

Case Study 1: Patient N.B.

Diabetic Ketoacidosis

Patient Profile

N.B., a 34-year-old Native American man, was admitted to the emergency department after he was found unconscious by his wife in their home.

Subjective Data (Provided by Wife)

- Was diagnosed with type 1 diabetes mellitus 12 mo. ago
- Was taking 50 U/day of insulin: 5 U of lispro insulin with breakfast, 5 U with lunch, and 10 U with dinner Plus 30 U of glargine insulin at bedtime
- States a history of gastroenteritis for 1 wk with vomiting and anorexia
- Stopped taking insulin 2 days ago when he was unable to eat

Objective Data

Physical Examination

- Breathing deep and rapid
- Fruity acetone smell on breath
- Skin flushed and dry

Diagnostic Studies

- Blood glucose level 730 mg/dL (40.5 mmol/L)
- Blood pH 7.26

Discussion Questions

1. Briefly explain the pathophysiology of the development of diabetic ketoacidosis (DKA) in this patient.

The pathophysiology of the development of diabetic ketoacidosis (DKA) in N.B. was the inadequate insulin dosing. The two days N.B. did not take his normal insulin doses sent him into a profound insulin deficiency. This causes the body to produce high levels of ketones that circulate in the blood. Ketones are the body's way of compensating when it does not have insulin to transform glucose into energy. The body is forced to turn fat cells into energy, resulting in circulating ketones.

2. What clinical manifestations of DKA does this patient exhibit?

N.B. demonstrates Kussmaul respirations, fruity breath odor, vomiting and anorexia, blood pH of <7.30, syncope, and high blood glucose levels. All of these clinical manifestations are characteristic of DKA and elevated circulating ketones.

3. What factors precipitated this patient's DKA?

When N.B. began experiencing gastroenteritis, this vomiting and anorexia led to malnutrition and overall decrease in appetite. When N.B. stopped eating, he also discontinued his insulin administration. The profound insulin deficiency sent him into DKA.

4. **Priority Decision:** What is the priority nursing intervention for N.B.?

The priority nursing intervention for N.B. is insulin therapy.

5. What distinguishes this case history from one of hyperosmolar hyperglycemic syndrome (HHS) or Hypoglycemia?

The distinguishing factor in N.B. diagnosis of DKA is his age, the rapid onset and T1DM diagnosis. The breakdown of fat and release of ketone acids into the bloodstream is the distinguishing factor from HHS and

hypoglycemia. In addition, when a patient experiences HHS, there is enough circulating insulin to prevent ketoacidosis from occurring.

Finally, hypoglycemia is less complex in the pathophysiology and can be resolved in most cases by intake of 15g of a simple carbohydrate.

6. Priority Decision: What is the priority teaching that should be done with this patient and his family?

The priority teaching that should be done with this patient and his family are the "sick day rules". This includes maintaining normal diet if able, in this case N.B. was unable to do so as he fell ill with gastroenteritis. A possible solution to this inadequate intake would be to supplement with CHO-containing fluids. Continuing insulin administration is extremely important even when normal diet is not maintained. This will prevent the liver from breaking down fat as an energy source and sending the body into diabetic ketoacidosis.

7. What role should N.B.'s wife have in the management of his diabetes?

N.B.'s wife can have an active role in management of his diabetes by monitoring his symptoms when he falls ill. Now that she knows the warning signs of DKA, she will be able to seek medical treatment faster, if another episode is not prevented by the precautions they were taught above. She will better understand now, the importance of supplemental intake and insulin administration regardless of appetite or consumption. Consistency in insulin administration will keep her husband in a more stable state while he recovers from gastroenteritis or other ailments in the future.

8. Priority Decision: Based on the assessment data presented, what are the priority nursing diagnoses? Are there any collaborative problems?

My priority nursing diagnosis is inadequate knowledge for management of T1DM. The DKA diagnosis in N.B. could have most likely been prevented by knowledge and implementation of fluid CHO intake and consistent administration of normal insulin. The patient and wife would benefit from having supplies to increase consumption of calories and CHO in alternative readily available in the home.

9. Evidence-Based Practice: N.B.'s wife asks you if she should have given her husband insulin when he got sick? How would you respond?

My response to N.B.'s wife is yes. It is key in the management of T1DM that insulin levels are maintained so that the body can use glucose as energy in cellular metabolism. Otherwise, the fat breakdown as an energy source will send N.B. into DKA.