OBSERVATIONS

Diabetic Ketoacidosis Complicated With Previously Unknown Gitelman Syndrome in a Tunisian Child

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Gitelman syndrome (GS) is an autosomal recessive disease characterized by hypokalemia, hypomagnesemia, metabolic alkalosis, and hypocalciuria (1). In the great majority of cases, GS is caused by mutations in the *SLC12A3* gene encoding the thiazide-sensitive NaCl cotransporter (*NCCT*), which is specifically expressed in the apical membrane of cells along the distal convoluted tubule (2).

A 10-year-old Tunisian male patient was admitted with polyuria, polydipsia, and profound fatigue associated with weight loss. His parents were first cousins. Physical examination revealed clouded sensorium, severe dehydration, fruity-like breath odor, and Kussmaul breathing. The laboratory profile revealed hyperglycemia 21.7 mmol/L with ketonuria, acidosis, serum bicarbonate 6.4 mmol/L, sodium 133 mEql/L, potassium 1.1 mEq/L, and HbA_{1c} 13.2%. On the basis of International Society for Pediatric and Adolescent Diabetes guidelines, a diagnosis of diabetic ketoacidosis (DKA) was proposed (3). No abnormalities were showed by electrocardiogram. Clinical management included restoration of intravascular volume, intravenous insulin, and potassium chloride infusion. After a month the clinical picture was improved, but low serum potassium values and low blood pressure were confirmed. Further investigations revealed hypocalciuria, hypochloremic alkalosis, and increased excretion of potassium. GS was then suspected as the etiology of the hypokalemia. A homozygous splice site mutation in the *SLC12A3* gene was found with the sequence analysis of the *NCCT* gene. This mutation was a homozygous G to A base pair substitution in intron 8 (c.1095+1G>A) leading to the inclusion of 95 amino acids before a stop signal at the 96th codon. Parents were heterozygous for c.1095+1G>A. The diagnosis of GS was thus genetically confirmed.

The association of GS and type 1 diabetes is rare, and it has been described in one pediatric patient only (4). In the case described by Zangeneh et al. (4), the diagnosis of GS had been proposed before the onset of diabetes. In our case, the manifestation of diabetes occurred first, and it allowed us to identify the presence of GS, which was unknown at that time.

DKA is characterized by hyperglycemia, ketonemia, and metabolic acidosis. The diagnosis of DKA can be confounded by the coexistence of combined acid-base disorders. The presence of a congenital tubulopathy as GS with metabolic alkalosis can conceal the severe acute DKA on the initial presentation. Furthermore, DKA is characterized by hypokalemia as a result of a significant depletion of renal solutes. The subsequent administration of insulin (3) worsened the hypokalemia. As described above, GS is characterized by hypokalemia and this, in association with DKA, can make clinical treatment very difficult. In our case, the management of ketoacidosis required high doses of intravenous potassium chloride to obtain normal potassium serum values. This case presentation shows that the concomitant presence of GS can make the diagnosis and the management of DKA difficult. On the other hand, the tendency to have lower blood pressure in a patient with GS is a protective factor for people with diabetes, exposing them to lower risk of cardiovascular complications. In a patient with type 1 diabetes onset and DKA, when the hypokalemia is not fully normalized with traditional therapy, it is important to consider the diagnosis of associated tubulopathies such as GS.

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