Research Article

Clinical Profile and Outcome of Acute Pancreatitis in Filipino Children

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Received on: 26-Nov-2020 Accepted for Publication: 10-Jun-2021

ABSTRACT

Background: There is an increasing incidence of pediatric acute pancreatitis worldwide. Determining local data on clinical profile, factors, severity and outcome would help improve recognition, diagnosis and management of this emerging disease.

Aim: To determine the clinical profile of Pediatric Acute Pancreatitis and the factors associated with their outcome and severity.

Methods: A retrospective chart review of children 0-18 years old with diagnosis of Acute Pancreatitis was done. Demographic, clinical and diagnostic data gathered were compared among severity classification and outcome.

Results: Thirty-five cases were identified in a period of 18 years but only 28 were reviewed. Mean age was 11.5 years old +/- 4.1 SD (range 4–18) with slight male predominance. Ninety-three percent presented with abdominal pain. Most common etiology was idiopathic (44%). Gallstones and choledochal cyst post-excision were the most common of the co-morbidities. Most common imaging findings were edematous pancreas. Most common local complications were pseudocyst formation and fluid collection. One death was due to hemorrhagic pancreatitis. Gallstones was associated with non-mild severity classification ($p<0.028$) and 3-10 years age group with incomplete enzymatic/radiologic resolution upon discharge ($p<0.04$).

Conclusion: Presence of gallstones and 3-10 years old age group were found to affect severity and outcome and should be viewed closely during management of pediatric acute pancreatitis.

Recommendation: A multi-center study on the incidence, clinical profile and outcome is recommended to obtain a better picture of the acute pancreatitis in Filipino children to help clinicians in recognizing and decreasing the morbidity and mortality of this disease.

Keywords: Acute Pancreatitis, Filipino children, severity, outcome, pediatric pancreatitis

INTRODUCTION

Different authors worldwide reported the increasing incidence of Pancreatitis in children [1,2,3]. Pancreatitis results from an insult to the pancreas leading to acute inflammatory changes, edema and necrosis that may lead to organ damage or fibrosis [4]. Data in children is limited to retrospective studies and current management is largely based from adult literature. In the Philippines, only one retrospective study on Childhood Pancreatitis was done in a tertiary government hospital from 2005-2009 with 23 cases included [5].

Factors that are associated with a more severe course of pancreatitis need to be recognized to optimize the clinician's approach and minimize complications and prevent mortality. This paper aims to describe the clinical profile of Filipino pediatric patients diagnosed with Acute Pancreatitis admitted in a tertiary hospital and to establish possible factors that might predict severity and outcome of the disease.

METHODOLOGY

This was a retrospective chart review done among Filipino children 0 to 18 years old admitted at a tertiary hospital with a discharge diagnosis of Acute Pancreatitis from January 2000 up to December 2017. Acute Pancreatitis (AP) was defined as having at least 2 out of 3 criteria [6]: (a) Abdominal pain suggestive of, or

compatible with AP (i.e. abdominal pain of acute onset, especially in the epigastric region) (b) Serum amylase and/or lipase activity at least 3 times greater than the upper limit of normal (international unit/liter), and, (c) Imaging findings characteristic of, or compatible with AP (e.g. using Ultrasonography, Contrast-enhanced computed tomography, endoscopic ultrasonography, magnetic resonance imaging/magnetic resonance cholangiopancreatography). Acute Recurrent Pancreatitis was defined as having at least 2 distinct episodes of Acute Pancreatitis, along with: (a) Complete resolution of pain ≥ 1-month pain-free interval between diagnoses of Acute Pancreatitis, OR, (b) Complete normalization of serum pancreatic enzyme levels (amylase and lipase), before the subsequent episode of Acute Pancreatitis is diagnosed, along with complete resolution of pain symptoms, irrespective of a specific time interval between Acute Pancreatitis episode [6].

There were 35 cases with ICD-10 code K95 pertaining to Acute Pancreatitis. Of these, only 32 charts were retrieved with 3 charts during 2001-2005 not recovered. Among the 32 cases, 2 were excluded due to early discharge (transferred to another hospital and opted home against medical advice) and 2 cases did not fulfill the criteria for Acute Pancreatitis. Twenty- eight (28) charts were reviewed with a dropout rate of 20%. Among the 28 charts reviewed, there were 5 patients who was classified as Acute Recurrent Pancreatitis with 4 readmissions and 1 new admission. Thus, observations referred to number of cases or admissions (N=28), but total number of patients was 24.

Outcomes includes severity of disease as mild, moderately severe or severe, which is based from classification by North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) Pancreas Committee for Acute Pediatric Pancreatitis [7]:

(1) Pediatric Mild AP is defined as AP not is not associated with any organ failure, local or systemic complications, and usually resolves within the first week after presentation
(2) Pediatric Moderate Severe AP is defined as AP with either the development of transient organ failure/dysfunction (lasting no >48 hours) or development of local or systemic complications.
(3) Pediatric Severe AP is defined as AP with development of organ dysfunction that persists >48 hours.

Outcomes of clinical improvement with and without resolution of enzymatic and/or imaging findings, and death were recorded.

Descriptive analysis was done with categorical variables presented as frequencies and percentages, while continuous variables as either means with standard deviations (SDs) or as medians for non-parametric data. Statistical analysis was performed by comparing categorical variables using Fisher's exact t test, while Mann Whitney test and ANOVA were used for continuous predictor variable. Data were compiled and analyzed using Stata 10 (StataCorp, TX). $P<0.05$ was considered statistically significant.

Bioethical considerations

The study was conducted in compliance with the principles set out in relevant guidelines including the Declaration of Helsinksi, World Health Organization guidelines, International Conference on Harmonization-Good Clinical Practice and National Ethics Guidelines for Health Research. The study protocol was approved by the Institutional Review Board of the Philippine Children's Medical Center with approval code of PCMC 2017-074. Confidentiality of records was observed throughout the research period. The principal investigator had no conflict of interest during the conduct of the study.

RESULTS

Patient characteristics

The medical records of 28 cases with discharge diagnosis of Acute Pancreatitis were reviewed (Table 1). There were slightly more males (n=15, 54%) than females with a mean age of 11.5 years old +/- 4.1 SD (range 4 – 18). Most of the cases (61%) belonged to the adolescent group of 11-18 years old. More than half had malnutrition (n=15, 54%), combined under- and over-nutrition. Sex and nutritional status showed no statistical significance between the two age groups (p=0.700, p=0.898, respectively).

Table 1. Demographics and clinical characteristics according to age group

Age group, n	Total N=28	3-10 years old n=11	11-18 years old n = 17	P value
Gender				
Male	15 (54%)	5 (45%)	10 (59%)	0.700
Female	13 (46%)	6 (55%)	7 (41%)	
Nutritional status				
Normal	13 (46%)	5 (46%)	8 (47%)	0.898
Overweight and obese	10 (36%)	4 (36%)	6 (35%)	
Wasting and severe wasting	5 (18%)	2 (18%)	3 (18%)	
Presenting Symptom				
Abdominal pain	26 (93%)	9 (82%)	17 (100%)	0.146
Vomiting	2 (7%)	2 (18%)	0	
With co-morbid condition	9 (32%)	5 (45%)	4 (23%)	0.409
Etiology				
Idiopathic	12 (44%)	4 (37%)	8 (47%)	0.721
Biliary disease	6 (21%)	2 (18%)	4 (23%)	
Infection	6 (21%)	3 (27%)	3 (18%)	
Metabolic	1 (4%)	0	1 (6%)	
Multisystem disease	1 (4%)	1 (9%)	0	
Medication	1 (4%)	1 (9%)	0	
Alcohol	1 (4%)	0	1 (6%)	

Almost all (93%) of the cases presented with abdominal pain with only 2 cases presenting with vomiting (7%). Both cases of vomiting were noted in the younger children group. Age group was not significantly associated with the presenting symptom (p=0.146). About half (46%) of those who presented with abdominal pain had associated vomiting. Other symptoms seen were jaundice (n=2), fever (n=2) and anorexia (n=2). Median time of occurrence of symptom to admission was 1 day.

One-third (n=9, 32%) of cases had co-morbidities, as shown in Table 1, and that almost half of the co-morbidities are of Hepatobiliary diseases such as 2 cases of Cholecystolithiasis and 2 cases of Choledochal cyst s/p excision. There were 2 oncologic cases (Acute Lymphoblastic Leukemia and Ewing's sarcoma), 2 neurologic conditions (Epilepsy) and 1 cardiac case (Atrial Septal Defect s/p repair).

Majority of the cases (n=12, 42%) had no recognized cause for pancreatitis and was classified as Idiopathic. There were 6 cases (21%) caused by Biliary diseases such as choledochal cyst, cholecystolithiasis and cholelithiasis. Another 6 cases (21%) were associated with infection such as mumps in 2 cases, intestinal parasitism, urosepsis and pneumonia. There was one case each with associated drug intake (Valproic acid), alcohol binge, metabolic (hypertriglyceridemia), and a multisystemic disease (febrile neutropenia, multiorgan involvement).

Radiographic Presentation

Twenty-four of cases had at least one imaging technique done. Of those with radiologic investigation, majority had ultrasonography, two cases had a computed tomography scan and one had both imaging modality done.

Out of the 24 imaging studies done, nine had normal findings. Half had findings suggestive of pancreatitis. Most common finding noted was that of an edematous/thickened/prominent pancreas seen in 8 cases. Biliary diseases (cholecystitis, cholelithiasis, cholecystolithiasis), were seen in 5 cases. Other findings were pancreatic or peripancreatic pseudocyst seen in 3 cases and a finding of phlegmonous pancreas.

Complications and severity of Acute Pancreatitis and associations with clinical factors, biochemical, radiographic presentation and management

Complications in Acute Pancreatitis were classified as either local or systemic complications [8]. Local complications involve the development of peri- or pancreatic complications including fluid collections or necrosis. Based on the imaging done, there were 7 cases with local complications including 3 cases each of pseudocysts and peripancreatic fluid collections and a case of phlegmonous pancreas. On the other hand,

systemic complications are defined as exacerbations of previously diagnosed co-morbid disease. In this study, there was one case of Acute Lymphocytic Leukemia who developed Febrile Neutropenia, pleural effusion and sepsis. .

Table 2. Association of clinical, biochemical, radiographic factors with severity of disease

	Mild Acute Pancreatitis (n=20)	Non-mild Acute Pancreatitis (n=8)	Total	p value
Age group, n(%)				
3-10 years old	8 (40%)	3 (38%)	11 (39%)	1.000
11- 18 years old	12 (60%)	5 (62%)	17 (61%)	
Gender, n(%)				
Male	12 (60%)	3 (38%)	15 (54%)	0.410
Female	8 (40%)	5 (62%)	13 (46%)	
Nutritional status, n(%)				
Normal	9 (45%)	4 (50%)	13 (46%)	0.356
Overweight & Obese	6 (21%)	4 (50%)	10 (25%)	
Moderate and Severe wasting	5 (18%)	0	5 (11%)	
Presence of co-morbidities, n(%)	4 (20%)	5 (62%)	9 (32%)	0.068
Etiology, n(%)				
Idiopathic	10 (50%)	2 (25%)	12 (44%)	0.919
Biliary disease	4 (20%)	2 (25%)	6 (21%)	
Infection	5 (25%)	1 (13%)	6 (21%)	
Metabolic	1 (5%)	0 (%)	1 (4%)	
Multisystem disease	1 (5%)	0 (%)	1 (4%)	
Medication	1 (5%)	0 (%)	1 (4%)	
Alcohol	1 (5%)	0 (%)	1 (4%)	
Laboratory				
Amylase elevation, as median	3.9	5.15	n=24	0.5401
Lipase elevation, as median	12.4	8.25	n=21	0.2935
Imaging, n(%)				
Normal	9 (45%	0	9 (32%)	**0.012**
Findings suggestive of pancreatitis*	6 (30%)	6 (75%)	12 (43%)	
Findings pertaining to other organ+	1 (5%)	2 (25%)	3 (11%)	
***Findings suggestive of pancreatitis**				
• Edematous/prominent/ enlarged	6 (30%)	2 (25%)	8 (29%)	0.667
• Fluid collections, pseudocyst, phlegmon	0	6 (75%)	6 (21%)	**0.000**
+Findings pertaining to other organ				
• Gallstones	1 (5%)	4 (50%)	5 (18%)	**0.028**
• Fatty liver	1 (5%)	3 (37%)	4 (14%)	0.091
• Ascites	2 (10%)	2 (25%)	4 (14%)	0.578
Timing of initiation of feeding, n(%)				
Early feeding	15 (75%)	5 (63%)	20 (71%)	1.000
Late feeding	5 (25%)	3 (37%)	8 (29%)	
Length of hospital stay (median, in days)	6	11.5		0.078
Outcome, n(%)				
Clinical improvement with complete resolution	11 (55%	5 (63%)	16 (57%)	0.662
Clinical improvement without incomplete resolution	9 (45%)	2 (25%)	11 (39%)	
Mortality	0	1 (12%)	1 (4%)	

Majority of the cases were classified under Mild AP (n=20, 71%), while one-fourth was Moderately Severe AP (n=7, 25%) and only one has Severe AP (n=1, 4%). Since only one case of severe AP was noted in this study, grouping was described as being Mild or Non-mild AP, with Non-mild AP being those Moderately Severe and Severe AP. Table 2 showed that age group, sex, nutritional status, presence of co-morbidities, etiology, biochemical presentation, timing of initiation of feeding, length of hospital stay and outcome were not

significantly associated with severity. There was significant association in terms of imaging classification as normal, with findings indicating pancreatitis, and findings pertaining to other organs among mild and non-mild Acute Pancreatitis (p=0.012).

Looking into the individual imaging findings showed a statistically significant association between presence of peri-/pancreatic fluid collections/pseudocyst/ phlegmon (p=0.000) and the presence of gallstones (p=0.028) and severity. Regression analysis was not done due to a small size, that joint effect of variation may be accurately assessed.

Table 3. Association of clinical, biochemical, radiographic factors with outcome of clinical improvement with complete and incomplete enzymatic/radiologic resolution

	Clinical improvement on discharge		Total N=27	p value
	Complete resolution (n=16)	Incomplete resolution (n=11)		
Age group, n(%)				
3-10 years old	3 (19%)	7 (64%)	10 (37%)	**0.040**
11- 18 years old	13 (81%)	4 (36%)	17 (63%)	
Gender, n(%)				
Male	9 (56%)	6 (55%)	15 (56%)	1.000
Female	7 (44%)	5 (45%)	12 (48%)	
Nutritional status, n(%)				
Normal	9 (56%)	4 (36%)	13 (48%)	0.599
Overweight & Obese	4 (25%)	5 (45%)	9 (33%)	
Moderate and Severe wasting	3 (19%)	2 (18%)	5 (19%)	
Presence of co-morbidities, n(%)	4 (25%)	5 (45%)	9 (33%)	0.411
Etiology, n(%)				
Idiopathic	7 (44%)	4 (36%)	11 (41%)	0.743
Biliary disease	4 (25%)	2 (18%)	6 (22%)	
Infection	3 (19%)	3 (27%)	6 (22%)	
Metabolic	1 (6%)	0	1 (4%)	
Multisystem disease	1 (6%)	0	1 (4%)	
Medication	0	1 (9%)	1 (4%)	
Alcohol	0	1 (9%)	1 (4%)	
Laboratory				
Amylase elevation, as median	6.05	3.15	n=23	0.1014
Lipase elevation, as median	10.5	12.4	n=21	0.8493
Imaging, n(%)				
Normal	5 (31%)	4 (36%)	9 (33%)	0.418
Findings suggestive of pancreatitis*	9 (56%)	3 (27%)	12 (44%)	
Findings pertaining to other organ+	2 (13%)	0	2 (7%)	
Timing of initiation of feeding, n(%)				
Early feeding	8 (50%)	6 (55%)	14 (52%)	1.000
Late feeding	8 (50%)	5 (45%)	13 (48%)	
Length of hospital stay (median, in days)	6	9		0.240
Severity, n(%)				
Mild	11 (69%)	9 (82%)	20 (74%)	0.662
Non-mild	5 (31%)	2 (18%)	7 (26%)	

Associations of clinical factors, biochemical, radiographic presentations and management with outcome on discharge

More than half (n=16, 57%) of the cases were discharged with clinical improvement and complete enzymatic and/or radiologic resolution. Thirty-nine percent (n=11) was discharged with incomplete resolution, while 1 has died. Thus, in this study, mortality rate was computed at 3.6%.

The remaining 27 cases was discharged clinically improved. Comparison of clinical, biochemical, radiographic factors and management trends of clinically improved cases upon discharge among those with complete resolution and incomplete resolution of enzymatic and/or radiologic parameters was shown in Table 3. The associations between the factors: sex, nutritional status, presence of co-morbidities, etiology, biochemical parameters, imaging findings, timing of initiation of feeding, length of hospital stay and severity (as mild and non-mild) with having complete versus incomplete enzymatic/radiologic resolution among those with clinical improvement were not statistically significant. There was statistically significant difference between age group and the type of clinical improvement outcome with a p-value of 0.040. However, regression analysis was not done due to a small size since joint effect of variation may be accurately assessed.

DISCUSSION

This study reviewed the cases of Pediatric Acute Pancreatitis admitted in a tertiary institution over a period of 18 years. Out of the initial 35 cases, 15 cases or 43% were noted in the first half of the study period (2000-2008) and the remaining 57% during 2009-2017 representing a 33% rise of admitted cases of AP over the specified period. Studies worldwide have reported an increasing incidence of pancreatitis in both children and adults which may reflect a true rise in number or due to increased awareness of the disease [1,7, 9,10]. Locally, Dizon et al observed this increased incidence of pancreatitis in children ≤18 years old in a tertiary referral medical center showing only 5 cases seen from 2000-2004, to 23 cases from 2005-2009 [5].

Twenty-eight cases of Acute Pancreatitis were reviewed. Age ranges from 4 years old to 18 years old, with a mean age was 11. 5 years old +/- 4.1 SD. Age groups was stratified based on a cohort study by Park, et al [11], as infancy, childhood and adolescence period. In this study, no reports from the infancy period was seen. This is important to note, since infants manifest fewer classical signs and symptoms on presentation and less likely to present with pancreatic enzyme elevations [11] making diagnosis challenging and thus a high index of suspicion is always warranted. In agreement with the large cohort study by Park [11], most of the cases were of the adolescent age group. There was a slight predominance of male sex (1.2:1) in this study. More than half of cases had malnutrition, comprising mostly of overweight and obese children. Obesity is a known risk factor of pancreatitis in adults [12,13,14]. In addition to increasing risk of cholesterol gallstones formation and gallstone-related complications, the severity of the disease is higher in obese patients because of specific pathogenic factors, including supersaturated bile and crystal formation, rapid weight loss and visceral obesity [15]. A study by Pathak [16] in Hispanic-American children in 2016 found that obesity and overweight was 7-fold and 6-fold (respectively) likely with pancreatitis as compared to non-cases. In this study however, there was no statistically significant difference between nutritional status as well as sex between the two age groups.

Clinical presentations seen in this study agreed with most of the known data available [9]. Abdominal pain as the presenting symptom was seen in 93% of the cases, in agreement with the proportion noted in a review by Bai et al of 80-95% [9]. In the remaining cases, vomiting was the presenting symptom, although half of the cases presenting with abdominal pain had associated vomiting as well. No reports of bilous vomiting, abdominal distension nor signs of mechanical obstruction was seen in this study. Symptoms of jaundice and fever were seen which were related to a co-morbid condition such as gallstones and mumps, respectively.

In one-third of the admissions, a co-morbid condition was present. This will lead to further exploration of possible drug-related pancreatitis in oncologic and neurologic conditions, or biliary-related pancreatitis in those with hepatobiliary conditions. Hepatobiliary diseases comprised majority of the co-morbidities. There were 2 cases of choledochal cyst s/p excision who both presented with abdominal pain without fever, jaundice, nor vomiting. The two other cases had gallstones with obstructive jaundice.

As reported by a review by Bai et al, etiology in children are more diverse as compared to adult population. The top three causes of AP in this study were Idiopathic (43%), Biliary diseases (21%) and Infection (21%). Biliary tract disease or obstruction caused by gallbladder sludge, gallstones or tumors comprised 10-30% of the etiology in acute pancreatitis in children [9]. In this study, there were 6 cases of biliary disease seen, two with choledochal cyst s/p excision and hepaticoduodenostomy, and the rest with gallstones. As mentioned, gallstones are known to cause pancreatitis and is one of the most common causes of pancreatitis in adults and is related to obesity as well. In children, however, causes of gallstones vary widely, with obesity, hemolytic anemia, biliary duct anomaly,

infection, ileal disease to name a few [15]. In this study, out of the 4 cases of gallstones, only 1 was associated with overweight. No anatomic abnormality was noted based on the limited imaging done, nor other possible causes of gallstone disease was noted in the chart. Pancreatitis is one of the possible late complications of choledochal cysts post excision due to occurrence of post anastomotic strictures [17]. In pediatric pancreatitis, 13-34% would have no recognized cause and be classified as idiopathic [9]. In this study, almost half were classified as idiopathic. This is one of the major limitations of a retrospective study, since further inquiry on possible etiology available to us currently may not done. The local study by Dizon, et al, reported as well, a high percentage of idiopathic cause (39%) [5]. Six cases (21%) were associated with infection such as mumps in 2 cases, intestinal parasitism, urosepsis and pneumonia. As mentioned in the review by Bai, et al, it was difficult to establish temporal relationship between the infection and occurrence of pancreatitis. Certain medications are known to cause pancreatitis. In this study, one case of generalized epilepsy who was on valproic acid developed pancreatitis. Valproic acid has the highest rate reported in a series of pediatric pancreatitis [15], although no clear mechanism has been delineated for such [9]. Moderate hypertriglyceridemia was noted in one case with triglyceride level of 2.39 mmol/L. A multisystemic disease of Acute Lymphocytic Leukemia with febrile neutropenia, sepsis and multiorgan dysfunction was seen in one case. Lastly, one case of alcohol-induced pancreatitis of an 18-year-old male with history of daily alcohol binge from 6 days prior to appearance of symptom and admission. In children, hereditary causes comprised 5%-8% of cases with genetic mutations of the cationic trypsinogen gene (PRSS1), the pancreatic secretory trypsin inhibitor gene (SPINK1), and the cystic fibrosis transmembrane conductance regulator gene (CFTR) which are all involved in the pathogenesis of pancreatitis [9]. Genetic testing for this, however, is not available locally. It remains to be determined to what extent these mutations are involved in those with idiopathic causes. It is important to note that compared to most data on etiology of pediatric pancreatitis, both local and foreign, trauma cases which comprised 10-40% of etiology, were not seen in this study. This is probably due to the proximity of our institution to a trauma center where cases of trauma-induced pancreatitis are possibly redirected.

One of the criteria for diagnosis of Acute Pancreatitis is the amylase and lipase elevation of at least 3 times the upper limit of normal [6]. In this study, median elevation of lipase (11.3 times elevated) was higher than amylase elevation (4.2 times elevated). Lipase is a known to stay elevated longer than amylase and is useful in cases of delayed presentation. Several correlation studies of the pancreatic enzymes showed its poor predictive value for severity of disease [18]. In this study, a wide range of elevation levels were noted for both enzymes (amylase: 1-28.9 times elevated and lipase 1 – 78.6 times elevated). Levels were compared in between groups, Mild vs Non-mild severity, and outcome, but found to have no statistically significant difference (tables 2 and 3). Thus, amylase and lipase use are purely for establishing diagnosis.

Another criterion for diagnosis is the radiographic findings suggestive of pancreatic inflammation. Although not routinely done [18], imaging provides information on possible etiology such as gallstones (as seen in 5 cases, 21%) and complications, such as pseudocysts (seen in 3 cases, 21%). In this study, majority had imaging done, most common is ultrasonography. This is particularly acceptable as an initial tool in pediatric pancreatitis since no exposure to ionizing radiation is done and is widely available [9]. It additionally provides information on multiple causes of an acute abdomen such as volvulus and intussusception. However, the disadvantage of being operator dependent and overlying bowel case or an obese patient can obscure investigation on the pancreas. Contrast enhanced computed tomography (CECT) remains the criterion standard for diagnostic imaging in pancreatitis [18] but indication may vary since radiation exposure and need to sedation are limiting considerations in the pediatric population. In this study, only 3 or 10% underwent CECT. Other imaging modalities, such as magnetic resonance imaging, magnetic resonance cholangiopancreatography, were not observed in this study.

Recurrence of pancreatitis episodes in children has been known to occur in 15%- 35% of children after an initial episode [18]. However, it was only in 2012 when a consensus definition of Pediatric-onset Acute Recurrent Pancreatitis (ARP) has been published [6]. In this study, there were 5 cases classified as Acute Recurrent Pancreatitis based on this consensus definition. Recurrence rate was 17.8%. As mentioned, these 5 cases reflected 4 patients, since 2 of the cases here were of the same patient. Majority was female, adolescent and of normal nutritional status. 2 cases were of idiopathic cause, one associated with infection, and the last 2 cases were of the same patient who had gallstones. Additional data on children are being gathered by the INSPPIRE

(INternational Study group of Pediatric Pancreatitis: In search for a cuRE) cohort to know more of the natural history of the disease, progression of ARP to Chronic Pancreatitis as well as factors affecting it. Uc, et al recently published their findings on the impact of obesity on Pediatric ARP and Chronic Pancreatitis based from the INSPPIRE cohort. They found out that compared with children with normal weight, obese or overweight children were older at first acute pancreatitis episode and diagnosed with Chronic pancreatitis at an older age and thus seems to delay the initial acute pancreatitis episode and diagnosis of CP compared with normal weight or underweight [14].

In this study, the median length of hospital stay in acute pancreatitis in children was 8 days. This agrees with the reported median hospitalization length in large studies abroad of 5 to 8 days [6]. Management of pediatric pancreatitis centers on fluid hydration, pain control and optimal nutritional support. Recently, a recommendation on the management of acute pancreatitis in the pediatric population was recently published by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) Pancreas Committee [18].

Bowel rest or putting the patient on NPO (*nil per os*) has traditionally been the conventional practice in pancreatitis in the aim of suppressing pancreatic enzyme secretion thus healing pancreas more rapidly. However, recent evidences have consistently demonstrated that this approach may lead to increased risk of infectious complications coming from bacterial overgrowth and translocation the gut and thereby resulting to higher morbidity and mortality in cases of severe acute pancreatitis [19]. Recognizing this, the NASPGHAN Pancreas committee recommended that children with mild acute pancreatitis may be benefit from early feeding (within 48 to 72 hours) either by oral or enteral means to decrease length of hospital stay and risk of organ dysfunction [18]. In this study, 24 of the 28 cases was initially on NPO, with a mean length of NPO at 2.9 days. Thus, majority (54%) was started on early feeding as defined in this study, as within 3 days. Contraindications to use the gut should be recognized such as ileus, complex fistulae and abdominal compartment syndrome, thus for these cases, a parenteral nutrition should be considered [18]. In our study, parenteral nutrition was given in 2 of the cases only, although none of these contraindications were noted from the review of charts.

Although, pediatric acute pancreatitis generally follows a mild course, there is a proportion of 15% to 34% that develops into a severe form [20,21]. The natural course of AP in children is still being investigated more closely in the INSPPIRE cohort, and no good predictor score system is available for children [16], it was important that severity classification specifically for children be defined. Thus, a classification system was recently published by the NASPGHAN Pancreas Committee in 2017 [8]. In this chart review, based on this classification, there were 20 cases (71%) had mild disease, there were 7 cases (25%) with moderately severe and only one (4%) who developed persistent organ dysfunction who was classified as severe. Looking at the clinical and biochemical factors, no statistically significant difference was seen between the group of mild versus non-mild group (which consists both of moderately severe and severe pancreatitis). The radiographic findings among the 2 groups was statistically significant with a p value of 0.012. Local complications such as findings of necrosis, pseudocysts and other fluid collections are part of the criteria for moderately severe acute pancreatitis and hence reflected on the analysis, with no normal imaging findings seen on non-mild cases. Findings of enlarged or edematous pancreas were both seen among the two severity groups and has no statistically significant difference among them (p=0.667). Findings pertaining to other organs, such as gallstones, ascites and fatty liver were also seen in both groups. Presence of gallstones occurred more frequently in the non-mild group at 50% compared to the mild group at 5% and this difference was statistically significant with p value of 0.028. Further sub analysis was not done due to the small sample size that joint effects of variation will not assessed accurately. The timing of initiation of feeding, length of hospital and outcome did not produce a statistically significant difference between mild and non-mild groups.

Outcome is highly dependent on the severity with those with severe forms leading to mortality [20,21]. In this study, only one case died, with mortality rate of 3.6% which agrees with the available data ranging from 3 – 11% [15]. The single mortality was an 8-year-old female, obese, without any other known co-morbid conditions who presented with a 2-day history of severe abdominal pain and vomiting who was classified as severe acute pancreatitis. No other co-morbid condition was noted, and no trauma nor drug intake use seen on review. The only risk factor seen was obesity and on ultrasonography done 2 days prior to admission to this institution, showed only fatty liver and ascites. Of all the cases included in this study, only this case had surgical intervention

with an initial impression of acute appendicitis. However, intraoperative findings showed hemorrhagic peritoneal fluid with noted fat saponification at the omentum and mesenteric wall. Post-operative diagnosis was hemorrhagic pancreatitis. Post operatively, the patient continued to decline with persistence of multi-organ failure. Although no evidence of pancreatic necrosis was seen on an initial imaging finding, ultrasonography has low sensitivity in detecting areas of necrosis for which a contrast-enhanced computed tomography would be indicated. Adult literature suggests that early intervention in pancreatic necrosis leads to increased morbidity and mortality and hence preferably be delayed for at least 4 weeks from presentation. Indications for acute surgical intervention include abdominal trauma where patient instability and/or search for associated injury to other organs is occurring [18].

In terms of the other clinical outcome seen, clinical improvement was further subclassified into those with complete (enzymatic and/or radiologic) resolution and those with complete (enzymatic and/or radiologic) resolution. Although a repeat pancreatic enzyme determination and imaging is not routinely done, most had repeat measurements of enzymes until they are within acceptable level before discharge. Sixteen cases or 59% were noted with complete resolution while the remaining were discharged with one or both enzymes not yet returning to levels below 3 times the upper limit. Sex, nutritional status, presence of co-morbidities, etiology, imaging findings, timing of feeding, hospitalization length nor severity were not statistically significant between the 2 types of clinical improvement outcomes. However, age was noted to have statistically significantly difference of p value 0.04 among those discharged with complete resolution compared to those with incomplete resolution. Further regression analysis was not done due to small sample size that joint effects of variations will not be accurately assessed.

CONCLUSION

Acute pancreatitis in the pediatric population has been gaining more recognition in the past decade approaching an incidence of that in the adult population. However, there is much to learn in the natural course and severity predictors in the pediatric pancreatitis. Large multi-centered studies and database, consensus definitions, severity classification which were done in the recent years were the initial steps taken towards understanding pediatric pancreatitis. Acute Pancreatitis was identified in 28 admissions during an 18-year period. It presented more commonly in the adolescent age group, with slight male predominance, of normal nutritional status and with no recognizable cause (idiopathic). In this study, the recent consensus definitions and severity classifications were utilized to compare groups and to check for possible associations. Of the factors included, imaging findings (i.e. gallstones) and the 3-10 years old age group were found have statistically significant difference in terms of having a mild vs non-mild severity classification and type of clinical outcome on discharge, respectively. These factors should be considered closely during management of pediatric acute pancreatitis.

As limitation of a retrospective chart review, further inquiries on additional pertinent findings on history and laboratory parameters to explore cannot be made. The small sample size restrained from executing further analysis that will be of value. A multi-center study on the incidence and clinical profile and outcome is recommended to obtain a better picture of the acute pancreatitis in Filipino children to help clinicians in recognizing and decreasing the morbidity and mortality of this disease.

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