

Original Research Article

Complications between early and standard oral feeding after pancreatico-enteric anastomosis

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ABSTRACT

Background: Pancreatico-enteric anastomosis is a complex and challenging surgical procedure. Early postoperative nutritional support plays a crucial role in minimizing complications and improving outcomes. The aim of this study was to compare the complications associated with early oral feeding and standard oral feeding following pancreatico-enteric anastomosis.

Methods: This study was conducted at Dhaka Medical College Hospital (July 2023–June 2024) on patients undergoing pancreatico-enteric anastomosis. After consent, they were assigned to Group A (early feeding on POD 1–2) or Group B (standard feeding on POD 4–5). Serum albumin was measured preoperatively and on POD 3 and 7; serum and drain amylase were assessed on POD 3.

Results: There were no significant differences in demographic characteristics between the groups. Pancreaticoduodenectomy was performed in 62.5% of Group A and 58.3% of Group B, while longitudinal pancreaticojejunostomy was done in 37.5% and 41.7%, respectively. POPF occurred in 16.7% of Group A and 25.0% of Group B, with no significant difference in severity. Other postoperative complications (vomiting, diarrhoea, wound issues, respiratory infections) were similar between groups. However, Group A had a significantly shorter hospital stay (9.33 ± 3.75 days) than Group B (12.3 ± 3.46 days).

Conclusions: Early oral feeding after pancreatocenteric anastomosis is safe and feasible. It shortens the hospital stay without increasing other post-operative complication.

Keywords: Complications, Early oral feeding, Pancreatico-enteric anastomosis, Standard oral feeding

INTRODUCTION

Pancreatico-enteric anastomosis, a vital component of surgical procedures such as pancreaticoduodenectomy and longitudinal pancreaticojejunostomy, remains central to the management of pancreatic and periampullary diseases.¹⁻³ Pancreaticoduodenectomy, often termed the

Whipple procedure, is the standard approach for malignant tumors of the pancreatic head, ampulla, distal bile duct and duodenum, while longitudinal pancreaticojejunostomy is primarily performed for symptomatic relief in chronic pancreatitis with ductal obstruction or intraductal calculi.⁴ Despite significant improvements in surgical techniques and perioperative

care, the postoperative course following pancreatic surgery remains challenging, with nutrition playing a critical role in influencing recovery and overall outcomes.^{5,6} Patients undergoing pancreatic surgery often present with varying degrees of malnutrition due to malignancy, chronic inflammation or obstructive jaundice, which are further aggravated postoperatively due to surgical stress, bowel dysfunction and prolonged fasting.^{7,8} Malnutrition significantly increases the risk of postoperative complications such as pancreatic fistula, wound infection, sepsis, impaired immunity and delayed healing.^{9,10}

Traditionally, postoperative nutritional strategies have been conservative, with standard oral feeding initiated after the return of bowel function, typically on postoperative day (POD) 4 or 5. During this fasting period, patients receive intravenous fluids or parenteral nutrition to maintain hydration and caloric support. This practice is based on the belief that delayed feeding reduces pancreatic stimulation, thereby protecting the anastomosis from enzymatic stress and mechanical disruption.^{11,12} However, increasing evidence from gastrointestinal and colorectal surgeries suggests that early oral feeding within the first 24–48 hours postoperatively may provide substantial benefits.⁹ Early feeding has been shown to stimulate gastrointestinal motility, preserve mucosal integrity, reduce bacterial translocation, enhance immune response and shorten hospital stays, all without a significant increase in postoperative complications.^{13–17}

Several clinical studies and meta-analyses have supported the inclusion of early feeding as a component of enhanced recovery after surgery (ERAS) protocols in colorectal and upper gastrointestinal surgeries.^{18,19} However, its application in pancreatic surgery remains controversial due to concerns about feeding intolerance, delayed gastric emptying and stress on complex anastomoses.^{20,21} Studies examining early feeding after pancreatico-enteric anastomosis have reported mixed outcomes, making it a topic of ongoing investigation.^{22,23}

The present study aims to compare the incidence of postoperative complications between early and standard oral feeding in patients undergoing pancreatico-enteric anastomosis, thereby contributing to the optimization of postoperative nutritional strategies in pancreatic surgery.

Objectives

The main objective was to compare the complications associated with early oral feeding and standard oral feeding following pancreatico-enteric anastomosis.

METHODS

This was an analytical observational study and was conducted in the Department of Surgery in Dhaka Medical College Hospital, Dhaka, Bangladesh during the period from July 2023 to June 2024. A total of 48

patients, comprising both male and female participants, were included in the study. Patients who underwent pancreaticoduodenectomy and longitudinal pancreaticojejunostomy were enrolled following strict inclusion and exclusion criteria. Patients were allocated into two groups alternatively after an initial selection by lottery to ensure equal distribution between procedures. Group A (Early oral feeding after pancreatico-enteric anastomosis) and Group B (Standard oral feeding after pancreatico-enteric anastomosis) each comprised 24 patients. Patients requiring ICU admission postoperatively, those without pancreatico-enteric anastomosis and those receiving naso-jejunal or jejunal feeding were excluded from the study.

A standardized semi-structured data collection sheet was used to collect necessary information through face-to-face interviews, clinical examination and review of medical records. Data collected included demographic details, preoperative diagnosis, operation details, postoperative progress, nutritional status and complications. Patients were optimized preoperatively by correcting anemia with blood transfusion, hypoalbuminemia with intravenous albumin and electrolyte imbalance with intravenous fluids. Antibiotics were administered to treat cholangitis or sepsis when necessary.

Preoperative counseling regarding surgical procedures and feeding protocols was provided and informed written consent was obtained for participation in the study. All surgical procedures were performed under general anesthesia. Pancreaticoenteric reconstructions were done by hand-sewn anastomosis in a retro colic position with routine drainage by silicone drains. Feeding jejunostomy was not performed in any patient. A nasogastric tube was placed during surgery and managed postoperatively according to the patient's condition. Patients were managed in the postoperative ward under similar postoperative care except for differences in the timing of oral feeding initiation.

Postoperative monitoring included measurement of serum and drain fluid amylase at 3rd postoperative day (POD), regular wound inspections from 4th to 5th POD and serum albumin re-check at 7th POD. The drain was removed if no evidence of pancreatic fistula was found. Postoperative complications were managed accordingly and follow-up was maintained for early detection of any morbidity.

Statistical analysis

All data were recorded systematically in preformed data collection sheets. Quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentages. Statistical analysis was carried out using SPSS (Statistical Package for the Social Sciences) Version 26 for Windows. For categorical variables, Chi-square or

Fisher's exact test was applied. For continuous variables, independent (unpaired) t-tests were used; if data were non-normally distributed, the Mann-Whitney U test was utilized. A p value of <0.05 was considered statistically significant. Confidentiality was strictly maintained throughout the study.

RESULTS

Table 1 shows the age distribution of the patients. The mean age was 47.8 ± 12.3 years in Group A and 48.6 ± 11.8 years in Group B. ($p=0.819$) indicating no significant difference between two groups preoperatively. Regarding gender, Group A comprised 54.2% male and 45.8% female, while Group B had 62.5% male and 37.5% female ($p=0.558$). In terms of preoperative disease findings, each group has similar distribution and p-value was 0.721.

Preoperative serum albumin level was 3.22 ± 0.40 g/dl for Group A and 3.30 ± 0.39 g/dl for Group B ($p=0.931$), indicating no significant difference between two groups preoperatively. In terms of distribution of types of surgery, In Group A, 62.5% of patients underwent pancreaticoduodenectomy, while 37.5% underwent longitudinal pancreaticojejunostomy surgery. Similarly, in Group B, 58.3% underwent pancreaticoduodenectomy and 41.7% underwent longitudinal pancreaticojejunostomy surgery. Indicating that, the distribution of the type of surgery was similar ($p=0.767$) between the two groups. Table 2 shows the comparison of postoperative nutritional status between two groups by postoperative serum albumin level g/dl. On the third postoperative day (POD), serum albumin levels were 2.78 ± 0.33 g/dl for Group A and 2.68 ± 0.20 g/dl for Group B ($p=0.252$), showing a slight decrease in both groups but no significant difference. By the seventh POD, serum albumin levels were 3.06 ± 0.37 g/dl for Group A and 2.90 ± 0.22 g/dl for Group B ($p=0.075$), with Group.

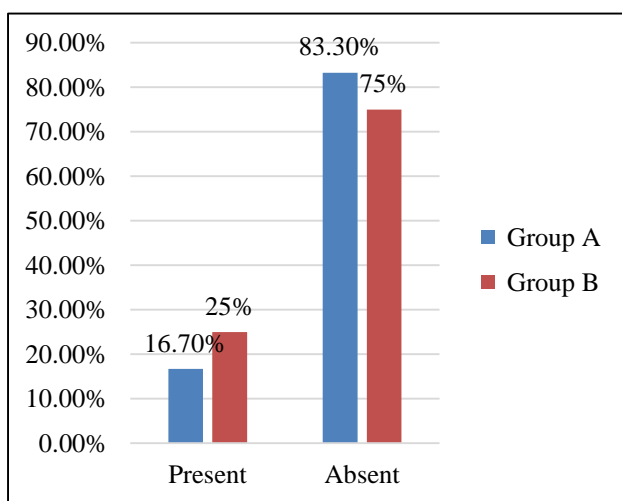


Figure 1: Number of the study subjects developed postoperative pancreatic fistula (POPF) in two groups (n=48).

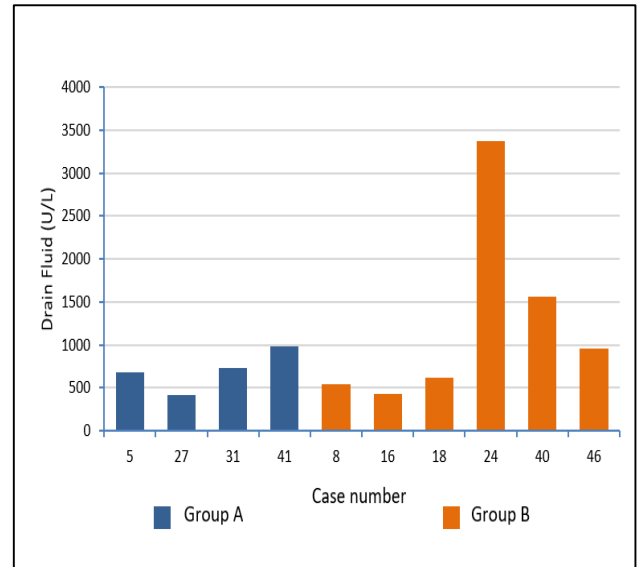


Figure 2: The number of study subjects developed pancreatic fistula (depending on amount of drain fluid amylase level) in patients of Group A and Group B according to case number.

Figure 1 shows the development of the postoperative pancreatic fistula (POPF). In Group A, 16.7% of patients experienced pancreatic anastomotic leakage, while in Group B, 25.0% of patients experienced the same. The comparison of pancreatic anastomotic leakage between the two groups was not statistically significant ($p=0.477$).

Figure 2 shows comparison of drain fluid amylase levels between Group A and Group B on the third postoperative day (POD). In Group A, 4 patients (case no 5, 27, 31 and 41) developed POPF. Among them case no. 5, 27 and 31 had Grade A and case no. 41 had Grade B POPF. All of them were cured spontaneously.

On other hand, in Group B, 6 patients (case no 8, 16, 18, 24, 40 and 46) had POPF. Among them, case no. 16, 18 had Grade A and case no. 8, 40, 46 had Grade B POPF. All these patients of Grade A and Grade B were cured spontaneously. Only case no 24 had Grade C POPF, which was managed by relaparotomy and was done on 15th POD.

In Table 3 the postoperative complications and hospital stay between two groups. In Group A, 8.4% experienced vomiting compared to 4.2% in Group B ($p=1.000$). Diarrhea occurred in 4.2% of Group A but none in Group B ($p=0.312$). Minor wound infection was reported in 12.5% of Group A and 16.7% of Group B ($p=0.682$). Wound dehiscence occurred in 4.2% of Group A and 8.3% of Group B ($p=0.551$). Additionally, respiratory tract infection (RTI) was observed in none of the patients in Group A but in 4.2% of Group B ($p=0.312$). The mean postoperative hospital stay for Group A was 9.33 ± 3.75 days, while for Group B it was significantly longer at 12.3 ± 3.46 days ($p=0.006$).

Table 1: Age distribution of our study subjects (n=48).

Variables		Group A (%) (n=24)	Group B (%) (n=24)	P value
Age group (years)	20-40	11 (45.8)	6 (25.0)	0.819
	41-60	9 (37.5)	14 (58.3)	
	61-80	4 (16.7)	4 (16.7)	
	Total	24 (100.0)	24 (100.0)	
Gender	Male	13 (54.2)	15 (62.5)	0.558
	Female	11 (45.8)	9 (37.5)	
	Total	24 (100.0)	24 (100.0)	
Preoperative findings	Chronic calcific pancreatitis	3 (12.5)	4 (16.7)	0.721
	Carcinoma head of pancreas	4 (16.7)	5 (20.8)	
	Periampullary Carcinoma	12 (50.0)	9 (37.5)	
	Cholangiocarcinoma	4 (16.7)	6 (25.0)	
	Duodenal carcinoma	1 (4.2)	0 (0.0)	
Type of surgery	Pancreaticoduodenectomy	15 (62.5)	14 (58.3)	0.767
	Longitudinal	9 (37.5)	10 (41.7)	
	pancreaticojejunostomy			
Preoperative serum albumin level (g/dl) (Mean±SD)		3.22±0.40	3.30±0.39	0.931

P value obtained by, An unpaired t-test was performed to compare between two groups (a, e and f), Chi-square was performed to compare between two groups (b, c and d), $p \leq 0.05$ considered as a level of significance.

Table 2: Comparison of postoperative nutritional status between two groups by postoperative serum albumin level g/dl (n=48).

Variable	Group A	Group B
Serum albumin at 3 rd POD	2.78±0.33	2.68±0.20
Serum albumin at 7 th POD	3.06±0.37	2.90±0.22

Data were expressed as mean±SD, An unpaired t-test was performed to compare between two groups, $p \leq 0.05$ considered as a level of significance.

Table 3: Distribution of the study subjects by postoperative complications and hospital stay between two groups (n=48).

Postoperative complications	Group A (%)	Group B (%)	P value
Vomiting	2 (8.4)	1 (4.2)	1.000
Diarrhoea	1 (4.2)	0 (0.0)	0.312
Minor wound infection	3 (12.5)	4 (16.7)	0.682
Wound dehiscence	1 (4.2)	2 (8.3)	0.551
RTI	0 (0.0)	1 (4.2)	0.312
Postoperative hospital stays (days)	9.33±3.75	12.3±3.46	0.006

DISCUSSION

This analytic observational study, conducted over twelve months at the Department of Surgery, Dhaka Medical College Hospital, aimed to compare the complications and outcomes between early and standard oral feeding after pancreatico-enteric anastomosis. A total of 48 patients were included, evenly divided into two groups: Group A (early oral feeding) and Group B (standard oral feeding). The findings of this study provide important insights into the safety and efficacy of early oral feeding in patients undergoing pancreatic surgery. The baseline characteristics were comparable between the two groups, with no statistically significant differences observed in

age, gender distribution or underlying pathology. The mean age was 47.8 ± 12.3 years in Group A and 48.6 ± 11.8 years in Group B, which aligns with findings from Das et al, Ali et al who reported similar age distributions among pancreatic surgery patients.^{24,25} Both groups showed a slight male predominance, consistent with Das et al suggesting that age and gender were unlikely confounding variables in our study.²⁴

A diverse range of underlying diseases, both benign and malignant, were represented in both groups. Periampullary carcinoma was more prevalent in Group A (50.0%) than Group B (37.5%), while chronic calcific pancreatitis was found in 12.5% and 16.7% of patients,

respectively. This distribution did not differ significantly ($p=0.721$) and similar disease spectrums have been documented in studies by Park et al and Das et al indicating that preoperative diagnosis did not significantly impact postoperative outcomes.^{24,26} The distribution of surgical procedures was also comparable: 62.5% of Group A and 58.3% of Group B underwent pancreaticoduodenectomy (PD), while 37.5% and 41.7% underwent longitudinal pancreaticojejunostomy. The difference was statistically insignificant ($p=0.767$). Gerritsen et al also found similar distributions in types of surgery between early and standard feeding groups, indicating uniform surgical approaches across patient cohorts.²⁷

Preoperative nutritional status, assessed via serum albumin levels, showed no significant differences between the groups (3.22 ± 0.40 g/dl in Group A vs. 3.30 ± 0.39 g/dl in Group B, $p=0.931$). Chatterjee et al and Das et al also reported comparable baseline serum albumin levels between early and standard feeding groups.^{24,28} Postoperative serum albumin levels on the 3rd and 7th postoperative days (POD) were slightly higher in Group A, though not statistically significant ($p=0.252$ on POD 3 and $p=0.075$ on POD 7).

Das et al observed a similar pattern of declining albumin until POD 3 with subsequent improvement, with consistently higher levels in the early feeding group, though not statistically significant.²⁴ Imran et al also found no significant rise in serum albumin in the early feeding group (3.9 ± 0.2 g/dl) compared to the standard group (3.5 ± 0.3 g/dl).²⁹ However, Chatterjee et al reported a statistically significant increase in albumin on POD 5 in the early feeding group (3.147 ± 0.44 g/dl vs. 2.935 ± 0.31 g/dl, $p=0.0029$), possibly due to early feeding promoting nutritional recovery.²⁸ These findings collectively support the notion that early oral feeding does not compromise and may enhance postoperative nutritional recovery, consistent with enhanced recovery after surgery (ERAS) guidelines. POPF is a significant concern following pancreatico-enteric anastomosis.

In this study, 16.7% of Group A and 25.0% of Group B developed POPF, a difference that was not statistically significant. This aligns with the findings of Gerritsen et al who reported a 12% incidence of pancreatic fistula in both early and standard feeding groups and Lu et al, who also found no statistically significant difference between early (14.9%) and standard (10.7%) feeding groups.^{27,30} Das et al similarly observed slightly higher fistula rates in the standard feeding group (13.3%) than in the early feeding group (7.1%), which supports our finding that early oral feeding does not increase the risk of POPF.²⁴

No significant differences were observed in other postoperative complications such as vomiting, diarrhea, minor wound infection, wound dehiscence and respiratory tract infections between the two groups. Minor wound infections and wound dehiscence were

slightly more common in Group B but were not statistically significant. Similar results have been reported by Gerritsen et al, Park et al, Rizk et al, all of whom observed comparable rates of wound infections, pulmonary complications and anastomotic leakage in both groups.^{26,27,31} Chatterjee et al, also found higher rates of postoperative nausea, vomiting, wound infection and RTIs in the early feeding group, though these differences were not statistically significant.²⁸ Urinary tract infections were evenly distributed between the groups in the current study, again consistent with previous literature.

A key finding of this study was that early oral feeding significantly reduced the length of hospital stay. Group A had a mean stay of 9.33 ± 3.75 days, significantly shorter than Group B's 12.3 ± 3.46 days ($p=0.006$). The shorter stay in Group A may be attributed to improved early nutrition, faster recovery and fewer complications. Chatterjee et al similarly reported significantly reduced hospital stays in early-fed patients (8.45 ± 5.14 days vs. 10.53 ± 4.95 days, $p=0.0257$).²⁸ Imran et al reported reduced hospitalization in early feeding groups (5.71 vs. 7.94 days).²⁹ Arif et al, Negi et al also demonstrated significantly shorter hospital stays in early oral feeding groups, reinforcing our findings.^{32,33}

This study has several limitations that should be considered. First, being conducted in a single center, the findings may be influenced by institutional practices and may not be widely generalizable across different healthcare settings. Second, the inclusion of two different types of surgical procedures introduced heterogeneity, which could have affected the postoperative outcomes but was not specifically addressed in the analysis.

Additionally, both benign and malignant diseases were included in the study groups, which may have influenced the postoperative results and created variability that was not separately examined. Lastly, there was limited control over potential confounding factors, such as patient comorbidities and differences in surgical techniques, which could impact the validity and reliability of the study outcomes.

CONCLUSION

Early oral feeding after pancreatico-enteric anastomosis has been shown to be both safe and feasible in this study. It does not result in an increase in postoperative complications, such as vomiting, diarrhea, wound infections or respiratory tract infections, compared to standard oral feeding. Additionally, early oral feeding significantly reduces the length of hospital stay, contributing to faster recovery and a more efficient healthcare process.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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