

# “Unique presentation: New Onset of Type 1 Diabetes in a Pre-existing case of type 2 Diabetes”

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## ABSTRACT

*We here report a case of “adult-onset type 1 diabetes” having uncontrolled sugar with diabetic ketoacidosis (DKA) in a pre-existing case of type 2 diabetes.*

## INTRODUCTION

- *A number of type 2 diabetic patients are increasing rapidly which create a major burden in health sector. At present all over the world 463 million people are living with diabetes which constitute 10% of total health expenses. India is on second position among top 10 countries with 77 million diabetic patients expected to rise up to 101 million by 2030.<sup>1</sup>*
- *Type 1 diabetes is characterised by insulin deficient state which is commonly seen in young age having rapid onset and develops in few weeks. They are more prone to get diabetic ketoacidosis (DKA). Latent autoimmune diabetes in adults (LADA) is similar to type 1 diabetes but they are relatively late onset with initial response to oral antidiabetic drugs (OADs). Characteristics of type 2 diabetes are insulin resistance state leading to obesity and metabolic syndrome.*
- *We here report an interesting case of “type 2 diabetes” who presented to us with sudden onset of weight loss, uncontrolled sugar, and history of DKA due to development of “type 1 diabetes” leading to insulin deficient state. She was treated with basal bolus insulin regimen which led to significant improvement in her sugar control with no DKA further.*

**Keywords:** LADA, type 1 diabetes

## CASE DISCUSSION

A 57-year-old female patient with type 2 diabetes of 6 years, hypertension for last 7 years, and hypothyroidism for 4 years came to our clinic with chief complaints of marked weight loss, increased frequency of urination, and uncontrolled sugar since last 1.5 months.

- She had three to four episodes of vomiting associated with abdominal pain 15 days back. She was admitted in a private hospital and treated by a primary care physician for the same. She was discharged on premix insulin and was advised four times a day for sugar monitoring. On regular sugar monitoring she had uncontrolled sugar with recurrent episodes of documented hypoglycaemia for which she consulted us. On detailed history and evaluation of her all document, she had lost 14 kg weight in last 1 month with current body mass index (BMI)  $\sim 24.21 \text{ kg/m}^2$  and was recently treated for DKA.
- For initial few years after diagnosis of diabetes, she was treated by the primary care physician and was on metformin 1 g, teneligliptin 20 mg, and glimepiride 1 mg. During that time, she further gained weight and her sugar control was deranged.
- From last 2 years she started consulting us. On first visit her weight was 76 kg, height was 160 cm with BMI of  $29.6 \text{ kg/m}^2$ . She was educated regarding diet and lifestyle modifications. Her routine laboratory investigations were within range.

## SPECIAL INVESTIGATIONS ON FIRST VISIT

Investigations	Reports	Reference values
HbA1C	8.3%	<7%: Well controlled
C peptide	4.89 ng/mL	0.92–3.73 ng/mL
HOMA-IR	5.39	<3: Normal insulin resistance 3–5: Moderate insulin resistance >5: Severe insulin resistance

[HbA1C: haemoglobin A1C (glycated haemoglobin); HOMA-IR: homeostasis model assessment of insulin resistance]

- It was a classic case of type 2 diabetes with metabolic syndrome. After viewing her laboratory investigations as per **Table 1**, she was treated with metformin 2 g, dapagliflozin 10 mg, pioglitazone 15 mg, and glimepiride 1 mg. She was in our regular follow-up with well-controlled sugar.
- She last consulted us 4 months back. At that time her haemoglobin A1C (HbA1C) was 7.3%, but now she presented with uncontrolled sugars and history of DKA in short span of time. Her routine laboratory reports were within normal limits.

## SPECIAL INVESTIGATIONS IN PRESENT VISIT

Investigations	Reports	Reference values
HbA1C	11.4%	<7%: Well controlled
C peptide	0.42 ng/mL	0.92–3.73 ng/mL
HOMA-IR	2.6	<3: Normal insulin resistance 3–5: Moderate insulin resistance >5: Severe insulin resistance
GAD antibody	56 IU/mL	Negative: <20 IU/mL Equivocal: 20–30 IU/mL Positive: 30 IU/mL and above

[HbA1C: haemoglobin A1C (glycated haemoglobin); HOMA-IR: homeostasis model assessment of insulin resistance; GAD: glutamic acid decarboxylase]

**Figure 1** shows that test for glutamic acid decarboxylase (GAD) antibody was performed on bridging method by Insudex®.

## MANAGEMENT

- Patient was initiated on injection glargine 14 units and injection lispro 6 units before each meal. She was explained to do regular self-monitoring of blood glucose. Correction dose and carbohydrate counting were explained. Her insulin dosage were



**Fig. 1:** *Insudex®: used to test for glutamic acid decarboxylase (GAD) antibody.*

titrated over teleconsultation according to her sugar reports. She was advised to take injection glargine 18 units, injection lispro 8 units before breakfast, 10 units before lunch, and 8 units before dinner.

- She came to follow up after 3 months having well-controlled sugar with HbA1C of 7.7% and no hypoglycaemia or DKA further. She also gained weight of 6 kg with BMI of 26.5 kg/m<sup>2</sup>.

## DISCUSSION

- Type 2 diabetes is considered to be the most common type of diabetes characterised by insulin resistance with variable amount of impaired insulin production.
- Type 1 diabetes is characterised by pancreatic  $\beta$ -cell destruction leading to state of insulin deficiency. Type 1 diabetes is divided into two categories. Type 1A is characterised by presence of underlying autoimmunity in which islet cell antibodies (antibodies to glutamic acid decarboxylase: GAD65, zinc transporter: ZnT8, and insulinoma-associated protein 2: IA-2) are present while type 1B are said to be idiopathic having absence of autoimmunity. Type 1 diabetes is commonly seen below 30 years of age but it can be seen at any age.
- Latent autoimmune diabetes in adults is seen in adults with relatively slow onset as compared to

type 1 diabetes. Diagnostic criteria for LADA: there are three main criteria—(1) adult age of onset (>30 years); (2) presence of any islet cell autoantibody; and (3) absence of insulin requirement for at least 6 months after diagnosis.<sup>2</sup> LADA constitutes 2–12% of diabetic cases in adults which makes it most frequent form of autoimmune diabetes. Studies primarily from Asia and Europe reported that 4–14% of type 2 diabetic patients are having type 1 diabetes associated autoantibodies which is suggestive of possibility of underlying LADA. Prevalence of LADA is much variable among different countries which is due to differences in study type, design exclusion and inclusion criteria, as well as difference in ethnicity.<sup>3</sup>

- There are few articles on terminology called “double diabetes” which means two different pathophysiologies of diabetes (insulin deficiency as well as insulin resistance) exist in same patient.<sup>4</sup> Type 1 diabetic children develop obesity over the period of time which can lead to impaired sugar control. Epidemiological data suggest that about 4% of type 1 diabetic patients can develop type 2 diabetes in future.<sup>5</sup> Here case presentation is unique as she was a patient of type 2 diabetes having insulin resistance as its main feature but currently the same patient has become insulin deficient. So, deliberately, we have avoided using the term of “double diabetes” as there is no existence of dual pathophysiology right now.
- In our clinical practice, we see many persons with type 2 diabetes of long duration become insulin deficient where they need insulin for control of sugar and sometimes they are treated with basal bolus therapy.
- In this case it is totally different as patient was having type 2 diabetes since last 6 years and she was well controlled on OAD. She presented to us with significant weight loss and uncontrolled diabetes with DKA within a short span of time of 1 month. On investigations she found to have positive autoantibody with very low c-peptide confirming it as case of type 1 diabetes in a pre-

existing patient of type 2 diabetes.

## CONCLUSION

We need to identify many type 2 diabetic patients who are being treated on insulin considering that long duration of diabetes makes them insulin deficient ignoring the reality that there can be few cases where there is new onset of type 1 diabetes.

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