Lactic acidosis due to attempted suicide with metformin overdose: A case report

Metformin is the most commonly prescribed oral antidiabetic agent worldwide. Lactic acidosis is an adverse effect of metformin with a high rate of mortality [1]. However, it is rarely seen with appropriate use, and a meta-analysis has shown that the risk of lactic acidosis is no higher with metformin than with other antidiabetic agents [2]. The present case report is of a patient who developed lactic acidosis on attempting suicide by metformin overdose.

A 37-year-old man with type 2 diabetes (T2D) was brought to the emergency room in a coma. It was reported he had attempted suicide by ingesting around 300 metformin tablets (total dose 75 g) earlier in the day. He had a 12-year history of T2D, which was well controlled by metformin (500 mg twice daily). He also had a 20-year history of schizophrenia with depressive symptoms, and had already made five suicide attempts.

On arrival, his level of consciousness was E1V1M1 (GCS 3, the worst) on the Glasgow Coma Scale. His blood pressure was 90/45 mmHg, pulse rate was 110/min, respiration rate was 44/min, temperature was 36 °C and O2 saturation was 94% (room air).

Laboratory investigations showed metabolic acidosis: pH 7.1; bicarbonate, 14 mmol/L; blood glucose, 4 mg/dL (severe hypoglycaemia); blood urea nitrogen, 9 mg/dL; creatinine, 1.1 mg/dL; and marked elevation of lactate to 29.2 mmol/L (normal range: 0.44–1.78 mmol/L). Urine ketones were negative, and HbA1c was 7.1%. Liver function was normal (AST, 23 U/L; ALT, 25 U/L; γ-GTP, 45 U/L; ALP, 178 U/L; and PLT, 27 × 10^4/μL).

Sodium bicarbonate was infused to correct the metabolic acidosis together with 20% glucose (80 mL/h) for hypoglycaemia. Whereas the patient's blood glucose normalized, his acidosis and consciousness did not improve significantly. Activated charcoal was administered via a nasogastric tube.

Chest radiography showed aspiration pneumonia, so antibiotics were started (ceftriaxone 600 mg/8 h and clindamycin 2 g/24 h). Sputum culture revealed *Klebsiella* and *Staphylococcus*. As his respiratory function subsequently deteriorated, he was intubated. Continuous haemodialfiltration (CHDF) was performed to remove lactate and metformin from his blood. However, plasma lactate rose to a peak of 33.4 mmol/L at 7 h after presentation, while acidosis peaked (pH 7.079) after 3 h of CHDF.

The patient became clearly conscious on hospital day 2. CHDF was continued until day 4, when he was also weaned from ventilation, and the lactic acidosis was corrected. After initial insulin therapy, blood glucose was controlled at 100–140 mg/dL.

Table 1

<table>
<thead>
<tr>
<th>Society (country)</th>
<th>Contraindications</th>
<th>Mental illness</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA/EASD (US/Europe)</td>
<td>Serum creatinine &gt;1.5 mg/dL in men or 1.4 mg/dL in women, with hypoxia, dehydration, etc.</td>
<td>Not described</td>
<td>Diabetes Care, 2015; 38(1):140–9</td>
</tr>
<tr>
<td>AACE/ACE (US)</td>
<td>Stages 3B, 4 or 5 of chronic kidney disease (CKD)</td>
<td>Not described</td>
<td>Endocr Pract, 2015; 21 (Suppl 1): 1–87</td>
</tr>
<tr>
<td>NICE (UK)</td>
<td>Serum creatinine &gt;150 μmol/L or eGFR &lt;30 mL/min/1.7 m²</td>
<td>Not described</td>
<td><em>Type 2 diabetes in adults</em>, NICE guideline 2015, pp 1–64</td>
</tr>
<tr>
<td>Canadian Diabetes Association (Canada)</td>
<td>CrCl/eGFR &lt;30 mL/min or hepatic failure</td>
<td>Not described</td>
<td>Can J Diabetes, 2013;37:S61–8</td>
</tr>
<tr>
<td>Japan Diabetes Society (Japan)</td>
<td>Serum creatinine &gt;1.3 mg/dL in men or 1.2 mg/dL in women, with hypoxia, dehydration, severe infection, hypoxia, etc.</td>
<td>Not described</td>
<td>Treatment Guide for Diabetes 2014–2015, pp. 49–50</td>
</tr>
</tbody>
</table>

ADA: American Diabetes Association; EASD: European Association for the Study of Diabetes; AACE: American Association of Clinical Endocrinologists; ACE: American College of Endocrinology; NICE: National Institute for Health and Care Excellence; eGFR: estimated glomerular filtration rate; CrCl: creatinine clearance.

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by vildagliptin (50 mg/day). He was transferred to the psychiatric ward on day 8 with no sequelae.

While various contraindications have been suggested for metformin, especially renal impairment (Table 1), there are no precautions regarding psychiatric patients.

Suicide is a leading cause of death worldwide, and overdose is common. Mental disorders, especially depression, and a history of prior suicide attempts are strong predictors of suicide [3]. A meta-analysis has also shown that the lifetime prevalence of depression is high at about 30% in patients with diabetes [4].

Metformin is often considered safer than either insulin or sulphonylureas because of the lower risk of hypoglycaemia. However, von Mach et al. [5] reported that overdose with biguanides like metformin have a higher mortality rate (6.1%) than overdoses with insulin and sulphonylureas (0.9% and 3.6%, respectively).

It has been suggested that renal dysfunction is a prerequisite for metformin accumulation, but is only dangerous when associated with liver failure [6]. Liver function was normal in our present case.

In summary, this very unusual case report underscores the idea that overdosing with metformin without insulin and/or sulphonylureas can lead to severe hypoglycaemia in association with lactic acidosis.

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Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References


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