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Intensifying Treatment in Poorly Controlled Type 2 Diabetes Mellitus: Case Reports

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ABSTRACT

There is no single correct treatment option for all patients with type 2 diabetes mellitus. Duration of diabetes and stage of the disease, level of control, lifestyle habits, and attitude toward disease management all affect the choice of treatment for any given individual. Indeed, the above factors should be especially considered when considering initiating insulin therapy in these patients. Basal insulin and premixed insulin remain the most common formulations used when initiating insulin in patients with type 2 diabetes and, as demonstrated in this article, both of these insulin strategies can be effective in controlling hyperglycemia when therapy is individualized to the patient.

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KEYWORDS: Control; Hyperglycemia; Treatment Intensification; Type 2 Diabetes

Depending on the degree of hyperglycemia and stage of the disease, there are various treatment options for patients with type 2 diabetes mellitus. The healthcare provider must partner with the patient, explore the various options with their attendant benefits and limitations, and then act to prevent the clinical inertia that unfortunately is common with diabetes treatment. The genuine cases presented here demonstrate a range of patient needs, as well as lifestyle and potential response issues, that require consideration when tailoring treatment to individual requirements.

CASE STUDIES

Case 1: Jane

A 74-year-old woman presented for her yearly physical examination with her primary care physician. She had a prior history of a myocardial infarction 6 years earlier, complicated by transient congestive heart failure, as well as type 2 diabetes for 9 years. Her medications included aspirin, a 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor (statin), an angiotensin-converting enzyme (ACE) inhibitor, extended-release glipizide 10 mg/day, and metformin 1,000 mg twice a day. Her 2 main complaints were increasing arthritis in her hands and decreasing vision due to cataracts. Jane stated that her ophthalmologist had said the cataracts were not yet "ripe" for removal. Her physical examination was only notable in that she had gained 4 lb (1.8 kg) in the last year, now bringing her body mass index (BMI) to 31.

Laboratory findings from routine blood tests that had been done the week before the examination were reviewed. Jane's fasting lipid profile revealed a low-density lipoprotein level of 60 mg/dL (1 mg/dL = 0.02586 mmol/L) but a triglyceride level of 267 mg/dL (1 mg/dL = 0.01129 mmol/L). Her urine microalbumin remained negative and she was congratulated that, in 9 years, she had no evidence of microvascular complications. However, her glycosylated hemoglobin (HbA_{1c}) level was 8.2%; 4 months previously it was 8.0%, up from 7.0% a year earlier. Her blood glucose records revealed a fairly flat curve of moderate hyperglycemia throughout the day with blood glucose values between 170 and 220 mg/dL (1 mg/dL = 0.05551 mmol/L), reflecting her 3 balanced meals.

She was advised that something had to be done to address her elevated glycemic levels. Results from the landmark United Kingdom Prospective Diabetes Study (UKPDS), a large intervention study in patients with type 2 diabetes, suggested that by reducing her HbA_{1c} from 8.2% back to 7.0% Jane would decrease her risk of developing microvas-

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cular disease by approximately 44% and decrease her risk of any diabetes-related adverse outcome or death by about 25%.[1]

When insulin was mentioned, Jane burst into tears. She related how a friend who started insulin had gained 21 lb (9.5 kg), at least in part because "she always had to eat to prevent her sugar from going too low." To prevent weight gain, Jane always exercised in the form of a daily walk and ate 3 balanced meals per day. She had followed this routine faithfully since her retirement. In addition, she expressed concern that she lived alone and that her arthritis and cataracts would not allow her to self-administer insulin.

Jane's physician discussed the point that progression to insulin use does not indicate failure, because the natural history of type 2 diabetes dictates that, after ≥10 years insulin is required to maintain good blood glucose control and to stay healthy.[2] Sensing Jane's severe apprehension, the physician requested permission to administer a mock injection. An insulin pen device with a 30-gauge pen needle was used with a test fluid: Jane was amazed that she really did not feel it. She was then given the device and asked to dial 10 U. The device featured a large-dose scale and audible clicks upon dose adjustment allowing her to perform this task easily despite her arthritis and poor vision.

Case 2: John

John is a 48-year-old man with type 2 diabetes who returned to see his family physician after a hiatus of 1 year. He noted that his new job, involving frequent travel, meant that finding time for "his health" was proving difficult. He was now in a situation whereby small meals during the day left him famished by evening, at which time he would return home and consume a large dinner. He felt that this dietary pattern, as well as decreased exercise, had led to a 5 lb (2.3 kg) weight gain and deterioration of his glycemic control. A year ago John's HbA_{1c} was 6.7% on extended release glipizide 10 mg/day and metformin 1,000 mg/day. He was also taking a statin, aspirin, and an ACE inhibitor. No evidence of microvascular disease was noted on his physical examination; the only change was an increase in the varicosities and edema in his legs, which he attributed to being "on his feet all day." Laboratory work showed that his HbA_{1c} level had increased to 8.5%. This finding was consistent with self-measured blood sugars: fasting blood glucose was 200 mg/dL and predinner glucose was 120 to 130 mg/dL, but bedtime ranged from 310 to 330 mg/dL. John realized that his meal patterns should change, but with the restrictions of the new job he thought he could not achieve this. His grandmother had had numerous complications due to diabetes and John understood that these complications were preventable; however the thought of insulin scared him.

Case 3: Sam

Upon receiving a diagnosis of type 2 diabetes 2 years earlier at the age of 33, Sam decided to take a proactive approach to the management of his disease, immediately attending an American Diabetes Association (ADA) educational course for people with diabetes. He was fortunate to have been diagnosed before complications occurred and wanted to keep it that way. Despite his best intentions, Sam had difficulty with portion control and gained rather than lost weight on his medication (a combination tablet of metformin and glyburide). Sam's current fasting glucose readings were on the order of 140 to 150 mg/dL, but his postprandial glucose levels would often reach 220 to 250 mg/dL. Sam was aware that his current HbA_{1c} of 7.5% represented an increased risk for diabetic complications and that something needed to be done.

Case 4: Gloria

Gloria, a 71-year-old woman, was shocked to learn she had diabetes. She was slim, exercised regularly, and knew no one who had the disease. She had been placed quickly on triple therapy (rosiglitazone 4 mg/day, glimepiride 8 mg/day, metformin 1,000 mg twice daily) but with poor results. A glutamic acid decarboxylase–65 antibody test was moderately positive, indicating that she had latent autoimmune diabetes in adulthood. Insulin was started and oral hypoglycemic agents were stopped. She was quickly advanced to a multiple injection insulin regimen with glargine 10 U at bedtime plus glulisine 2 to 4 U with meals administered with a pen device. Gloria was taught carbohydrate counting and was meticulous in testing. She was able to obtain reasonable fasting glucose values in the 85–120 mg/dL range, and adequate prelunch glucose values in the same range. However, her predinner glucose values, taken at about 7 PM were always >200 mg/dL, despite increasing the lunchtime dose of glulisine to achieve postprandial values of about 140 mg/dL.

INSULIN: TO START OR NOT TO START? WHAT ARE THE CONSIDERATIONS?

The patient is an important ally in selecting insulin as a therapy. The patient must be made aware that in most cases, treatment of type 2 diabetes eventually progresses to insulin therapy. Some individuals are apprehensive about the presumed pain of injections, a fear that can readily be allayed by a mock injection, as in the case of Jane. Perceived inability to administer injections because of physical impediments, such as Jane's arthritis, can also be addressed by showing the patient how to use insulin pens. In the discussion with the patient, the physician must assess how willing the patient is to follow recommendations, that is, would he/she only consider 1 injection or could he/she administer insulin 4 times a day?

The usual patient preference is to add another pill, rather than an injection, to their existing oral regimen. The limitations and side effects of the medicines must be considered:

- sulfonylureas may show their maximal effects at lower doses than prescribing guidelines suggest[3]