Acute pancreatitis in children: an experience with 50 cases

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Background/purpose **Acute pancreatitis in childhood is not common. It can be associated with severe morbidity and mortality. The role of clinical evaluation is vital as it can be misdiagnosed easily. The objective of this study was to review the etiology, presentation, diagnosis, management, and prognosis of acute pancreatitis in children and to assess the relevance of currently available prognostic criteria.**

Patients and methods **Fifty children with acute pancreatitis admitted to the Pediatric Surgery Unit at the Al-Azhar University Hospitals, within the period January 1998 to December 2008 were retrospectively reviewed. They were diagnosed by clinical examination, laboratory, and radiological investigations, as well as by abdominal exploration.**

Results **There were 25 boys and 25 girls. The median age was 9 years (range: 2–17 years). In the majority of cases, the main cause of acute pancreatic was idiopathic (17 patients), followed by trauma (10 patients). Most of the patients presented with abdominal pain (10 cases), vomiting (nine cases), jaundice (five cases), and an abdominal mass in computed tomography (48 cases).**

Conclusion **Trauma is a major cause of pancreatitis in children. Early diagnosis, close monitoring, and proper intervention are mandatory to reduce the potential morbidity and mortality.** ***Ann Pediatr Surg*** **7:72–75**

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Introduction

Acute pancreatitis in childhood is not common. It can be associated with severe morbidity and mortality. High index of suspicion is needed to avoid the frequent misdiagnosis [1].

Several clinical and methodological difficulties occur when diagnosing acute pancreatitis in the pediatric age group. As it is uncommon and has heterogeneous symptoms, acute pancreatitis in children is often misdiagnosed [1].

Acute pancreatitis should be considered in every child with unexplained acute or recurrent abdominal pain. The prognosis of acute pancreatitis in children is generally good, except when complicated with multiorgan failure. Regardless of the cause, certain common features are found in all types of pancreatitis. However, as numerous disease entities can cause pancreatitis, patient management must be highly individualized [2].

Pancreatic injuries are uncommon and are rarely described in children. In contrast, pancreatic injuries and their management in adults are well documented in the surgical literature [3,4]. A large retrospective study from Japan and the United States has shown the rarity of pancreatic injury, despite including 15-year-old data in each study [5,6]. The etiologies were quite variable and included idiopathic, traumatic, drug-related, biliary, congenital, and alcohol. The diagnosis of pancreatitis was made from the clinical presentation and laboratory values in most cases. Serum amylase was elevated in the majority of children. Further diagnostic evaluations included abdominal ultrasound (US), computed tomography (CT), and endoscopic retrograde cholangiopancreatography (ERCP). Pseudocyst development was the most common complication, especially in those cases associated with trauma. In contrast to adults with pancreatitis, who usually respond to nonoperative therapy, only 32 of the 50 children responded to nonoperative treatment. The most common long-term morbidity was recurrent pancreatitis [7].

The objective of this study was to review the etiology, presentation, diagnosis, management, and prognosis of acute pancreatitis in children and to assess the relevance of currently available prognostic criteria.

Patients and methods

The hospital records of 50 children with acute pancreatitis admitted to the Pediatric Surgery Unit at the Al Azhar University Hospitals, between January 1998 and December 2008 were reviewed and included in the study. They were diagnosed by clinical examination, laboratory, and radiological investigations, as well as by abdominal exploration.

Statistical analysis was carried out using SPSS version 15 (IBM, USA). The nonparametric Wilcoxon matched-pairs test was used to compare data of two independent samples, whereas the Mann–Whitney test was used to compare data of dependent samples. A P value less than 0.05 was considered significant.

Results

There were 25 boys and 25 girls. Their median age was 9 years (range: 2–17 years). In the majority of cases, the etiology of acute pancreatic was idiopathic, followed by trauma (Table 1).

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Abdominal pain was the most common presentation (96%). Serum pancreatic enzyme concentrations progressively and significantly decreased from the first to the third day after admission ($P < 0.05$). Acute pancreatitis was associated with abdominal trauma in 10 patients (20%), viral infection in six patients (12%), pancreatic duct abnormalities in four patients (8%), familial chronic pancreatitis in three patients (6%), biliary disease in five patients (10%), and other causes (type 4 hyperlipidemia, duodenal duplication, drugs, cystic fibrosis, celiac disease) in five patients (10%). Acute abdomen was of unknown origin in 17 patients (34%) (Table 1, Fig. 1). Twelve patients had previous attacks of acute abdomen (six of unknown origin, two with pancreatic duct abnormalities, two with familial idiopathic pancreatitis, one with viral infection, and one with type 4 hyperlipidemia (Table 2).

The mean duration of the pain was 9.3 days (range: 0–59 days). On the basis of the Atlanta criteria, 34 patients (68%) were diagnosed as having mild acute abdominal pain and 16 (32%) as having severe acute abdominal pain.

The etiology of the nine patients with severe acute abdomen was idiopathic, in four cases it was by viral infection, in two cases it was by trauma, and in one case it was due to type 4 hyperlipidemia (Table 3).

Diagnostic study

Abdominal US was the most common diagnostic modality. Forty-eight children underwent abdominal US, 19 of these were read as abnormal, and only two of these patients were found to have abnormal CT scans at the same admission. One of the CT scan showed an abnormal annular pancreas, and one described posttraumatic transected pancreas, which was proved during laparotomy (Fig. 1). In 20 patients who underwent abdominal CT, only three patients were read as normal. ERCP was used in six of the patients.

Systemic and local complications are shown in Table 4. Patients with severe pancreatitis had C-reactive protein serum concentration significantly higher on the first day ($P < 0.008$) and on the third day ($P < 0.033$) after hospital admission than patients with mild abdominal pain. The mean hospital stay was 16.0 ± 10.7 days in those with the severe form of the disease.

Discussion

Several aspects of pancreatitis in children differ from adults. Although biliary tract disease and alcohol abuse are the most common causes of acute pancreatitis in the adult, they are rare in children [8]. The causes in the pediatric population include trauma, drugs, congenital anomalies, hyperlipidemia, as well as choledocholithiasis. Other reported cases include malnutrition and viral, bacterial, and parasitic infections [9,10].

Table 1 Causes of pancreatitis

Cause	Male	Female	Total
Abdominal trauma	7	3	10
Pancreatic duct anomalies	1	3	4
Viral infection	4	2	6
Familial idiopathic pancreatitis	2	1	3
Metabolic	2	3	5
Biliary disease	1	4	5
Idiopathic	8	9	17

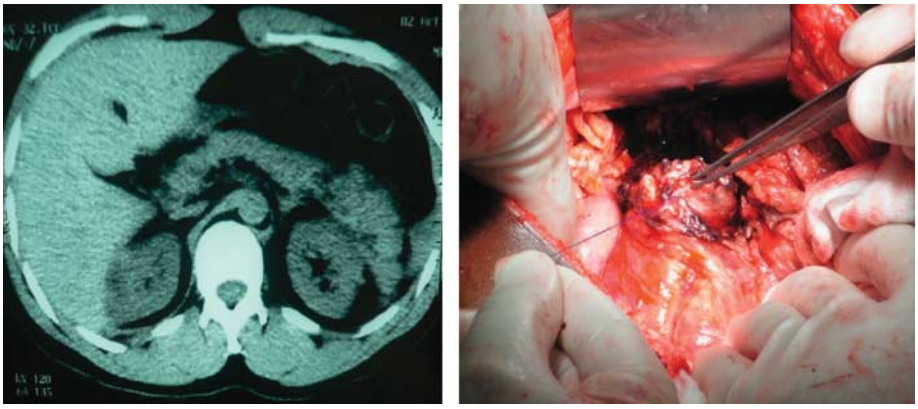
One of the most common causes of acute pancreatitis in children is trauma. Injuries to the pancreas occur in up to 10% of cases of blunt abdominal trauma [11]. Fracture usually occurs in the body of the pancreas. This portion is relatively fixed over the spine, predisposing it to injury [12]. Previous studies have stated that the incidence of trauma-induced pancreatitis in children ranges from 19 to 33% [8,10,12]. A frequent cause of pancreatic trauma is bicycle handlebar injury. Up to 42% of the pancreatic trauma reported is bicycle related [11]. Other causes of traumatic pancreatitis include motor-vehicle accidents, sports injuries, and penetrating trauma.

Congenital abnormalities of the pancreaticobliary system were found in four of the patients in this series. No case of pancreatic divisum was found, despite its presence in 10% of the Western population [13]. This is consistent with the theory that to cause disease, pancreas divisum must be accompanied by an additional factor such as papillary stenosis [13], as it occurred in our patient. Choledocal cyst is also a cause of pancreatitis, although this is an uncommon presentation [14]. The risk factors, such as female sex, obesity, family history, and pregnancy, for teenagers developing gallstone pancreatitis are similar to those of adults [14].

In this study, the most common etiology of pancreatitis was idiopathic (43%). This is slightly higher than in other studies, which range from 6 to 33% [7,15]. Although it is rare in children, the most common cause of recurrent pancreatitis in the pediatric age group is hereditary pancreatitis [4]. There are two criteria for the diagnosis of hereditary pancreatitis, that is, it is suspected when it affects three or more members of the same family and when it is associated with episodes of abdominal pain in childhood without other etiology factors [16]. The diagnosis of pancreatitis can be made with reasonable certainty on the basis of clinical, radiological, and laboratory findings [17]. An overwhelming majority of our patients complained of abdominal pain, mostly described as diffuse or epigastric. However, abdominal pain may be difficult to assess in very young children or in children involved in multiple trauma with possible head or extremity injuries. Nausea and vomiting were also found commonly in our study.

Weizman and Durie [10] considered serum amylase to be the most important diagnostic aid in determining pancreatic injuries. Although serum amylase can be normal in pancreatitis [18], up to 95% of cases of acute pancreatitis have elevated amylase levels. It should be noted, however, that serum amylase may not rise until 12 h after the acute event. White blood cells, lactate dehydrogenase, and total bilirubin levels were also found to be normal or only slightly elevated in the large majority of cases. Extreme elevation of these values should lead one to suspect serious complications of pancreatitis or other illnesses [12].

Fig. 1



A computed tomography abdomen showing transected pancreas due to trauma. Intraoperative photo for the same patient.

Table 2 Causes of recurrent attacks of pancreatitis

Cause	Number of cases
Pancreatic duct anomalies	2
Viral infection	1
Familial idiopathic pancreatitis	2
Metabolic	1
Idiopathic	6

Table 3 Severity related to etiology according to Atlanta criteria

Cause	Mild pancreatitis	Severe pancreatitis
Abdominal pain with trauma	8	2
Pancreatic duct anomalies	4	–
Viral infection	2	4
Familial idiopathic pancreatitis	3	–
Metabolic	4	1
Biliary disease	5	–
Idiopathic	8	9

Table 4 Complication related to severity of pancreatitis

Complications	Mild pancreatitis	Severe pancreatitis
Pulmonary	2	2
Renal	–	2
Metabolic alternation	1	2
Cardiovascular	–	1
Pancreatic pseudocyst	2	–
Mortality	–	2

Abdominal US has been shown to have 80% accuracy in the evaluation of pancreatitis, usually showing decreased echogenicity of the pancreas [8]. It is a noninvasive imaging modality that allows not only for diagnosis of the disease but also for following its course and for detecting complications [18]. Owing to its accuracy, noninvasiveness, speed, portability, and relative inexpensiveness, US should be performed in any case of suspected pancreatitis or unexplained abdominal pain [10].

CT scan has been shown to be the most valuable single imaging modality in children with suspected abdominal trauma. It can be used not only to evaluate the pancreas but also to evaluate the liver, spleen, kidney, spine, gastrointestinal tract, and other organs that may be involved in abdominal trauma. Therefore, CT should be considered in patients who present with traumatic pancreatitis, but it adds little to abdominal US when used for more isolated causes of pancreatitis [12,19].

ERCP is emerging as the most useful tool in the diagnosis and management of chronic pancreatitis in children [20]. It has a morbidity of 2% in children, consisting mainly of mild pancreatitis [20,21]. Relative contraindications to ERCP include acute pancreatitis and the presence of drainage. Small size is only a relative contraindication as cannulation has been successful in infants [12]. ERCP should be considered in the evaluation of idiopathic, nonpseudocyst before operation [21].

The most common complication of childhood pancreatitis is pseudocyst formation (10–25%) [9,10]. Pseudocysts occur most frequently in association with the pancreatic trauma. Most childhood pseudocysts are acute and thin walled and share no connection with the pancreatic duct. Pseudocysts in children are usually acutely symptomatic and require earlier treatment than those in adults [9]. Biliary obstruction secondary to acute or chronic pancreatitis is rare in childhood, and obstructive jaundice secondary to biliary stricture is an uncommon manifestation of childhood pancreatitis. Two of these children in our series were treated conservatively with resolution of their symptoms, whereas three had undergone bypass procedures.

The treatment of the pancreatitis consists of bowel rest and intravenous fluids with or without nasogastric tube suction; 30–75% of cases of pancreatitis in children can be treated conservatively [8,14,15]. This is in contrast to a large series of adults with pancreatitis, in whom 73% were treated nonoperatively [14].

In this study, drainage of pseudocyst was the most common operation performed. Results with percutaneous drainage have been reported to be better in children than in adults, probably because of the higher percentage of patients with the absence of primary pancreatic pathology [11]. However, among the patients drained percutaneously in this series, two required further operation, one had a residual pseudocyst that resolved spontaneously, one had no recurrent problems, and one was lost to follow-up. Percutaneous drainage of the pseudocyst failure was reported in other study [19].

The second most common operation was cholecystectomy with intraoperative cholangiogram or common bile duct exploration. Although only 14% of children with choledocholithiasis develop recurrent pancreatitis while waiting for operation, as compared with 37% of adults, cholecystectomy during the initial hospitalization is recommended for all patients with gallstone pancreatitis [15].

The debate continues over the choice of surgical procedure for biliary obstruction. Choices include sphincterotomy, sphincteroplasty, and/or biliary bypass with choledochoduodenostomy or choledochojejunostomy [20]. A reported complication of these procedures is cholangitis [20]. However, none of the patients in this series have developed cholangitis as their bypass surgery. If only mild pancreatitis is found during an exploratory laparotomy for acute abdomen, Ranson [17] recommends that no further operative procedure (including placing drains) is appropriate.

The mortality in pediatric pancreatitis varies greatly from 0 to 78% [16]. The average length of hospital stay for children treated primarily for pancreatitis in our series was 16 days. The most frequent long-term complication was recurrent pancreatitis, which occurred in six children, four of whom in the idiopathic group have also been reported in the literature. ERCP should be performed to rule out a structural cause [10].

Exocrine deficiency may also result from pancreatitis. Malabsorption has been reported in 5–45% of adults as a complication of pancreatitis [22]. Two patients in our series were diabetic at the time they developed pancreatitis. This agrees with the known increase in the incidence of pancreatitis in diabetics [16,21]. Another long-term complication of childhood pancreatitis is persistent abdominal pain, which occurred in 4% of our patients, both of whom had idiopathic pancreatitis.

Although the majority of children with pancreatitis respond to nonoperative therapy, a high percentage requires operation when compared with adults. The morbidity and mortality of pancreatitis in childhood are minimal.

Conclusion

Trauma is a major cause of pancreatitis in children. Early diagnosis, close monitoring, and proper intervention are mandatory to reduce the potential morbidity and mortality. The high rate of recurrent pancreatitis in children has also been noted. In patient with idiopathic pancreatitis, metabolic, structural, and hereditary causes should be sought.

Exocrine deficiency and persistent abdominal pain are long-term complications of pancreatitis in children.

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