The Usage of Basal Plus Regimen in Management of Diabetes

A 60-year-old lady of Asian Indian ethnicity with a 12-year history of type 2 diabetes enrolled with our Diabetes Tele Management System (DTMS)¹ on May 2009.

Biothesiometry revealed presence of peripheral neuropathy and retinal examination proved normal. She was previously on 4 mg glimepiride and 1,000 mg metformin. In our clinic, initially she was started on Lantus 10 U in the morning and metformin 1,000 mg daily. Glimepiride was not continued. Subjects enrolled under our intensive treatment are followed up via DTMS using a customized software where 4 point blood sugar values (one sample as fasting, second sample as two-hour postprandial after each main meal, another sample at 3:00 a.m. and other whenever required) will be reported by subjects through phone, email or website.

This enables a multidisciplinary team consisting of doctor, dietitian, diabetes educator, nurse, pharmacist and psychologist to maintain interaction and follow-up with patients to modify drug dosages and give advice on diet, exercise, usage of glucometer and insulin pens, etc. During the course of DTMS follow-up, it was found that the patient's fasting sugar values dropped to 90-110 mg/dl and the post-breakfast values ranged consistently between 170-220 mg/dl.

During the next physical visit after three months, the patient and her
caretakers discussed further management with our diabetes treatment team and our team suggested the introduction of insulin analog glulisine just before breakfast. The observation of glycemic pattern over several days suggested that addition of a bolus insulin just before breakfast in combination with oral agents would help normalize postprandial sugar values after lunch and dinner too. Glulisine was planned before breakfast since other post-meal values were relatively controlled. During subsequent tele-titration visits, the dose of Apidra was up-titrated to 10 units with no bolus before lunch and dinner. Subsequent to administration of Apidra, all the post-meal values (post-breakfast, post-lunch, post-dinner) remained between 120-156 mg/dl. More importantly, the patient did not experience any hypoglycemic symptoms.

The physical examination and laboratory parameters before and after treatment are described in Table below.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before treatment (May 2009)</th>
<th>After treatment (November 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>156.5 cm</td>
<td>156.5 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>51.2 kg</td>
<td>59.6 kg</td>
</tr>
<tr>
<td>BMI</td>
<td>20.90 kg/m²</td>
<td>24.33 kg/m²</td>
</tr>
<tr>
<td>BP</td>
<td>140/87 mmHg</td>
<td>130/80 mmHg</td>
</tr>
<tr>
<td>Pulse</td>
<td>76/min</td>
<td>86/min</td>
</tr>
<tr>
<td>HbA₁c</td>
<td>16.2%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Fasting blood sugar</td>
<td>515 mg/dl</td>
<td>106 mg/dl</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>332 mg/dl</td>
<td>164 mg/dl</td>
</tr>
<tr>
<td>SGPT</td>
<td>13 IU/l</td>
<td>12 IU/l</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.8 mg/dl</td>
<td>0.7 mg/dl</td>
</tr>
</tbody>
</table>

**Discussion**

In the early treatment of type 2 diabetes mellitus (T2DM), the addition of a basal insulin, such as insulin glargine, to existing oral therapy can help subjects attain recommended glycemic control targets, including hemoglobin A₁c <7% and fasting blood glucose of 70-130 mg/dl.² For patients close to but not at target, the management of postprandial glucose excursions with rapid-acting insulin, such as insulin glulisine, can provide further improvements in glycemic control.

A simple approach for treatment of T2DM is optimization of the basal insulin dose (added to oral antidiabetic drugs) to target fasting glycemia followed by the addition of a single
prandial dose of rapid-acting insulin to target the largest glucose excursion. A second and third dose of prandial insulin can then be added if HbA1c remains above target and to manage postprandial glucose excursions at other meals.3

Apidra (Insulin glulisine) is a safe and effective fast-acting human insulin analog for meal time insulin supplementation.4,5 Since it is the only zinc-free formulation, it has a faster onset and shorter duration of action than other short-acting analogs which results in an action profile that closely mimics the normal post-meal endogenous insulin response, thus fulfilling the prandial insulin requirement and making the basal-bolus treatment approach clinically achievable.6,7

Insulin glulisine has been designed to exhibit intrinsic stability while maintaining rapid deployment of insulin monomers. Evidences suggest that a single bolus of glulisine, added to glargine and OADs, resulted in markedly improved HbA1c levels, when glulisine is administered at breakfast or at main mealtime though the percentage of patients achieving the A1c target of 6.5% is significantly more in the main meal group, a simplified and effective approach to treatment intensification in type 2 diabetes patients.8

In our subject, though she was only on once-daily Apidra, she was educated on the possibility of using it before lunch/dinner and in the rare occasion of having extra calories. Insulin glulisine also has a flexible administration period, i.e., immediately before or after meals which makes it a suitable prandial insulin with its precise duration of action. Thus, insulin glulisine is an effective and well-tolerated option for the treatment of patients with type 1 and type 2 diabetes as well.9

We could observe that she tolerated it well and moreover the quality-of-life dramatically improved due to the efficacy of analog insulins and the ease of using it. Pharmacokinetic and pharmacodynamic profiling of insulin glulisine in healthy subjects and patients with type 1 and type 2 diabetes not only confirms the rapid absorption and fast action of insulin glulisine compared with human insulin, but also provides evidence that the unique drug formulation may offer additional benefits.

Insulin glulisine complements insulin glargine (21(A)-Gly30(Ba)-L-Arg-30(Bb)-L-Arg-human insulin), the first long-acting basal insulin analog that displays a smoothened time-action profile with a 24-hour duration of action. Together, these analogs offer patients a more physiologic approach to insulin replacement.10
References

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