CASE REPORT

Extracorporeal Membrane Oxygenation Support in Refractory Multi-organ Failure by 3,4-Methylenedioxymethamphetamine Intoxication ("Ecstasy")

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Abstract

The substance known as 3,4-methylenedioxymethamphetamine (MDMA) that is commonly named ecstasy is a designer drug used for recreation. The intoxication for MDMA could generate hyperthermia, hepatotoxicity, acute renal failure, cardiovascular toxicity, hyponatremia, serotonin syndrome, coma, and, eventually could lead to, death. There is no antidote available, that is why the treatment is symptomatic and of advanced vital support until the resolution of the case. A case is presented of an adult with multi-organ failure secondary to intoxication for MDMA in whom it was decided to initiate support of oxygenation with extracorporeal membrane oxygenation as a bridge to recovery, with good results.

Keywords: Extracorporeal membrane oxygenation treatment, Intensive care, N-methyl-3,4-methylenedioxyamphetamine.

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Introduction

The substance known as 3,4-methylenedioxymethamphetamine (MDMA) that is commonly named ecstasy is a designer drug that acts directly inhibiting the reuptake of serotonin and belongs to the family of amphetamines.[1] Its original use and diffusion were related to electronic parties and *rave* culture, but nowadays, its consumption was extended outside of that scope.[2]

The MDMA is absorbed in the intestinal tract and reaches the maximum concentration in plasma approximately 2 hours after oral consumption.[3] The substance is degraded metabolically in the liver, mainly through CYP2D6 enzyme, with early enzyme saturation; therefore, small increments of doses could lead to a risk of large increases in toxicity.[4] Common doses are between 50 and 200 mg, but if it is ingested in capsules or tablets that are manufactured with no regulation, the quantity of active principle and the quality of the excipients are unknown.[1] Even more, the clearance of 95% of the drug is accomplished after 40 hours of use which explains the persistence of secondary effects even 2 days after use.[5] There is no antidote available that is why the treatment is symptomatic and of vital support. Measures of aggressive cooling are required with strict monitoring of corporal temperature and adequate reanimation.[6]

There are scarce reports in the literature that detail extracorporeal membrane oxygenation (ECMO) as a strategy in acute poisoning. A report from the American Society of Toxicology observed 26,271 cases, and stated only 10 patients with ECMO support, even though those presented survival of 80%.[7] On the other hand, there are reports of poisoning with substances such as organophosphates,[8] aluminum phosphate,[9] chloroquine,[10] and amlodipine toxicity[11] that were successfully treated with extracorporeal devices. There is one report published by Thakkar et al.[12] of venovenous ECMO support in a patient intoxicated with MDMA, where the device was used in the context of acute respiratory distress, with concomitant hyponatremia and associated cerebral edema. In all these cases, the results of the use of extracorporeal devices were satisfactory, proving the effectiveness of the treatment as support with a noticeable increase in survival.

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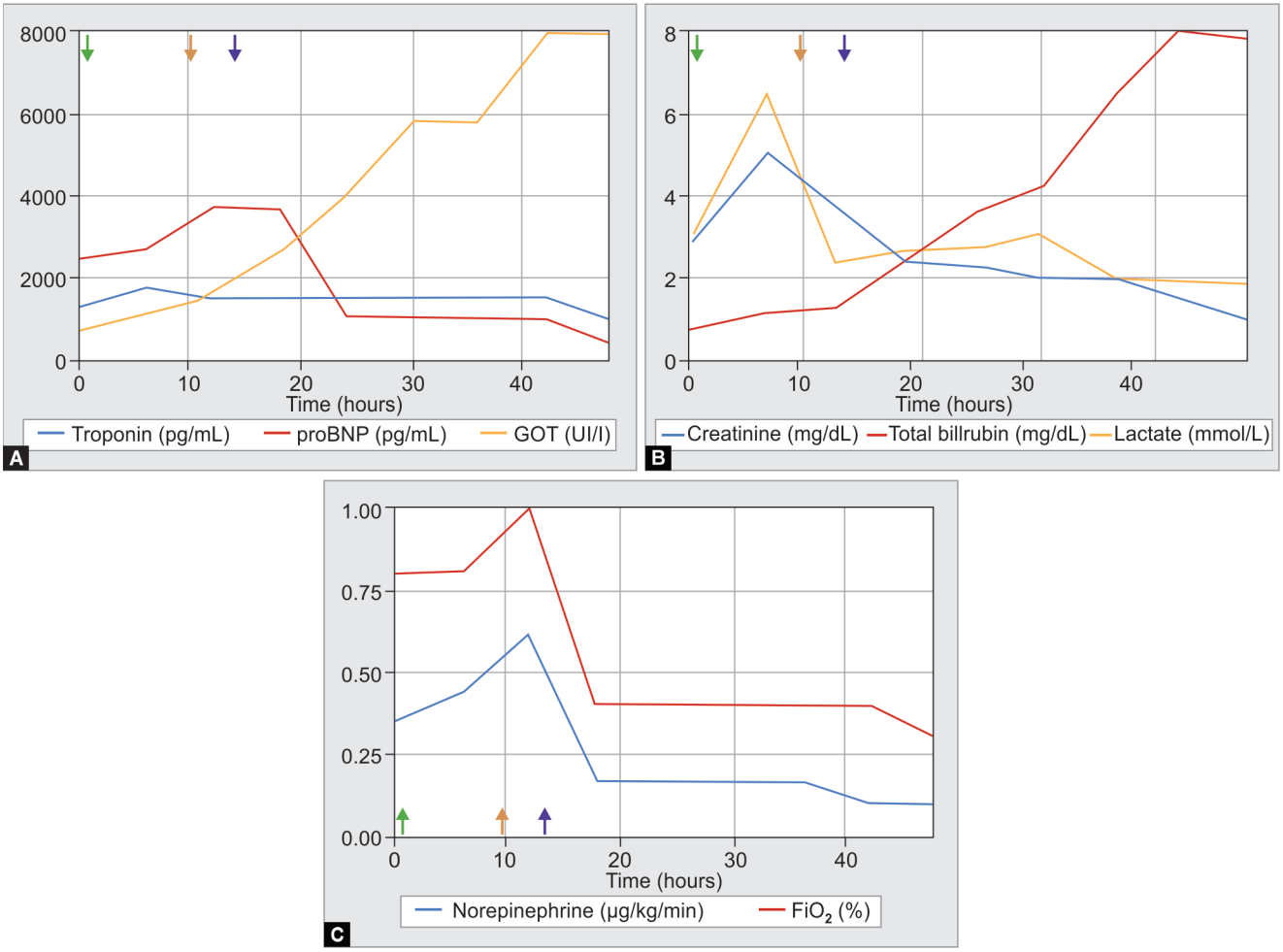
We report a case of an adult patient who presented refractory multi-organ failure secondary to MDMA poisoning requiring extracorporeal life support with good response.

Case Description

A male of 31-years-old with previous problematic drug use entered the emergency department presenting alteration of mental state with psychomotor excitement, neuromuscular rigidity, and hypothermia. Companions referred to him as having taken three tables of ecstasy during the previous 12 hours.

During physical examination, he presented sinus tachycardia (heart rate of 146 heartbeats/minute), central and peripheral cyanosis, oliguria, arterial hypotension (median arterial tension of 41 mm Hg), and fever (39.9°C).

Lab evidenced acute renal failure (creatinine 3.15 mg/dL—hyperkalemia 5.8 mmol/L), rhabdomyolysis (CKP 3375 UI/L), and fulminant liver failure (TGO 5844 UI/L, TGP 4376 UI/L, prothrombin time 23%, factor V 17% and ammonia 194 µg/dL). A toxicological urine exam confirmed positive results for MDMA and initiated continuous renal replacement therapy with hemodiafiltration for metabolic acidosis, hyperlactatemia, and hyperammonemia. During the first 6 hours, he additionally presented critical thrombocytopenia,



Figs 1A to C: Vasopressors and FiO_2% requirement and the evolution of lab findings since hospital admission. Orotracheal intubation (green arrow), hemodialysis (orange arrow), and ECMO initiation (violet arrow). proBNP, pro B-type natriuretic peptide; FiO_2, fraction of inspired oxygen; ECMO, extracorporeal membrane oxygenation

severe acute respiratory distress syndrome (PaO_2/FiO_2 ratio 67), and cardiac failure with systolic biventricular deterioration (troponin 1553 pg/mL, transesophageal echocardiogram with ejection fraction of 29%). He persisted with hypoxemia and refractory shock even though the high dose of vasopressors and inotropic administered and protective mechanical ventilation strategy; therefore, it was decided to initiate arteriovenous ECMO support. Figure 1 shows vasopressors and FiO_2% requirement and the evolution of lab findings since hospital admission.

He evolved favorably with hemodynamic and respiratory improvement and a gradual decrease of vasopressors. He required extracorporeal support for 9 days, and he did not present associated complications. He was discharged after 104 days. In a 6-month period, he was able to realize everyday life activities with no sequel.

Conclusion

Even though there is no formal suggestion of the use of ECMO in MDMA poisoning, this report proposes to open the discussion about the recognition of this device and its use, considering the timing of its implementation fundamental in relation to its potential of future recovery. In this line, extracorporeal support could be transferable to further situations that nowadays do not possess a formal recommendation by international societies.

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