

Fatal metformin overdose presenting with refractory hypotension: Postmortem examination

Dear Editor,

Metformin is a biguanide oral hypoglycemic agent. A 57-year-old male ingested over 100 g of metformin in a suicidal attempt. He presented with mild decreased level of consciousness, severe hypotension, and metabolic acidosis. Conventional measures including gastrointestinal decontamination, crystalloid fluid, norepinephrine infusion, and sodium bicarbonate therapy were performed. Despite aggressive intervention, the patient died. Severe hypotension and metabolic acidosis were the life-threatening presentation of severe metformin poisoning, which led to fatality. Other interventions such as hemodialysis may be lifesaving.

A 57-year-old male with a history of hypertension, diabetes mellitus, and depression was transferred to the general hospital 2 h after a deliberate ingestion of 100-g metformin. On admission, the patient was slightly lethargic, but his vital signs were stable. Blood glucose was 97 mg/dL. Electrocardiogram (ECG) and chest X-ray were normal; arterial blood gas, serum electrolytes, and renal function tests were also within normal ranges. Gastrointestinal decontamination was done and referred to our service. On arrival, he was confused (Glasgow Coma Scale score = 10–11) and cyanosed regardless of O₂ saturation 93%, blood pressure (BP) = 64/40 mmHg, heart rate = 60 b/min, and rate = 22 bpm. Initial venous blood gas showed metabolic acidosis; pH: 7.14 (7.35–7.45), PO₂: 38 mmHg, PCO₂: 49 mmHg, O₂ saturation: 53%, HCO₃: 16.7 mmol/L, and base excess: 12.3 mmol/L. The lactate concentration was 16 mmol/L. Other laboratory tests including Na, K, blood urea nitrogen, Cr, complete blood count, hemoglobin, hematocrit, white blood cell count, platelet count, prothrombin time, international normalized ratio, activated partial thromboplastin time, aspartate aminotransferase, alanine aminotransferase, creatine phosphokinase, and lactate dehydrogenase were within normal range.

An ECG showed an interventricular conductive defect, not present on previous ECG.

The patient received 50 ml of 8.4% sodium bicarbonate; 1 l of N/S was infused and a norepinephrine infusion (0.1 µg/kg/min) was started and rapidly titrated until BP raised (97/50). The patient's general condition rapidly became worse and he was intubated. Shortly after, cardiac arrest occurred. Cardiopulmonary resuscitation was unsuccessful. The length of patient's stay in our hospital was just 2 h. The deceased was transferred to the forensic medicine center and based on external and internal examination and microscopic and toxicological investigations, other causes of death were ruled out.

Metformin is a biguanide oral hypoglycemic agent. Metformin reduces lactate metabolism by overwhelming pyruvate carboxylase, and it also reduces glucose consumption and increases hepatic lactate production.^[1,2]

Lactic acidosis secondary to metformin overdose is a complication associated with significant mortality. Prognosis depends on factors other than metformin concentrations, specifically underlying conditions that reduce lactate elimination, increase lactate production, or make circulatory function worse.^[3,4]

The utility of increasing metformin clearance using renal replacement therapies in patients with preserved renal function is unproven. However, the portion of metformin contained in the intravascular space is poorly protein bound and may be removed by hemodialysis; on the other hand, increasing the intracellular vascular compartment gradient may reduce cardiac toxicity and the possibility of sudden cardiac arrest.^[2,5]

Our case illustrates the potential for sudden cardiac arrest in patients with large metformin overdose, who develops an extreme acidosis. In these cases, early utilization of extracorporeal elimination techniques to increase metformin elimination and correct acid–base disturbance may improve outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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