

CASE REPORT

Mistaken Identity: Missed Diagnosis of Type 1 Diabetes in an Older Adult

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Abstract

Type 1 diabetes can occur at any age from infancy to elderhood. Patients with hyperglycemia onset at older ages are presumed to have type 2 diabetes, but the misdiagnosis of type 2 diabetes as type 1 diabetes in adults has serious consequences. Medical error in this domain leads to significant patient harm that could be avoided with the correct diagnostic testing. Here, we discuss the case of a 58-year-old man who presented with diabetic ketoacidosis (DKA) at age 51 but was given the diagnosis of type 2 diabetes. During two subsequent admissions for DKA, he suffered severe complications. After his third episode of DKA, antibodies and C-peptide were checked, prompting a change in diagnosis to T1DM. Following a correct diagnosis of T1DM, diabetes education and appropriate treatment, the patient remained free of DKA and had improved glucose control. Under-diagnosis of type 1 diabetes can lead to recurrence of life-threatening episodes of DKA. Anti-GAD antibody and C-peptide testing are under-utilized in the differential diagnosis of type 1 versus type 2 diabetes in adults. This case demonstrates the consequences of the mis-diagnosis of type 1 diabetes as type 2 diabetes. The correct diagnosis is necessary to prevent hospital readmissions, morbidity, mortality and medical errors.

Keywords: late, onset, type 1 diabetes, diabetic ketoacidosis, DKA

1.1 Introduction

Type 1 diabetes is characterized by autoimmune destruction of pancreatic islet beta cells, while type 2 diabetes is characterized by peripheral insulin resistance and declining insulin production. Traditionally, type 1 diabetes was thought to occur in children, while type 2 diabetes is diagnosed when diabetes onset is in adulthood. Contrary to common belief, type 1 diabetes is not exclusive to childhood. In fact, almost 50% of type 1 diabetes arises in adulthood¹. Data from the UK Biobank shows that more than 40% of type 1 diabetes occurs after the age of 30 and that patients are often misdiagnosed as type 2 diabetes². Medical error in this domain occurs because <5% of the diabetes cases that occur in adulthood are type 1 diabetes³ and clinicians presume adult onset diabetes to be type 2 diabetes. There are numerous consequences for the misdiagnosis of adult onset type 1 diabetes as type 2 diabetes, such as diabetic ketoacidosis and worsened glucose control. Adult onset type 1 diabetes has serious consequences, as 11% develop ketoacidosis within the first year of diagnosis and 89% require insulin treatment⁴. Former British Prime Minister Theresa May was initially diagnosed with type 2 diabetes; however it was later discovered that she had instead developed adult onset type 1 diabetes⁵. This case illustrates the deleterious

complications of an adult with adult onset type 1 diabetes misdiagnosed as type 2 diabetes.

2.1 Case Report

A 58-year-old Caucasian man presented to the emergency department with intractable nausea, fatigue, abdominal pain, and polyuria for 18 hours. On the day of presentation, the patient's emesis turned bloody, which prompted him to seek medical care.

Vital signs in the emergency department were as follows: temperature 36.5° C, heart rate 91 beats per minute, blood pressure 116/70 mmHg, respiratory rate 20, oxygen saturation 95%. Labs were notable for the following: glucose 551 mg/dL, bicarbonate 12 mEq/L, anion gap 31, creatinine 1.2 mg/dL, lactate 1.5 mmol/L, beta-hydroxybuturate 6.5 mmol/L, leukocyte count 13500/mm³, haemoglobin 12.8 g/dL, INR 0.91, urinalysis with 2+ protein/3+ glucose/2+ ketones, >2 hyaline casts, >2 granular casts, negative leukocyte esterase, negative nitrites. The patient was admitted to ICU for treatment of DKA and monitoring of hematemesis.

During two prior admissions for ketoacidosis, the patient had severe acidosis and required ICU care. The first admission announced his diabetes diagnosis at age 51. The second

admission occurred 6 years later at age 57 and was complicated by atrial fibrillation with a rapid ventricular response and troponin leak. During both admissions, the patient had upper gastrointestinal bleeds due to Mallory-Weiss tears from vomiting and acute kidney injury. Follow-up after hospitalization at his primary care clinic was sporadic, the visit notes utilize the diagnosis of type 2 diabetes and recommend treatment with metformin and sitagliptin plus basal insulin. Medical history revealed no episodes of pancreatitis or pancreatic surgery. Family history revealed no history of autoimmune diseases or type 2 diabetes. Social history revealed former employment as a video producer, and current status as disabled and not working. The patient denied any tobacco, alcohol, or illicit drug use.

The diagnosis of type 1 diabetes was made with positive anti-glutamic acid decarboxylase 65 antibody, titer 0.30 nmol/L (nl <0.02 nmol/L) and nearly undetectable C-peptide of 0.2 ng/mL (nl 1.1 – 4/4 ng/mL). After his diagnosis of type 1 diabetes, the patient was compliant with 21 units of insulin glargine QHS and 5-10 units of insulin lispro with each meal. Access to a certified diabetes educator and registered dietitian allowed the patient to better understand and manage his condition correctly. Since the most recent admission, the patient has not developed diabetic ketoacidosis, but has

persistent chronic kidney disease, proliferative diabetic retinopathy and neuropathy.

Discussion

Misdiagnosing type 1 diabetes as type 2 diabetes is common in older adults, and can lead to life-threatening acute metabolic decompensation, poor glucose control and diabetes complications. DKA has a one-year mortality rate of 9% and a one-year readmission rate of 36%⁶, and may be accompanied by cardiovascular events⁷ and organ failure. Recurrences of DKA are preventable with appropriate treatment of insulin-deficient diabetes and awareness of sick-day management, however, a proper diagnosis of type 1 diabetes must be made, especially in patients with atypical presentation whether due to age or other factors. Type 1 diabetes is commonly misdiagnosed in adults, although data on this occurrence is limited. A study from the Diabetes Alliance for Research in England (DARE) found that 38% of type 1 diabetes patients diagnosed over age 30 were misdiagnosed with type 2 diabetes and did not receive the required insulin⁴. Testing for anti-GAD antibody and C-peptide is the first step to differentiate type 1 diabetes from type 2 diabetes. While up to 30% of patients with type 1 diabetes will be antibody negative⁸, a low C-peptide can help clarify the diagnosis⁹.

Whether this patient had latent autoimmune diabetes in adults is unclear, as his medical care prior to the onset of his first episode of DKA was sporadic at best. The American Diabetes Association views patients with latent autoimmune diabetes in adults as having type 1 diabetes¹⁰. Unfortunately, the errant diagnosis of type 2 diabetes, inappropriate treatment and poor follow-up put this patient at risk for recurrence of DKA, during which he experienced adverse events including Mallory-Weiss tears, atrial fibrillation, acute kidney injury and troponin leak. Poor glucose control from insufficient insulin replacement has contributed to long term diabetes complications, including diabetic retinopathy and chronic kidney disease, which the patient now manifests. In addition, patients with late onset type 1 diabetes are also at higher risk for other autoimmune diseases¹¹; timely diagnosis of type 1 diabetes allows clinicians to effectively monitor patients for other autoimmunity.

Prevention of recurrent DKA and long-term complications of diabetes relies on provision of

appropriate treatment to manage hyperglycemia, which is predicated on making the correct diagnosis. Patients who present with DKA, regardless of age, should have diagnostic testing to determine the etiology of their diabetes, and those with a new diagnosis of type 1 diabetes should be treated with physiologic insulin replacement. All persons with type 1 diabetes should be informed of the risk of DKA with lapses in insulin therapy, wear a medical information bracelet or have information about their diagnosis readily available in case of emergency. State of the art treatment for type 1 diabetes may include advanced technologies, such as insulin pumps or continuous glucose monitoring, but a correct diagnosis is required by providers⁹.

Consent

Written patient consent was obtained.

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