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Research Article

Ultrasound Assessment of Pancreatitis in Paediatric Adolescent Population

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Abstract: Pancreatitis in paediatric-adolescent population is less common compare to adult population. Common causes in the adult and pediatric population are different. Chronic pancreatitis is divided into noncalcific and calcific variety of which calcific is generally associated with long term complications like diabetes and steatorrhoea. Ultrasound is an important first line investigation which can be used in the diagnosis, classification and follow up of pediatric-adolescent pancreatitis. The Aim and objective of the study was demographic and ultrasound evaluation of pancreatitis in paediatric population. Twenty patients were evaluated retrospectively. Data of demographic and ultrasonographic finding was obtained and analysed. In our study pancreatitis was most common in 10-15 years age group. Maximum were females with youngest age of 4 years. Acute pancreatitis was seen in two cases and chronic pancreatitis was reported in 18 cases. Idiopathic calcific pancreatitis was seen in ten cases. Calcific idiopathic chronic pancreatitis was found in four out of five males. Pseudocyst and ascites were most common complication of pancreatitis in paediatric-adolescent population found in our study. Pancreatitis is less common in paediatric-adolescent population. Idiopathic cause and chronic variety is commonly seen in this population. Ultrasound is an important investigation which can differentiate acute and chronic type, calcific and noncalcific type, detection of complication and follow up of patients.
Keywords: Ultrasound, Pancreatitis, Paediatric.

INTRODUCTION

Pediatric onset of pancreatitis is labeled when first episode of acute pancreatitis occurred before the patients 19th birthday [1]. Acute pancreatitis is a relatively uncommon disease in the paediatric-adolescent age group (0-18 years). Though the disease is well characterized in adults, there is limited data in children and adolescents. Incidence of acute pancreatitis is very low in the childrens and relatively increase incidence is observed in the adult due to alcohol consumption. The incidence ranges from 10 to 120 new cases per year per 100000 inhabitants between 12 and 18 years old in one study [2].

Acute Pancreatitis requires at least two out of the following three criteria: a) Abdominal pain of acute onset, especially in the epigastric region, b) Serum amylase and /or lipase activity of at least 3 times greater than the upper limit of normal, c) Imaging findings compatible with acute pancreatitis [2]. Acute pancreatitis is an inflammatory condition characterized by release of pancreatic enzymes out of pancreatic duct into the pancreatic and retroperitoneal region.[3] Acute Recurrent Pancreatitis requires at least 2 distinct episodes of acute pancreatitis as defined above along with complete resolution of pain and ≥1 month pain-free interval between the diagnoses of acute pancreatitis or complete normalization of serum amylase and lipase before the subsequent episode of acute pancreatitis along with complete pain symptoms resolution irrespective of a specific time interval between acute pancreatitis episodes [2].

Chronic pancreatitis is a chronic progressive inflammatory disorder causing irreversible damage of the pancreas leading to exocrine and endocrine insufficiency. Abdominal pain is a predominent symptom of chronic pancreatitis which can cause significant impairment of life quality [2]. Steatorrhea and diabetes mellitus are the long term sequele of chronic pancreatitis [4, 5]. Chronic Pancreatitis requires at least one of the following three criteria: a) Abdominal pain suggestive of pancreatic origin and imaging findings of chronic pancreatic damage, b) Evidence of exocrine pancreatic insufficiency along with pancreatic imaging findings of chronic pancreatitis, c) Evidence of endocrine pancreatic insufficiency along with pancreatic imaging findings of chronic pancreatitis [2].

We are reporting here a case series to evaluate acute and chronic pancreatitis with its complications with the help of ultrasonography regarding morphological changes associated with pancreatitis.

MATERIALS AND METHODS

Patients attending the Gastroenterology department of our hospital were retrospectively studied during the interval from January 2012 to August 2014. Clinical information, complications and laboratory data were collected by a standardized review of medical charts and the data recorded in data forms. Imaging data was collected from our departmental archieved collection. The diagnosis of pancreatitis was confirmed on the basis of clinical, radiographic, and laboratory findings.

Diagnosed cases of pancreatitis with age of onset of symptoms below 18 years were included in our study. The sonographic evaluation was done on Philips HD 11XE equipped with a 3.5 to 5 MHz curve transducer and a 7 MHz linear-array transducer. Patients were examined after a 4 hour fasting period and in a supine position. Patients with successful demonstration of the pancreas and detection of the pancreatic duct were enrolled into the study.

Imaging was done by epigastric, transhepatic and transplenic approach. In epigastric approach imaging was done in transverse and oblique planes. Transhepatic approach was used for the pancreatic head and transplenic approach was used for pancreatic tail. Sometimes water administration was done for demonstration of pancreas by forming an optimal window for better ultrasound transmission.

Acute pancratitis was diagnosed by clinico-laboratory findings and demonstration of bulky, hypoechoic pancreas. Chronic pancreatitis was diagnosed on the basis of clinical features (abdominal pain, diabetes mellitus) and the identification of pancreatic ductal and/or parenchymal changes (calcification, atrophy, ductal dilatation) on imaging. Morphological changes in the pancreas were identified by ultrasound abdomen. Main pancreatic duct was considered to be dilated if the duct diameter was more than 3 mm in the head and 2 mm in the body or tail of the pancreas.

RESULTS

Out of total 20 patients five were male and fifteen were female. Age wise distribution revealed 1in 0-5 year age group, 5 in 5-10 years, 8 in 10-15 years, 6 in above 15 years (Fig. 1). Maximum eight patients were in the age group 10-15 years. Etiology wise we found 15 cases of idiopathic, 2 cases of traumatic, one case of congenital, 1 case of infection and one case of biliary disease. Pain was main complaint in all these patients. Two cases were of acute and eighteen cases were of chronic pancreatitis.

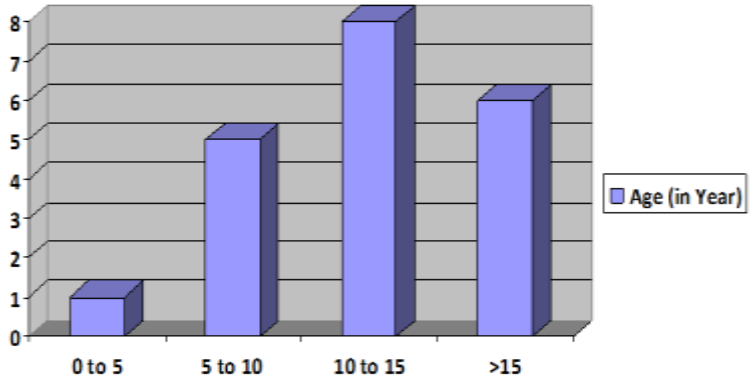

Fig. 1: Chart diagram showing age distribution of our patients

Morphological changes of bulky and hypoechoic pancreas was found in both cases of acute pancreatitis (Fig. 2). Single or multiple changes of chronic pancreatitis were seen (Fig. 3). Chronic pancreatitis changes of pancreatic calcification, duct dilatation, parenchymal atrophy found in eight cases. Duct dilatation and parenchymal atrophy was found in five cases. Pancreatic calcification, duct dilatation was observed in two cases. Pancreatic calcification and parenchymal atrophy was noted in one case. Pancreatic calcification in one case and parenchymal atrophy is seen in remaining one case. Idiopathic calcific pancreatitis was found in ten cases and idiopathic noncalcific pancreatitis was observed in rest cases. Idiopathic chronic calcific pancreatitis was seen in four out of five males.

Table 1: Morphological changes of chronic pancreatitis in our patients

Sl. No.	Morphological changes in Chronic pancreatits.	Cases
1	Pancreatic calcification, duct dilatation and parenchymal atrophy	8
2	Pancreatic calcification, duct dilatation	2
3	Duct dilatation and parenchymal atrophy	5
4	Pancreatic calcification and parenchymal atrophy	1
5	Pancreatic calcification	1
6	Duct dilatation	1

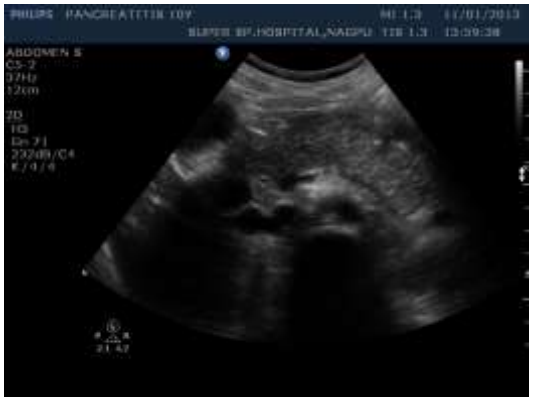

Fig. 2: Ultrasound image of pancreas in acute pancreatitis showing bulky, hypoechoic pancreas

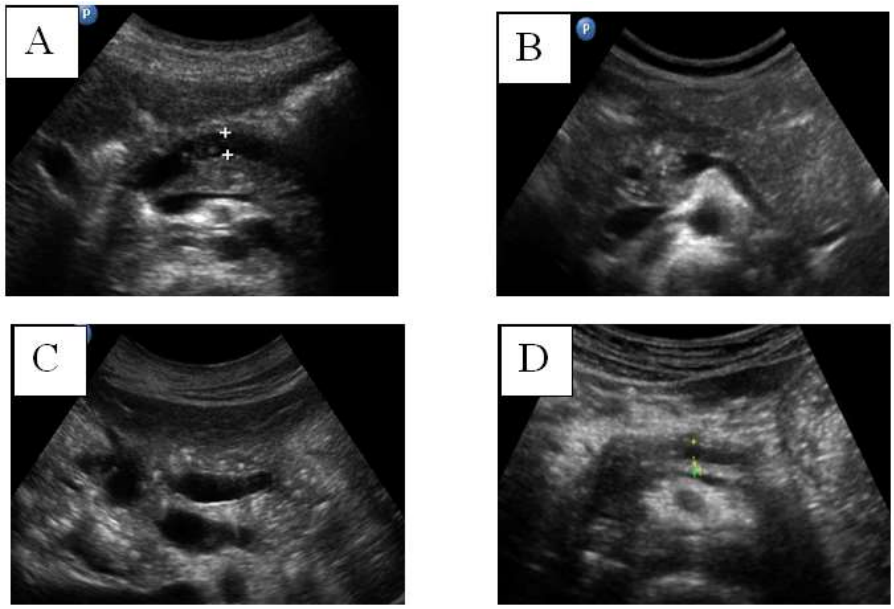

Fig. 3: Ultrasound images of pancreas in chronic pancreatitis showing pancreatic duct dilatation in case A, pancreatic calcifications in head of pancreas in case B, pancreatic duct dilatation with pancreatic calcification in case C pancreatic duct dilatation with parenchymal atropy in case D.

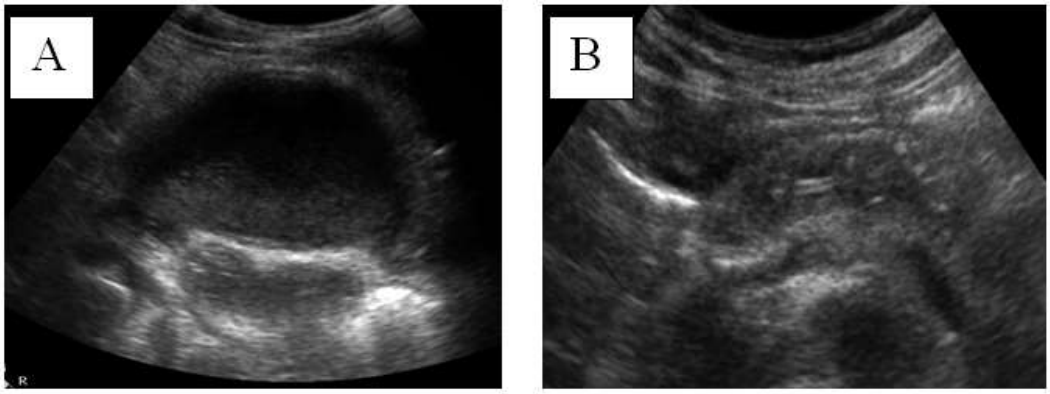

Fig. 4: A) Ultrasound image showing pseudocyst of pancreas in retroperitoneal region. B) Ultrasound image showing pancreatic stent in main pancreatic duct in a case of chronic pancreatitis.

Diabetes melitus was seen in two cases of idiopathic calcific pancreatitis. Pseudocyst (Figure 4A) was present in four, ascites was present in four and plural effusion was present in one case. Complications were not seen in rest cases.

DISCUSSION

There are multiple causes which can lead to pancreatitis. In pediatric population abdominal trauma, pancreatic duct anomalies, viral infection, familial idiopathic pancreatitis, drug therapy, hyperlipidemia, biliary disease , infection, idiopathic are the reported

causes. Trauma is one of the major cause for pancreatitis in children [6]. Pancreatic injury occurs in 10% of abdominal trauma [7]. Pancreatic body is located in front of vertebral body and commonly predisposed to the injury in cases of abdominal trauma. Child abuse, bicycle related injury, sport injury, motor vehicle accidents and penetrating trauma are causes for traumatic pancreatitis. Alcohol abuse and gall stone disease are the most common causes of pancreatitis reported in adult population. However these causes are uncommon in pediatric population [6].

Structural abnormalities such as pancreatic divisum and choldochal cyst can cause pediatric pancreatitis. Choledochal cyst uncommonly present as pancreatitis. Pancreatic divisum requires associated condition like papillary stenosis to induce pancreatitis [6]. Herediatory pancreatitis is a common cause of recurrent pancreatitis in childrens. Diagnosis of herediatory pancreatitis requires evidence of pancreatitis in three or more member of family and history of recurrent abdominal pain since childhood without any etiological cause [8]. Azathioprim, sulphonamide, hydrocholorothiazides, L-asparaginase, vincristine and corticosteroids are reported to cause drug induced pancreatitis. It may be due to idiopathic, metabolic, heridiatory or structural cause. Hyperthyroidism, hyperlipidemia , cystic fibrosis are metabolic causes to be ruled out and for structural cause ruled out on ERCP [6]. The most common cause was idiopathic in our study. Previous studies had reported a range from 6 to 33% [9, 10].

Pain in abdomen, nausea and vomiting are the common complaints reported in cases of paediatric pancreatitis. Abdominal pain is diffuse or epigastric in location. Assesement of abdominal pain is very difficult task. Abdominal pain was most common symptom found in our study. Nausea and vomiting was also reported in some patients. Serum amylase is elevated in upto 95% of pancreatitis patients. In our patients amylase was found to be raised in all the patients. It can be normal in pancreatitis and may be elevated after 12 hours in acute cases. In majority of cases LDH, TLC and total bilirubin levels could be normal or slightly elevated [6].

Ultrasonography of abdomen has showed 80% accuracy in the evaluation of pancreatitis. Pancreatic visualization reported in 75-93% cases on ultrasound. It is also useful to exclude other causes of abdominal pain such as acute appendicitis, renal colic, intestinal obstruction etc. Acute pancreatitis usually demonstrates increase pancreatic volume and decreased pancreatic echogenicity [3]. Pancreatic atropy, calcifications, ductal dilatation are seen in the chronic pancreatitis [11]. Ultrasonography is a noninvasive, safe, widely available and cheap first line imaging modality in the evaluation of pancreatitis. It is also important in the follow up of known cases of pancreatitis and detecting the various complications at the earliest. Main disadvantage of ultrasound is operator dependency.

Computed tomography (CT) is helpful in the suspected cases of pancreatitis in which pancreas is obscured due to bowel gases. In cases of traumatic pancreatitis, CT can also evaluate the liver, spleen, gastrointestinal tract, spine, or other organs that may be involved in abdominal trauma [6].

Endoscopic retrograde cholangiopancreaticography (ERCP) is a valuable investigation in the diagnosis and management of chronic pancreatitis in children. 2% morbidity is reported in children, mainly of mild pancreatitis [12, 13]. Relative contraindications to ERCP are acute pancreatitis and a pancreatic pseudocyst that is not being staged for operative drainage. ERCP should be considered in the evaluation of idiopathic, non-resolving or recurrent pancreatitis and in all children with pseudocyst prior to operation. Diagnosis of pancreatitis is generally based on clinical, laboratory and imaging findings [6].

Pseudocyst formation is most common complication reported in 10-25% cases of childhood pancreatitis. Most of them are acute, thin walled. Biliary obstruction secondary to acute or chronic pancreatitis is uncommon in the paediatric population [14, 15]. In our patients pseudocyst and ascites were most common complication and biliary obstruction was not reported.

Bowel rest and I.V. fluid with or without nasogastric suction are initial line of treatment and conservative management is done in 30-76% cases [9, 10, 16]. Pancreatic drainage is required in some cases and gives better results compare to adults due to absence of primary pancreatic lesion. Pseudocyst drainage was done in two cases. Cholecystectomy with intraoperative cholangiogram or CBD exploration is also done in cases of gallstone pancreatitis. Other operative treatments like spincterotomy, spincteroplasty, stenting, biliary bypass surgery (choledochoduodenostomy, choledochojejunostomy) had also been reported [6].

Chaudhury et al had reported two subsets of idiopathic chronic pancreatitis such as calcific idiopathic chronic pancreatitis and noncalcific idiopathic chronic pancreatitis. Calcific idiopathic chronic pancreatitis was characterized by male predominance, early calcification and high frequency of endocrine insufficiency. Noncalcific idiopathic chronic pancreatitis had showed equal sex distribution, no calcification and low incidence of endocrine insufficiency [17]. Our study also showed male predominance and endocrine insufficiency in calcific idiopathic chronic pancreatitis.

Exocrine pancreatic deficiency can result from the pancreatitis. Diabetes is reported in 2 cases. Long term abdominal pain is also seen in pancreatitis which was seen in 7 cases. Average length of hospital stay in our patients was 6 days. Most common long term complication reported was recurrent pancreatitis which was observed in 7 cases. The mortality varies from 0 to 78% in cases of pancreatitis [10]. In our study we found it to be 0%. Overall mortality is approximately 18-23%. Atlanta classification had divided acute pancreatitis into mild and severe form. In mild form it is very low (1%) in both children and adults. In severe form mortality in paediatric adolescent age group (30-35%) is more than adult group (20-25%) [1].

CONCULSION

Pancreatitis is an uncommon disorder in children but can lead to significant morbidity. Chronic pancreatitis was most common in our study. In our study pancreatitis was more common in female and pseudocyst was most common complication. Idiopathic chronic pancreatitis is predominant form of chronic pancreatitis in children and adolescents. It is important to differentiate calcific / noncalcific variety because calcific variety is characterized by early morphological and functional damage. Because of accuracy, noninvasiveness, speed, portability and relative inexpensiveness, ultrasound should be performed in any suspected case of paediatric-adolescent pancreatitis.

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