Fatal metformin overdose leading to MALA and abdominal compartment syndrome: a case report

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Background: Metformin-associated lactic acidosis (MALA) is a well-recognized adverse effect of metformin, which can rapidly progress to severe clinical features, including altered mental status, respiratory failure, circulatory failure, and multiple organ dysfunction syndrome. While MALA is known, fatal cases resulting from intentional metformin overdose for suicide are comparatively rare, posing unique management challenges.

Case Presentation: A 56-year-old male with a history of hypertension and diabetes mellitus was found unconscious in a bathtub with multiple wrist lacerations. A suicide note and empty blister packs of prescription medication were discovered nearby, including a total of 162 hypoglycemic tablets containing 10,500 mg of metformin. He was initially transported to a local hospital, where he received fluid resuscitation and bicarbonate therapy for severe lactic acidosis (pH 7.186, lactate 16.0 mmol). However, the acidosis remained uncorrected, and transfer to our facility was arranged due to the lack of continuous hemodiafiltration (CHDF) capabilities at the referring hospital. During preparation for transport, the patient suffered a cardiac arrest, but achieved return of spontaneous circulation after approximately 30 minutes and was then transferred by ambulance. Upon arrival at our emergency department - after a 40-minute transfer - he experienced a second cardiac arrest, prompting initiation of veno-arterial extracorporeal membrane oxygenation (VA-ECMO). Vascular access was placed with a plan to initiate high-flow CHDF. However, the patient subsequently developed abdominal compartment syndrome, which led to impaired venous drainage and ECMO dysfunction. Despite maximal resuscitative efforts, the patient was pronounced dead in the emergency room. Post-mortem analysis revealed a serum metformin concentration already exceeding the reported fatal threshold of 50 µg/ml at the time of arrival at the referring hospital.

Conclusion: We describe a fatal case of MALA following intentional metformin overdose, complicated by refractory lactic acidosis, recurrent cardiac arrest, and abdominal compartment syndrome. This case highlights the rapid progression and high mortality of MALA, the importance of prompt initiation of extracorporeal metformin clearance, such as hemodialysis at critical care facilities, and illustrates the challenges of extracorporeal support in such patients.

Keywords: Metformin-associated lactic acidosis (MALA), Intentional metformin overdose, Abdominal compartment syndrome (ACS), Veno-arterial extracorporeal membrane oxygenation (VA-ECMO), Continuous hemodiafiltration (CHDF).