A Case Report of Idiopathic Ketotic Hypoglycemia Masquerading as Epilepsy

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Abstract

Idiopathic ketotic hypoglycemia (IKH) is characterized by recurrent neurohypoglycemic symptoms with ketosis. Hypoglycemic episodes typically occur during early mornings, especially either with illness and/or prolonged fasting. We reported a case of IKH which presented with recurrent episodes of seizures during early morning with intercurrent illness and which was labeled as epilepsy and started on antiepileptic medication. The purpose of this case report is to alert clinicians about this condition, which is not an uncommon entity, but rarely thought of. Therefore, in view of keeping the IKH in mind, which can be prevented with proper diet advice during illness, unnecessary long-term antiepileptic therapy can be avoided.

Keywords
- idiopathic ketotic hypoglycemia
- epilepsy
- diet advice

Introduction

Idiopathic ketotic hypoglycemia (IKH) is the most common cause of fasting intolerance and is defined as recurrent neurohypoglycemic symptoms with ketosis in children. This condition usually presents between the ages of 18 months and 5 years and commonly remits spontaneously by the age of 8 to 9 years.[1] Hypoglycemic episodes typically occur during periods of intercurrent illness, like respiratory tract infection, diarrhea, and viral infections, when food intake is poor. Common presentation is early morning drowsiness, seizures, and altered sensorium. Seizures with intercurrent illness and fever may be easily mislabeled as febrile seizures. Recurrent episodes of such seizures may be mislabeled as epilepsy and started on chronic antiepileptic therapy. Blood glucose and urine ketone bodies as bedside tests could be helpful to rule out suspicious cases of IKH. In this study, we reported a 4-year-old male child patient with recurrent morning seizures labeled as epilepsy that was on antiepileptic medications.

Case Report

A 4-year-old male patient, only child of nonconsanguineous couple with an uneventful birth history, was delivered by elective lower segment cesarean section (LSCS) at term gestation with a birth weight of 1,800 g. He was admitted in the neonatal intensive care unit for 28 days with a probable diagnosis of meningitis and necrotizing enterocolitis (NEC). The patient attained all his milestones, appropriate for age. At 15 months of life, the patient had an upper respiratory tract infection and early morning seizure for a period of 5 minutes. He was treated as simple febrile seizures. After 1 month, the patient had a similar event in the early morning that was preceded by episodes of loose stools and improper food intake. Third episode occurred 4 months later, followed by episodes of vomiting and diarrhea. At that time, the child was started on valproic acid. However, even after that, the child had two more similar events with fever and cold, hence valproic acid dose was increased and levetiracetam was added. At 3 years of age, the patient had early morning generalized tonic–clonic seizures for 5 minutes and was admitted in a hospital under the pediatric neurology department. Child had fever, vomiting, and loose stools at the time of admission and also poor food intake. In the emergency room, blood glucose was 56 mg/dL, urine for ketone bodies was +++, and random blood glucose was 45 mg/dL. The patient was treated with intravenous (IV) dextrose and midazolam. At that time, we reviewed all his old admission records. We noticed

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that during all his previous admissions, urine for ketone bodies were positive (+++/++++) and blood glucose (glucometer) levels were low (39–52 mg/dL). We suspected ketotic hypoglycemia. To find out the cause of hypoglycemia, tandem mass spectroscopy (TMS) was done, which was normal. Blood urea nitrogen, creatinine, and liver function tests were normal. Arterial blood gas (ABG) analysis showed mild metabolic acidosis, cortisol (ELISA) was 19.5 µg/dL (4.82–19.5 µg/dL), and fasting insulin (electrochemiluminescence) 16.5 µU/mL (2.4–24.9 µU/mL). Magnetic resonance imaging of brain showed bilateral occipital T2/fluid attenuated inversion recovery (FLAIR) hyperintensities with T1 hypointensities suggestive of hypoglycemic changes. The patient had normal electroencephalogram (EEG). Based on the history and laboratory test reports, we confirmed the diagnosis of IKH. We counseled the parents regarding his condition and advised proper diet during illness and also to avoid prolonged fasting. After 6 months, the patient had again fever, diarrhea, and poor oral intake. Appropriate IV fluids were given to prevent hypoglycemic attack. On follow-up, we tapered and stopped antiepileptics. There was no recurrence of seizures since last 1 year.

Discussion

According to American Diabetes Association (ADA), "hypoglycemia alert value in hospitalized patients is defined as blood glucose $\leq$70 mg/dL and clinically significant hypoglycemia as glucose values $<$54 mg/dL." In the present case, the child fulfilled the definition for clinically significant hypoglycemia. Ketotic hypoglycemia is one of the most common causes of hypoglycemia in children. The etiology and pathophysiology of IKH are incompletely understood. Some studies revealed that children with IKH have lower fasting intolerance due to inadequate hepatic glucose production (GPR) or inability to sustain high GPR.[2,3] Other studies revealed that children with IKH may have decreased capacity for hepatic gluconeogenesis and inadequate supply of ketogenic aminoacids.[4] Infants and children are more susceptible to hypoglycemia, because the proportion of brain mass to body size is relatively high compared with adults and the rates of glucose turnover per kilogram of body weight in infants and children is higher.[5,6]

The diagnosis was based on a combination of typical clinical presentation and exclusion of other causes of hypoglycemia with ketosis. In hypoglycemia with ketosis, hormonal evaluation with estimation of insulin, C-peptide, and counter regulatory hormones like cortisol and glucagon is needed. Also to rule out metabolic disorders, TMS is needed.[1] IKH should be suspected in every child who presents with early morning seizures or drowsiness especially after poor intake, with or without any illness. Bedside tests, blood glucose estimation and urine for ketone bodies should be done routinely. In the present case, clinical symptoms were consistent with the diagnosis of IKH. Hypoglycemia was accompanied by presence of ketone bodies in urine. Serum lactate showed marginal rise. TMS was negative. Hormonal evaluation during fasting showed marginal rise in cortisol with normal insulin. Hence in the present case, diagnosis was consistent with IKH. Treatment aimed at preventing hypoglycemic episodes and tapering of antiepileptics. Actually, the present case was misdiagnosed as epilepsy and the child was put on two antiepileptic drugs.

Thomas et al published a similar case which was presented with febrile seizures.[7] In our case also, the child was initially treated for febrile seizures. Daly et al's study revealed that 30% children presented with seizures with mean age of presentation at 30.8 months and after 7 years of age, none had hypoglycemic episodes.[8] Kogut et al reported that all the children ($n = 13$) presented with early morning seizures, similar to our case.[9] Yadav et al published a case series with four children presenting with early morning ketotic hypoglycemia and among them, three were diagnosed with IKH.[10]

IKH or hypoglycemia occurred due to any cause manifests with neurological symptoms like altered sensorium, seizures, and coma. So any child presenting with these symptoms, suspected hypoglycemia, is advised for blood glucose estimation. Severe, prolonged, or repeated episodes of hypoglycemia in infants and children can cause irreversible brain damage. Therefore, early identification of the cause and timely management is extremely important. In any child with recurrent seizures, even during febrile or afebrile illnesses before administering prolonged prophylactic antiseizure medications other etiologies of seizures, should be ruled out. To approach these, children history is the key and a few simple tests, such as blood biochemistry, must be considered.

Conclusion

IKH is not an uncommon condition and can easily be prevented. It needs a high index of suspicion especially when a child has early morning seizures with illness. Early recognition of this condition and proper diet advice during illness can avoid unnecessary antiepileptic therapy and social stigma as an epileptic child.

Authors' Contributions

S.C.D. took part in case management, follow-up, and drafted the manuscript; K.C. contributed in case management; P.M. contributed in literature review and designed the manuscript; L.K.C. performed the literature review and reviewed the manuscript.

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Conflict of Interest

None declared.

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