ORIGINAL ARTICLE

Vascular Complications of Chronic Pancreatitis and Their Management: Our Experience from Children's Hospital, University of Child Health Sciences, Lahore

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ABSTRACT

Objective: To determine the frequency, management, and outcomes of vascular complications associated with chronic pancreatitis in children.

Study Design: Cross-sectional study.

Place and Duration of Study: The study was conducted at the Department of Gastroenterology & Hepatology, Children's Hospital, University of Child Health Sciences, Lahore, from April 2021 to April 2025.

Material and Methods: Total of 178 children diagnosed chronic pancreatitis based on INSPPIRE (International Study Group of Pediatric Pancreatitis: In Search for a Cure) criteria were included in the study. Data were analyzed using SPSS version 25.

Results: Among 178 children (61.7% male, mean age 9.47 ± 3.5 years), vascular complications were identified in 11 (6.2%). The most affected age group was 7-12 years (46.1%). Portal vein thrombosis was the most common complication (6, 54.5%), followed by splenic artery aneurysm and splenic vein thrombosis (2, 18.2% each). Pseudoaneurysm of the gastroduodenal artery was less common (1, 8.3%). Management strategies included variceal band ligation (n=2) and endovascular coiling (n=2). One patient with ascites died due to multi-organ dysfunction and sepsis. The remaining cases are under regular surveillance with follow-up endoscopy

Conclusion: Vascular complications can occur in children with chronic pancreatitis, with portal vein thrombosis being the most common. Early detection, appropriate management and vigilant follow up are essential to reduce the associated morbidity and mortality.

Key Words: Chronic pancreatitis, Vascular complications. Portal vein thrombosis.

INTRODUCTION

Chronic pancreatitis (CP) is a long-standing inflammatory condition of the pancreas characterized by irreversible structural changes, progressive fibrosis, and the eventual loss of both exocrine and endocrine functions.[1,2] While CP is more commonly observed in adults, it is relatively

rare in the pediatric population, with an estimated incidence of 0.5 to 1 per 100,000 children per year. In contrast to adults where lifestyle factors such as alcohol use are often implicated, genetic mutations and anatomical abnormalities are the predominant causes of CP in children.[3,4] Data from the INSPPIRE (International Study Group of Pediatric Pancreatitis: In Search for a CuRE) cohort indicates that pediatric chronic pancreatitis is frequently associated with genetic predispositions rather than environmental or lifestyle factors.[5]

Vascular complications of chronic pancreatitis, though relatively uncommon, are clinically significant and may contribute to morbidity and mortality. [6] In adults, approximately 10–20% of CP patients develop vascular complications. However, in the pediatric population, the incidence is notably lower.[7] According to the INSPPIRE cohort, the incidence of vascular complications in children with CP is estimated at 1.2%.[8] These complications primarily include portosplenomesenteric venous thrombosis (PSMVT) and, less frequently, arterial pseudoaneurysms.[8] Among the affected vessels, the splenic vein is most commonly involved, followed by the portal vein, leading to conditions such as splenic vein thrombosis and extrahepatic portal hypertension. Although rare - reported in only 1.2% of pediatric chronic pancreatitis cases in the INSPPIRE study, portal vein thrombosis (PVT) requires timely diagnosis and endoscopic variceal band ligation remains the practical first-line intervention.[8]

Management of vascular complications in pediatric chronic pancreatitis necessitates a multidisciplinary approach involving pediatric gastroenterologists, interventional radiologists, and vascular surgeons.[6,9,10] Some studies suggest that anticoagulants such as enoxaparin may support recanalization of thrombosed vessels without significant risk. However, the safety and efficacy of anticoagulation in children remain uncertain and must be evaluated on a case-by-case basis.[9] In cases of arterial pseudoaneurysms, endovascular interventions such as coil embolization are generally preferred.[10] For asymptomatic thrombosis, conservative management and careful monitoring are often sufficient.[8,10]

The aim of this study is to see the clinical profile, frequency, management strategies, and outcomes of vascular complications in pediatric chronic pancreatitis patients and evaluate effective and safe therapeutic approaches based on evidence-based management strategies for children with vascular involvement secondary to chronic pancreatitis.

MATERIAL AND METHODS

This cross-sectional study was conducted in the Department of Gastroenterology & Hepatology at The Children's Hospital, University of Child Health Sciences, Lahore from April 2021 to April 2025. Data for all patients admitted with Chronic Pancreatitis were prospectively collected. Non-probability consecutive sampling was employed, and the sample size was calculated using the WHO sample size calculator.

A total of 178 children of both genders and pediatric age group up to 18 years were included. All patients diagnosed chronic pancreatitis (CP) based on INSPPIRE criteria (clinical symptoms, evidence of pancreatic exocrine or endocrine insufficiency, and radiological findings indicating chronic pancreatitis) were included. Children with acute pancreatitis or with other conditions not consistent with chronic pancreatitis were excluded from the study. Ethical approval was obtained from the institutional review board of University of Child Health sciences, The Children's Hospital, Lahore number 993 dated 18-11-2024. Confidentiality of patient data was ensured throughout the study.

Demographic data and clinical variables including age, gender, family history, clinical presentation, management approach, and outcomes were collected on a predesigned proforma. Vascular complications were identified through contrast enhanced CT, CT angiography, MR angiography or Doppler ultrasound Descriptive statistical analysis of both continuous and categorical variables was performed using SPSS software version 25.

RESULTS

It is a cross-sectional study conducted at The Children's Hospital and the University of Child Health Sciences, Lahore, a total of 178 children diagnosed with chronic pancreatitis were included in the study, 61.7% (110) were males and 38.2% (68) were females, with a mean age of 9.47 ± 3.5

years (range: 1–18 years). The most affected age group was 7–12 years which accounts for 45% (80), followed by 32.5% (58) in 1-6years and 23% (40) were in 13-18 years age group. Past history of recurrent episodes of chronic pancreatitis was documented in 65% (98) of patients.

Out of 178 children with chronic pancreatitis, 6.2% developed vascular complications **(fig 1)**. The majority of these complications occurred in the 7–12-year age group (46.1%), followed by the 1–6-year group (30.7%), as in **table 1**.

Among the vascular complications, portal vein thrombosis (PVT) 54.5%, was the most prevalent, followed by splenic artery aneurysm and splenic vein thrombosis (SVT), 18.2% of each. Very rare complication, like pseudo-aneurysm of gastroduodenal artery, accounts for 8.3%, as shown in **table 1**.

Management of vascular complications included variceal esophageal banding in two patients **(fig 3)** and coiling of a splenic artery pseudoaneurysm in two patients **(fig 2)**. One patient with ascites succumbed to multi-organ dysfunction and sepsis. The remaining patients with portal vein and splenic vein thrombosis are under regular follow-up with surveillance endoscopy.

TABLE 1. Demographic characteristics of the study population with chronic pancreatitis and with those with vascular complications

Features	Demographic features of the study population with chronic pancreatitis n=178	Demographic features of patients with chronic pancreatitis and vascular compli-cations n=11
	Frequency (%)	Frequency (%)
Gender		
Male	110 (61.7)	9 (81.8)
Female	68 (38.2)	2 (18.2)
Age in years		
1-6	58 (32.5)	3 (27.3)
7-12	80 (45.0)	6 (54.5)
13-18	40 (23.0)	2 (18.2)
Previous history of pancreatitis in patients with vascular Complications		
Yes	98 (65.0)	
No	80 (45.0)	

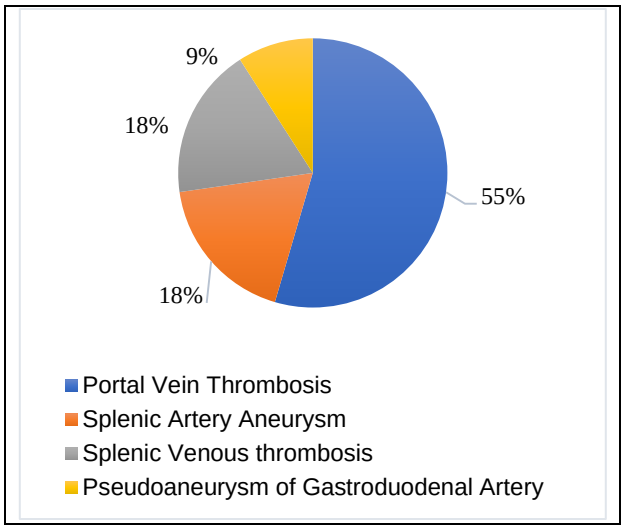

Fig 1: Vascular Complications of Chronic Pancreatitis

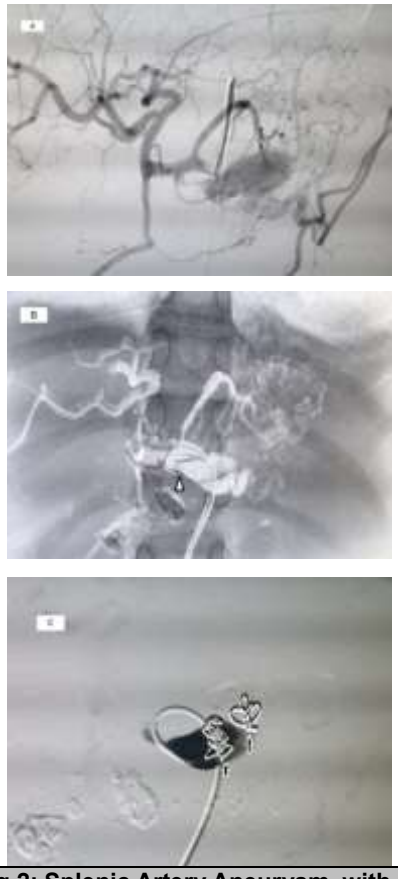

Fig 2: Splenic Artery Aneurysm, with coil embolization of splenic artery

a) Digital subtraction angiography image shows a splenic artery aneurysm sac. (Arrow)

b) Angiographic image showing the splenic artery with a contrast-filled aneurysm (arrow) prior to coil embolization. A catheter tip is in place for coil deployment. (Arrow Head)

c) Image shows two deployed coils (Arrows) with

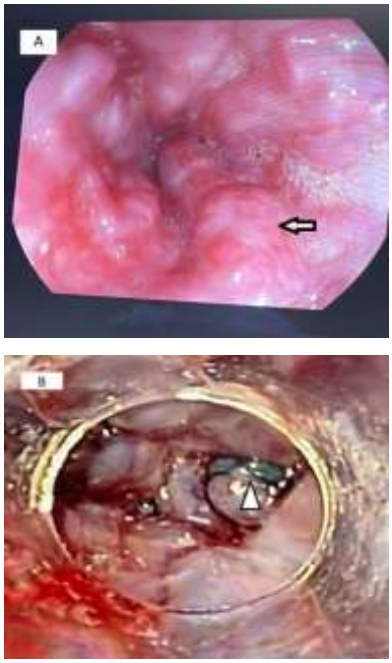

Fig 3: Esophageal varices due to Portal Vein thrombosis and Band ligation

A. Endoscopic picture shows Esophageal varices(arrow)
B. Esophageal varices after band ligation (arrow Head)

DISCUSSION

Chronic pancreatitis (CP) leading to vascular complications in the pediatric population is rare but poses serious clinical challenges. In our study, vascular complications were identified in 6.2% of children with CP, with a notable male predominance (81.8%), consistent with trends reported in previous literature. The relatively higher prevalence in our cohort compared to the 1.2% incidence reported in the INSPPIRE cohort warrant cautious interpretation.[8] This finding underscores the need for heightened clinical vigilance and further research into genetic, environmental and health related risk factors specific to our region.

The most affected age group in our study was 7–12 years (54.5%), followed by 1–6 years (27.3%), suggesting that mid-childhood may represent a critical window for the development of vascular complications in CP, particularly in patients with recurrent episodes (ARP) or long-standing disease.

Portal vein thrombosis (PVT) was the most common vascular complication (54.5%) in our cohort, followed by splenic artery aneurysm (15.3%) and splenic vein thrombosis (15.3%). This differs from adult studies where splanchnic vein thrombosis is more frequently reported.[6] For instance, Vujasinovic et al. (2021) and Anand et al. (2020) documented 53.3% and 63.8% prevalence of splanchnic and splenic vein thrombosis in adults with CP, respectively.[6,7,11,12] In comparison to pediatric studies, our cohort observed a notably higher incidence of these complications than in the INSPPIRE cohort, which reported a 1.2% incidence of vascular involvement, predominantly splanchnic thrombosis.[8,13-15]

A study from India reported vascular complications in 5 out of 99 children, with splenic vein thrombosis in four and a pseudoaneurysm of the splenic artery in one patient.[16] These findings are comparable to ours and suggest a need for multicenter data to understand regional variability.

Management approaches for vascular complications in pediatric chronic pancreatitis must be individualized and guided by the type and severity of the lesion. In our study, two patients with PVT were managed with endoscopic variceal ligation and beta-blocker prophylaxis. Similar management approaches were reported by Chowdhury et al. who described three pediatric cases presenting with acute gastrointestinal bleeding secondary to chronic pancreatitis: two were managed conservatively, while one underwent cyanoacrylate glue injection for gastric varices.[17] In our cohort, two patients with splenic artery aneurysm were successfully treated with coil embolization, and splenic vein thrombosis patients were managed conservatively with long-term follow-up to monitor for potential progression or complications.

Our findings underscore those vascular complications, although infrequent, represent a significant clinical concern in pediatric chronic pancreatitis and warrant routine screening, particularly in children with recurrent or severe

disease. Early detection and timely intervention can significantly reduce morbidity and prevent life-threatening outcomes. The study also highlights the necessity of a multidisciplinary approach, involving pediatric gastroenterologists, interventional radiologists, and vascular surgeons, for optimal outcomes.

There is also a critical need to evaluate the effectiveness of management approaches, particularly the use of anticoagulation therapy and endovascular interventions, to help establish standardized care protocols tailored to pediatric patients. It is a single-center retrospective analysis, conducted at a tertiary care hospital, which may limit the generalizability of the findings to broader pediatric populations. Additionally, long-term follow-up data were not available, restricting our ability to assess outcomes and recurrence rates post-intervention. Furthermore, we did not investigate potential risk factors, such as genetic mutations, anatomical variants, or comorbid conditions, which could contribute to the development of vascular complications in children with CP.

CONCLUSIONS

This study concludes that vascular complications occurred in 6.2% of children with chronic pancreatitis, representing a relatively higher frequency than previously reported in pediatric populations. Portal vein thrombosis was the most common vascular complication, followed by splenic vein thrombosis and splenic artery pseudoaneurysm. These findings highlight the importance of early identification, routine vascular screening, and individualized management strategies to reduce morbidity and improve outcomes in children with chronic pancreatitis.

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Author's Contribution

NH: Conceptualization of project, patient diagnosis, data collection, statistical analysis
SSBH: Patient diagnosis, literature search and review, data collection, statistical analysis, manuscript writing
ZY: Conceptualization of project, director supervision of patient diagnosis and management, literature review, manuscript writing
MAA: Conceptualization of project, patient diagnosis & management, manuscript writing
MNA: Literature review, manuscript writing
AS: Literature review, manuscript writing

All the authors have approved the final manuscript draft and accept the responsibility of research integrity.