

Nocturnal hypoglycaemia

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Introduction

Hypoglycaemia can be a feature of diabetes treated with insulin and patients have expressed their fear of hypoglycaemic attacks (Premming et al, 1991). If hypoglycaemic attacks occur regularly, there is a danger that control can deteriorate. Nocturnal hypoglycaemia can have damaging consequences, especially if the patient is unaware of it. This article will discuss how nocturnal hypoglycaemia can be recognised and how some of the problems associated with it can be resolved.

Nocturnal hypoglycaemia is a not uncommon feature of insulin-treated diabetes. Premming et al (1991) raised awareness of the fear of hypoglycaemia as expressed by insulin-treated patients. If the patient has good awareness of hypoglycaemia and is able to treat the episode adequately, the result will be a disturbed night's sleep but little harm. However, if occasional hypoglycaemia becomes a routine event, sleep patterns will be disturbed and night-time can become a nightmare. Hypoglycaemic control may also deteriorate.

If the person has little awareness, recognition becomes difficult and the consequences of nocturnal hypoglycaemia can be more damaging.

Signs and symptoms of hypoglycaemia

Most patients will be familiar with mild hypoglycaemia, and they should be able to recognise and treat the condition, or accept advice from a third party. It may well manifest itself as behaviour change or vagueness, even difficulty in concentrating. This is neuroglycopenia which, if not treated, will cause the blood glucose level to continue to fall. Eventually signs and symptoms will become more severe and more easily recognisable to a third party. The most common signs and symptoms are listed in *Table 1*.

Hypoglycaemia is the state in which the blood glucose level falls below the

accepted normal value. In the non-diabetic individual, if the blood glucose level falls below 3.5mmol/l, counter-regulatory hormones will activate. These hormones (including glucagon, cortisol, adrenaline and vasopressin) oppose insulin action, thus allowing blood glucose levels to rise. However, if the glucose level falls below 3.5mmol/l in a person being treated with insulin, the mechanism may be a little tardy. Signs and symptoms of hypoglycaemia (*Table 1*) will then become evident and self-treatment will retrieve the situation.

Many patients with long-standing diabetes have reported that their awareness of hypoglycaemia has been blunted or become non-existent. Human insulin, especially

Table 1. Signs and symptoms of hypoglycaemia

- Tremor
- Hunger
- Tingling, especially around the mouth
- Anxiety
- Sweating
- Palpitation
- Headache
- Visual problems
- Fitting (in extreme cases)
- Loss of consciousness

ARTICLE POINTS

1 Nocturnal hypoglycaemia is a feared complication of insulin-treated diabetes.

2 Signs and symptoms of hypoglycaemia may become very subtle.

3 The Diabetes Specialist Nurse may need to use detective-type skills to discover the problem.

4 Lifestyle factors may contribute to the problem.

5 Prevention may not be absolute, though reduction of risk is possible.

KEY WORDS

- Nocturnal hypoglycaemia
- Detection
- Prevention
- Insulin analogue

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following change-over from animal insulin, was blamed by many people. However, accumulating evidence (George et al, 1995; Boyle et al, 1994) suggests that recurrent hypoglycaemic episodes can impair the recognition of later episodes of hypoglycaemia, and that the brain may have difficulty in recognising low glucose levels if frequently exposed to abnormally low levels.

Detection of nocturnal hypoglycaemia

Nocturnal hypoglycaemia may be difficult to detect, especially in people with little or no awareness. Taking a history may well give some clues:

- High glucose values on waking
- History of waking with a headache, the feeling as if one is 'suffering with a hangover'
- Restlessness during the night
- Vivid dreams or nightmares.

Partners can be very helpful because they are often the person who recognises and helps treat the hypo. Asking the patient to set the alarm clock for between 2am and 4am to test their blood glucose levels can often be enlightening, even if the suggestion is not accepted with alacrity. It is at this time of day that blood glucose values are at their lowest for everyone. If testing at this time reveals extremely low values, necessary measures can be taken.

Gaining information on the patient's diet and alcohol consumption can also provide useful information. Snacks, especially from late evening onwards, may have been abandoned. Alcohol may pose a problem with diabetes. It can mask the signs and symptoms of hypoglycaemia; even more serious, it can block hepatic glucose production and so hinder recovery from hypoglycaemia.

At the end of the twentieth century, very pure genetically-engineered insulin is being used. Patients' injection sites must be continually checked and patients reminded to change site location. Patients may find some areas of the body easier to reach and may favour 'comfortable' areas for injections. Examination of injection sites can be revealing, e.g. for finding areas of lipohypertrophy. Such areas lead to fatty deposits and, in turn, poor insulin

absorption. Injection sites are an important area of education, which are quite often discussed soon after diagnosis but not revisited. Explanations as to the variation in absorption of insulin from different sites is often beneficial. The value of correct injection technique and sensible use of sites can often be built into the annual review.

Due consideration must also be given to the profiles of the insulins that patients are currently using and whether or not they are right for that individual.

Exercise is another situation which can predispose to nocturnal hypoglycaemia, and sexual activity can be quite energy consuming! If exercise is planned, extra carbohydrate can be taken prior to the event. However, if the exercise is not pre-planned, knowledge that blood glucose levels may drop several hours after the activity may alert the person to possible hypoglycaemia.

Prevention

Once nocturnal hypoglycaemia has been diagnosed, how can one reduce the risk of further episodes? Checking pre-bedtime blood glucose values may be a first step. Amiel (1998) suggested that this level should not be less than 7mmol/l. If it is lower, extra carbohydrate should be added to the usual bedtime snack.

The type of insulin may well need to be addressed. There is evidence that the rapid-acting analogue, insulin lispro, can reduce hypoglycaemic events by 30% (Shaw et al, 1997). Hoogwerf (1999) reported a reduction of nocturnal hypoglycaemia events by 50% using the analogue insulin aspart.

Conclusion

In conclusion, the key to treatment of patients with diabetes is achievement of good control, as measured by HbA_{1c}. The healthcare professional must be aware of episodes of hypoglycaemia, particularly nocturnal hypoglycaemia. Patients must be educated or re-educated about snacking, especially before bedtime. The pre-bedtime blood glucose level should be at least 7mmol/l. The use of insulin analogues, which may be able to significantly reduce the risk of hypoglycaemia, should be strongly considered. ■

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