OBSERVATIONS

"Mind the Gap" When Managing Ketoacidosis in Type 1 Diabetes

Substance abuse has increased among type 1 diabetic patients (1) and can lead to life-threatening diabetic ketoacidosis (DKA). This is the first study examining the impact of substance abuse on acidosis in DKA.

A retrospective review was performed on 19 type 1 diabetic patients who presented with DKA (glucose >15 mmol/l, presence of urinary and/or plasma ketones , and pH <7.2) during a 10-month period. Of these, patients reported nonadherence to ≥1 dose of insulin before presentation. Ten patients reported illicit drug use in the 48 h before presentation, including cannabis (n = 8), ecstasy (n = 6), ketamine (n = 6), benzodiazepines (n = 3) , and heroin (n = 3); seven patients were poly-drug users.

Drug users were younger than nonusers (21 ± 6 vs. 32 ± 10 years, respectively, P = 0.01) and tended to have higher plasma glucose concentrations (32.4 ± 7.7 vs. 26.1 ± 10.1 mmol/l, respectively, P = 0.1). A1C was not different (12.9 ± 2.8 vs. 11.7 ± 1.0%, respectively, P = 0.3). Despite significantly lower plasma β-hydroxybutyrate concentrations (3.4 ± 1.0 vs. 4.9 ± 1.2 mmol/l, respectively, P = 0.01), drug users had lower arterial pH values (7.02 ± 0.14 vs. 7.19 ± 0.05, respectively, P = 0.002) and lower bicarbonate concentrations (3.9 ± 2.2 vs. 8.6 ± 2, respectively, P = 0.0007). Lactatemia was absent in both groups. Calculated acidosis-ketosis gap (AKG) (arterial pH − plasma β-hydroxybutyrate concentration) was significantly higher in drug users (3.6 ± 1.0 vs. 2.5 ± 1.2, P = 0.04). Eighty percent of drug users had an AKG>3, in contrast to 33% of nondrug users (P = 0.0009).

Designer drugs can cause serious complications in type 1 diabetes, especially in "rave" parties (1). Underreporting is common due to fear of retribution (2). Concurrent benzodiazepine use can mask sympathetic overactivity classically reported with stimulant use, making diagnosis difficult.

Our study documented a greater gap between arterial pH and plasma β-hydroxybutyrate concentration in drug users. Although drug users presented with more severe acidosis, it was only accompanied by relatively mild ketosis.

The mechanism by which designer drugs cause acidosis is poorly understood. DKA may be precipitated by the combination of insulin noncompliance during rave parties; hyperglycemic properties of drugs such as cannabis, heroin, and ecstasy (3,4); and ketosis caused by stimulant-enhanced lipolysis from sympathetic overactivity. Ketamine can cause severe acidosis, which could be secondary to renal bicarbonate and β-hydroxybutyrate wasting (5).

Although only limited conclusions can be drawn from our study due to the small number of patients, any observations that guide assessment will aid clinical practice given the limitations of research in substance abuse. Despite treatment of DKA becoming more successful, standardized insulin infusion protocols do not trigger suspicion of other etiology. A modern approach to DKA should emphasize not only prompt treatment with insulin, but also identification of precipitants beyond noncompliance and infection. Calculation of the AKG may help identify nonreporters or victims of drink spiking, whose acidosis could be partly due to drug use. Although treatment of most drug toxicity is supportive, failure to recognize drug use can lead to rapid clinical deterioration. Early identification of such patients also facilitates referral to detoxification and counseling services.

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