Use of Basal-Bolus Insulin Therapy at Time of Diagnosis of Type 1 Diabetes Mellitus in Pediatric Patients Provides Improved 1st Year Glycemic Control Compared to Conventional NPH Regimens

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Clinical Question

In pediatric patients with new onset diabetes, does NPH (traditional regimen) or Lantus (basal-bolus therapy) lead to better short term control and a decreased risk of hypoglycemia?

Clinical Bottom Line

1. A single-center retrospective case-control study found that, among newly-diagnosed pediatric patients > 6 years of age, those patients started on basal-bolus (glargine) insulin therapy at the time of diagnosis averaged 0.58% lower hemoglobin A1c levels during the first year (3, 6, 9, and 12 month follow up average) compared to those started on an NPH regimen (7.05% vs. 7.63%, average difference: 0.58%, 95% CI: 0.36%-0.81%).

2. This treatment effect varied significantly by age, with a significantly greater treatment effect observed in older (≥10.5 years) compared to younger (<10.5 years) patients (although the treatment effect was still statistically significant in both older and younger patients):

<table>
<thead>
<tr>
<th>Patients</th>
<th>HgbA1c with glargine</th>
<th>HgbA1c with NPH</th>
<th>Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients ≥ 10.5 years</td>
<td>6.81%</td>
<td>7.67%</td>
<td>0.86% (0.52%-1.19%)</td>
</tr>
<tr>
<td>Patients &lt; 10.5 years</td>
<td>7.27%</td>
<td>7.64%</td>
<td>0.37 (0.08%-0.67%)</td>
</tr>
</tbody>
</table>

3. Authors reported that they were unable to determine rates of hypoglycemia accurately in this study.

Evidence Summary

1. Study subjects included 459 children diagnosed with Type I diabetes mellitus between July 1, 2002 and June 30, 2006 at children’s Medical Center Dallas. 247 were treated at the time of diagnosis with conventional NPH regimen, mostly during the early years of the study, and 212 were treated with basal-bolus therapy, mostly during the latter years of the study, reflecting an institutional change in treatment approach over time.

2. Patients were followed-up at 3, 6, 9, and 12 months after diagnosis, although data
was only available for between 63% and 75% of glargine-treated patients and between 56% and 80% of NPH-treated patients at these time points.

Comments

1. This is the first reported study on the effects of starting basal-bolus therapy at the time of diagnosis of Type I diabetes mellitus on first-year glycemic control in pediatric patients.
2. While the study authors addressed issues of potential selection bias and confounding effects of undefined treatment differences occurring over time (NPH was largely used during the early years of the study and glargine was largely used during later years of the study) and concluded that these factors likely did not affect their results, a prospective randomized controlled trial would potentially have better validity and is needed.
3. Prior studies suggest that basal bolus therapy provides equivalent glycemic control to traditional NPH regimens while significantly reducing rates of hypoglycemia. A few studies have found that basal bolus therapy provides better glycemic control than traditional NPH regimens in certain populations.
4. Future studies should include measurement of C-peptide to help elucidate whether one regimen has advantages over another in terms of preservation of endogenous insulin secretion.

References

3. Fulcher GR, Gilbert RE, Yue DK. Glargine is superior to neutral protamine Hagedorn for improving glycated haemoglobin and fasting blood glucose levels during intensive insulin therapy. Intern Med J. 2005; 35(9):536–542.

Link to evidence on the medical library portal: TBD