Diabetic Ketoacidosis: Evaluation and Treatment

DYANNE P. WESTERBERG

Cooper Medical School of Rowan University, New Jersey

Abstract

Diabetic ketoacidosis is characterized by a serum glucose level greater than 250 mg per dL, a pH less than 7.3, a serum bicarbonate level less than 18 mEq per L, an elevated serum ketone level, and dehydration. Insulin deficiency is the main precipitating factor. Diabetic ketoacidosis can occur in persons of all ages, with 14 percent of cases occurring in persons older than 70 years, 23 percent in persons 51 to 70 years of age, 27 percent in persons 30 to 50 years of age, and 36 percent in persons younger than 30 years. The case fatality rate is 1 to 5 percent. About one-third of all cases are in persons without a history of diabetes mellitus. Common symptoms include polyuria with polydipsia (98 percent), weight loss (81 percent), fatigue (62 percent), dyspnea (57 percent), vomiting (46 percent), preceding febrile illness (40 percent), abdominal pain (32 percent), and polyphagia (23 percent). Measurement of A1C, blood urea nitrogen, creatinine, serum glucose, electrolytes, pH, and serum ketones; complete blood count; urinalysis; electrocardiography; and calculation of anion gap and osmolar gap can differentiate diabetic ketoacidosis from hyperosmolar hyperglycemic state, gastroenteritis, starvation ketosis, and other metabolic syndromes, and can assist in diagnosing comorbid conditions. Appropriate treatment includes administering intravenous fluids and insulin, and monitoring glucose and electrolyte levels. Cerebral edema is a rare but severe complication that occurs predominantly in children. Physicians should recognize the signs of diabetic ketoacidosis for prompt diagnosis, and identify early symptoms to prevent it. Patient education should include information on how to adjust insulin during times of illness and how to monitor glucose and ketone levels, as well as information on the importance of medication compliance.

Diabetic ketoacidosis (DKA) continues to have high rates of morbidity and mortality despite advances in the treatment of diabetes mellitus. In a study of 4,807 episodes of DKA, 14 percent occurred in persons older than 70 years, 23 percent in persons 51 to 70 years of age, 27 percent in persons 30 to 50 years of age, and 36 percent in persons younger than 30 years. In a second study of 28,770 persons younger than 20 years (mean age of 14 years) with diabetes, 94 percent had no episodes of DKA, 5 percent had one episode, and 1 percent had at least two episodes.2 Additionally, DKA occurred more often in females, in persons with a migration background, and in persons 11 to 15 years of age. DKA has a case fatality rate of 1 to 5 percent. Although the highest rate of mortality is in older adults and persons with comorbid conditions, DKA is the leading cause of death in persons younger than 24 years with diabetes, most often because of cerebral edema.

NOTE: This work is partly presented at 8th International Conference on World NO Diabetes and Obesity Congress at July 10-11, 2019 | London, UK