Continuous subcutaneous insulin infusion (CSII) in the Veneto region: efficacy, acceptability and quality of life

Background information

• Continuous subcutaneous insulin infusion (CSII) has been used for over 20 years to improve glycemic control in patients with diabetes in whom multiple daily injections of insulin have not been completely successful.

• A meta-analysis of 12 randomized clinical trials has shown that CSII is associated with improvements in levels of blood glucose and glycated hemoglobin (HbA1c) (Pickup et al. 2002).

• However, it has been suggested that CSII might be less safe than injection therapy, with increases in the incidence of diabetic ketoacidosis.

Aims

• To study the efficacy, safety, patient acceptability and impact on quality of life of CSII therapy in patients with type 1 diabetes living in the Veneto region of Italy.

Methods

• A retrospective, uncontrolled analysis was performed in patients who had started CSII therapy within the previous 20 years at 11 centers in the Veneto region.

• HbA1c levels, bodyweight, body mass index and insulin requirements were obtained from patients’ medical notes before the start of CSII and every subsequent year.

• Ketoacidosis, severe hypoglycemia frequency, hospital admission details and outpatient visits were recorded from the start of diabetes to the present time.

• Other data (demographics, patient acceptability and quality of life, assessed using the Diabetes Quality-of-Life Measure [DQOL]) were obtained via questionnaires at the time of data collection.

Results

• 138 patients participated in the study. The mean age, duration of diabetes and duration of CSII therapy were 33.1 ± 1.0, 13.1 ± 0.7 and 7.4 ± 0.4 years, respectively.

• HbA1c levels and daily insulin requirements decreased significantly during the first year of CSII and remained unchanged over the following years.

• Episodes of severe hypoglycemia and ketoacidosis decreased significantly after switching from insulin injection therapy to CSII (Table 1), the latter possibly because of technological improvements in infusion devices and better patient education.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>On CSII therapy</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c (%)</td>
<td>9.3 ± 0.2</td>
<td>7.9 ± 0.1 a</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Daily insulin requirements (units)</td>
<td>49.1 ± 1.5</td>
<td>42.2 ± 1.1 a</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Severe hypoglycemic episodes (per patient-year)</td>
<td>0.31 ± 0.07</td>
<td>0.09 ± 0.02</td>
<td>&lt; 0.003</td>
</tr>
<tr>
<td>Ketoacidotic episodes (per patient-year)</td>
<td>0.41 ± 0.12</td>
<td>0.11 ± 0.03</td>
<td>&lt; 0.013</td>
</tr>
<tr>
<td>Hospital admissions (per patient-year)</td>
<td>0.52 ± 0.06</td>
<td>0.23 ± 0.06</td>
<td>&lt; 0.0015</td>
</tr>
<tr>
<td>Outpatient visits (per patient-year)</td>
<td>8.1 ± 0.4</td>
<td>5.9 ± 0.4</td>
<td>&lt; 0.0003</td>
</tr>
</tbody>
</table>

Table 1. Effect of CSII therapy on diabetic outcomes in 138 patients in the Veneto region of Italy. All data are means ± SE.

aAt the first year of CSII

Key points

- Benefits of continuous subcutaneous insulin infusion (CSII) therapy included significant improvements in HbA1c levels and reductions in severe hypoglycemia, diabetic ketoacidosis and insulin requirements.

- More than 75% of patients expressed a desire to remain on CSII therapy, citing reasons such as improved metabolic control and an increased sense of well-being.

- CSII was associated with a reduced frequency of hospitalizations and outpatient visits for diabetes.
Additionally, CSII was associated with a significant reduction in the number of annual hospitalizations and outpatient visits (Table 1), suggesting that patients receiving CSII may use fewer healthcare resources.

As in the Diabetes Control and Complications Trial (DCCT; DCCT Research Group 1988), patients’ mean bodyweight increased after the switch to CSII therapy, and the change was significant from the third year of CSII therapy onwards.

Patient acceptability of CSII therapy was very high, with 78.4% of patients expressing a desire to continue with treatment. Benefits of CSII therapy cited by patients included improvements in metabolic control and greater flexibility with meals (Figure 1).

The DQOL questionnaire was completed by 98 patients. The overall score of 73.0 ± 1.8 suggested a high level of well-being among patients receiving CSII therapy.

Conclusions

- In a retrospective analysis of > 100 patients in Veneto, Italy, CSII therapy was associated with improvements in glycemic control, and reductions in hypoglycemia, diabetic ketoacidosis, insulin requirements, hospitalizations, and outpatient visits.
- Patient acceptability of CSII therapy was good, and quality of life scores indicated a high level of well-being among patients treated with CSII.

From the authors

“The observed decrease of HbA_1c could translate into a 50% reduction of the risk of developing retinopathy”

Additional references