DIABETES CLINICAL SUMMARIES

LGS AND HYPOGLYCEMIA: THE IMPACT OF SAP THERAPY WITH LGS IN HYPOGLYCAEMIA REDUCTION

STUDY RATIONAL

- Hypoglycaemia is a major burden for people with Type 1 diabetes. It can cause confusion, disorientation, loss of consciousness and in the worst cases coma and even death.
- Sensor Augmented Pump (SAP) therapy has been shown to reduce hypoglycaemia compared to Continuous Subcutaneous Insulin Infusion (CSII) therapy1.
- Automated suspension of insulin delivery, also known as Low Glucose Suspend (LGS), in response to hypoglycaemia detected by Continuous Glucose Monitoring (CGM) when sensors glucose values fall below a pre-set threshold is designed to minimise the risk of hypoglycaemia.
- Whether SAP with the LGS technology may further reduce hypoglycaemia incidence as compared to CSII was evaluated.

OBJECTIVES

- The study aimed to evaluate the clinical effectiveness of MiniMed™ Paradigm™ Veo™ system with LGS in severe and moderate hypoglycaemia reduction, as compared to CSII therapy.

DESIGN AND METHODS

- The study was a randomised control trial comparing SAP therapy with LGS technology to CSII over 6 months.
- Subjects eligibility criteria: Type 1 diabetes for ≥1 year; aged 4 to 50; on CSII therapy for ≥ 6 months; no previous experience with SAP therapy; HbA1c level ≤8.5%; impaired awareness of hypoglycaemia (Clarke score ≥4).
- All patients attended a screening visit 3 months before randomisation where they reported severe and moderate hypoglycaemic events in the previous 3 months. Subjects were asked to document occurrences of hypoglycaemia (date, time, symptoms, blood glucose value and treatment administered) in a diary from screening to the end of the study.
- Subjects were randomised to either LGS therapy with LGS feature (LGS group) or to CSII therapy (CSII group) for 6 months. The randomisation was stratified by 5 age groups (4-7, 8-11, 12-17, 18-25 and 26-50 years).
- Subjects in the SAP group received a standardised training on SAP therapy with LGS feature at baseline before starting treatment with MiniMed® ParadigmTM VeoTM system. Subjects in the CSII group continued treatment using their own insulin pump for the 6-month study period. Visits were scheduled at 3 and 6 months for all subjects.
- The LGS feature was set to suspend insulin delivery when sensor glucose level reached or fell below a pre-set low glucose level. The suspension lasted for up to 2 hours, during which the subjects could intervene anytime to resume insulin delivery.
- The primary endpoint was the change in combined incidence of severe and moderate hypoglycaemia. Baseline hypoglycaemia rates were obtained from data obtained in the 6 months prior to baseline.
- Severe hypoglycaemia was defined as a hypoglycaemic seizure or coma. Moderate hypoglycaemia was defined as a hypoglycaemic event requiring assistance from another person.

KEYPOINTS

- No severe hypoglycaemic events with SAP therapy and LGS technology
- Incidence rate of Hypoglycaemia is 3.6 lower with SAP therapy and LGS technology
- No increase in HbA1c

STUDY TYPE

- Randomised controlled trial
- SAP with LGS vs CSII
- 6 months duration
- 95 subjects (aged 4 – 50) with impaired hypoglycaemia awareness

ENDPOINTS

- Combined incidence of severe and moderate hypoglycaemia
- HbA1c levels

REFERENCE

Effect of Sensor-Augmented Insulin Pump Therapy and Automated Insulin Suspension vs Standard Insulin Pump Therapy on Hypoglycaemia in Patients With Type 1 Diabetes. A Randomized Clinical Trial. Ly T.T. et al. JAMA 310(12):1240-1247, 2013.

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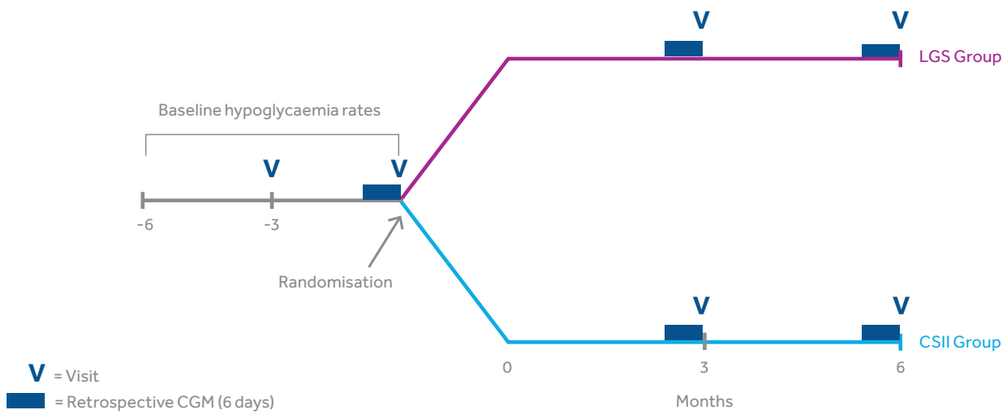
FIGURE 1: Study Design



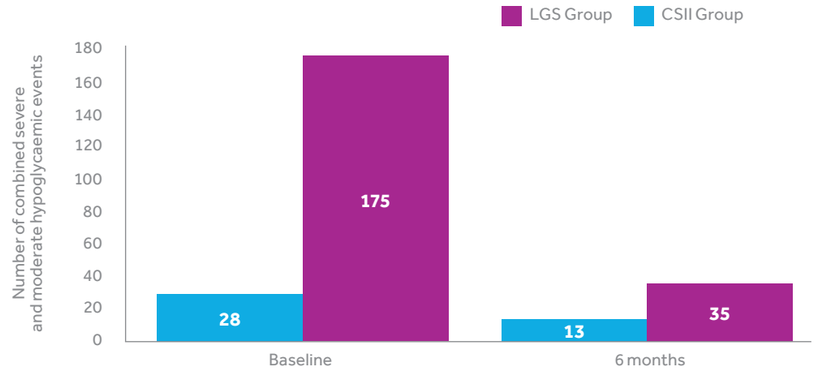
RESULTS

95 subjects (65 children aged 4-17 and 30 adults aged 18-50) were randomised to the LGS group (46 subjects) or to the CSII group (49). The mean CGM usage in the LGS group was 68% of the time during the 6-month treatment period.

Combined Severe and Moderate Hypoglycaemia

- The baseline number of combined severe and moderate hypoglycaemia was significantly higher for subjects in the LGS group compared to subjects in the CSII group (175 vs 28, respectively).
- After 6 months the number of combined severe and moderate hypoglycaemia events in the LGS group decreased from 175 to 35, whereas the number of events decreased from 28 to 13 in the CSII group. The adjusted incidence rate per 100 subject-months, fitted using the 0-inflated Poisson model, was 9.5 in the LGS group and 34.2 in the CSII group. The incidence rate ratio was 3.6 in favour of the LGS group (Figure 2).

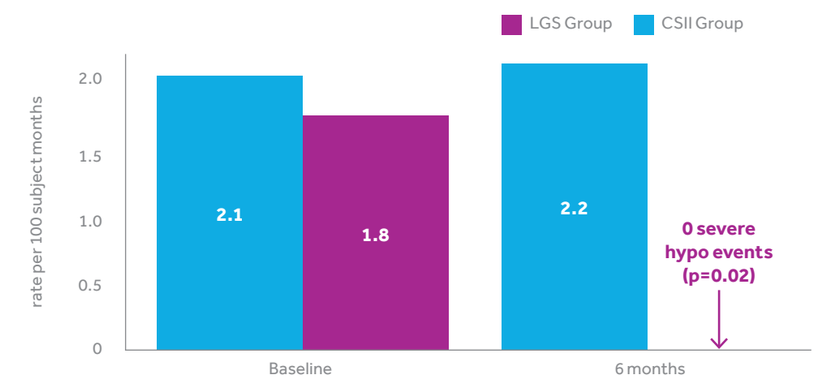
FIGURE 2: Combined severe and moderate hypoglycaemia



Severe Hypoglycaemia

No severe hypoglycaemia was observed in the LGS group during the 6-month treatment period, compared to a baseline rate of 1.8 events per 100 subject-months. The rate of severe hypoglycaemia in the CSII group did not change significantly from baseline to treatment period (2.1 vs 2.2 events per 100 subject-months) (p=0.02) (Figure 3).

FIGURE 3: Severe Hypoglycaemia Incidence Rates



HbA1c

HbA1c levels at baseline were similar in both groups and did not change significantly in either group after 6 months (7.4% to 7.4% in the CSII group vs 7.6% to 7.5% in the LGS group).

CONCLUSIONS

- Sensor Augmented Pump (SAP) therapy with the Low Glucose Suspend (LGS) technology was associated with a significant decrease in severe hypoglycaemia, as well as moderate hypoglycaemia, as compared to CSII therapy, without increasing HbA1c levels.

Additional References

1. The use and efficacy of continuous glucose monitoring in type 1 diabetes treated with insulin pump therapy: a randomized controlled trial. Battelino T. et al. Diabetologia 55:3155-3162, 2012.