Case Report

New-onset type 1 diabetes mellitus with diabetic ketoacidos in a 12-months old indian toddler: A case report

Dr Harshindar Kaur[1], Dr Kulwinder Kaur[2], Dr Anshul Rai Gupta[3]

[1]Associate professor, Department of pediatrics, Government Medical College, Patiala
[2]Senior resident, Department of pediatrics, Government Medical College, Patiala
[3]Jounir Resident, Department of pediatrics, Government Medical College, Patiala

Corresponding Author : Dr Kulwinder Kaur
Senior Resident, Department of pediatrics, Government Medical College, Patiala
email : drnoorbubber@gmail.com

Absract

The presentation of type 1 diabetes mellitus is very rare in infants and the classical symptoms are not present at this age group, so they are usually treated as the case of infection and associated with risk of high mortality especially if complicated with diabetic ketoacidosis (DKA). Type 1 diabetes can appear at any age but it appears at two noticeable peaks 4-7years of age and second peak between 10-14 years. This is the case of a 12-months old infant with new-onset type 1 diabetes mellitus, complicated with DKA at diagnosis and is reported in view of its rarity and elevated mortality even when diagnosed. Intravenous insulin was given and then shifted to subcutaneous insulin after 48 hours of admission. Now he is stable and comes to the out patient department for regular check up.

Keywords: Diabetic ketoacidos is, children, Type 1 diabetes

Introduction:

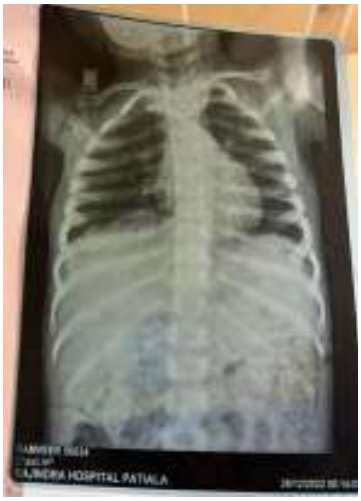
Type 1 diabetes can appear at any age but it appears at two noticeable peaks. The first peak occurs in children between 4-7 years and second peak occurs between 10-14 years.1 DKA is the most common presentation among diabetic children in the age group primarily 5-9 years and rarely <2 years.[1] Cerebral and other autoregulatory mechanisms may not be as well developed in younger children[2]. In this case, the child presented at one year of age which is rare. To treat these young children pose significant challenge not only for health care providers but also for families. Type 1 diabetes is generally precipitated by an immune-associated or destruction of insulin-producing pancreatic β cells.[3] The classical symptoms are polydipsia, polyphagia, and polyuria along with overt hyperglycemia but these symptoms are often overlooked until the disease progress to overt diabetic ketoacidosis. Infants and toddlers are often misdiagnosed as having sepsis, pneumonia, asthma, or bronchiolitis and therefore treated with glucocorticoids and antibiotics, the duration of symptoms may be longer, leading to more severe dehydration and acidosis and ultimately to coma4 .Cerebral edema, which occurs in ~0.5–1% of all episodes of DKA in children and is the most common cause of mortality in children with DKA.[5] Diabetes ketoacidosis (DKA) is the common presentation of type 1 diabetes mellitus in children. The prevalence of onset of diabetic ketoacidosis among type 1 diabetes mellitus was found to be 26.3% in one of the studies.[6] DKA is the most common cause of death with type1 diabetes. Hepatic generation of ketone bodies is usually stimulated by the combination of low insulin levels and high counter-regulatory hormone levels, including glucagon.[7] Immediate and aggressive intervention is required. Early medical management could prevent complications like cerebral edema, mental confusion, shock and death. Here, we report a case of 12 month old infant with new onset of type 1 diabetes mellitus complicated with diabetic ketoacidosis at the emergency department of tertiary care centre, Punjab.

CASE PRESENTATION

A 12 months old male child presented with complaints of vomiting, difficulty in breathing,

abdominal pain for 1 day along with loss of consciousness for last 4 hours . Child had a history of polyuria, polydipsia, and polyphagia for 7 days. There was no family history of type I DM and any chronic illness. On physical examination, the child was irritable and dehydrated with a dry tongue and mucosa. Vitals at time of admission were, pulse rate of 128 beats/ min, blood pressure of 80/50 mmHg, respiratory rate of 52 breaths/minute, oxygen saturation of 73 % on room air, and body temperature were 98 F. Child was very irritable, dehydrated with a dry oral mucosa and had acidotic breathing with GCS of E3V3M4. Pupils were bilateral symmetrical and reacting to light. Fundus was normal. Rest of the systemic examinations were normal. Child was put on oxygen by mask with oxygen flow rate at 6L. Based on hyperglycemia, metabolic acidosis, and ketonuria a diagnosis of type 1 diabetes complicate with DKA was made and management was initiated with isotonic normal saline fluids 0.9%, human insulin at the rate of 0.1 unit/per kg/per hour and other supportive measures. Vitals and GCS were monitored strictly, Random blood sugar monitoring and urine output monitoring was done hourly.

Blood investigations revealed random blood glucose level of 529 mg/dl and hyponatremia with value of 128 mEq/L (ref. 136–145 mEq/L), however serum potassium, urea and creatinine levels were normal. Arterial blood gas analysis showed pH 7.13 (ref. 7.35–7.45), pCO2 28 (ref. 35–45 mmHg), HCO3– 11.21 (ref. 22–26mmoL/l), and PO2 96 (80–105 mmHg). Total leukocyte count 11,000/µl (differential count - neutrophils: 70%, lymphocytes: 30%, eosinophils: 6%, monocytes: 1%, basophils: 1%) hemoglobin 9.9g/dL, platelets 112 00/µl. General condition of child improved gradually and the child was shifted to subcutaneous insulin after 48 hours of admission. Further, the vitals were monitored hourly; random blood sugar and neurological assessment were done 2 hourly; renal function test, electrolyte were monitored 6 hourly. HbA1C was 11.8 and GAD antibodies were positive(18.3) We discharged the patient with advice of 4 IU per day Insulin Glargine subcutaneous once a day and 3 IU Insulin gluilisine three times a day. The patient was properly instructed to follow up after 1 week for insulin management as per glucose report .Now he is stable and comes to the out patient department for regular check up.



CLINICAL DISCUSSION

DKA is life threatening complications of uncontrolled diabetes mellitus if proper intervention is not managed on time . the risk of developing DKA at manifestation of diabetes is high in young children (<2 years), girls, children of ethnic minority status, low socio-economic status . The diagnosis of DKA can be made on the basis of biochemical criteria of random blood glucose level greater than 200mg/dl with a venous pH of level <7.3 and/or a bicarbonate (HCO3) level of <15 mmol/L; ketonemia and ketonuria8. However, diagnosis of DKA should not be confused with asthma, hypokalemia, metabolic acidosis, respiratory acidosis, pneumonia, salicylate poisoning, acute abdomen, gastroenteritis etc.9

Rosenbloom et al. in his study had described the management of Diabetic Ketoacidosis depends on the severity of DKA. The severity of DKA is categorized by acid-base status in which mild DKA has pH 7.2 to <7.3; bicarbonate 10 to <15 mEq/L, moderate DKA has pH 7.1 to <7.2; bicarbonate 5 to 9 mEq/L and severe DKA has pH < 7.1; bicarbonate <5 mEq/L10. The patient with DKA is treated with intravenous fluids and intravenous insulin if the child is nauseated/vomiting, clinically dehydrated and is not alert.11Our patient had pH level of 7.13 and

bicarbonate level at 11.21. Thus, he had a moderate DKA and was treated accordingly. After the resolution of DKA, he was continued on insulin and dietary care, with daily education sessions with her mother in order to help the latter better manage the toddler at home. We monitored our patient's vitals hourly; random blood glucose level and neurological assessment 2 hourly; electrolyte, input/output charting, and urine routine examination 6 hourly. The patient with DKA is treated with intravenous fluids and intravenous insulin if the child is nauseated/vomiting, clinically dehydrated or is not alert .We managed our patient as per his symptoms. We used normal saline for the first 24 hours to treat and manage dehydration and mild sodium depletion. We kept our patient on Insulin to control increased random blood glucose level. KCL along with intravenous fluids was given to manage the impending hypokalemia. In order to treat and prevent possible bacterial infections, ceftriaxone was given. After successfully treating this patient, he was discharged on subcutaneous insulin to follow up regularly in opd.

CONCLUSION

We presented a case of an infant with type 1 diabetic mellitus complicated with diabetic ketoacidosis. Timely management with fluid therapy along with insulin should be done so that various complications like hypokalemia, cerebral edema, acute kidney injury ,venous thrombosis, pulmonary edema and multi organ dysfuntion syndrome can be avoided.12. Educational programs, diabetes awareness campaigns, and school educational tutorials can be beneficial for community awareness of the signs and symptoms of diabetes.

References

1. www.mayoclinic.org/diseases-conditions/type-1-diabetes/syptoms-causes/syc-20353011 [Google Scholar].
2. Wolfsdorf J, Glaser N, Sperling MA; Diabetic Ketoacidosis in Infants, Children, and Adolescents: A consensus statement from the American Diabetes Association. Diabetes Care 1 May 2006; 29 (5): 1150-1159. https://doi.org/10.2337/dc06-9909
3. Todd JA. Etiology of type 1 diabetes. Immunity. 2010;32:457–67. [PubMed] [Google Scholar].
4. Young E, Bradley RF. Cerebral edema with irreversible coma in severe diabetic ketoacidosis. N Engl J Med. 1967 Mar 23;276(12):665–9. [PubMed] [Google Scholar].
5. Lawrence SE, Cummings EA, Gaboury I, Daneman D: Population-based study of incidence and risk factors for cerebral edema in pediatric diabetic ketoacidosis. J Pediatr146:688–692,2005
6. A. Neu, A. Willasch, S. Ehehalt, R. Hub, M.B. Ranke, Wuerttemberg the D group B-.Ketoacidosis at onset of type 1 diabetes mellitus in children – frequency and clinical presentation, Pediatr. Diabetes 4 (2) (2003) 77–81. Crossref Pubmed Google Scholar. 7.Barnes AJ,Bloom SR,Goerge K,Alberti GM,Smythe P,Alford FP,Chisholm DJ, Ketoacidosis in pancreatectomized man. The New England journal of medicine. 1977 Jun 2 [PubMed PMID: 404553]
8. P. Raghupathy, Diabetic ketoacidosis in children and adolescents, Indian J Endocrinol Metab 19 (Suppl 1) (2015 Apr). S55–7. Crossref Pubmed Google Scholar.
9. N. EL-Mohandes, M.R. Huecker, Pediatric Diabetic Ketoacidosis, StatPearls Publishing, 2022. StatPearls [Internet]. Treasure Island (FL), http://www.ncbi. nlm.nih.gov/books/NBK 470282/Crossref Pubmed [cited 2022 Mar 28].
10. A.L. Rosenbloom, The management of diabetic ketoacidosis in children, Diabetes Ther 1 (2) (2010 Dec) 103–120. Crossref Pubmed Google Scholar.
11. Diabetes in children and young people overview - NICE Pathways [Internet]. [cited2022 Mar 29]. Available from: https://pathways. nice. org. uk/path ways/diabetes-in-children-and-young-people Crossref.
12. Hursh BE,Ronsley R,Islam N,Mammen C,Panagiotopoulos C, Acute Kidney Injury in Children With Type 1 Diabetes Hospitalized for Diabetic Ketoacidosis. JAMA pediatrics. 2017 May 1 [PubMed PMID: 28288246]