

Can Unemployment Act As Provocation For Intentional Insulin Overdose In Insulin Treated Diabetes?

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Abstract

We report the case of a 51-year-old man presenting in a comatose state following an intentional massive overdose of 1200 units of insulin. Prompt recognition and treatment of the problem precluded long term systemic damage. Although rarer than non-intentional overdose, intentional overdosing with insulin is probably more common than is generally appreciated. A discussion on management considerations in intentional insulin overdose follows, including some occupational adjustments that insulin treated diabetics may face.

CASE REPORT

A 51-year-old unemployed driver was admitted to hospital in December 2003 with a two-month history of thirst, polyuria and weight loss of nearly 13 kg. His blood sugar on admission was 44 mmol/L and his urine contained ketones. His body mass index (BMI) was 20. He was commenced on insulin therapy with twice daily pre-mixed insulin regime and allowed home on Christmas Eve, some 48 hours after admission.

When seen one week later at the Diabetes Centre, the insulin dose was adjusted to 20 units a.m., 8 units p.m., Mixtard 30 with a Penfill device.

At subsequent outpatient clinic review in mid-January 2004, he reported considerable improvement in wellbeing with weight gain and a marked reduction in osmotic symptoms. He was beginning to achieve good glycaemic control with current total insulin dose of 60 units per day. The patient admitted to a history of previous alcohol misuse but stated that current consumption had been cut to 10 units per week. There was a past history of a single episode of deliberate self harm about 2 years prior. At the time of his visit to clinic he appeared co-operative and his demeanour did not suggest depression.

In early May 2004, he was admitted to hospital after being found by relatives in a collapsed state following a verbal argument with his wife. There were some abrasions to the left side of his face and it later became clear that he had been consuming very large quantities of alcohol over the

preceding three days with little dietary intake. His blood glucose was unrecordable when checked by the paramedics called to the home and he was given intravenous Glucagon and 50% Dextrose infusion. By the time he arrived in the accident and emergency department 20 minutes later, his blood glucose was 2.8mmol/L. There was a profound smell of alcohol. His Glasgow coma scale (GCS) fluctuated between 6/15 and 13/15 with blood sugars plummeting despite high concentration Dextrose (10 - 20%) infusions.

After 72 hours he was well enough to recommence premix insulin 20 units twice daily.

It became clear that prior to admission he had intentionally injected 4 x 3ml (100units/mL) cartridges of Penfill insulin into his thigh, a total dose of 1200 units of Mixtard 30.

He confirmed that he had administered the dose intentionally, but as an impulsive action whilst under the influence of alcohol. He had not been actively contemplating suicide. The identified potential triggers for his action were 1) influence of alcohol, 2) unemployed status with financial implications, 3) the misunderstanding with his wife and 4) presence of a chronic medical condition in the form of insulin treated diabetes mellitus. He expressed regret regarding the incident but declined a psychiatric referral. On assessment by the medical team, he was judged mentally capable to make this decision and his wishes were therefore respected. He was discharged fit and well some five days after the overdose with arrangements for follow-up with the diabetic services.

DISCUSSION

Fortunately, intentional overdosing with insulin remains a less common occurrence than accidental overdose. However, it would appear that it is more common than generally appreciated.^(1,2,3,4,5,6) A literature review of multiple papers revealed 38 patients of whom six have died as a result of intentional insulin overdose.^(1,2,3,4,5,6,7,8) Most patients who attempt deliberate self-harm or suicide in this way are insulin treated diabetics with a history of depression or other psychiatric illness. The quantity of insulin quoted as injected in these papers has varied from 20 to 3,200 units.

The suspicion of hypoglycaemia consequent upon insulin overdose should be entertained in any patient (or indeed any person) who has access to insulin, and presents with an altered sensorium or coma. It is mandatory to check blood glucose in these settings. The duration and severity of hypoglycaemia depends on the dose, type and route of administration of the insulin. Other co-factors at play include states that can diminish hypoglycaemic awareness e.g. autonomic insufficiency and concomitant beta-blocker therapy.⁽³⁾ Hypoglycaemia may be even more profound in older patients treated inappropriately with sulphonylurea drugs, particularly those with known long half-lives.^(2,6,7) Some documented electrolyte abnormalities which can occur following insulin overdose include hypokalaemia, hypophosphataemia and hypomagnesaemia. Hypoglycaemia induced transient neurologic deficits or varying degrees of neuro-glycopenia can occur. It can also result in persistent neurological deficit or death.

Development of adult respiratory distress syndrome has been reported.⁽⁷⁾ High blood insulin levels with concurrent low C-peptide levels suggest an exogenous source of insulin, both in living patients and where necessary, in post-mortem blood samplings.^(1,4) In post-mortem cases, elevated insulin concentrations may be noted in the ocular vitreous humour.⁽⁴⁾

The mainstay of the management of massive insulin overdosage is intravenous glucose infusion with 10-20% Dextrose solutions and is dependent on regular blood glucose monitoring.⁽⁶⁾ Higher concentration infusions of 50% Dextrose may be required in certain situations, e.g. if large volume fluid replacements may be inappropriate for the patient in question. However, 50% Dextrose needs to be administered with appropriate cautions and into a large vein as it can cause irritation and tissue damage if extravasation occurs.

Monitoring is essential, as excessive glucose administration in the setting of treating the massive insulin overdose can result in acute hepatic steatosis, a condition which can present as hepatomegaly and deranged liver function tests. Hepatic steatosis is potentially reversible following rapid tapering of the glucose infusions.⁽⁸⁾

In some situations, surgical excision of the 'depot' of insulin at the injection site has been recommended.

This case is presented as a reminder to all medical staff who work in Accident and Emergency and Medical Admission Units to consider intentional overdosage of insulin in those patients or family members who have access to insulin. With prompt treatment, despite the massive insulin overdose, this patient suffered no persistent damage.

On a general note, it would seem reasonable to offer psychological and/or psychiatric support to patients recovering from intentional insulin overdose, though as noted in this case, individual patients may still demonstrate the mental capacity to decline such support.

Although our patient was a professional driver, his unemployed status predated his diagnosis of diabetes mellitus. The fact that he now has insulin treated diabetes has implications for lifestyle changes and could also make him face major occupational adjustments. For such patients, a complete change in occupation may be required. This would depend on the country in which the patient resides as legislation may exist regarding specific restrictions to the nature of employment possible. Driving regulations may preclude holding a licence for heavy goods vehicles and other public carriage vehicles.

If relevant, patients should also be made aware of other appropriate notifications expected from them e.g. pension arrangements, life insurance and other health-related policies.⁽⁹⁾ Fortunately, most developed countries have legislation in place that safeguards some of the employee rights of insulin treated diabetics, or other individuals considered to have a disability as defined by acts of legislation.⁽¹⁰⁾ The Disability Discrimination Act (DDA) of 1995 (as applied in the United Kingdom) and the Americans with Disabilities Act (ADA) are examples. Where appropriate, consideration should be given to referring patients to an occupational health service for further professional advice.

KEY POINTS

- Intentional insulin overdose is more common than generally appreciated.
- It may occur in both diabetics and non-diabetics who have access to insulin.
- The possibility of insulin overdose should be considered when evaluating a comatose patient.
- The management of massive insulin overdosage involves intravenous glucose infusion titrated according to regular blood glucose monitoring.
- Prompt and appropriate treatment can prevent significant neurological and multi-system damage.
- Insulin treated diabetics may face major occupational adjustments.

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