

Case Report

Co-presentation of diabetic ketoacidosis and hepatitis an infection with anasarca: a case report

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ABSTRACT

Diabetic ketoacidosis is the common initial presentation of Type 1 Diabetes Mellitus in paediatric practice. Hepatitis A infection is a common cause of jaundice in children with varied constitutional symptoms. However, co-presentation of diabetic ketoacidosis and hepatitis A infection with anasarca is rare. One four-year-ten-month-old male child presented to the emergency department of our hospital with diabetic ketoacidosis with new-onset Type 1 diabetes mellitus. At the time of presentation, the blood sugar level was in the diabetic range, 677 mg% laboratory value and was suggestive of diabetes mellitus. The HbA1c level was 14.47% at that time; however, there was no history of the classical triad of polyuria, polydipsia and polyphagia in the child. The child presented with mild acidosis (pH 7.3) and responded to the Milwaukee regimen of DKA management. During the course of the management, the child developed clinical jaundice on the 5th day of hospital admission and was investigated and diagnosed as having viral hepatitis A. On the 7th day of illness, the child developed anasarca in the form of moderate pleural effusion and gross ascites, leading to respiratory distress along with pedal edema and scrotal edema. The anasarca responded to symptomatic treatment and the clinical improvement of Hepatitis A occurred after 15 days. The stressful event of brewing hepatitis A, precipitating DKA in a relatively asymptomatic child of type 1 diabetes mellitus, is more likely in our case. The chance association of both the conditions in an underweight child with a history of 3rd degree consanguinity is noted in our child. The child also developed anasarca, which is uncommon in viral hepatitis A or diabetic ketoacidosis alone.

Keywords: Anasarca, Co-presentation, Diabetic ketoacidosis, Hepatitis A, Respiratory distress

INTRODUCTION

Co-presentation of diabetic ketoacidosis and hepatitis A is extremely rare.¹⁻⁶ Diabetic ketoacidosis is a common initial presentation of Type 1 diabetes mellitus in children.⁷⁻⁹ Hepatitis A is the most common viral infection in pediatric practice, which presents with jaundice and other constitutional symptoms.¹⁰⁻¹²

Clinical presentation of diabetic ketoacidosis followed by the appearance of jaundice and ascites on the 5th day, due to Hepatitis A during the management of DKA, is rare in the literature review.¹³⁻¹⁴

CASE REPORT

One four years ten-month-old male child was brought by his mother to the emergency room in the Department of Pediatrics with complaints of fever, lethargy, weakness and decreased oral intake for 7 days. On leading questions, the mother confirms a history of polyuria and polydipsia for 8 days and a history of weight loss for the last 2 months. The child is the only child and was reared by a single parent and had a history of two episodes of hospitalization in the past, in February 2023 for pneumonia and October 2023 for acute gastroenteritis. anthropometric measurements of the child revealed

weight below the 3rd percentile and height in between the 90th and 97th percentiles. Clinical examination of the child reveals a sacral dimple and slightly large ears; he was conscious but lethargic. He was febrile and the low-grade fever continued for 8 days.

There was some dehydration. The HGT on admission was 309 mg% and the laboratory value was 677 mg% on admission. The VBG suggested mild metabolic acidosis with a pH of 7.309 with bicarbonate 13 mEq/l. The urine examination revealed glucose 2+ and ketones 2+. Urine protein was negative. Cardiovascular system examination was normal.

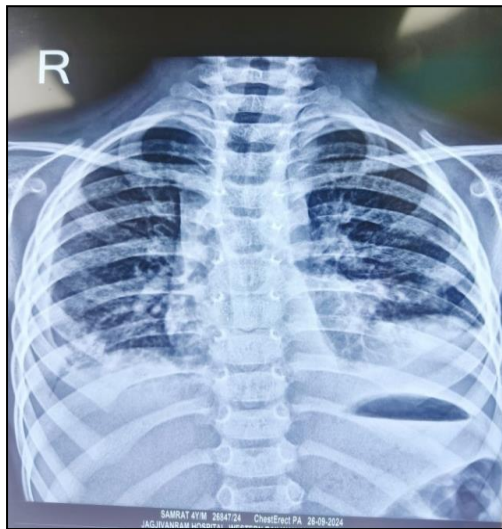


Figure 1: X-ray chest showing bilateral pleural effusion.

Routine blood investigations revealed neutrophilic leukocytosis with hyponatremia (119 mEq/l) and hyperkalemia (5.23 mEq/l). Fever profile for malaria parasite & PLDH, dengue NS1 and IgM and Salmonella Typhi IgM card test were negative. BUN and serum creatinine were normal.

Serum bilirubin on day 1 of admission was 0.89 mg/dl. Serum alkaline phosphatase was slightly on the higher side (473.79 U). Serum ALT and AST could not be measured due to lipaemic serum. Subsequent blood reports are as depicted in the tables.

Other investigations revealed

Hepatitis A IgM was reactive and Sr. Albumin was 2.6 gm/dl and total protein was 4.9 gm/dl. Serum cholesterol was normal. Prothrombin time was 12.5/11.4 seconds, aPTT was 38.2/29 seconds and INR was 1.1. The thyroid function test was normal and anti-tTg-IgA was negative.

USG abdomen

Moderate ascites and left flank showed to and fro bowel movements on 22/09/2024, which progressed to gross ascites and bilateral moderate pleural effusion with no features of bowel obstruction on 25/09/2024. Management of the diabetic ketoacidosis was done as per the Milwaukee regimen and the monitoring chart is depicted in monitoring chart. Long-acting insulin (basal) glargine in bold, underlined, started on day 3.

The child required insulin infusion for 40 hours, after which the child was shifted to subcutaneous insulin as the child clinically improved and was able to eat. The ketones in the urine were negative by 43 hours. The child had a persistent fever for which he was started on IV antibiotics. The child complained of pain in the abdomen with distension on day 2 of admission. Clinical examination revealed free fluid in the abdomen, which was confirmed by ultrasonography. The free fluid increased on day 3 and there was clinical evidence of free fluid in the pleural cavity along with scrotal edema. The child developed increasing breathlessness on day 3. The child was started on oxygen supplementation by nasal prongs with propped-up positioning. The child developed icterus on day 5 of admission, for which investigations revealed evidence of Hepatitis A infection.

Serial monitoring of the abdominal girth suggested an increase for 5 days, achieving 48 cm, which later reduced with symptomatic treatment. Clinical icterus was observed on day 4 with serum bilirubin raised up to 6 mg/dl. The icterus persisted till the child was discharged from the hospital with advice. On day 17, in view of most HGT readings above 300 mg/dl, Inj Glargine was increased to 4 units. Human Actrapid was increased to 3 units each of BBF, BL and BD in view of continued higher readings of HGT.

Table 1: Venous blood gas analysis.

Date/Time	21/09/2024 03:47 PM	22/09/2024 12:14 PM	23/09/2024 09:59 AM	24/09/2024 09:25AM	26/09/2024 11:02PM
PH	7.309	7.394	7.394	7.41	7.43
pCO₂	27.2 mmHg	36.8 mmHg	41.6 mmHg	40.2 mmHg	49.9 mmHg
pO₂	51.5 mmHg	42.4 mmHg	34.0 mmHg	49.2 mmHg	49.2 mmHg
HCO₃⁻	13.2 mmol/l	22 mmol/l	24.8 mmol/l	25 mmol/l	32.2 mmol/l
Na⁺	124 mmol/l	130 mmol/l	131 mmol/l	131 mmol/l	130mmol/l
K⁺	4.5 mmol/l	4.4mmol/l	4.4 mmol/l	3.8 mmol/l	3.7 mmol/l

Table 2: Liver function tests.

	21/09/2024	22/09/2024	25/09/2024	27/09/2024
Total Bilirubin	0.94 mg/dl	2.71 mg/dl	5.01 mg/dl	6.00 mg/dl
Direct	0.89 mg/dl	2.31 mg/dl	4.48 mg/dl	5.58 mg/dl
Indirect	0.05 mg/dl	0.4 mg/dl	0.53 mg/dl	0.42 mg/dl
SGOT	Lipaemic	13 U/l	538U/l	610 U/l
SGPT	Lipaemic	NaN	1046 U/l	1069 U/l
ALP	473.79 U/l	357.89U/l	207.3 U/l	197.79 U/l

Table 3: Monitoring chart.

Date	HGT monitoring in mg/dl (BBF /ABF / BL / AL /BD / AD /EM)	Insulin human actrapid and glargine	AG in cms	Urine sugar	Urine ketones	Icte rus
21/09/2024	306/442/482/428/313/246/147/357/205	0.1U/kg/hr Infusion		++	Moderate	-
22/09/2024	202/200/220/364/392/313/284/220/178/244/112 /88/170/380/170/398/250/372/371/155/163/268/ 378/353	0.1U/kg/hr Infusion	43	++	Moderate	-
23/09/2024	311/301/280/270/240/229/149/126/242/285/301 /302/310/304/300/251/256/252/157/182/387/33 6/202/220/	(2-2-2-2) subcutaneous	43	+	Negative	-
24/09/2024	294/245/171/239/200/185/195/87/277/300/212/ 153/253/1665/263/173	(2-2-2-2) subcutaneous	44	+	Negative	+
25/09/2024	163/88/80/181/111/303	(2-2-2-2) subcutaneous	48	++	Negative	+
26/09/2024	190/163/400/382/158/241	(2-2-2-2) subcutaneous	47	+	Negative	+
27/09/2024	253/213/149/95/149/173/275/238/301/471	(2-2-2-2) subcutaneous	46	+	Negative	+
28/09/2024	366/197/227/85/104/227/156/125/173/124/217/ 353/344	(2-2-2-2) subcutaneous	46	+	Negative	+

DISCUSSION

Diabetic ketoacidosis is the usual initial presentation in most of the cases in children with type 1 diabetes mellitus.⁷ In our child, also the first clinical presentation was similar. The child also had a fever with lethargy and weakness for 7 days, along with a brief history of polyuria and polydipsia for 8 days, which the mother told on asking leading questions only. The random blood sugar on HGT was 309 mg/dl and the laboratory value was 677 mg/dl, however, the HbA1c was 14.47% at the time of presentation.

The child had mild metabolic acidosis with a pH of 7.309 and a bicarbonate value of 13 mEq/l in venous blood analysis. The urinalysis was suggestive of ketones ++ (4 mmol/l) and glucose ++ (30 mmol/l). The child was managed as per the Milwaukee regimen with a normal saline bolus and subsequent maintenance and intravenous insulin (human Actrapid) infusion at 0.1 U/kg/hr.

The clinical improvement in the form of improved activity, sensorium and decrease in the respiratory efforts was observed within 18 hours in our child. The

dehydration improved and the child started taking liquids orally, followed by solids subsequently. Venous blood gas analysis of 20 hours after presentation suggested normalization of blood pH and bicarbonates. The serum potassium was normal to start with and intravenous potassium was started at a dose of 20 mEq per 100 cc of intravenous fluid 2 hours after starting intravenous insulin infusion. Serum potassium remained within normal range during the whole period of treatment. The child was shifted to subcutaneous insulin therapy after 40 hours of admission when the child started taking food orally.

The child became lethargic again with decreased oral intake on the 5th day of admission. The appearance of icterus was detected on examination and the liver was enlarged and tender. There was clinical evidence of free fluid in the abdomen. Investigations revealed Sr Bilirubin of 5.01 mg/dl with positive HAV IgM Antibody. Other viral markers like Hepatitis B, C and E were negative.

The ascites increased and the clinical evidence of free fluid in the pleural cavity was detected in the next 2 days. USG of the abdomen and chest confirmed the presence of

free fluid. The respiratory distress increased over the next 3 days. The periorbital swelling and scrotal swelling also developed and persisted. The child improved clinically after around 9 days of symptomatic treatment.

The development of acute viral hepatitis A and anasarca with respiratory distress while being treated for DKA, as in the case of our patient, is rare. Only a few case reports of DKA with acute viral hepatitis occurring simultaneously were reported in the literature, Maken et al, Fawzy et al.^{13,14}

However, clinical anasarca with jaundice in a child in the first presentation of DKA is not found in literature reviews as observed in our case. The pedal edema improved over a period of 10 days, followed by scrotal edema, pleural effusion and lastly ascites. During the course of a stay of 21 days in the department of pediatrics, the requirement of subcutaneous insulin human actrapid was titrated and increased to 3 units thrice daily and injection glargine 4 units at bedtime. later the child required 4 units of injection human actrapid thrice daily and 4 units of injection glargine twice daily.

The child was discharged with above insulin doses with advice for follow-up in Pediatrics OPD. After 7 days of discharge, on follow-up in OPD, the child completely improved of jaundice and anasarca and the requirement of insulin reduced to 2 units thrice daily and one dose of injection glargine 3 units at 10 p.m. Subsequent follow-up in the OPD revealed complete clinical and laboratory improvement of acute viral hepatitis A and the child is gaining weight with good glycemic control with subcutaneous insulin.

CONCLUSION

Diabetic ketoacidosis is the common initial manifestation of type 1 diabetes mellitus in pediatric practice, which responds to conventional management protocol. Co-presentation of acute viral hepatitis A and diabetic ketoacidosis is rare. The development of anasarca in a case of DKA who later developed acute viral hepatitis during the course of the treatment, as in our case, is still rarer and hence reported.

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