis enforces prolonged fasting due to fear of anastomotic leakage and severe feeding intolerance. Enhanced Recovery After Surgery (ERAS) pathways promote early enteral feeding, but evidence on the precise timing and safety across heterogeneous surgical reconstruction types remains limited and controversial.

What is New

In a large cohort of 701 infants, early or intermediate postoperative feeding (≤72 h) achieved an exceptional safety profile with an intolerance rate of only 0.23%, significantly shortening hospital stays (e.g., from 11 to 6.5 days in primary anastomoses). Decompression output trajectory demonstrates surgical-specific physiological milestones: oral feeding can safely begin at 24–48 h for low-trauma reconstructions (biliary surgery and tertiary closure), while initiation should be tailored to 72–96 h for complex bowel resections.

Introduction

The concept of Enhanced Recovery After Surgery (ERAS) was first proposed by Kehlet. Its core philosophy focuses on mitigating surgical

stress and promoting organ function recovery through multimodal perioperative interventions, aiming to provide standardized, evidence-based, and collaborative care throughout the patient's surgical journey. Currently, ERAS pathways are widely applied across various adult surgical specialties and are gradually being adapted and expanded into pediatric and neonatal surgical disciplines [1-4]. As a cornerstone component of ERAS, early enteral nutrition (EEN) breaks through the traditional shackles of conservative postoperative feeding strategies. A substantial body of high-quality clinical evidence now suggests that infants can significantly benefit from EEN during their postoperative recovery phase[5-10]. Early enteral nutrition typically encompasses two primary modalities: oral feeding and tube feeding (enteral tube gavage). Prior studies focused on neonatal surgical cohorts indicate that early initiation of postoperative oral feeding is more aligned with the infant's intrinsic physiological structures, thereby exerting a more profound and beneficial effect on the functional recovery of the gastrointestinal tract [11][22-26]. However, some researchers have noted that aggressive early oral feeding protocols may conversely elevate the risk of postoperative feeding intolerance, suggesting that the timing of early feeding initiation requires meticulous, individualized assessment for each patient [2-4][6-10]. According to current domestic expert consensuses and relevant clinical trials, early enteral nutrition should be heavily advocated following neonatal and infant intestinal anastomosis. For infants without definitive contraindications, initiating feeding within 24–48 hours postoperatively is generally recommended; specifically for certain surgical types such as primary intestinal anastomosis, clinical practice has repeatedly demonstrated the safety and feasibility of early oral feeding[3][7][31][34]. For many years, our team has dedicated substantial efforts to researching pediatric enhanced recovery after surgery, with

a particular focus on postoperative early enteral nutrition; however, the precise indications for applying early enteral nutrition remain a subject of active clinical debate [4][22-29]. This study examines the clinical outcomes regarding postoperative oral feeding among 701 infants who underwent gastrointestinal operations in the Department of Neonatal Surgery at the Affiliated Children's Hospital of Nanjing Medical University. By grouping the patients according to their specific surgical anastomosis types, we analyze the critical factors influencing the timing of postoperative oral feeding and compare the impacts of different feeding timelines on infant recovery. Through this investigation, we aim to provide data support for tailoring optimal postoperative oral feeding strategies across various types of infant surgeries in the future.

Materials and Methods

1. Data collection: A retrospective analysis was performed on the surgical clinical data of infants at the Department of Neonatal Surgery, Children's Hospital Affiliated with Nanjing Medical University, between May 2018 and January 2026. Initially, data from 743 cases were retrieved. After sequential screening based on predetermined criteria, patients were enrolled or excluded. Inclusion criteria: (1) Surgical age ≤ 1year old; (2) Presence of an intestinal anastomosis (including small bowel and colonic anastomosis) during the surgical procedure. A total of 701 cases successfully met these criteria and were enrolled in this study.Exclusion criteria: (1) Preoperative presence of severe cardiopulmonary dysfunction; (2) Pediatric patients undergoing unplanned reoperation; (3) Patients with postoperative non-intestinal derived infections.The enrolled infants were categorized into four groups based on their specific surgical anastomosis staging and digestive system anatomical characteristics: the primary anastomosis group (n=132), the secondary

anastomosis group (n=243), the tertiary anastomosis group (n=102), and the biliary surgery group (n=224).

2. Feeding protocols and grouping standards: Enteral feeding was initiated at a low volume (6–8 times daily). The single feeding volume was progressively increased by 15-30 mL per feeding each day as oral feeding advanced, until the infant achieved their target rational full feeding volume. If signs of feeding intolerance occurred, feeding was temporarily suspended until symptoms completely resolved [4][5][30][31]. Based on the actual time to initiation of postoperative oral feeding, the infants were categorized into three clinical timelines: the early feeding group (≤48 h), the intermediate feeding group (48-72 h), and the delayed feeding group (>72 h).

3. Observation indicators: Clinical data including sex, gestational age, age at surgery, surgical body weight, disease classification, birth weight, surgery-related parameters, 7-day cumulative postoperative gastrointestinal decompression drainage volume, time to first enteral feeding, length of hospital stay (discharge time), and postoperative feeding tolerance outcomes were systematically collected and analyzed.

4. Statistical analysis: SPSS 26.0 was used for data processing and analysis. Continuous variables conforming to a normal distribution were expressed as mean ± standard deviation (Mean ± SD), and comparisons among multiple groups were performed using one-way analysis of variance (one-way ANOVA). Skewed continuous variables and ordinal variables, such as total hospital stay, were expressed as median and interquartile range [M (Q1, Q3)], and intergroup comparisons were performed using the Kruskal-Wallis nonparametric rank-sum test. Categorical variables were expressed as frequencies and percentages (%), and intergroup comparisons were performed using Pearson's chi-square test or Fisher's exact test. Pearson or Spearman correlation analysis was used to examine the

correlations of operative weight and preoperative albumin level with postoperative feeding initiation time. Kaplan-Meier survival curves for discharge probability were plotted, and the log-rank test was used to evaluate differences in hospital stay among groups with different feeding initiation times. All tests were two-sided, and $P<0.05$ was considered statistically significant.

This study was conducted in accordance with the Declaration of Helsinki (1964 and its later amendments) and approved by the Ethics Committee of Children's Hospital of Nanjing Medical University (Approval No. 202608029-1). Because of the retrospective nature of this study and the secondary use of anonymized clinical records, informed consent was not required, as approved by the Ethics Committee.

Results

1. Postoperative oral feeding timing statistics: Among the 701 infants included in this study, the overall mean time to the first postoperative enteral feeding was 68.36±35.06 h. When stratified by the surgical anastomosis stage, significant differences were observed among the four groups ($P < 0.001$, Kruskal-Wallis test; see Figure 1):

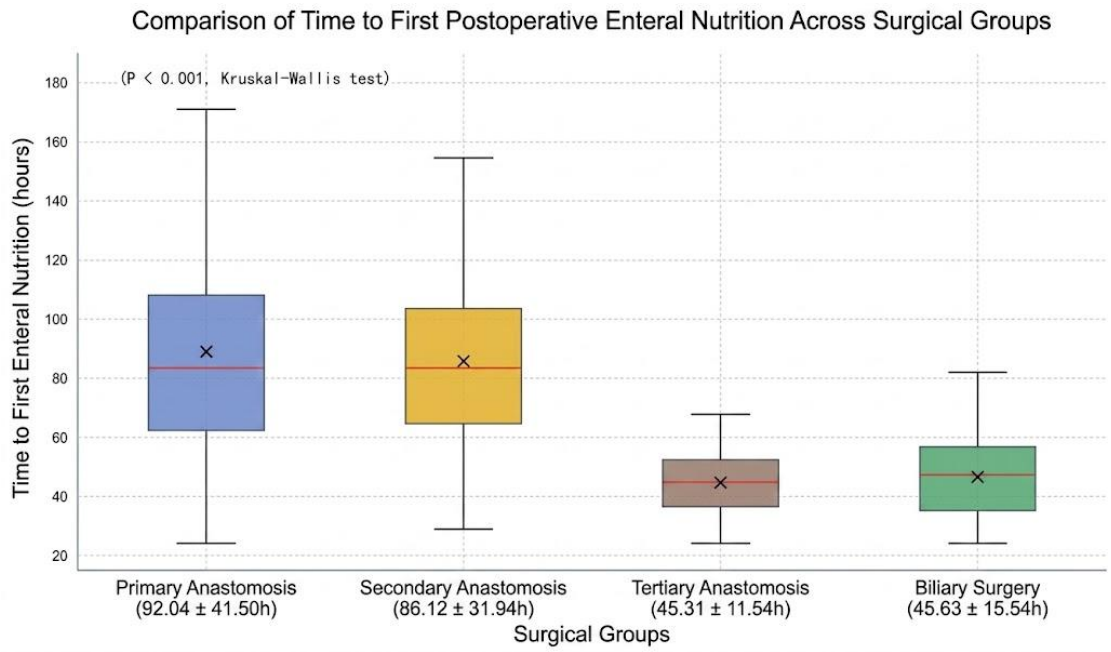
Primary Anastomosis Group: 92.04 ± 41.50 hours ;

Secondary Anastomosis Group: 86.12 ± 31.94 hours ;

Biliary Surgery Group: 45.63 ± 15.54 hours ;

Tertiary Anastomosis Group: 45.31 ± 11.54 hours ;

Compared with the primary and secondary anastomosis groups, the postoperative oral feeding timelines in the tertiary anastomosis and biliary surgery groups were significantly shorter and more tightly clustered.



Factors influencing postoperative feeding decisions:In the analysis of discharge data for all infants, several baseline parameters demonstrated strong predictive values for the timing of feeding initiation (see Table 1):

Table 1. Correlation analysis between baseline clinical parameters (surgical weight and preoperative albumin) and time to first postoperative enteral nutrition across subgroups

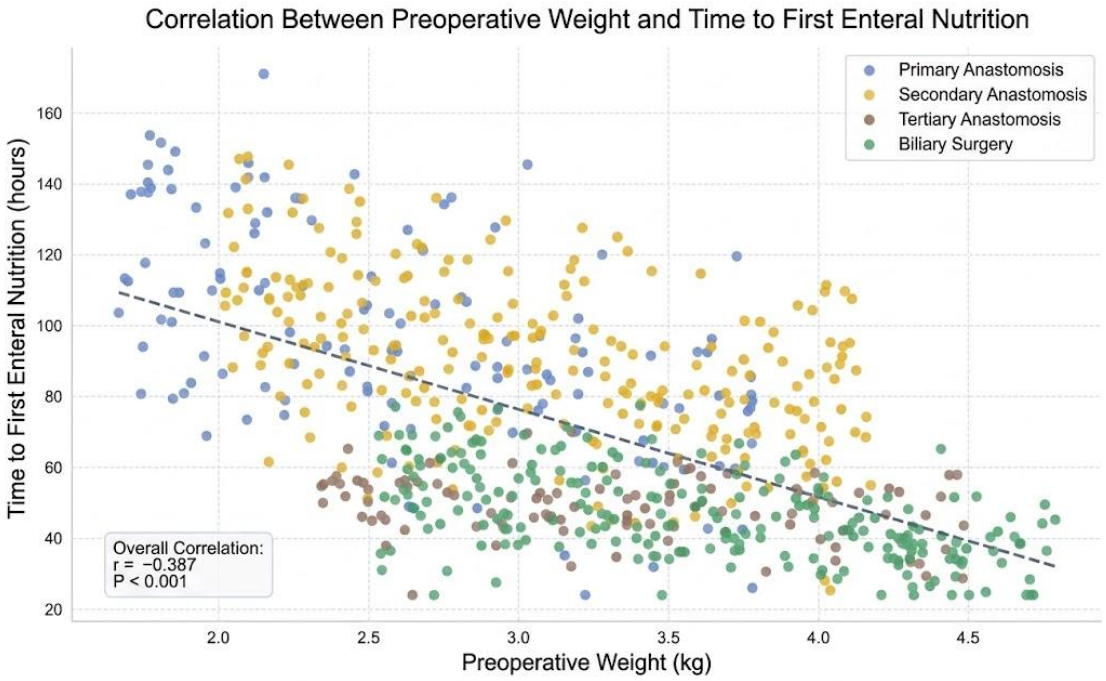
Patient Classification (Groups)	Number of Cases (n)	Surgical Weight (r value)	Surgical Weight (P value)	Preoperative Albumin (r value)	Preoperative Albumin (P value)
Overall Cohort	701	-0.387	< 0.001*	-0.751	< 0.001*
Primary Anastomosis	132	-0.440	< 0.001*	-0.806	< 0.001*
Secondary Anastomosis	243	-0.285	< 0.001*	-0.729	< 0.001*

Tertiary Anastomosis	102	-0.200	0.044*	-0.257	0.009*
Biliary Surgery	224	-0.233	< 0.001*	-0.455	< 0.001*

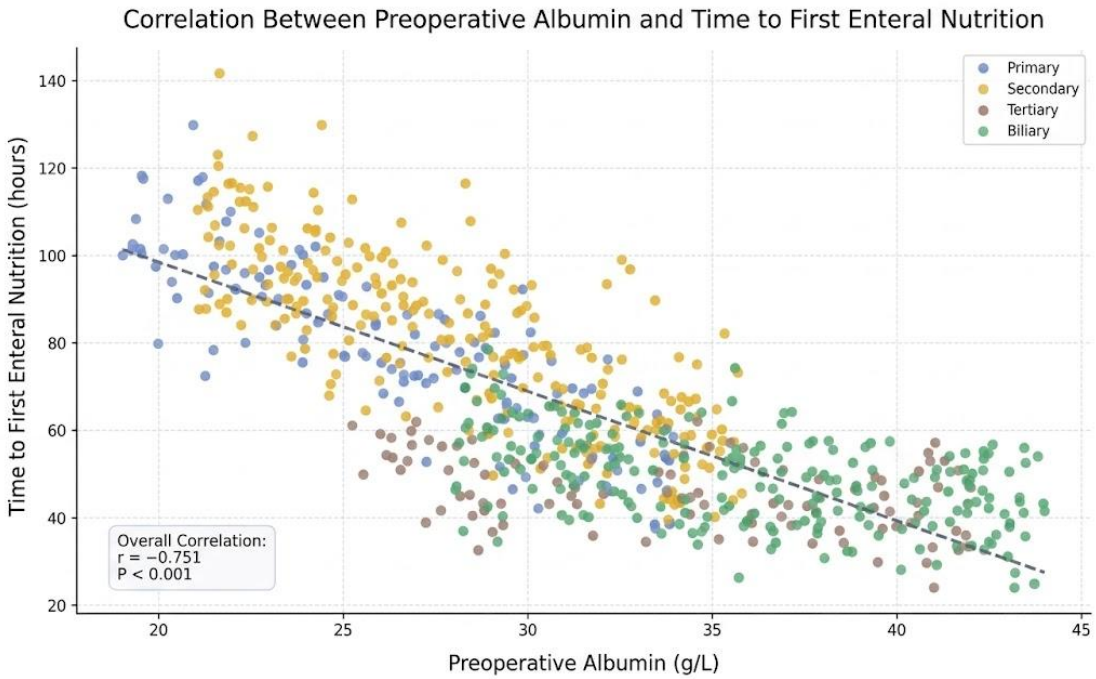
* P < 0.05 indicates statistical significance.

2.

Surgical Weight: Preoperative body weight exhibited a significant negative correlation with the postoperative time to feeding initiation ($r = -0.387$, $P < 0.001$).(see Figure 2)



Preoperative Albumin Level: Serum albumin levels were also significantly and negatively correlated with the time to feeding initiation (overall $r = -0.751$, $P < 0.001$, see Figure 3), which aligns perfectly with the clinical principles of preoperative nutritional risk assessment established in previous literature [5][30][31].



Furthermore, the surgical staging and the anatomical site of the digestive tract exerted pronounced impacts on feeding decisions. Patients undergoing primary and secondary anastomoses frequently required the resection of bowel loops and reconstruction across different physiological segments. Consequently, these infants experienced a longer duration before feeding could be initiated compared to those in the tertiary anastomosis and biliary surgery groups.

To explore the relationship between early feeding initiation and the timing of patient discharge, Spearman rank correlation analysis was initially applied. The results demonstrated a highly significant positive correlation between the time to feeding initiation and the total length of hospital stay across all subgroups and the overall cohort ($r = 0.559$, $P < 0.001$). Notably, this positive correlation was most pronounced in the primary anastomosis group ($r = 0.702$, $P < 0.001$).To establish clear clinical thresholds for feeding timelines, infants were categorized into three cohorts based on their actual feeding initiation: Early (≤48h, n=248), Intermediate (48-72h, n=190), and Delayed (>72h, n=263), and Kaplan-Meier discharge probability curves were subsequently constructed (see Figure 4, including subplots A, B, C, D, and E). The overall median length of hospital stay for the early, intermediate, and delayed feeding groups was 8 days (IQR: 6–9 days), 8 days (IQR: 7–10 days), and 11 days (IQR: 9–12 days), respectively.Further subgroup evaluations

demonstrated that after adjusting for the confounding effects of specific disease classifications and surgical stages, early postoperative feeding consistently and robustly driven an earlier discharge. The primary anastomosis group derived the most substantial benefit from early feeding, with its median length of hospital stay being dramatically reduced from 11 days in the delayed cohort to 6.5 days.Regarding safety outcomes, the overall incidence of postoperative feeding intolerance (encompassing clinical signs such as vomiting, abdominal distension, and hematochezia) across the entire cohort of 701 patients was 1.57% (11/701). Intergroup comparisons based on feeding timelines (see Table 2) revealed that the incidence of intolerance was remarkably low in both the early (≤48h) and intermediate (48-72h) groups, combining for a mere 1 case (0.23%). Conversely, the vast majority of feeding intolerance events (10 cases) were strictly concentrated within the delayed feeding group (>72h).In deeper subgroup analyses, the secondary anastomosis group exhibited the highest number of feeding intolerance events (7 cases), 100% of which occurred in infants subjected to delayed feeding (>72h). Remarkably, infants in the tertiary anastomosis group did not experience a single event of postoperative feeding intolerance, irrespective of whether their feeding was initiated early or late.

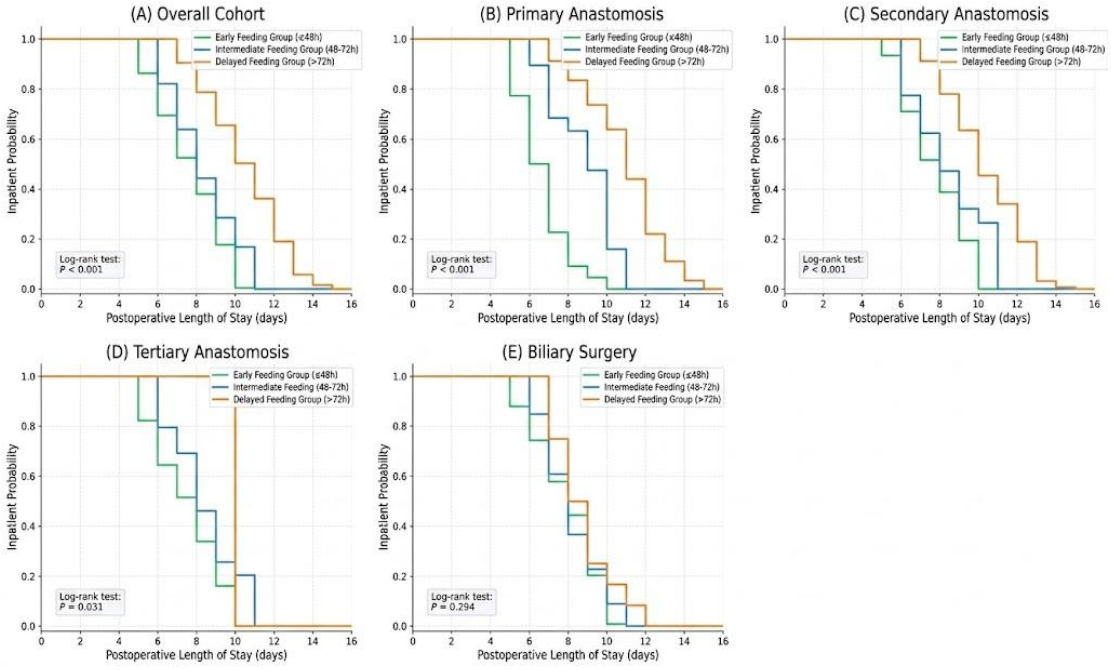


Table 2. Incidence of postoperative feeding intolerance stratified by surgical anastomosis staging and feeding initiation timelines

Surgical	Early	Intermediate	Delayed	Overall

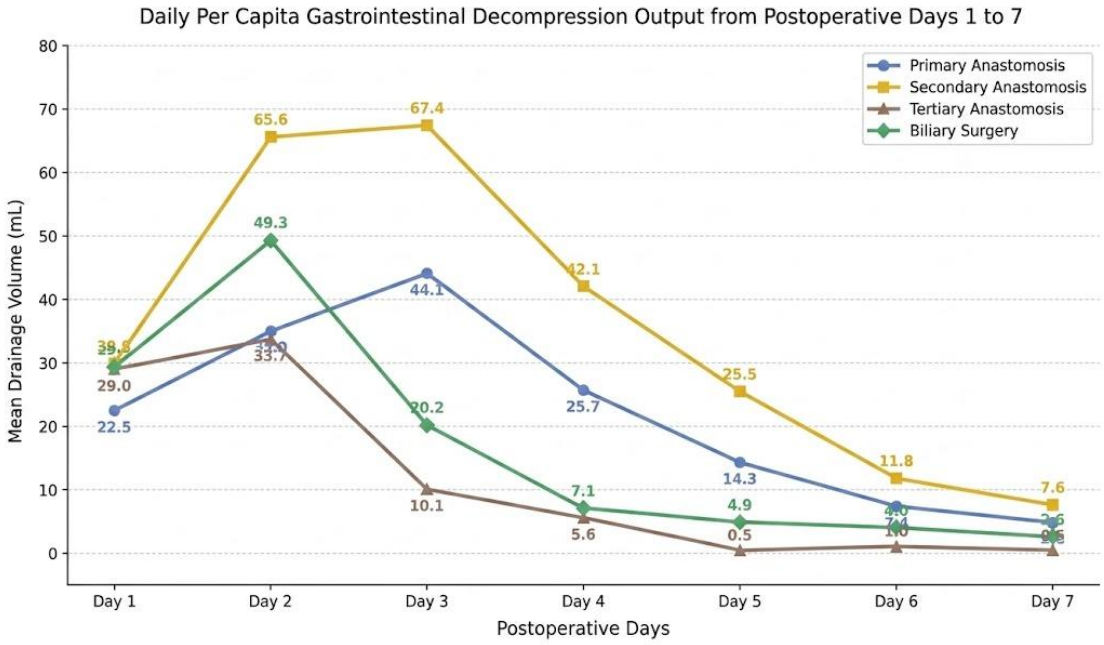
Anastomosis Staging	Feeding Group (≤ 48 h)	Feeding Group (48–72 h)	Feeding Group (>72 h)	Incidence
Primary Anastomosis (n=132)	1 / 22 (4.55%)	0 / 19 (0.00%)	1 / 91 (1.10%)	2 / 132 (1.52%)
Secondary Anastomosis (n=243)	0 / 31 (0.00%)	0 / 53 (0.00%)	7 / 159 (4.40%)	7 / 243 (2.88%)
Tertiary Anastomosis (n=102)	0 / 62 (0.00%)	0 / 39 (0.00%)	0 / 1 (0.00%)	0 / 102 (0.00%)
Biliary Surgery (n=224)	0 / 133 (0.00%)	0 / 79 (0.00%)	2 / 12 (16.67%)	2 / 224 (0.89%)
Overall Cohort (N=701)	1 / 248 (0.40%)	0 / 190 (0.00%)	10 / 263 (3.80%)	11 / 701 (1.57%)

Data are presented as numerator / denominator (percentage). Feeding intolerance events include clinical signs such as vomiting, abdominal distension, and hematochezia.

3.

4. Postoperative gastrointestinal decompression output trends within 7 days: To precisely calibrate the optimal timing for postoperative feeding, this study calculated the mean single-day drainage load per

capita across each whole cohort from postoperative days 1 to 7, using the fixed total number of patients per group as the denominator. The adjusted drainage data profiles revealed that the mean gastrointestinal drainage volumes for both the tertiary anastomosis and biliary surgery groups reached their maximum peaks during the 24–48 h postoperative window (33.7 mL and 49.3 mL, respectively), followed by a sharp, "cliff-like" drop beginning on day 3 (48–72 h). In contrast, for the primary and secondary anastomosis groups, the per capita drainage volumes peaked on day 3 (48–72 h), reaching values of 44.1 mL and 67.4 mL, respectively, and did not experience a sharp downward transition until day 4 (72–96 h). (see Figure 5)



Discussion

1. Clinical significance of early oral feeding after infant abdominal surgery: Historically, clinical attitudes toward early postoperative oral feeding following infant intestinal anastomosis have been conservative. Traditional surgical dogmas suggested that gastrointestinal operations required a prolonged, absolute resting phase to allow functional recovery, minimize gastrointestinal workload, and reduce the risk of postoperative feeding intolerance, which established intravenous parenteral nutrition as the default, "safer" postoperative strategy[5][30][31]. While contemporary research in adult gastrointestinal surgery has robustly validated the safety and efficacy of early oral feeding [33], clear clinical consensus and concrete evidence regarding pediatric and neonatal populations have remained sparse, and whether early feeding is universally applicable across all types of bowel anastomoses remains highly controversial.Driven by the multifaceted clinical benefits of early enteral nutrition, our team reviewed several years of intestinal anastomosis cases to identify the optimal physiological windows for feeding initiation [2-4][6-12][22-26]. The retrospective data from this cohort of 701 infants strongly demonstrate that timely early or intermediate feeding initiation (≤72h) carries an exceptional safety profile, yielding a feeding intolerance rate of just 0.23% (1 case) while significantly accelerating discharge timelines. Conversely, the remaining 10 intolerance events were strictly clustered within secondary anastomosis patients who underwent delayed feeding (> 72h); a carefully calibrated delay may be more appropriate for secondary stoma closures, likely due to prolonged local adhesions and the time required for distal bowel loops to recover motility [5][30][31].Our evidence reveals that early feeding was successfully achieved in 59.38% of biliary surgeries and 60.78% of

tertiary anastomoses, with an additional 35.27% and 38.24% proving highly feasible for intermediate feeding. Given that 68.94% of primary anastomoses and 65.43% of secondary anastomoses were managed via late feeding pathways in this real-world dataset, these findings confirm that while early feeding is highly safe for simple reconstructions, a single timeline cannot be uniformly applied across heterogeneous surgical categories.

2. Surgical anastomosis staging as the prime driver of feeding decisions: Superficially, our overall dataset presented a trend where lower birth weight and lower preoperative serum albumin levels correlated with a delayed initiation of oral feeding, reflecting a widespread, cautious clinical bias toward low-weight or malnourished infants in real-world practice. However, by implementing a rigorous subgroup analysis based on surgical disease typologies, this study demonstrated that the vast majority of critically ill infants with severe hypoalbuminemia were concentrated within the complex primary and secondary anastomosis groups. From a pathophysiological standpoint, these patients suffered from profound preoperative intestinal barrier disruption, making low body weight and low serum albumin predictable baseline characteristics.Regarding postoperative functional recovery, infants undergoing primary and secondary anastomoses experience severe bowel ischemia, severe obstruction, or extensive intestinal resections, which significantly slow the return of coordinated peristalsis. Conversely, tertiary stoma closure (stage III closure for anal atresia) represents a low-position, relatively straightforward anatomical reconstruction, while biliary surgeries represent high-position, non-obstructive reconstructions that entail minimal local tissue trauma and cause significantly less disruption to baseline intestinal anatomy and nutrient absorption capacity compared to complex bowel

resections. Therefore, the stage and type of surgical anastomosis must serve as the core metric driving clinical feeding decisions.For decades, the fear that premature oral intake would precipitate catastrophic anastomotic leakage or intractable feeding intolerance has stood as the single greatest barrier to implementing neonatal ERAS pathways. Our large-cohort data substantially alleviate this concern: the incidence of intolerance in the early and intermediate feeding groups (≤72h) was extremely low (0.23%), whereas the vast majority (10/11) of all intolerance events occurred exclusively within the extremely delayed feeding cohort (> 72h). This distribution strongly challenges traditional conservative fasting theories, confirming that excessive, ungrounded fasting offers no clinical benefit; instead, it triggers disuse atrophy of the intestinal mucosa and disrupts the gut microbiome, ironically elevating the risk of intolerance once feeding is finally reintroduced[5][30][31]. Furthermore, after controlling for disease-specific clustering, early tailored feeding delivered massive clinical value by significantly shortening the length of hospital stay across all sub-groups.

3. Clinical utility of ERAS protocols and total length of stay:The Kaplan-Meier curves generated in this study provide direct visual evidence of the profound impact that early oral feeding exerts on shortening hospital stays, showing that initiating oral feeding within the early window (≤48 h) enabled an overall median discharge timeline that was exactly 3 days earlier than that of the delayed cohort (>72 h; 8 days vs. 11 days).Notably, implementation of early oral feeding in the complex primary anastomosis group delivered a profound recovery benefit, directly shortening the median length of hospital stay from 11 days to 6.5 days. In contrast, while early feeding was equally safe for the biliary surgery group, its impact on accelerating discharge was

relatively modest. This discrepancy is driven by the intrinsic management pathways of biliary diseases: although infants with choledochal cysts are discharged rapidly, patients undergoing surgery for biliary atresia routinely require prolonged postoperative hospitalization to administer intensive intravenous corticosteroid regimens and specialized anti-infective therapies aimed at preventing intractable cholangitis[26][27].

4. Synchronizing postoperative drainage trajectories with optimal feeding windows: By adopting a population-wide average drainage algorithm, this study successfully corrected for individual quantitative distortions—such as cases where a small number of critically ill infants required extremely late extubation and produced outsized drainage volumes. Utilizing the total number of patients as the constant denominator and the cumulative drainage volume as the independent metric allowed us to clearly map the collective physiological trends of the entire cohort. The standardized drainage workload curves revealed powerful, disease-specific physiological turning points:For tertiary closures and biliary surgeries, gastrointestinal decompression volumes peaked rapidly within the first 24-48h postoperatively, followed by a sharp, dramatic attenuation on day 3.For the more traumatized primary and secondary anastomosis cohorts, the drainage peak was characteristically deferred until day 3, with the sharp downward inflection delayed until day 4 (72-96h). This objective clinical marker provides robust physiological justification for tailoring post-surgical feeding windows. The rapid decline in decompression drainage serves as a direct proxy for the resolution of bowel wall edema and the systematic return of intestinal mucosal absorption. Initiating early oral feeding precisely at this physiological inflection point leverages the mechanical and

neuroendocrine stimulation of early chyme to accelerate the return of coordinated intestinal motility[5-10]. Aligning feeding strategies with these specific physiological milestones dictates that infants with low-grade gastrointestinal trauma should initiate oral feeding at 24-48h postoperatively, whereas infants with extensive intestinal trauma should safely defer initiation to 72-96h, thereby achieving true, data-driven accelerated recovery.

5. Study Limitations: While this study successfully evaluated a substantial cohort of over 700 cases focused specifically on the unique physiological window of infancy, it is limited by its single-center, retrospective design. Additionally, the granularity of specific disease sub-classifications warrants further deepening. Future prospective, multi-center cohort studies spanning a broader disease spectrum and larger patient populations are essential to fully validate the universal generalizability of these conclusions.

Conclusion

Through a large-sample retrospective analysis of 701 cases, this study provides robust, evidence-based medical validation for the safety and efficacy of early postoperative oral feeding following infant intestinal anastomosis. Our findings offer a strong counterexample to the traditional dogma that dictates prolonged absolute fasting to protect the anastomosis, confirming that timely early or intermediate enteral nutrition (≤72h) does not elevate the risk of feeding intolerance or associated complications; instead, it significantly shortens postoperative hospital stay, serving as a critical pillar for advancing neonatal Enhanced Recovery After Surgery (ERAS) pathways[1-4][18-21]. By correlating postoperative gastrointestinal decompression trajectories with feeding windows, this study introduces a novel strategy for precisely defining optimal

oral intake timelines. While baseline parameters like low birth weight and low preoperative serum albumin naturally delay feeding decisions in real-world practice, specific surgical typologies and anatomical factors must dictate management. For infants undergoing tertiary stoma closures or biliary surgeries, where local tissue trauma is minimal and normal anatomy is preserved, the physiological turning point for fluid reabsorption consistently occurs on postoperative day 2. Clinical protocols should actively capitalize on this pattern by advancing oral feeding to the 24-48h window. Conversely, for primary and secondary complex anastomoses characterized by severe bowel ischemia or extensive resections, the prolonged intestinal edema phase pushes the drainage peak to day 3. For these complex cases, the optimal feeding window should be prudently deferred to the 72-96h postoperative mark. Despite our large sample size, multi-center prospective randomized controlled trials remain highly anticipated to refine and optimize targeted enteral nutrition pathways across more granular pediatric gastrointestinal disease spectrums, maximizing clinical benefits for these fragile patients [2-4].

References

[1] Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation[J]. British Journal of Anaesthesia, 1997, 78(5): 606-617. DOI: 10.1093/bja/78.5.606.

[2] Pilkington M, Nelson G, Pentz B, et al. Enhanced Recovery After Surgery (ERAS) Society Recommendations for Neonatal Perioperative Care[J]. JAMA Surgery, 2024, 159(9): 1071-1078. DOI: 10.1001/jamasurg.2024.2044.

[3] Brindle M E, McDiarmid C, Short K, et al. Consensus Guidelines for Perioperative Care in Neonatal Intestinal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations[J]. World Journal of Surgery, 2020, 44(8): 2482-2492. DOI: 10.1007/s00268-020-05530-1.

[4] Neonatal Surgery Group of the Pediatric Surgery Branch of the Chinese Medical Association. Expert consensus on the application of enhanced recovery after surgery in neonatal perioperative period (2026 edition)[J]. Chinese Journal of Pediatric Surgery, 2026, 47(2): 97-105. [in Chinese]

[5] Weimann A, Braga M, Carli F, et al. ESPEN practical guideline: Clinical nutrition in surgery[J]. Clinical Nutrition, 2021, 40(7): 4745-4761.

DOI:10.1016/j.clnu.2021.03.031.
[6] Greer D, Karunaratne Y G, Karpelowsky J, et al. Early enteral feeding after pediatric abdominal surgery: A systematic review of the literature[J]. Journal of Pediatric Surgery, 2020,55:1180-1187. DOI:10.1016/j.jpedsurg.2019.08.055.
[7] Braungart S, Siminas S. Early enteral nutrition following gastrointestinal surgery in children: A systematic review of the literature[J]. Annals of Surgery, 2020,272(3):377-383. DOI:10.1097/SLA.0000000000003128.
[8] Tian Y, Zhu H, Gulack B C, et al. Early enteral feeding after intestinal anastomosis in children: A systematic review and meta-analysis of randomized controlled trials[J]. Pediatric Surgery International, 2021,37(3):403-410. DOI:10.1007/s00383-020-04830-w.
[9] Behera B K, Misra S, Tripathy B B. Systematic review and meta-analysis of safety and efficacy of early enteral nutrition as an isolated component of Enhanced Recovery after Surgery (ERAS) in children after bowel anastomosis surgery[J]. Journal of Pediatric Surgery, 2022,57(8):1473-1479. DOI:10.1016/j.jpedsurg.2021.07.020.
[10] Drossard S, Schuffert L. Early enteral nutrition (EEN) following intestinal anastomosis in pediatric patients—what's new?[J]. Innovative Surgical Sciences, 2024,9(4):167-173. DOI:10.1515/iss-2024-0017.
[11] Peng Y, Xiao D, Xiao S, et al. Early enteral feeding versus traditional feeding in neonatal congenital gastrointestinal malformation undergoing intestinal anastomosis: A randomized multicenter controlled trial of an enhanced recovery after surgery (ERAS) component[J]. Journal of Pediatric Surgery, 2021,56(9):1479-1484. DOI:10.1016/j.jpedsurg.2021.02.067.
[12] Shang Q, Geng Q, Zhang X, Xu H, Guo C. The impact of early enteral nutrition on pediatric patients undergoing gastrointestinal anastomosis: A propensity score matching analysis[J]. Medicine, 2018,97(9):e0045. DOI:10.1097/MD.0000000000010045.
[13] Amanollahi O, Azizi B. The comparative study of the outcomes of early and late oral feeding in intestinal anastomosis surgeries in children[J]. African Journal of Paediatric Surgery, 2013,10(2):74-77. DOI:10.4103/0189-6725.115025.
[14] Mamatha B, Alladi A. Early oral feeding in pediatric intestinal anastomosis[J]. Indian Journal of Surgery, 2015,77(Suppl 2):670-672. DOI:10.1007/s12262-013-0971-8.
[15] Yadav P S, Choudhury S R, Grover J K, et al. Early feeding in pediatric patients following stoma closure in a resource limited environment[J]. Journal of Pediatric Surgery, 2013,48(5):977-982. DOI:10.1016/j.jpedsurg.2013.02.013.
[16] Cope J, Greer D, Soundappan S S V, Pasupati A, Adams S. The safety

and efficacy of early enteral nutrition after paediatric enterostomy closure—the EPOC study[J]. Journal of Pediatric Surgery, 2024. DOI:10.1016/j.jpedsurg.2023.11.011.
[17] Treider M, Engebretsen A H, Skari H, Bjørnland K. Is postoperative transanastomotic feeding beneficial in neonates with congenital duodenal obstruction?[J]. Pediatric Surgery International, 2022,38(3):479-484. DOI:10.1007/s00383-021-05053-3.
[18] Loganathan A K, Joselyn A S, Babu M, Jehangir S. Implementation and outcomes of enhanced recovery protocols in pediatric surgery: A systematic review and meta-analysis[J]. Pediatric Surgery International, 2022,38(2):157-168. DOI:10.1007/s00383-021-05008-8.
[19] Arena S, Di Fabrizio D, Impellizzeri P, et al. Enhanced recovery after gastrointestinal surgery (ERAS) in pediatric patients: A systematic review and meta-analysis[J]. Journal of Gastrointestinal Surgery, 2021,25(11):2976-2988. DOI:10.1007/s11605-021-05053-7.
[20] Rove K O, Edney J C, Brockel M A. Enhanced recovery after surgery in children: Promising, evidence-based multidisciplinary care[J]. Pediatric Anesthesia, 2018,28(6):482-492. DOI:10.1111/pan.13380.
[21] Phillips M R, Adamson W T, McLean S E, et al. Implementation of a pediatric enhanced recovery pathway decreases opioid utilization and shortens time to full feeding[J]. Journal of Pediatric Surgery, 2020,55(1):101-105. DOI:10.1016/j.jpedsurg.2019.09.065.
[22] Jiang W, Lv X, Xu X, Geng Q, Zhang J, Tang W. Early enteral nutrition for upper digestive tract malformation in neonate[J]. Asia Pacific Journal of Clinical Nutrition, 2015,24(1):38-43. DOI:10.6133/apjcn.2015.24.1.08.
[23] Jiang W, Zhang J, Geng Q, Xu X, Lv X, Chen Y, Liu X, Tang W. Early enteral nutrition in neonates with partial gastrectomy: A multi-center study[J]. Asia Pacific Journal of Clinical Nutrition, 2016,25(1):46-52. DOI:10.6133/apjcn.2016.25.1.16.
[24] Chen H, Geng Q M, Lu C G, et al. Application of enteroplication combined with early enteral nutrition in enhanced recovery after surgery for children with jejunal atresia[J]. Chinese Journal of Gastrointestinal Surgery, 2017, 20(5). DOI: 10.3760/cma.j.issn.1671-0274.2017.05.012. [in Chinese]
[25] Jiang W W, Tang W B. Enhanced recovery strategies for intestinal atresia[J]. Journal of Clinical Pediatric Surgery, 2023, 22(9):801-806. DOI: 10.3760/cma.j.cn101785-202306012-001. [in Chinese]
[26] Lu C G, Sun X H, Pan S W, Chen H, Li W, Geng Q M, Tang W B. Application of early oral feeding after primary intestinal anastomosis in infants: a real-world study[J]. Chinese Journal of Pediatric Surgery, 2024, 45(4):322-328. DOI: 10.3760/cma.j.cn421158-20230721-00043. [in Chinese]
[27] Zheng R F, Lv X F, Zhang J, Lu C G, Geng Q M, Tang W B, Jiang W W. Application of enhanced recovery after surgery strategies in

perioperative period of children with biliary atresia[J]. Journal of Clinical Pediatric Surgery, 2024, 23(8):729-736. DOI: 10.3760/cma.j.cn101785-202310050-006. [in Chinese]
[28] Li H X, Tang W B. Clinical characteristics and early diagnostic methods of neonatal digestive tract malformations[J]. Journal of Clinical Pediatric Surgery, 2022, 21(9):820-826. DOI: 10.3760/cma.j.cn101785-202205033-005. [in Chinese]
[29] Lv X F, Chen G L, Jiang W W, Lu C G, Zhang J, Chen H, Geng Q M, Tang W B. Clinical characteristics and prognosis of short bowel syndrome occurring in neonatal period[J]. Chinese Journal of Pediatric Surgery, 2025, 46(4):296-301. DOI: 10.3760/cma.j.cn421158-20241028-00448. [in Chinese]
[30] Pediatrics Group of Parenteral and Enteral Nutrition Society of Chinese Medical Association, Neonatologists Branch of Chinese Medical Doctor Association, Neonatal Surgery Group of Pediatric Surgery Branch of Chinese Medical Association. Clinical application guidelines for neonatal nutritional support in China[J]. Chinese Journal of Pediatric Surgery, 2013, 34(10). DOI: 10.3760/cma.j.issn.0253-3006.2013.10.016. [in Chinese]
[31] Pediatrics Group of Parenteral and Enteral Nutrition Society of Chinese Medical Association, Neonatal Surgery Group of Pediatric Surgery Branch of Chinese Medical Association, Anorectal Group of Pediatric Surgery Branch of Chinese Medical Association, Clinical Nutrition Group of Pediatrics Branch of Chinese Medical Association. Expert consensus on perioperative nutritional management in children[J]. Chinese Journal of Pediatric Surgery, 2019, 40(12):1062-1070. DOI: 10.3760/cma.j.issn.0253-3006.2019.12.002. [in Chinese]
[32] Shi ZY, Wu Y, Li XW, Wan XL, Chen Q, Hu YL. Interpretation of Consensus Guidelines for Perioperative Management of Neonatal Intestinal Surgery by ERAS Society[J]. Chinese General Practice, 2021, 24(11): 1333-1338. DOI: 10.12114/j.issn.1007-9572.2021.00.424.[in Chinese]
[33] Zhang C J, et al. Early versus traditional postoperative oral feeding in patients undergoing elective colorectal surgery: A meta-analysis of randomized clinical trials[J]. Digestive Surgery, 2013,30(3):225-232. DOI:10.1159/000353136.
[34] Pediatric Surgery Branch of Chinese Medical Association, et al. Expert consensus on perioperative management of children guided by enhanced recovery after surgery[J]. Chinese Journal of Pediatric Surgery, 2021, 42(12):1057-1064. [in Chinese]

Funding

This work was supported by General project of Jiangsu Provincial Health Commission under Grant M2022037; grants from Top Talents of Jiangsu Provincial Health Committee’s Six One Project, China under Grant LGY2020019 and High level Hospital Technology Innovation Support Program under Grant KJCXM2024008,DKZD-01.

Competing Interest

The authors declare that they have no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors’ Contributions

Han Wang and Huan Chen conceptualized and designed the study, performed the statistical analyses, and drafted the initial manuscript. Xiaofeng Lv, Peng Wang, and Jie Zhang were responsible for clinical data collection, database curation, and data visualization. Weiwei Jiang and Huan Chen supervised the project, critically revised the manuscript for important intellectual content, and acquired funding support. All authors read and approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki. The protocol was formally approved by the Ethics Committee of the Children’s Hospital of Nanjing Medical University (Approval No. 202608029-1). Because of the retrospective nature of this study and the secondary use of anonymized clinical records, informed consent was not required, as approved by the Ethics Committee.

Figure Legends

Figure 1. Comparison of time to first postoperative enteral nutrition across surgical groups.

Figure 2. Correlation between preoperative weight and time to first enteral nutrition.

Figure 3. Correlation between preoperative serum albumin levels and time to first enteral nutrition.

Figure 4. Kaplan-Meier curves for discharge probability stratified by feeding initiation timelines: (A) Overall cohort, (B) Primary anastomosis, (C) Secondary anastomosis, (D) Tertiary anastomosis, and (E) Biliary surgery.

Figure 5. Daily per capita gastrointestinal decompression output trajectories from postoperative days 1 to 7 across distinct surgical typologies.