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Case Report

Pancreatic pseudocyst following enteric fever–associated acute pancreatitis in a child: successful ultrasound-guided percutaneous drainage

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Introduction:

Acute pancreatitis (AP) is an inflammatory condition of the pancreas, most often presenting with pain in the epigastric region, radiating to the back, and elevated levels of pancreatic enzymes in the blood. While AP is considered a rare condition in the pediatric population, recent studies indicate an increasing trend in its incidence over the past few years (1). This rising trend underscores the importance of understanding the clinical manifestations, causes, and potential complications of AP in pediatric patients. One of the etiologies of pancreatitis include infective agents. In a patient of fever with abdominal pain in developing countries, the availability bias keeps enteric fever as a foremost differential, Enteric fever however causes involvement of various organ systems like gastrointestinal, muscular, nervous system and has various skin manifestations as well,(2) although rare same enteric fever can be associated with gastrointestinal complications including intestinal hemorrhage, intestinal perforation, hepatic abscess, acute cholecystitis, splenic rupture, hepatitis and a rare but documented one i.e.
enteric pancreatitis that has been discussed in our case report.

One of the less common complications of AP is a pancreatic pseudocyst (PP), characterized by a fibrous-walled cavity containing necrotic tissue, pancreatic enzymes, and fluid (3). The incidence of developing a PP in children following AP is reported to be approximately 10-23% (4). The development of a PP signifies a collection of pancreatic secretions in a localized area encapsulated by fibrous and granulation tissue, lacking a true epithelial lining. The causes of AP in pediatric patients differ from those in adults, where excessive alcohol intake and gallstones are the primary risk factors (5). In children, common causes include biliary or obstructive factors, medications, and systemic diseases. Less frequent etiologies include abdominal trauma, bacterial and viral infections, and metabolic and genetic disorders (5). Notably, a significant proportion of cases, around 15-30%, are idiopathic. This case report aims to present a unique instance of PP formation in a pediatric patient following acute pancreatitis that was likely triggered by enteric fever, a rare association, and its successful management using an anterior percutaneous drainage approach.

CASE REPORT:

A 4-year-old previously healthy girl presented to the paediatric gastroenterology clinic at Lahore

General Hospital with bilious vomiting, epigastric abdominal pain radiating to the back, and recent treatment for culture-proven enteric fever. She denied trauma, drug use, or family history of pancreatitis. Examination revealed mild upper abdominal tenderness without guarding or mass.

Laboratory results showed elevated serum amylase (252 U/L) and lipase (178 U/L), along with leucocytosis and raised CRP, Liver function tests, serum triglycerides, calcium, and abdominal ultrasound showed no alternative cause of pancreatitis. Transabdominal ultrasonography demonstrated blurred pancreatic margins; CT imaging confirmed interstitial oedematous pancreatitis with peripancreatic fluid. A diagnosis of acute pancreatitis secondary to enteric fever was made.

She was managed with IV fluids, analgesics, nasogastric decompression, and antibiotics. Oral feeding was reintroduced on day six. She was discharged once clinically stable.

Two weeks later, the patient returned with early satiety and a non-tender, firm epigastric mass. CT imaging revealed a 9.2 × 8.8 × 7.4 cm thin-walled pseudocyst anterior to the pancreatic body and tail. Given the cyst's size and symptomatic nature, CT- and ultrasound-guided anterior percutaneous drainage was performed. Drainage fluid was analysed for enzyme content and infection. Culture of the drained cyst fluid grew *Salmonella Typhi*, confirming persistent enteric infection and supporting a direct infectious etiology of the pancreatitis and pseudocyst formation.

Post-procedure recovery was uneventful. The patient was monitored for complications including bleeding, infection, and fistula formation. Follow-up imaging at 8 weeks and again at 6 months confirmed complete pseudocyst resolution with no recurrence. The child remained clinically well with no evidence of pancreatic insufficiency.

DISCUSSION:

Typically, a localized *Salmonella* infection of the pancreas arises from *Salmonella choleraesuis* bacteraemia but can also result from *Salmonella typhimurium*-induced gastroenteritis or enteric fever caused by *Salmonella typhi* that can eventually lead to formation of a pancreatic abscess often occurs as a dreadful complication of pancreatitis secondary to enteric fever. (6) It has been demonstrated in studies by Hermans *et al*.,(7) and Renner *et al*.,(8) that raised amylase and lipase levels is seen in about 50, and 62% of enteric fever patients, respectively without having clinical or radiological evidence of acute pancreatitis. Baert *et al*. explained several mechanisms leading to hyperamylasemia including reduced excretion secondary to renal and hepatic dysfunctional physiology in enteric fever and immune mediated inflammation rendering increased absorption of macromolecules like amylase.(9) In this case patient not only had culture proven enteric fever but also had radiological evidence of pancreatitis that later on developed unprecedented complication of pancreatic pseudocyst necessitating aggressive and invasive management plan. Notably, cyst fluid culture in our patient yielded *Salmonella Typhi*, providing microbiological confirmation of direct pancreatic involvement rather than a coincidental association. Such confirmation is rarely documented in pediatric cases and strengthens the causal link between enteric fever and both pancreatitis and pseudocyst formation.

The most common aetiologies of paediatrics acute pancreatitis include trauma, systemic infections, drugs, gallstones, hereditary, and organic acidemias. The complications of acute pancreatitis can be divided as local or systemic according to the revision of the Atlanta classification, 2012 including two discrete morphological phenotypes delineated via abdominal contrast-enhanced CT (CECT) or contrast-enhanced MRI: acute peripancreatic fluid collection (APFC) and acute necrotic collection (ANC).

Management of paediatric pancreatic pseudocyst is controversial, ledging between conservative management and surgical management. Conservative management with measures such as total parenteral nutrition and octreotide acetate is preferred for acute paediatric pancreatic pseudocysts that measure less than 5 cm as there is an increased chance of spontaneous resolution in 6-8 weeks' time. Certain minimally invasive techniques such as laparoscopic, percutaneous, and endoscopic drainage are preferred modalities with very favourable results if expertise and logistics are available having the selection of a surgical approach for drainage or excision is contingent upon the anatomical characteristics of the pseudocyst.

Khizar *et al*. outlined in their study that both endoscopic drainage (ED) and percutaneous

drainage (PD) were associated with adverse effects but further analysis between ED and PD had comparable outcomes regarding technical success, clinical success, adverse events, recurrence, mortality, and stent migration, however, ED was associated with a shorter hospital stay and a lower rate of re-intervention compared to PD (10). Despite these advantages, both ED and PD carry inherent risks, and the selection of an appropriate drainage method must be tailored based on individual patient characteristics, clinical presentation, availability of expertise and logistics.

CONCLUSION:

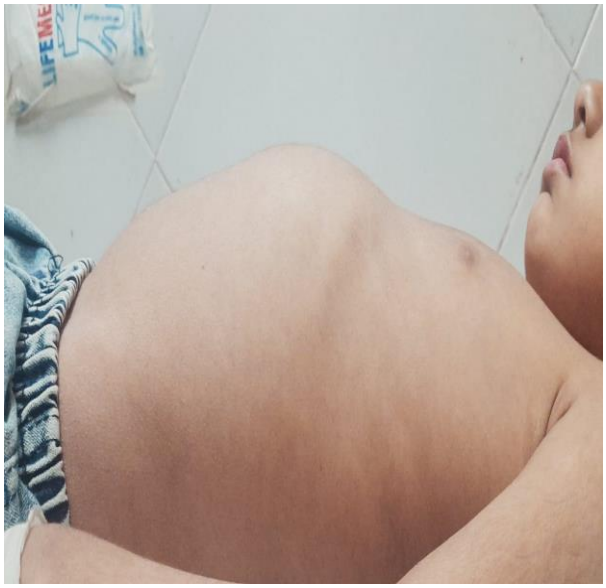
Enteric fever can occasionally lead to rare complications like pancreatitis and pancreatic pseudocyst formation. Persistent abdominal symptoms post-typhoid warrants a high index of suspicion, with early imaging and enzyme analysis being key to timely diagnosis.

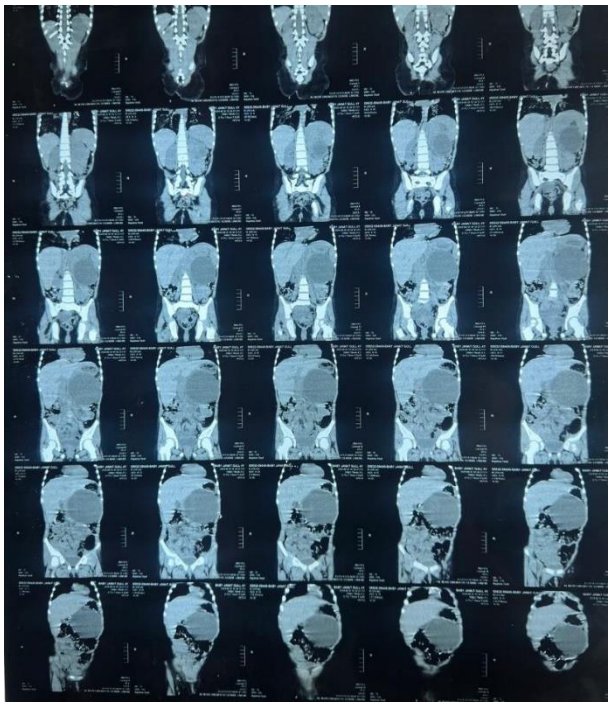
Management of pancreatic pseudocysts in children should be tailored to cyst size, symptoms, and anatomical considerations. Conservative therapy suffices for small, asymptomatic cysts, while image-guided percutaneous drainage offers a minimally invasive solution for larger, symptomatic ones.

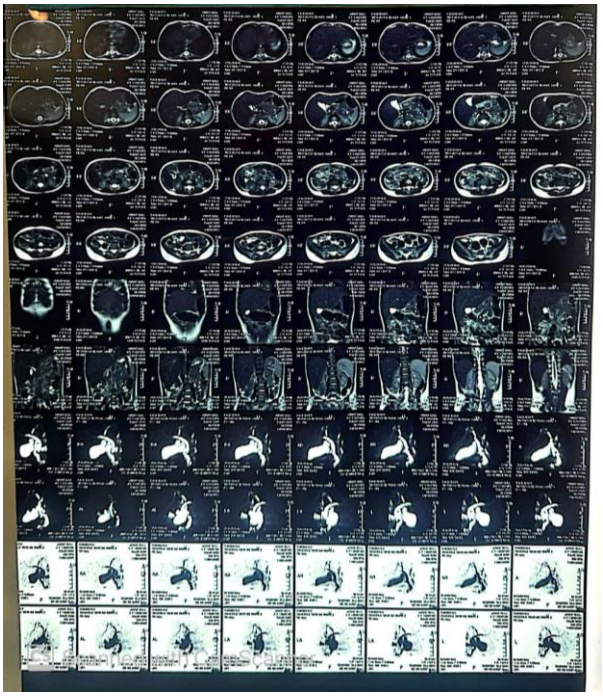
Percutaneous drainage serves as a safe, less invasive alternative to surgery, significantly reducing morbidity. However, vigilant post-procedural monitoring is critical to detect complications such as infection, fistula, or recurrence.

Typhoid-associated pancreatitis, though uncommon, underscores the importance of multidisciplinary care. Coordinated input from pediatric gastroenterology, infectious disease, and interventional radiology teams enhances outcomes. Ongoing follow-up with repeat imaging and clinical review is essential for ensuring resolution. Caregiver education on red-flag symptoms empowers early recognition and improves long-term outcomes.

FIGURES:







LEGENDS:
Figure 1. Abdominal mass with protuberant abdomen
Figure 2. Ct scan revealing pancreatic pseudocyst anterior to body and tail of pancreas
Figure 3. follow up imaging revealing resolution of Pancreatic PC.

Author's Contribution:

NA: Conceived and designed the study, involved in data collection, performed statistical analysis and writing the manuscript.
MS, HS, HR, MT: Collected the data, critical review and preparation of manuscript.

All authors have read, approved the final manuscript and are responsible for the integrity of the study.

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