CASE REPORT

COVID-19 Associated Multisystem Inflammatory Syndrome in Children Presenting as Acute Necrotizing Pancreatitis with Walled-off Pancreatic Necrosis (WOPN)

Priti Vijay[1], Raj Kumar Gupta[2], Anshul Madaan[3], Manohar Lal Gupta[4]

Received on: 19 September 2021; *Accepted on:* 11 November 2021; *Published on:* 30 June 2023

Abstract

Aim and objective: To highlight the importance of looking for multisystem inflammatory syndrome in children (MIS-C) as an etiology of pancreatitis in children.

Background: MIS-C is a newly recognized, potentially serious illness in children related to COVID-19. MIS-C has varied symptoms that affect several organ systems in body. Many children have symptoms resembling Kawasaki disease. Some children have signs of excessive blood clotting, gastrointestinal symptoms, kidney injury, or neurological symptoms. To date, very few cases have been reported with acute pancreatitis with SARS CoV-2 infection in children and only two cases with subsequent inflammatory syndrome.

Case description: A 12-year old male child with severe necrotizing pancreatitis managed with IVIg and I/V methylprednisolone, which later on developed walled-off pancreatic necrosis (WOPN) required surgical intervention.

Conclusion: It is important to look for etiology of pancreatitis and in present era MIS-C is important cause. Clinicians should always search for this etiology as management is entirely different from other causes of pancreatitis.

Clinical significance: We describe first case of necrotizing pancreatitis with walled-off pancreatic necrosis requiring surgical intervention associated with MIS-C. Management required IVIg and/ or steroids which is entirely different from pancreatitis associated with other etiologies.

Keywords: MIS-C, Necrotizing pancreatitis, Walled-off pancreatic necrosis.

Pediatric Infectious Disease (2023): 10.5005/jp-journals-10081-1340

Introduction

COVID-19 is increasingly recognized to have a protean range of clinical manifestations, from mild respiratory illness to hyper-inflammatory and coagulopathic complications, as well as a broad spectrum of disease severity. When the epidemic began case reports of pediatric illness were relatively rare, and almost all children had mild clinical courses.[1] A growing number of reports now described a severe inflammatory syndrome in children named Multisystem Inflammatory Syndrome in Children (MIS-C), which can range from mild febrile illness to Kawasaki disease like presentation to severe illness like multi-organ dysfunction, shock, myocarditis and might lead to death.[2] MIS-C defined by Centers for Disease Control and Prevention (CDC) as a condition where different body parts can become inflamed, including the heart, lungs, kidneys, brain, skin, eyes, or gastrointestinal organs.[3] Although gastrointestinal symptoms are common at time of MIS-C presentation, however acute pancreatitis (AP) at presentation is limited to few case reports only. Few case reports are there in literature showing association of SARS-CoV-2 with pancreatitis in children, but only 2 case reports subsequent inflammatory syndrome.[4–6] Here, we describe first case of necrotizing pancreatitis with walled of pancreatic necrosis requiring surgical intervention with MIS-C.

Clinical Description

A 12-year old obese (BMI 95 percentile) male child presented to emergency with complaint of diffuse nonradiating abdominal pain 4 days before admission followed by daily fever of 100.4° F with nonbilious emesis and anorexia. Pain tends to decrease in leaning forward position. Other associated features include decreased urine output, abdominal distension, edema over feet, and respiratory distress. He had no history of COVID-19 contact, but his father tends to go outside regarding his work with no history of abdominal trauma. On presentation he had fever, tachycardia, and tachypnea. His vitals were temperature 101° F, HR 120/minute, RR 32/minute, BP 88/60 mmHg, room air saturation of 84%, and with oxygen (5 L/min) it was 94%, with decreased air entry in bilateral infra-axillary region. He had abdominal distension, epigastric tenderness, moderate ascites, hepatosplenomegaly along with discoloration of flanks (Grey Turner's sign), so a suspicion of acute pancreatitis was kept. Soon after admission, he had worsening of respiratory distress and developed multi-organ dysfunction,

[1-4]Department of Pediatrics, SMS Medical College, Jaipur, Rajasthan, India

Corresponding Author: Raj Kumar Gupta, Department of Pediatrics, SMS Medical college, Jaipur, Rajasthan, India, Phone: +91 9414054040, e-mail: rkguptadr@hotmail.com

How to cite this article: Vijay P, Gupta RK, Madaan A, *et al.* COVID-19 Associated Multisystem Inflammatory Syndrome in Children Presenting as Acute Necrotizing Pancreatitis with Walled-off Pancreatic Necrosis (WOPN). Pediatr Inf Dis 2023;5(2):60–62.

Source of support: Nil

Conflict of interest: None

Patient consent statement: The author(s) have obtained written informed consent from the patient's parents/legal guardians for publication of the case report details and related images.

decreased urine output and hypotension, managed with fluid boluses, no inotropic support was needed. He was urgently transferred to pediatric intensive care unit (PICU).

Management and Outcome

In PICU, high flow oxygen (15 L/minute) via nasal cannula was started along with all supportive treatment viz. IV fluids, antibiotics, and analgesics. His blood investigations are shown in Table 1. Etiological evaluation for pancreatitis was normal. Triglycerides 120 mg/dL, calcium 9 mg/dL, there was no gallstones in USG abdomen and no gross structural abnormality. No history of pancreatitis in family. SARS-CoV-2 PCR (swab from nasopharynx) was negative. Workup for scrub typhus, dengue fever, and malaria was negative. Blood and urine culture were sterile after 72 hours of incubation. Contrast enhanced computerized tomography (CECT) abdomen was suggestive of acute necrotizing pancreatitis and peripancreatic fluid collection with CT severity score index (CTSI) of 10/10. CECT thorax revealed large patch of consolidation in bilateral lower lobes with bilateral pleural effusion. In view of persistent tachycardia, hypotension, and higher oxygen requirement, panel of inflammatory markers were sent as shown in Table 2.

Due to hyperferritinemia, elevated ESR, CRP, LDH and d-dimer, possibility of MIS-C was high so SARS-COV antibodies were sent which came out to be positive (89.60 AU/ml). Diagnosis of MISC with severe acute pancreatitis was confirmed as per CDC criteria and he was started on IVIg in a dose of 2 g/kg over 48 hours and Intravenous (I/V) methylprednisolone (2 mg/kg/day) on which he showed gradual improvement and weaned off from oxygen. Edema decreased and increase in urine output was noticed. He was allowed to take oral sips of water on day 4 and gradually diet was increased to which patient shows tolerance. I/V Methylprednisolone (MPS) was tapered after 7 days and he was shifted to oral MPS and discharged on day 12.

On follow up his USG scans were showing necrotizing collection. Initially he was managed conservatively and kept under close follow up. After 6 weeks he readmitted with pain abdomen, recurrent nonbillious vomiting, and early satiety with significant weight loss of 5 kg. USG abdomen revealed large necrotizing collection in pancreas compressing stomach with debris inside. CECT abdomen showed walled-off pancreatic collection of size 15X13 cm with necrotic collection, creating compression over stomach and splenic vein but the wall was not very well formed. In view of significant weight loss, recurrent vomiting, and severe pain abdomen (not responding to analgesics), decision with surgical management was considered.

Pancreatic necrosectomy followed by cystogastrostomy was done by gastroinstestinal surgeons. Child improved clinically and hemodynamically, feeding was reinitiated on day 3 and he was discharged on day 5. Now on further follow-ups he was doing well.

Discussion

According to current guidelines, the diagnosis of acute pancreatitis requires at least two of three following signs (1) abdominal pain, (2) amylase or lipase > 3 times the upper limit of normal limit,

Table 1: Hematological and biochemical evaluation

Tests	*D1*	*D3*	*D5*	*D7*	*D9*	*D11*
TLC (*10^3/CUMM)	12.51	14.87	15.4	16.1	11.8	10.7
Neutrophils (%)	78.7	79		81		75
Lymphocytes (%)	9.2	12		8		21
Hemoglobin (gm/dL)	11.9	10.4	9.9	9.4	10.2	10.3
Hematocrit	34.1	29.3	29.5	27.4	29.3	32
Platelet (*10^3/CUMM)	179	234	323	404	476	532
Amylase	262		147	59	53	41
Lipase	287		156	23	86	46
Urea	12		22	20	16	15
Creatinine	0.52		0.83	0.5	0.30	0.30
AST/ALT	110/121		90/82	30/13		32/28
Albumin (g/dL)	2.7					2.9
INR	1.3		1.28			1.27
SE (Na^+,K^+,CL^+)	132/4.1/98		135/3.7/ 99			136/4.2/102

TLC, Total leukocyte count (mm^3); AST, Aspartate amino transferase (IU/L); ALT, Alanine aminotransferase (IU/L); INR, International normalized ratio; SE, Serum electrolyte (meq/L)

Table 2: Inflammatory marker's panel

Tests	*Day 3*	*Day 7*	*Day 11*
ESR	110	75	30
CRP (mg/L)	98	56	26
Ferritin (ng/ml)	652.3	314.1	342.3
D-dimer (mcg/ml)	7.89	3.15	2.407
LDH	1,102	1,067	584

ESR, Erythrocyte sedimentation rate (1st hour); CRP, C-reactive protein; LDH, Lactate dehydrogenase

and (3) characteristic findings on diagnostic imaging.[7] Previous studies have reported acute inflammation in pancreas due to human immunodeficiency virus, cytomegalovirus,coxsackievirus B, and influenza virus. The overall incidence of viral pancreatitis is unknown.[8] Our case is first documented case of pediatric acute necrotizing pancreatitis with rare surgical complication in form of WOPN related to MIS-C in India. Few cases have described in literature showing association of mild pancreatitis with SARS-CoV infection but only two cases have been reported so far with subsequent inflammatory syndrome. In a case report from Atlanta 10-year-old child with moderately severe pancreatitis managed with IVIg[5] and another report of India in which 14 months old girl developed necrotizing pancreatitis, managed with IVIg.[6] In our case presentation with fever, elevated inflammatory markers, and multisystem organ involvement with concurrent SARS-CoV infection is consistent with diagnosis of MIS-C, as defined by CDC.[3] Our patient managed with IVIg and steroids along with standard management guidelines of pancreatitis. The association between AP and SARS-CoV-2 is not well understood. Several potential mechanisms of injury are possible. Viral infections, including the coronavirus family, account for 10% of idiopathic AP. Angiotensin-converting enzyme 2 is the human receptor for coronaviruses, including both the 2003 SARS-CoV strain and the current SARS-CoV-2 strain.[9] Angiotensin-converting enzyme 2 is widely expressed in epithelial tissues including the pancreas, and autopsy data from the 2003 SARS- CoV outbreak detected viral RNA polymerase in pancreatic acinar cells.[10] Thus, direct viral invasion with cytopathic effect is a potential cause of pancreatic injury. Another possible mechanism for pancreatic injury in MIS-C is the systemic inflammatory response. Many patients with COVID-19 are sedated or mechanically ventilated, precluding evaluation of pancreatitis symptoms. In one report, 7.5% of such patients had inflammatory changes in the pancreas on abdominal CT, suggesting that pancreatitis may be under-recognized.[11]

Conclusion

The progression to MIS-C with pancreatitis can be more rapid and severe than what is typically seen in severe pancreatitis. We have described a case of acute severe pancreatitis with WOPN needing surgical intervention showing the gravity of complication. As we learn more about SARS-CoV-2 and how it affects children, pediatric gastroenterologists, and pediatricians must maintain a high index of clinical suspicion for its presence in patients who present with AP or other significant gastrointestinal symptoms.

Management of pancreatitis with MIS-C is entirely different without MIS-C. Pancreatitis with MIS-C needs management with steroids and/or IVIg, which will create awareness amongst pediatricians and pediatric gastroenterologist about this complication in current scenario of COVID and MIS-C.

Clinical Significance

This case report emphasizes the importance of MIS-C as an etiology of pancreatitis and its progression can be more rapid and severe. Pediatricians must maintain a high index of clinical suspicion for MIS-C in children with pancreatitis in present era. Management of pancreatitis with MIS-C is entirely different without MIS-C. Pancreatitis with MIS-C needs management with steroids and/or IVIg, which will create awareness amongst pediatricians and pediatric gastroenterologist about this complication in current scenario of COVID and MIS-C. WOPN is though rare complication in children but associated with significant morbidity, so long term follow up in necessary.

Orcid

Priti Vijay https://orcid.org/0000-0003-1130-116X
Raj Kumar Gupta https://orcid.org/0000-0002-7177-9184

References

1. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China Pediatrics 2020;145(6):E20200702. DOI: 10.1542/peds.2020-0702
2. Cheung KS, Hung IFN, Chan PPY, et al. Gastrointestinal manifestations of SARS-CoV-2 infection and virus load in fecal samples from a Hong Kong cohort: systematic review and meta-analysis. Gastroenterology 2020;159(1):81–95. DOI: 10.1053/j.gastro.2020.03.065
3. Centers for Disease Control and Prevention. 2021. Multisystem Inflammatory Syndrome in Children (MIS-C). [online] Available at: https://www.cdc.gov/mis-c/index.html [Accessed 1 June 2021]. DOI: 10.1016/j.nurpra.2021.05.008
4. Sanchez RE, Flahive CB, Mezoff EA, et al. Caseh COVID-19 report: acute abdominal pain as presentation of pneumonia and acute pancreatitis in a pediatric patient wit. JPGN Rep 2020;2(1):e011. DOI: 10.1097/PG9.0000000000000011
5. Stevens JP, Brownell JN, Freeman AJ, et al. COVID-19-associated multisystem inflammatory syndrome in children presenting as acute pancreatitis. J Pediatr Gastroenterol Nutr 2020;71(5):669–671. DOI: 10.1097/MPG.0000000000002860.
6. Bana SK, Deswal S, Mohan N. Acute severe necrotizing pancreatitis: a manifestation of multisystem inflammatory syndrome in children? Indian Pediatr Case Rep 2021;1(1):162–165. DOI: 10.4103/ipcares.ipcares_182_21
7. Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis-2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013;62(1):102–111. DOI: 10.1136/gutjnl-2012-302779
8. Lankisch PG, Apte M, Banks PA. Supplementary appendix: acute pancreatitis. Lancet 2015;386(9988):85–96. DOI: 10.1016/S0140-6736(14)60649-8.
9. Wan Y, Shang J, Graham R, et al. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. J Virol 2020;94(7):e00127–20. DOI: 10.1128/JVI.00127-20
10. Ding Y, He L, Zhang Q, et al. Organ distribution of severe acute respiratory syndrome (SARS) associated coronavirus (SARS-CoV) in SARS patients: implications for pathogenesis and virus transmission pathways. J Pathol 2004;203(2):622–630. DOI: 10.1002/path.1560
11. Liu F, Long X, Zhang B, et al. ACE2 expression in pancreas may cause pancreatic damage after SARS-CoV-2 infectionClin Gastroenterol Hepatol 2020;18(9):2128–2130.e2. DOI: 10.1016/j.cgh.2020.04.040