Case Study Responses

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Note: Readers are encouraged to visit www.InsulinJournal.com to review the details of a Case Study published in the July 2007 issue of *Insulin*.

This was the case of a 25-year-old white woman (body mass index [BMI], 29 kg/m^2) with a history of polycystic ovary syndrome (PCOS). She had come to the diabetes mellitus (DM) clinic for a follow-up appointment after being diagnosed with gestational DM (GDM) during her recent pregnancy. Results of her 2-hour plasma glucose test were 202 mg/dL, and she had acanthosis nigricans on the back of the neck.

Question 1. All of the following are considered "high-risk" groups for the development of type 2 DM according to the American Diabetes Association (ADA), except:
Answer: e. History of stress hyperglycemia.

The latest clinical practice guidelines from the ADA, released in January 2007,[1] recommend that screening for type 2 DM should be performed in the following groups because of the increased risk for disease development:

- People aged ≥45 years, especially if their BMI is ≥25 kg/m^2.
- People aged <45 years, with a BMI ≥25 kg/m^2.
- Those who are habitually physically inactive.
- Individuals with a first-degree relative with type 2 DM.
- Members of high-risk ethnic populations (ie, black, Latino, Native American, Asian American, Pacific Islander).
- Women who have delivered a baby weighing >9 lb or who have been diagnosed with GDM.
- Patients with hypertension (blood pressure >140/90 mm Hg).
- Patients with high-density lipoprotein cholesterol levels <35 mg/dL (0.90 mmol/L) and/or triglyceride levels >250 mg/dL (2.82 mmol/L).
- Women who have PCOS.
- Individuals who, on previous testing, had impaired glucose tolerance or impaired fasting glucose.
- Those who have other clinical conditions associated with insulin resistance (eg, acanthosis nigricans).
- Patients with a history of vascular disease.

Patients with "stress hyperglycemia" are not recognized as having an increased risk for the development of type 2 DM. Stress hyperglycemia usually subsides after the stressful situation has resolved.

Question 2. This patient meets the ADA criteria for the diagnosis of:
Answer: b. DM.

The clinical practice guidelines from the ADA[1] establish the criteria for diagnosis of DM as follows:

- Symptoms of DM and a casual plasma glucose level ≥200 mg/dL (11.1 mmol/L). The classic symptoms of DM include polyuria, polydipsia, and unexplained weight loss. *Casual* is defined as any time of day without regard to time since last meal.
- Fasting plasma glucose level ≥126 mg/dL (7.0 mmol/L). *Fasting* is defined as no caloric intake for ≥8 hours.
- Two-hour plasma glucose ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test (OGTT). The test should be performed as described by the World Health Organization,[2] using a glucose load containing the equivalent of 75-g anhydrous glucose dissolved in water. (Screening for GDM involves a 100-g OGTT.)

Question 3. In terms of this patient's glucose metabolism abnormality, what initial treatment option is most appropriate?
Answer: c. Nutritional counseling and exercise program for weight reduction.

According to the ADA,[1] modest weight loss has been shown to improve insulin resistance in overweight and obese insulin-resistant individuals. Thus, weight loss is recommended for all such individuals who have or are at risk for DM.

Structured programs that emphasize lifestyle changes—including education regarding exercise programs and diet, regular physical activity, and consistent participant contact with health care providers—can produce long-term weight loss on the order of 5% to 7% of starting weight. Thus, a change in lifestyle should be the primary approach to weight loss.

Low-carbohydrate diets (ie, restricting total carbohydrate intake to <130 g/d) are not recommended for the treatment of patients who are overweight or obese. The long-term effects of these diets are unknown. Although such diets produce short-term loss of weight, maintenance of this weight loss is similar to that from low-fat diets (ie, long-term weight reduction is difficult to maintain).

Physical activity and behavior modification are important components of weight loss programs and are the most helpful factors in the maintenance of weight loss.

The other treatment options mentioned (birth control pills, spironolactone, clomiphene, and metformin) may be considered for patients with PCOS; however, they are not approved by the US Food and Drug Administration for this diagnosis. Additionally, appropriate PCOS therapy is based on each patient's individual circumstances and presentation (eg, fertility and desire for pregnancy, degree of hirsutism, excessive weight).

In this case, we tried to emphasize the patient's need to maintain good glycemic control after her diagnosis of type 2 DM. Nutritional counseling and an exercise program for weight reduction are the most appropriate options for initial therapy, particularly since her glycosylated hemoglobin level (6.0%) was on target (ADA target level,[1] <7.0%; American Association of Clinical Endocrinologists target level,[3] <6.5%). Metformin may be indicated if lifestyle measures fail to effect an improvement in the patient's condition.

Question 4. Describe the abnormalities in insulin secretion and action that place patients with PCOS and GDM at risk for type 2 DM.

Answer: The following factors put patients with PCOS and GDM at risk for type 2 DM.

- PCOS: Insulin resistance in women with PCOS is more prominent than in weight-matched controls and occurs in both obese and nonobese women.[4,5] The etiology of this insulin resistance is unknown. Additionally, there are abnormalities of insulin secretion, especially in individuals with a family history of DM.[6,7] The main abnormalities are reduced first-phase insulin response to glucose and a diminished ability of the β-cell to adjust and respond to oscillations in the plasma glucose levels.
- GDM: Impaired glucose tolerance and GDM develop in 2% to 8% of pregnant women, usually during the second half of gestation.[8] The mechanisms include sluggish first-phase insulin release coupled with excessive insulin resistance. Human placental lactogen enhances lipolysis later in gestation, with a subsequent increase in levels of glycerol and free fatty acids.[9] This contributes to impaired glucose utilization by skeletal muscle. Some ethnic groups (eg, Latino, Asian American, black, Native American), women with central obesity (as measured by increased waist circumference), and those with a family history of DM are more susceptible to the development of GDM.[9]

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