Case Report

A Case of Diabetic Ketoacidosis in a Patient on an SGLT2 Inhibitor and a Ketogenic Diet: A Critical Trio Not to Be Missed

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Results from major clinical trials have shown significant cardiorenal-protective benefits of SGLT2 inhibitors in patients with type 2 diabetes (T2DM), leading to increased popularity. A rare but serious side effect of SGLT2 inhibitors is euglycemic diabetic ketoacidosis (EDKA), which presents more covertly but has been described. Identification and report of modifiable risk factors would be an important step in helping clinicians appropriately counsel patients. In this case report, we present DKA in a patient on an SGLT2 inhibitor and ketogenic diet (KD). A 47-year-old male with a history of poorly controlled T2DM on metformin and empagliflozin presented to the emergency department (ED) with several days of pharyngitis, dyspnea, emesis, abdominal pain, and anorexia. Of note, one month prior to this event, he presented to the ED with malaise and was found to have an anion gap of 21, a bicarbonate level of 13 mmol/L, a pH level of 7.22, 3+ ketonuria, and a glucose level of 7 mmol/L (127 mg/dl). Additional workup was negative, and findings were attributed to his KD. His use of empagliflozin was not identified on his medication list. At second presentation, the patient was tachypneic and tachycardic and had mild abdominal tenderness. Labs revealed anion gap 28, bicarbonate 5 mmol/l, pH 6.94, 3+ ketonuria, glucose 14.9 mmol/L (269 mg/dl), and beta-hydroxybutyrate 8.9 mmol/L. He was diagnosed with DKA and was treated accordingly. With closure of anion gap, the patient was transitioned to insulin and metformin, and his empagliflozin was discontinued indefinitely. Before prescribing this medication class, physicians should inquire about low-carbohydrate diets given the higher risk for DKA, though knowledge of this risk is still not widespread.

1. Introduction

Recent results from major clinical trials such as CANVAS, CREDENCE, EMPA-REG OUTCOME, and DAPA-HF have shown significant cardiovascular and renal protective benefits of SGLT2 inhibitors [1–4]. These findings have led to increased use of this class of medication in patients with type 2 diabetes (T2DM). Although reported as rare, a serious side effect of SGLT2 inhibitors is diabetic ketoacidosis (DKA), which can present more covertly with euglycemic DKA and has been described numerous times. There are some thoughts about patients that might be at greater risk for developing this condition such as longer duration of diabetes, insulin deficiency, or even possible variants of the SGLT molecule [5, 6]. Identification of additional modifiable risk factors such as special diets would be an important step in helping clinicians choose which patients should avoid using this medication. In this case report, we present a case of profound DKA in a patient on an SGLT2 inhibitor on a ketogenic diet.

2. Case Presentation

A 47-year-old male, with a 10-year history of T2DM, presented to the emergency department (ED) with several days of sore throat, dyspnea, nonbloody emesis, abdominal pain, and poor oral intake. He denied any fever, chills, cough, chest pain, or diarrhea. He had a urinary tract infection (UTI) 2 weeks prior, which had resolved with a course of antibiotics. Over several months, he had made significant changes in his diet which resulted in a 60 lb weight loss. The patient reported that he was following an Atkins or
3. Discussion

Our case illustrates a case of profound DKA of a patient on an SGLT2 inhibitor and following a ketogenic diet. Interestingly, our patient also developed a UTI twice in the same month, which is another reported side effect of this medication. Randomized control trials studying SGLT2 inhibitors have indicated DKA to be a rare side effect, with an estimated incidence rate of DKA varying from 0.13 to 0.76 events per 1000 patient years [6].

On review of the literature, this is not the first case of DKA in a patient on an SGLT2 inhibitor following a ketogenic or low-carbohydrate diet [7–10]. Another case reports a similar story of a 44-year-old man who had been on sitagliptin, metformin, and an Atkins diet, and 3-4 days after starting canagliflozin, he developed euglycemic DKA which was first missed by the ED and later recognized by his primary internist [10]. As in our case, our patient had already presented with euglycemic DKA to the ED, which was diagnosed as dehydration and starvation ketosis. Luckily, at that time, he recovered by one week with change in diet. Later, he presented with profound dehydration and severe anion gap metabolic acidosis with a bicarbonate level of <5 mEq/L, requiring inpatient critical care. Recognition of the association of this medication with euglycemic DKA and asking about medications is most important.

4. Conclusion

Before prescribing this medication class which is now starting to be more widely prescribed, physicians should ask whether patients are following low-carbohydrate diets as this likely puts them at higher risk for DKA. Knowledge of this risk is still not widespread.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References


