Ketosis-Prone Diabetes: Evidence-Based Case Report

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Abstract: *Ketosis-Prone Diabetes is a type of diabetes mellitus that not fit to be classified as type 1 diabetes either type 2 diabetes. The diagnose must including Antibody test and beta-cell function. In this case, we would like to share the clinical presentation of diabetic ketoacidosis which similar and can considered to ketosis-prone diabetes. Male 27 years old, came with heavy nausea and vomiting since 1 day before admission, we diagnose him with diabetic ketoacidosis, in examination, we did not find any infection source, so we consider ketosis-prone diabetes.*

Keywords: Ketosis, Prone, Diabetes

1. Introduction

Diabetes mellitus term represents a heterogenous group of metabolic conditions characterized by hyperglycemia. All of these conditions caused by defect of insulin secretion and impaired of insulin action.[1] Ketosis-prone diabetes (KPD) is a type of diabetes that not fit to be classified in type 1 diabetes mellitus neither type 2. KPD is an emerging and heterogenous syndrome that comprising patient who are prone to develop ketosis.[2] This type of diabetes has a clinical and metabolic feature of type 2 diabetes, and commonly presenting with severe hyperglycemia or diabetic ketoacidosis.[3] This atypical diabetes is increasingly recognized but often poorly defined and may be diagnosed as type 1 or type 2 diabetes. Recognizing of this type of diabetes is important to confirm the specific diagnosis, prognosis and treatment.[3]

2. Case Illustration

Male 27 years old came to emergency department with chief complaintheavy nausea and vomiting since 1 day before admission. Nausea and vomiting were not triggered by food or any activity. He was vomiting more than 12 times a day, containing food in the beginning and followed by water. No diarrheacomplained. 1 week before admission, he hadmalaise, polyuria, polydipsia, and polyfagia. No Fever complained. He had no history of illness.He decreasedhis weight until 10 kg in 1 month. His mother had type 2 diabetes. No history of hypertension on his family, no consumption of any drug. He drink alcohol for socialize.

In physical examination, he seems to be in severe illness. His consciousness was somnolen. His vital sign was: BP 100/70 mmHg, Pulse 115 x/min, temperature 37.8°C, respiratory rate 40 x/min (kussmaul). His BMI was 24.5 kg/m2(normal), if we calculate with his old weight BMI was 28.02 (overweight). Another physical examination was in normal limit.

In laboratory result: complete blood count show leukocytosis 15.000/ul, hemoglobin 16.5 g/dl, hematocrit 50.5 %, thrombocyte 465.000/ul. His blood sugar was 486 g/dl, electrolyte was in normal limit, blood gas analysis was acidosis metabolic (pH 7.01, PaCO2 10, PaO2 169, HCO3 2, BE -30). His BUN 37 mg/dl, creatinine 1.8 mg/dl, normal liver enzyme. His chest x-ray was in normal limit, no sign of infection. His urinary laboratory show ketonuria +3, other was in normal limit. His C-peptide was 2.3 ng/ml (normal limit). He was diagnosed with ketoacidosis diabeticum and acute kidney injury et cause hipovolemia.

Outcome
In this case, the patient has ketoacidosis, all of the physical examination and laboratory result was confirm the diagnosis. The unique problem, we did not find any sourceof infection like usual in type 2 diabetes. So we consider another diagnosis, ketosis-prone type 2 diabetes. The treatment as usual in ketoacidosis with iv fluid rehydration, insulin drip, kalium chloride and antibiotic as prevention was given. In the day seven of hospitalizations, the patient was allowed to go home with insulin therapy.

Method
We want to evaluate about the clinical presentation in ketosis-prone diabetes patient. We try to find the article about ketosis-prone diabetes in Proquest. We use the key-word "ketosis-prone" and "diabetes". To find the right article, we exclude review article, case report and other article that not fit in our problem and only use the original article research about ketosis-prone diabetes to see clinical presentation. In the result, we use 3studies that associated with our problem.
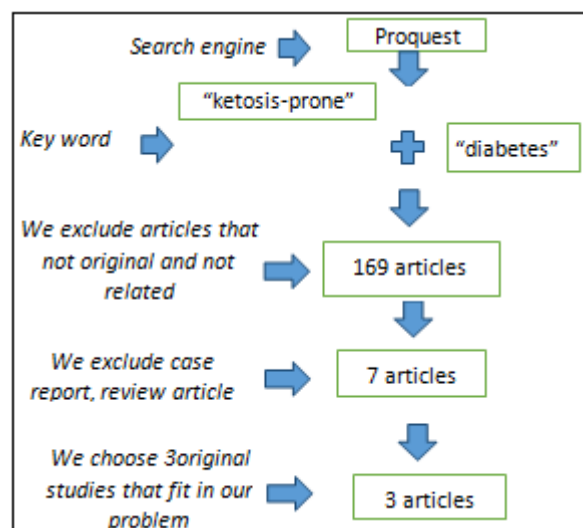
Feature 1: Our pathway to find article.

3. Result

Balasubramanyam, et al[4] reported their study in 294 patients with DKA. They do cohort study to compare the accuracy of four classification(AB system) of KPD. They analyzed clinical and biochemical data from the samples and followed in 12 months. They reported characteristic of the patients, the average age was 38 years old, with male dominance, with ethnicity African American dominance, with mostly unprovoked DKA, average of BMI was 29 kg/m2, A1c average was 13.4, and positive C-peptide. The conclusion of their study was Aβ scheme has the highest accuracy and predictive value in classifying KPD patients, and the patient with KPD A-β+ can discontinuing insulin therapy.[4]

Gupta RD, et al[5] also reported their study in 34 samples. They were comparing between KPD patient with A+β- with KPD patient with A-β+ to see the clinical presentation and recovery of beta-cell function. They do cohort study for 12 months. The result of clinical presentation were the average age about 39 years old, with male dominance, history of weight loss, BMI average is 25 kg/m2, A1c average level about 11.3 %, all with unprovoked DKA. The conclusion of their study was KPD with A- β+ relatively younger and leaner, with male dominance and natural recovery of beta-cell dysfunction.[5]

4. Evaluation

Clinical Presentation	Balasubramanyam et al[4]	Gupta RD et al[5]	Jarvis KM et al[6]
Population	All patients with DKA	All patients with DKA (A- β+)	All patients with DKA (A- β+)
Age at presentation	38 ± 11	39.8 ± 6.5	39.1 ± 9.5
Sex	Male 175 (60%)	Male 8 (72%)	Male 84 (75.7%)
Ethnicity	African American 132 (45%)	Asian Indian	African
	Hispanic 128 (44%)		
	Caucasian 32 (11%)		
	Asian 2 (1%)		
Precipitating factor	Acute illness 54 (18%)	Unprovoked (100%) (history of weight loss)	Unprovoked (100%) (weight loss 9.8 ± 6.1 kg)
	Noncompliance 105 (36%)		
	New-onset diabetes (unprovoked DKA) 135 (46%)		
BMI	29.4 ± 8.7 kg/m^2	25.3 ± 1.6 kg/m^2	28.5 ± 5.1 kg/m^2
A1C	13.40%	11.3 ± 1.8 %	13.4 ± 2.1 %
A-β+	Can discontinuing insulin	Can discontinuing insulin	Can discontinuing insulin

Feature 2: Evaluation table of the studies

5. Discussion

KPD is the type of diabetes that is not easily classified as either type 1 or type 2 diabetes. KPD can be under diagnosed because its heterogenety at diagnosis and lack of a clinical experience. These forms of diabetes include a heterogenous syndrome comprising patient who are prone to develop ketosis, although they lack evidence of autoimmunedestruction of beta-cell. Ketosis-prone diabetes has been variably termed "atypical", "Flatbush", "reversible" or "ketosis-prone type 2 diabetes", which reflects the ongoing difficulty of classifying this heterogenous group. There was ABclassification system, in this system, individuals are categorized into one of four groups, depending on the presence or absence of islet cell autoantibodies (A+ or A-) and the presence or absence of β cell functional (β+ or β-).

From the evidence, we can see the average age is about 38 ± 1 years old, which in type 1 diabetes, juvenile onset is the most common. But in some cases has been reported the presentation age is about 25 years old. Male predominance has been reported in all studies. From ethnicity, mostly predominantly in African

Feature 3: AB system classification.

population, but Asian population has been reported in some cases. The unique presentation is no precipitating factor in A-β+ population, even their beta-cell function is detected, this evidence can differentiate KPD with type 2 diabetes. From these studies, the BMI result dominantly above the normal range, and in several cases, the patient has a weight loss history in several weeks before onset, and the patient will presentated with polyuria, polydipsia and polyfagia. Some cases also reported in KPD population, they had a family history of diabetes. The long-term outcome of these studies show that A-β+ population can discontinuing insulin therapy.

6. Recommendation

DKA is emergency condition in hyperglycemia disorder. From this article, we can classified the type of diabetes that

unusual diagnosed in our daily practice. Ketosis-prone diabetes is type of diabetes that has unique symptoms, the patient will develop DKA without precipitating factor like infection or stress condition, and in the long-term outcome, the patient with A-β+phenotype can discontinuing insulin therapy. To confirm the diagnose, we should check the islet-cell antibody and beta-cell function. This classification will help us to deciding patient prognosis.

Reference

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