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Surgical Management of Pancreatitis in Children: An Observational Study

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Abstract

Pancreatitis in children is uncommon. Treatment is usually supportive and non-surgical. However, surgery may be needed for complications like infected necrosis or pseudocysts and dilated main pancreatic duct with calculi. The timing of surgery is critical. Understanding surgical indications helps optimize treatment. This observational study aims to establish evidence-based guidelines by assessing surgical techniques and outcomes in children, which was conducted in the Department of Paediatric Gastro-surgery, National Gastroliver Institute & Hospital, Dhaka, Bangladesh, between February 2022 and February 2024. A total of 24 children who underwent pancreatic surgery were enrolled using a purposive sampling technique. Data collected included demographic information, clinical details, surgical outcomes, and complications. At the one-year follow-up, 62.5% of cases achieved full recovery, and 25% recovered from the initial episode. Residual problems without recurrence occurred in 8.3% of cases, with a 4.2% mortality rate. Postoperative complications included pancreatic necrosis and pseudocyst formation in 12.5% of patients, respiratory failure and hyperglycemia in 8.3%, and circulatory collapse, renal failure, gastrointestinal bleeding, and diabetes each in 4.2% of patients. Surgical management of pancreatitis in children showed a good recovery rate, but recurrence was a challenge.

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Introduction

In recent years, the incidence of pancreatitis in children has significantly increased, with trauma and metabolic diseases being the most common causes. Biliary pancreatitis is documented in 5.4% to 28.3% of cases.[1,2] Acute pancreatitis (AP) typically presents as sudden-onset upper abdominal pain.[3] A previous prospective study reported an incidence of AP in children under 15 years at 0.78 per 100,000.[4] Evidence also showed that 25% of children experience major complications following an episode of acute pancreatitis.[2,5] The clinical course and complications of acute pancreatitis in children can vary widely, from mild and self-limiting to severe, involving organ failure and potentially death.[6,7] Complications following acute pancreatitis in children may include pancreatic necrosis, pseudocyst formation, and abscesses.[5,8] Additionally, the development of diabetes mellitus (DM) after AP has been documented in the United States in 4.5% of cases.[9] Besides, recurrence of AP is also a concern, with 15% to 35% of children experiencing recurrent episodes.[7,8] Evidence showed that in the United States, 17% of patients developed acute and recurrent pancreatitis after an initial episode of AP.[10] The indications and outcomes of pancreatic surgery in children are not well-documented, with limited data available due to the low number of cases in most centres.[11] As such, mostly smaller case series have been published, providing only partial insights into this specific patient group.[11,12] Previous studies suggest that pancreatic surgery in children tends to

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have lower risks than in adults.[13,14] However, the studies show significant differences, with complication rates ranging from 15% to 60%.[15,16] This study aims to establish evidence-based guidelines by assessing surgical techniques and outcomes in children.

Methods

This observational study that was conducted in the Department of Paediatric Gastro-surgery in the National Gastroliver Institute & Hospital, Dhaka, Bangladesh, between February 2022 and February 2024. Our study involved 24 children who underwent pancreatic surgery, selected using a purposive sampling technique. Written consent was secured from all participants before data collection. The inclusion criteria focused on patients aged from 3 to 16 years who were admitted and met at least two of the following three criteria: (i) abdominal pain characteristic of acute pancreatitis (AP), (ii) serum amylase and/or lipase levels at least three times the upper limit of normal, and (iii) characteristic findings of AP on abdominal ultrasonography and/or a CT scan, following the 2012 Atlanta Classification.[17] Conversely, the exclusion criteria included: (i) patients with chronic pancreatitis based on hospital records, (ii) those with radiological findings such as pancreatic calcifications, dilated pancreatic ducts, areas of atrophy, and pseudocysts, and (iii) patients who were critically ill and unwilling to continue participating in the study. A one-year follow-up was conducted, involving prospective monthly surveillance of new pancreatitis (AP) cases. Data collection encompassed demographic information, clinical details, surgical outcomes, and complications, all analyzed using MS Office tools.

The study was approved by the Institutional Review Board of the National Gastroliver Institute & Hospital, Dhaka, Bangladesh.

Results

In this study, the age distribution of participants revealed that the highest proportion (41.7%) were in the 3-5 years age group. Additionally, 33.3% were in the 6-12, and 25.0% were in the 12-16 years age group. In total, 58% were male and 42% were female (Table-I). In etiology, most of the patients (45.8%) had gallstones, followed by idiopathic cause (25.0%) and hypertriglyceridemia (16.7%) (Table-II).

Table-I: Demographic data of the participants ((n=24)

Variables	Frequency	Percentage
Age group		
3-5 years	10	41.7
6-12 years	8	33.3
13-16 years	6	25.0
Gender		
Male	14	58
Female	10	42

Table-II: Etiological findings (n=24)

Etiology	Frequency	Percentage
Gallstone	11	45.8
Idiopathic	6	25.0
Hypertriglyceridemia	4	16.7
Post-ERCP	2	8.3
Autoimmune	1	4.2

Abdominal pain and abdominal tenderness were present in all cases (100%). Additionally, vomiting was observed in 66.7% of cases, fever in 50.0%, jaundice in 37.5%, hypoxia in 29.2%, ascites in 25.0%, and pleural effusion in 20.8% of the patients (Table-III). Surgical procedures adpoted were: lateral pancreatico-jejunostomy (58.3%), both open and laparoscopic cysto-gastrostomy (12.5% each), distal pancreatectomy (8.3%) and exploratory laparotomy (8.3%) (Table-IV). Postoperative complications with pancreatic necrosis and pseudo-cyst formation were found in 12.5% of patients. Respiratory failure and hyperglycemia appear in 8.3% of cases. Circulatory

collapse, renal failure, gastrointestinal bleeding, and diabetes are each reported in 4.2% of patients (Table-V).

Table-III: Signs and symptoms of the patient (n=24)

Outcomes	Frequency	Percentage
Pain in the abdomen	24	100
Abdominal tenderness	24	100
Fever	12	50
Vomiting	16	67
Jaundice	9	38
Ascites	6	25
Hypoxia	7	29
Pleral effusion	5	21

Table-IV: Surgical procedures (n=24)

Surgical procedures	Frequency	Percentage
Distal Pancreatectomy	2	8.3
LPJ	14	58.3
CG (Laparoscopy)	3	12.5
CG (Open)	3	12.5
Exploratory laparotomy	2	8.3

LPJ: Lateral Pancreato-Jejunostomy, CG: Cysto-gastrostomy

Table-V: Postoperative complications (n=24)

Complications	Frequency	Percentage
Diabetes	1	4.2
Hyperclycemia	2	8.3
Gatrointestinal bleeding	1	4.2
Pseudocyst formation	3	12.5
Pancreatic necrosis	3	12.5
Renal failure	1	4.2
Respiratory failure	2	8.3
Circulatory collapse	1	4.2

At the one-year follow-up, it was observed that nearly two-thirds of the cases (62.5%) achieved full recovery, and one-fourth (25%) also attained full recovery from the initial episode. Additionally, 8.3% of cases had residual problems without recurrence, and only 1 child (4.2%) resulted in death (Table-VI).

Table-VI: Outcomes during follow-up at 1-year (n=24)

Outcomes	Frequency	Percentage
Full recovery	15	62.5
Full recovery from the initial episode	6	25.0
Residual problems without recurrence	2	8.3
Residual problems with recurrence	1	4.2
Death	1	4.2

Discussion

In this study, 41.7% of participants were aged 3-5 years, 33.3% were aged 6-12 years, and 25% were aged 12-16 years. Most of our cases (58%) were male, while 42% were female, reflecting a nearly similar gender distribution observed in another study.[18] The analysis of etiological findings revealed that 45.8% of patients had gallstones as the cause, followed by idiopathic cases in 25.0% of patients, and hypertriglyceridemia in 16.7%. These can provide valuable insights into the primary contributors to the condition studied in our study. The study by Marco found that alcohol consumption was the most common etiology (39.3%), followed by gallstones (24.1%).[19] The differences in predominant etiological factors between studies could be attributed to variations in geographical location, as lifestyle factors such as alcohol consumption can vary significantly by region. In this study, all cases (100%) exhibited abdominal pain and tenderness. Vomiting was noted in 66.7% of cases, fever in 50.0%, jaundice in 37.5%, hypoxia in 29.2%, ascites in 25.0%, and pleural effusion in 20.8%. A comparable result was found in another study.[20] In our study, the distribution of surgical procedures showed that the most common procedure was lateral pancreatico - jejunostomy,

making up 58.3% of the surgeries. Distal pancreatectomy and exploratory laparotomy were each performed in 8.3% of cases. Cysto-gastrostomy was performed in both laparoscopic and open approaches (12.5% cases each). Nearly similar procedural distribution was found in another study.[21] At the one-year follow-up, our study observed that approximately 62.5% of cases achieved full recovery, and 25% fully recovered from the initial episode. Additionally, 8.3% of cases had residual problems without recurrence, while 4.2% resulted in death. Regarding postoperative complications, pancreatic necrosis, and pseudocyst formation were reported in 12.5% of patients. Respiratory failure and hyperglycemia were each observed in 8.3% of cases. Circulatory collapse, renal failure, gastrointestinal bleeding, and diabetes were reported in 4.2% of patients. Nearly similar findings were observed in another study.[22] However, in a similar study, over one-third of patients required a second hospital admission.[23]

Conclusion

In managing different type of pancreatitis in children, surgical procedures generally show a satisfactory recovery rate. However, a significant challenge in treatment is the potential for recurrence. Additionally, complications such as pseudocyst formation, pancreatic necrosis, respiratory failure, and hyperglycemia can arise, which require careful monitoring and management. Addressing these complications promptly is critical in minimizing their impacts and improving overall outcomes for the child. To effectively manage acute pancreatitis and its complications, a multidisciplinary approach involving pediatric gastroenterologists, surgeons, and nutritionists may be beneficial. This approach allows for comprehensive care and tailored interventions to address both the immediate and long-term needs of the patient.

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