Prolonged glucose requirements after intentional glargine and aspart overdose

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Abstract

Intentional insulin overdose in diabetic patients is a rather rare critical situation. We report the case of a patient suffering from type 1 diabetes who was found comatose with a plasma glucose close to zero after having injected herself massive doses of both aspart and glargine insulin analogues. The prevention of hypoglycaemic episodes in this patient required a long-term glucose infusion (i.e., 59 hours) which significantly exceeds the usual time-effect profile of glargine. This observation emphasizes again that clinicians should be aware of the extremely prolonged action of long acting insulin analogue glargine after intentional massive injection in order to avoid a too early interruption of glucose infusion and a subsequent risk of relapse of severe hypoglycaemic episodes.

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1. Introduction

Intentional overdose with insulin is a rather rare clinical situation in type 1 diabetic patients [1–6]. Experience of such critical complication with new insulin analogue is limited [7–9]. Here, we report the observation of a patient who injected large amounts of both glargine and aspart in an attempted suicide. From this case report, we would like to highlight the necessity of prolonging IV glucose infusion for a much longer period than expected from pharmacokinetic properties of these insulin analogues after intentional massive overdose.

2. Case report

A 22-year-old woman with a 9-year history of brittle type 1 diabetes and usually treated by a basal-bolus schema using

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glargine (40 units injected at 7 p.m.) and aspart (12 units TID before meals) was found comatose at home, 4 hours after the subcutaneous injection of 300 units of each insulin analogue in two distinct sites in attempted suicide. The capillary blood glucose was not measurable. She resumed consciousness just after the IV injection of 40 ml of 30% glucose solution which raised capillary blood glucose value to 2 mmol/l. She was immediately transferred to the intensive care unit. At admission, she was still conscious and vital signs were: body temperature 36 °C, blood pressure 121/87 mmHg, pulse rate 86 per min. Physical examination was normal. Potassium concentration was low (3.2 mmol/l). Other parameters such as sodium, phosphate, calcium and liver functions were in the normal range. ECG monitoring was also normal.

A central intravenous line was set up and 20% glucose solution infusion was administered with a flow adapted to the capillary blood glucose monitoring (Fig. 1). Insulin IV infusion was administered only when capillary blood glucose rose above 11 mmol/l, especially after meals (free oral feeding was allowed as soon as the patient was completely consciousness), but the amounts infused were very small and scarce (Fig. 1). During the first 24 hours, potassium level was monitored and maintained in the normal range by intravenous supplement (6 g/day). Relapse of hypoglycaemia occurred till 30 hours after initial insulin overdose. Continuous intravenous insulin infusion could be reintroduced 59 hours after the insulin overdose. Finally, the intravenous line was removed and previous subcutaneous treatment was reintroduced 65 hours after insulin overdose.

3. Discussion

Diabetologists are usually poorly familiar of the treatment of insulin overdose because of its relative rarity. Even if most of these insulin overdoses have a rather good prognosis, they are potentially dangerous because some complications can occur such as hypokaliemia, hypomagnesemia, hypophosphatemia [6,10] acute steatosis [11], pulmonary edema [6] and permanent cognitive function impairment [2]. The treatment of such insulin overdose is based on the prevention of hypoglycaemic episodes by continuous glucose infusion, liberal oral feeding and capillary glucose blood monitoring. However, it is tempting to adapt the glucose infusion on the known time-action profile of the longest insulin analogue that has been injected (glargine: protracted effect between 20 and 24 hours). However, this case report confirms the existence of a more prolonged hypoglycaemic effect of long acting insulin analogues such as glargine after massive injection. The last episode of hypoglycaemia occurred 30 hours after the overdose injection and insulin had to be permanently reintroduced only after 59 hours. Such a prolongation of glucose requirements had been already observed with human insulin [1–5] or short [7] and long acting insulin analogues [8,9] in similar situations. In the case report of Tofade and Liles [8], a suicidal attempt in a non diabetic individual with a combination of analogues glargine and aspart similar to ours, glucose infusion had to be maintained 40 hours to prevent hypoglycaemia, confirming the prolongation of pharmacokinetic of glargine after massive injection. Increase of duration of hypoglycaemic effect observed after either insulin or insulin analogue overdose is attributed to both delay in absorption of the subcutaneous deposit and saturation and/or down-regulation of insulin receptors in target tissues [1,2].

4. Conclusion

This clinical observation of a suicide attempt with a fortunate outcome emphasizes again that clinicians should be aware of the unusually prolonged action of long acting insulin analog glargine after massive injection in order to avoid a too early
interruption of glucose infusion and a subsequent risk of relapse of severe hypoglycaemic episodes.

References


