

The highs and lows of DKA

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Q: What's diabetic ketoacidosis (DKA)?



A: A disorder associated with a reduction in circulating insulin that results in hyperglycemia, DKA is one of the most serious acute complications of diabetes. In addition to the reduction of circulating insulin, an elevation in counterregulatory hormones, such as glucagon, catecholamines, cortisol, and growth hormone, leads to an increase in glucose production in the liver and kidneys, impaired use of glucose in the peripheral tissues, and the release of free fatty acids from adipose tissue into the circulation (lipolysis). The liver oxidizes fatty acids to ketone bodies, which results in excess ketones in the blood (ketonemia) and metabolic acidosis.

The most common cause associated with DKA is infection. Other factors include stroke, alcohol abuse, pancreatitis, myocardial infarction, trauma, the use of drugs that affect carbohydrate breakdown (such as corticosteroids, thiazides, and sympathomimetic agents), and incorrect insulin administration or missed doses. DKA occurs more often in adults than children. At times a patient with diabetes may not take his insulin as prescribed for a variety of reasons, such as rebellion against authority or resistance to the diagnosis, fear of weight gain, or fear of hypoglycemia. Dealing with the stress of the day-to-day management of a chronic illness may also lead to the development of DKA.

The classic signs and symptoms include polyuria, polydipsia, polyphagia, weight loss, vomiting, abdominal pain, dehydration, weakness, and dulled senses. Physical findings may include poor skin turgor, Kussmaul respirations (deep, rapid respirations), tachycardia, hypotension, changes in mental status, shock, and coma. Emesis is often coffee-ground-like in appearance and tests guaiac positive.

The initial lab tests for a patient suspected of having DKA should include serum glucose, blood urea nitrogen/creatinine, serum ketones, electrolytes (particularly potassi-

um), osmolality, urinalysis, urine ketones by dipstick, arterial blood gases, and a complete blood cell count with differential. Other studies include an ECG; bacterial cultures of urine, blood, and the throat; and chest X-ray. Diagnosis of DKA in an adult patient is made when he presents with a serum glucose level above 250 mg/dL, an arterial pH value of less than 7.3, a bicarbonate level of less than 15 mEq/L, and ketonuria or ketonemia.

Successful treatment of DKA involves identification of the precipitating events and frequent patient monitoring, along with correcting hyperglycemia, dehydration, and electrolyte imbalances. Administration of regular insulin by I.V. infusion is the treatment of choice for DKA, unless the episode is mild. Correction of dehydration is aimed at expanding the intravascular and extravascular volumes and restoring renal perfusion by initial I.V. infusion of 0.9% sodium chloride solution. Follow-up fluid replacement depends on many factors, including the state of dehydration, serum electrolyte levels, and urine output. To prevent hypokalemia, potassium replacement is initiated.

Goals for prevention include education regarding insulin therapy, avoiding prolonged fasting states, preventing severe dehydration, and managing sick days. The patient should be provided with specific information about insulin administration, goals for self-monitoring of blood glucose levels, and nutrition management during periods of acute illness. ■

Learn more about it

Mayo Clinic. Diabetes management: creating your sick day plan. <http://www.mayoclinic.com/health/diabetes-management/DA00110>.

Medline Plus. Diabetic ketoacidosis <http://www.nlm.nih.gov/medlineplus/print/ency/article/000320.htm>.

Smeltzer SC, Bare BG, Hinkle JL, et al. *Brunner and Suddarth's Textbook of Medical-Surgical Nursing*. 11th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2007:1412-1415.