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Artículo original

Quality of life outcomes in subjects with type 1 diabetes with and without repeated hypoglycaemia. Short-term results of CSII treatment

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Abstract

Objectives: To evaluate quality of life (QoL) characteristics and outcomes in subjects with T1D with and without non-severe (NSH)/severe hypoglycaemia (SH) as a main indication for CSII. **Patients and methods:** Two groups of T1D subjects were selected from candidates to CSII following the criteria of the Catalan National Health Service. Twenty-one subjects (aged 34.6±7.5 years; 13 women) in whom CSII was started because of recurrent NSH and SH) were included (H Group). They were compared to 18 T1D subjects (aged 32.3±10.1 years; 14 women) in whom CSII was initiated because of non-optimal control without repeated NSH/SH (NH group). General characteristics, metabolic control and QoL/health state (DQoL/SF-12 questionnaires) were evaluated (baseline/after 12-months). **Results:** In the H group, the number of NSH/week diminished from 5.01±1.56 (baseline) to 2.76±1.09 after 12 months ($p < 0.001$). SH diminished from 1.24±0.62 per subject year (baseline) to 0.12±0.21 (12 months, $p < 0.001$). There were no differences in A_{1c} (6.9±1.3 vs 6.5±0.8%; NH and H) after 12-months of CSII. The H group scored better in DQoL-impact of treatment subscale at baseline (45.7±7.0 vs 33.7±7.3; $p < 0.001$, NH and H). QoL improved similarly after 12 months in both groups, but the difference in DQoL-impact of treatment (41.5±8.5 vs 31.0±5.8; $p < 0.001$) was maintained. **Conclusions:** CSII improves QoL independently of its main indication. Subjects who initiate CSII because of repeated hypoglycaemic episodes display a different QoL perception than those without this indication when starting this therapy. Although this finding does not preclude favorable results, probably it has to be considered in order to encourage patients to start this modality of treatment.

Keywords: quality of life, type 1 diabetes, CSII, repeated hypoglycaemia.

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List of abbreviations:

CSII: continuous subcutaneous insulin infusion; MDI: multiple daily injections; T1D: type 1 diabetes ; NSH: non-severe hypoglycaemia; SH: severe hypoglycaemia; DQoL: Diabetes Quality of life.

Introduction

Continuous subcutaneous insulin infusion (CSII) represents an alternative to a conventional intensive insulin therapy with multiple daily injections (MDI) when it is unable to achieve the major metabolic goals of diabetes treatment: HbA_{1c} within desirable levels without an unacceptable incidence of hypoglycaemia.[1-3] Up to now, CSII has demonstrated beneficial effects in reducing the number of episodes of severe hypoglycaemia, as well as, diminishing HbA_{1c} depending on the meta-analysis.[4-6] However, data and information on the relative benefits of this type of treatment in terms of quality of life and health perception is still scarce particularly when comparing data obtained in subgroups of subjects with type 1 diabetes (T1D) with different indications for CSII treatment.[7]

Frequent, unpredictable and repeated non-severe and severe hypoglycaemia is one of the main indications for health service or health insurance-funded CSII.The aim of our study was to evaluate quality of life perception characteristics and outcomes in subjects with T1D with and without non-severe (NSH)/severe hypoglycaemia (SH) as a main indication for starting CSII.

Patients and methods

We included twenty-one subjects with T1D (aged 34.6±7.5 years; 13 women, T1D duration 16.2±6.6 years,

A_{1c} 6.7±1.1%) in whom CSII was started because of recurrent hypoglycaemic episodes (more than 4 NSH episodes/week -last 8 weeks- and more than 2 SH during the last 2 years) in spite of MDI treatment supported by optimised education (H group). They were compared to a group of 18 T1D subjects (aged 32.3±10.1 years; 14 women, T1D duration 16.2±8.9 years; A_{1c} 8.2±1.2%) in whom CSII treatment was initiated because of non-optimal glycaemic control (intensive insulin therapy with MDI had been unable to maintain A_{1c} levels <7.5% without disabling hypoglycaemia) without repeated NSH/SH (NH group). These two groups of subjects were selected from candidates in whom the initiation of CSII treatment was proposed following the criteria for reimbursement of the Catalan National Health Service authorities. In groups (H and NH groups), general characteristics, metabolic control (HbA_{1c}; Menarini Diagnostici, Firenze, Italy, normal range 3.5-5.5%) and data concerning quality of life and health state perception (Diabetes Quality of life questionnaire: DQoL, SF-12 health survey questionnaire) were evaluated at baseline and after 12-months of initiating CSII therapy. DQoL questionnaire scores evaluate different aspects including: satisfaction with treatment, impact of treatment, worries about social and vocational issues and worries about diabetes-related issues (higher scores relate to deterioration in QoL).[8] NSH events were defined as symptoms or signs associated with hypoglycaemia experienced by the patient and self-treated without the need of assistance from a third party or a blood glucose measurement of <3.3 mmol/l. SH events were defined as those associated with neuroglycopenia severe enough to require treatment from a third party and they were collected during the previous two years. All the subjects included in our study received our specific therapeutic education programme for patients beginning CSII. Patients were instructed on glucose goals and self-monitoring glucose control when necessary.

All patients were using pumps with pre-programmable variable basal rates. In H Group 12 subjects used insulin lispro (Humalog, Eli Lilly and Company, Indianapolis, IN, USA) and 9 used insulin aspart (Novorapid, Novo Nordisk A/S, Bagsvaerd, Denmark). In NH Group, 11 patients used insulin lispro and 7 used insulin aspart. Pumps, infusions sets, insulin, finger test strips and capillary glucose meters were provided to all the patients and were funded by the National Health Service. The Ethical Committee of Hospital Clínic i Universitari approved the study and all subjects gave informed written consent.

Results are presented as mean±SD. Comparisons between were performed using a paired or unpaired Student's t-test as required. A p value <0.05 was considered statistically significant. All statistical calculations were performed with the Statistical Package for Social Science (SPSS, v 14.0) for personal computers.

Results

At baseline, no differences were observed between the groups with respect to age, gender and T1D duration. As expected, A_{1c} (8.2 vs 6.7%, p <0.01) and insulin dose before CSII (0.83±0.27 vs 0.64±0.14 UI/kg, p <0.01) were lower in H group. In the H group, the mean number of episodes of NSH per week diminished from 5.01±1.56 at baseline to 2.76±1.09 after 12 months, respectively (p <0.001). When the number of SH episodes were analyzed they diminished from 1.24±0.62 per subject year at baseline to 0.12±0.21 at the end of the follow-up (p <0.001). Likewise, there were no differences with respect to A_{1c} values (6.9±1.3 vs 6.5±0.8%; NH and H groups, respectively) after 12-months of CSII. Regarding QoL outcomes, the H group scored better in DQoL-impact of treatment subscale at baseline (45.7±7.0 vs 33.7±7.3; p <0.001, NH and H groups) and this was nearly the case in the QoL-social/vocational worrying subscale (15.7±3.8 vs 13.2±3.7; p= 0.055, NH and H groups) (figure 1A). We did not observe differences in the scores obtained from the SF-12 health survey questionnaire neither at baseline nor at the end of the follow-up. In spite of the fact that all the items evaluated in QoL questionnaires improved similarly after 12 months in both groups of subjects (table 1), the difference in DQoL-impact of treatment subscale (41.5±8.5 vs 31.0±5.8; p <0.001, NH and H groups) was maintained (figure 1B).

Discussion

In addition to the expected clinical and metabolic differences at baseline, subjects in whom CSII was indicated mainly because of repeated hypoglycaemia had different QoL perception than those without this indication for starting CSII. However, CSII improves QoL in both groups after 12 months of follow-up.

Our study confirms that the use of CSIII has a positive impact on quality of life outcomes evaluated, with the exception of the SF-12 health survey questionnaire.[9,10] A very recent case–control study regimens suggest that the

Table 1. Quality of life outcomes/scores at baseline and after 12 months of follow-up

	Baseline	12 months	p
DQoL Satisfaction			
H Group	36.1±9.1	32.5±5.5	<0.05
NH Group	37.9±9.0	30.0±6.4	<0.01
DQoL Impact of treatment			
H Group	33.7±7.3	31.0±3.8	<0.05
NH Group	45.7±7.0	41.4±4.5	<0.05
DQoL Social/vocational worrying			
H Group	13.2±3.7	11.6±1.8	=0.06
NH Group	15.7±3.8	12.4±1.5	=0.06
DQoL Diabetes-related issues worrying			
H Group	10.1±2.5	8.7±1.9	=0.07
NH Group	9.3±2.8	8.6±2.0	=0.08

DQoL: data of quality of life. CSII: continuous subcutaneous insulin infusion.

quality of life improvement is derived from greater lifestyle flexibility, less fear of hypoglycaemia, and higher treatment satisfaction, when CSII is compared with either glargine-based or NPH-based MDI regimens.[11]

Intensive insulin therapy significantly reduces the risk of micro and macrovascular complications in subjects with T1D and represents the standard treatment from the onset of the disease. However, this sort of therapy is unfailingly associated with 3 to 4-fold risk of hypoglycaemia including severe episodes, precluding in some cases this type of therapy. Hypoglycaemia is one of the most troubling problems in the management of T1D. The presence of hypoglycaemia produces a "vicious circle" of repeated hypoglycaemia, the appearance of hypoglycaemic unawareness, together causing a predisposition to severe episodes. Because hypoglycaemia is one of the most feared and disabling complication of diabetes treatment, it is surprising that patients with such a problem scored better in some aspects of quality of life measurements

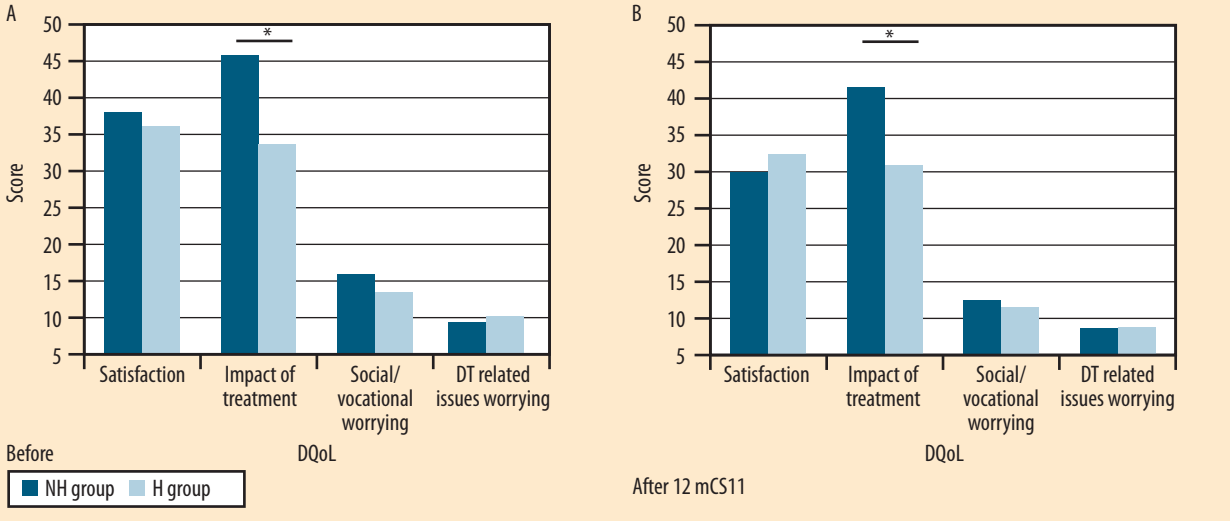

Figure 1. Results of the Diabetes Quality of Life Questionnaires (DqoL) in both groups of subjects with T1D. A) Baseline, B) After 12-months of starting CSII. *p <0.001. DT: diabetes

than subjects without it (impact of treatment and social/vocational worrying). In our study this finding remained stable at the end of the 12-month follow-up. However, our results are in agreement with previous studies demonstrating that the concern about hypoglycaemia is underscored in subjects with T1D when compared to their cohabitants.[12] The possible contributors to this underestimation of the problem are multiple and they were not directly addressed in our study. In our opinion, the massive and disproportionate importance that professionals of diabetes management have given to hyperglycaemia and its consequences for decades in comparison with the attention paid to hypoglycaemia could be partly responsible. Fortunately, as well as in the group of subjects in which hypoglycaemia was not the indication for initiating CSII, the improvement in quality of life evaluation was also observed in the group of subjects who initiated CSII because of repeated non-severe and severe hypoglycaemia.

Conclusions

In summary, independently if the main indication for starting CSII includes or not repeated hypoglycaemia, this therapy improves QoL. Subjects who initiate CSII mainly because of repeated hypoglycaemic episodes display a different QoL perception at baseline than those without this indication when starting this type of therapy. Although this finding does not preclude favorable results at short-term, probably it has to be considered in order to encourage patients to start this modality of treatment, as well as, when evaluating QoL results.

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Potential conflicts of interest

I. Conget and I. Levy have received speaker's fees from Medtronic and Roche in the past 5 years.

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