CSII and CGM in real clinic practice in Moscow Region

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Introduction

Insulin pump therapy with continuous glucose monitoring is a progressive method of treatment of both patients with type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) who needs insulin. CSII and CGM are generally used in Moscow Region but advantages of these methods are not obvious yet. In Russia, more than 15,000 patients in 2015 used CSII, including the Moscow region about 1500.

Aim. The aim of this study is to evaluate the efficacy of the massive use of the insulin pump therapy in clinical practice, compare different basal regimes, determine problems patients have switching from insulin injections to insulin pump.

Materials and Methods

The data of 187 patients with diabetes mellitus (Type 1 - 175 people with Type 2 diabetes - 12 persons), which were transferred to the insulin pump using in 2015-2016 in the Department of Endocrinology of Moscow Regional Research Clinical Institute. All used insulin pump Accu-Chek Spirit Combo ("Roche") and conducted SGM (iPro-2, "Medtronic"). SGM was performed in the first week after the pump therapy was introduced. The distribution of the daily dose of insulin to basal and bolus parts produced according to Bode protocol. The allocation of the basal insulin dose was used in the timeline, or the so-called "Renner`s Scale" simulates insulin delivery rate based on hourly settlement and physiological model that takes into account the body weight and age of the patient, or the dose was distributed evenly over 24 hours. Calculation of bolus insulin doses and programming settings made on the basis of the patient data by calculation. We compared two basal regimes: Renner's scale with different basal rate during the day (n=82) and constant basal rate (n=105). Statistical analysis was performed using SPSS 15.

Table 1. Baseline characteristics of the studied group of patients with diabetes

Index		Value	
		Different basal rate (Renner's scale)	Constant basal rate
n		82	105
sex	male, n (%)	38 (46,3%)	43 (40,9%)
	female, n (%)	44 (53,7%)	62 (59,1%)
Age, years ± SD		31,0 ± 9,7	33,1 ± 9,9
BMI ± SD		24,5 ± 4,6	23,7 ± 4,6
Duration of diabetes ± SD		13,8 ± 8,1	11,9 ± 8,6
Retinopathy, n (%)		44 (53,6%)	45 (42,8%)
Nephropathy, n (%)		44 (53,6%)	50 (47,6%)
Neuropathy, n (%)		34 (41,5%)	68 (64,7%)
HbA1c (%)± SD		9,0 ± 1,9	8,6 ± 1,9
Number of hypoglycaemia (a week), n		2,0 ± 0,8	1,9 ± 0,7
The daily dose of insulin		57,6 ± 15,7	55,9 ± 21,0
The level of fasting blood glucose (FBG), mmol / L ± SD		9,1 ± 3,8	9,0 ± 3,3
Postprandial blood glucose (PPG), mmol / l ± SD		9,0 ± 3,8	9,1 ± 3,5
The level of blood glucose in overnight 3:00 mmol / l ± SD		8,4 ± 3,6	8,3 ± 4,3

Results

It has been found that:
1. Total daily insulin dose declines by 18,4% in 6 months;
2. The level of HbA1c drops by 1,3% in 6 months; the number of hypoglycemia lowers.
3. Patients with different basal rate had more hypoglycemia comparing with constant basal rate: AUC less goal was considerably bigger in the group of patients with different basal rate (0,17±0,27 & 0,07±0,16, p=0,016).
4. The lack of knowledge patients have about the insulin pump work requires a high use of information materials during the patient's education.
5. The enhanced training of health-care professionals on working with insulin pump and continuous glucose monitoring systems is needed.

Table 2. Comparison of the data of CGM of different different basal rate.

Data of CGM	Different basal rate (Renner's scale)	Constant basal rate	p
The number of deviations above the target	2,4±3,0	1,77±2,2	0,241
The number of deviations below target	3,58±2,8	4,39±3,83	0,171
AUC above the limit	1,2±1,6	1,12±1,51	0,764
AUC less goal	0,17±0,27	0,07±0,16	0,016 *

AUC - area under the curve;
 * Statistically significant difference, p <0.05.

Conclusions

1. This study shows the efficacy of insulin pump therapy that can be proved by the decrease of HbA1c level, number of hypoglycemia, and insulin dose in six months.
2. Constant basal rate of insulin is safer because it induces less hypoglycemia.
3. Using an insulin pump therapy with continuous glucose monitoring as a part of high-technology medical services is an effective method of improving diabetes control.
4. Besides the obvious benefits mentioned above, this method gives an opportunity for patients as well as for health officials to master modern medical technologies.

References

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