Pancreatitis in Pre-Adolescent Children

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Pancreatitis in Pre-Adolescent Children

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Author's Contributions
LB conceptualized and designed the study and critically reviewed the manuscript for important intellectual content.

MR designed the study, designed the data collection tools, collected data, carried out the initial analyses, drafted the initial manuscript, reviewed and revised the manuscript.

SM, KK, MM, and JG collected data, and reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Abstract

Background

Pediatric pancreatitis is increasing, whether due to an increase in cholelithiasis or factors such as increased awareness and testing. This study was to describe previously undescribed pre-adolescent children with pancreatitis to illuminate this population and clarify who should be screened for pancreatitis.

Methods

This is a descriptive retrospective study of emergency department patients <13 years old over 10 years with the diagnosis of pancreatitis. Demographics, laboratory values, imaging results and final diagnoses/etiologies were recorded and evaluated using descriptive statistics.

Results

100 patients presented with acute pancreatitis and median age of 8 years (IQ range 5-11). 25% were attributed to an unknown etiology. 16 were medication induced, 13 genetic/congenital/structural, 14 traumatic/post surgical, 14 had gallstones, and 17 had autoimmune or systemic illness-related pancreatitis. 29 patients had recurrent pancreatitis.

Conclusions

Cholelithiasis is a much less frequent etiology in children than in adults. Genetic/structural factors represent a larger proportion of acute cases and higher proportion of recurrent pancreatitis. Concurrent systemic and viral illnesses are more common than in adults. Patients on pancreatitis-causing medications or with known genetic/structural issues should be tested for pancreatitis. Patients without risk factors rarely developed recurrent pancreatitis. Hypertriglyceridemia was not found to be an etiology. Chronic pancreatitis was uncommon.

Abbreviations: acute pancreatitis(AP), aspartate aminotransferase(AST), computed tomography(CT), endoscopic retrograde cholangiopancreatography(ERCP), magnetic resonance cholangiopancreatography(MRCP), total parental nutrition(TPN), diabetic ketoacidosis(DKA), acute lymphoblastic leukemia(ALL), right upper quadrant(RUQ), outside hospital(OSH), ultrasound(US), upper respiratory infection(URI), absolute neutrophil count(ANC).

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Background

The diagnosis of pancreatitis has been increasing in the pediatric population over the last 15 years but the etiology of this is uncertain (1,2,3,4,5,6,7). It is possibly due to increase in rates of childhood obesity and subsequent increase in biliary tract disease. Studies have shown that biliary disease is usually the most common comorbidity associated with pancreatitis (2,8,9,10). However these studies include a wide age range including both small children and adolescents. Another theory about the cause of increased childhood pancreatitis is a heightened awareness of pancreatitis among clinicians and increase in widespread access to lipase testing (1,6,7). There are few studies that focus primarily on younger patients and describe the etiology, risk factors and outcome of these patients, and no studies that look specifically at pre-adolescent children(11). Our objective was to determine the characteristics of this patient population in order to illuminate this population and attempt to clarify which children should be screened for pancreatitis.

Methods

We performed a retrospective study of all pediatric patients under the age of 13 years between 2006 and 2016 who presented to the pediatric emergency department with a final diagnosis of pancreatitis. Our pediatric emergency department at Loma Linda University Medical Center is a tertiary referral center with approximately 30,000 ED visits per year and is the only children's hospital serving San Bernardino and Riverside counties in Southern California with >1 million children. An ICD code of acute, recurrent or chronic pancreatitis and age less than 13 years were used to query the medical records database. Children transferred from an outside facility were included. Exclusion criteria included patients 13 years of age or

greater, or patients with a diagnosis of acute pancreatitis(AP) but without evidence of at least 2 of the following: 1)abdominal pain compatible with AP, 2) serum amylase and/or lipase ≥3 times upper limits of normal (reference ranges: amylase 20-90U/L, amylase 10-70U/L), 3) imaging findings consistent with AP. Charts of patients with a previous history of pancreatitis but currently admitted for a different problem and with no other signs or symptoms of concurrent pancreatitis were also excluded.

Using a standardized data collection form and trained data collectors not blinded to the study objective, the following data points were collected: gender, height, weight, ethnicity, past medical history, medications, and whether or not the patient had a family history of pancreatitis. The following test results were collected: Aspartate Aminotransferase(AST) level, Lipase level, Amylase level, Total Bilirubin level, ultrasound results, computed tomography(CT) results, endoscopic retrograde cholangiopancreatography(ERCP) results, and magnetic resonance cholangiopancreatography(MRCP) results. Finally, the stated etiology of pancreatitis, whether the episode was acute, chronic, or recurrent, and the number of previous pancreatitis episodes were obtained. Etiologies were grouped into size categories that were determined in a *post hoc* manner.

Descriptive statistics were used. Detailed descriptions of patients with no known risk factors who were found to have pancreatitis were to be determined. This study was approved by our institutional review board.

Results

During the 10 year period from 2006 to 2016, we identified 154 visits to the emergency department for children less than 13 years with a final diagnosis of pancreatitis. Of these, 100

visits were children with a first episode of acute pancreatitis, 54 were children with recurrent pancreatitis, 5 of whom were diagnosed with chronic pancreatitis. There were 29 patients who had known recurrences of pancreatitis during the study period. The median time from the first acute episode to the first recurrence was 6 months (IQ range 3-12.4 months). The median time to any recurrent episode after a previous episode was 6 months (IQ range 2.5-12 months).

Of the acute pancreatitis visits, 57 were female, 43 were male. The median age for all visits was 8 years (IQ range 5-11). The median age for acute pancreatitis visits was 7 (IQ range 4-11).

Of the acute pancreatitis visits and their etiologies, we identified 6 broad categories: Medication induced, Genetic or Congenital, Traumatic or Postoperative, Cholelithiasis related, Autoimmune or Systemic, and those with Uncertain etiology. Medication-induced included 7 patients on valproic acid, 4 patients on pancreatitis-inducing chemotherapy agents - pegasparginase or pentamidine, 1 patient each on oxcarbazepine, metronidazole, erythromycin, chlorothiazide, and total parental nutrition(TPN). Genetic or congenital abnormalities included 5 patients found to have congenital choledochal cysts, 3 patients with propionic acidemia, 2 patients with possible hereditary pancreatitis, 1 patient with Hennekam syndrome on TPN, 1 patient with Caroli disease, and 1 patient with a possible pancreatic/ampulla duct stricture (Table 1). Traumatic or post-operative patients included 12 patients with trauma-induced pancreatitis and 2 patients believed to have post-operative pancreatitis (1 after spinal fusion surgery and 1 after perforated appendicitis with IR drainage). Cholelithasis etiologies included 13 patients with gallstone induced pancreatitis and 2 patients admitted with cholelithiasis without pancreatitis but developed pancreatitis after ERCP was performed. 17 patients had concurrent or possibly

contributing autoimmune or systemic illnesses: 4 patients were thought to have Celiac disease, 2 patients with type 1 diabetes mellitus and admitted for diabetic ketoacidosis(DKA) were found to have elevated lipases, 2 patients had inflammatory bowel disease, 2 patient had Kawasaki's disease, 1 patient had lupus, 1 patient had hypothyroidism, 1 patient had Takayasu's arteritis and likely developed pancreatitis from high dose steroids, 1 patient with Hemolytic Uremic Syndrome and colitis, 1 patient with acute renal failure and diabetes insipidus, 1 patient with Acute Tubular Necrosis and interstitial nephritis, and 1 patient admitted for pancreatitis but found to have new onset preB cell acute lymphoblastic leukemia(ALL). 25% of patients had uncertain/undetermined etiologies including **9** patients with no identifiable risk factor except being overweight or obese (Table 2) and 16 patients with no identifiable risk factors and were either underweight or normal weight (Table 3). No patients had hypertriglyceridemia.

There were 29 patients with recurrent episodes of pancreatitis during the study period. Nearly half of these patients were found to have an underlying genetic or structural abnormality.

Discussion

Limitations to this study were that being retrospective, some data was incomplete or missing, and while most patients did not have any recurrent episodes, it is unknown if they did have a recurrence but were seen at another institution. While the diagnosis of acute pancreatitis is generally straightforward given the widespread use of lipase, it is often more difficult to determine the exact etiology of pancreatitis. Some of the patients with the etiology listed as unknown or uncertain had risk factors such as cholelithiasis or family history that were not listed as the etiology.

One of the goals of this paper was to elucidate the symptoms that would lead a physician to order a lipase. Many of the patients presented to surrounding non-pediatric emergency departments and may have had a lipase ordered due to routine abdominal pain lab protocols that are more common in adults. When evaluating the presenting signs, symptoms and chief complaint, there were a group of patients who may have been diagnosed only because of this. Since labs are less routinely required or ordered in children than in adults presenting with abdominal pain, it is possible we may be missing pancreatitis in children without known risk factors. However, since the vast majority of children without risk factors had no known recurrences, the importance of diagnosing these episodes is uncertain.

Conclusions

The etiology of pancreatitis in pre-adolescent children has a different distribution than in adolescents and adults, with gallstone disease much less frequent at 14%. Certain genetic and structural biliary or pancreatic factors represent a larger proportion of cases in children and a much higher proportion of recurrent pancreatitis. Concurrent autoimmune, systemic disease or viral illness contributing to pancreatitis is also more common than in adults. Patients on pancreatitis-causing medications or with known genetic or structural pancreatic issues should be tested for pancreatitis if presenting with classic symptoms. Patients without pancreatitis risk factors rarely developed recurrent pancreatitis. Hypertriglyceridemia was not found to be an etiology in this study. Chronic pancreatitis with evidence of pancreatic exocrine insufficiency was uncommon.

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Supplementary Files

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