Ecstasy, 3-4 methylenedioxymethamphetamine (MDMA), a fatality associated with coagulopathy and hyperthermia

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A fatality is reported associated with 3.4 methylenedioxymethamphetamine (MDMA) known as *Ecstasy*, *XTC*, or *Adam*. This drug with cult status is associated with acid house parties. Taken as a tablet, it is reputedly safe. One non fatal case of hyperpyrexia and three deaths from cardiovascular causes have been reported, in the USA[1-3]. There are no reports from the UK.

Case report

A previously fit 16-year-old girl was admitted to accident & emergency following a convulsion. She complained of feeling unwell. She was apparently visually hallucinating, pupils widely dilated, agitated and tremulous. Axillary temperature 40°C, pulse 190 per min, regular, blood pressure (BP) 80/50 mmHg. Investigation showed haemoglobin (Hb) 13.6 g/dl. Amphetamine overdose was provisionally diagnosed and she was admitted to the coronary care unit.

Two hours later axillary temperature measured 42°C and fresh oral bleeding was noted. At 3 hours she became deeply unconscious. Arterial gases showed pH 7.37, P_aCO_2 2.77 kPa, P_aO_2 16.75 kPa, FiO_2 0.24. Hb was 13 g/dl and platelets 69×10^9/l. Four hours later BP was unrecordable. Following a large haematemesis she was referred for intensive care. She was immediately intubated and ventilated, and volume replaced intravenously. Invasive haemodynamic monitoring was instituted.

Findings were; pulse 200 per min, BP 40 mmHg systolic, pulmonary capillary wedge pressure (PCWP) −3 cm H_2O and temperature 41°C. Investigations showed Hb 5.5 g/dl, platelets 23×10^9/l, PT > 180 s, APTT > 180 s, FDPs 74 mg/l, fibrinogen < 0.5 g/l. Arterial sample showed pH 7.13, P_aCO_2 5.13 kPa, P_aO_2 56.8 kPa, and cardiac output (CO) 2.8 l/min.

Resuscitation included blood and products, dobutamine and noradrenaline infusions for inotropic support, sodium bicarbonate for acidosis and frusemide and mannitol infusion to encourage a diuresis and cerebral protection. After 1 h PCWP was +12 cm H_2O, BP 90/50 mmHg, pulse 114 per min and CO 3.4 l/min. CT scan showed no intracranial haemorrhage but mild cerebral oedema.

Over the next 6 h she became progressively more acidotic and required increasing inotropic support. BP and CO fell and PCWP rose. Veno-venous haemodiafiltration was commenced to remove remaining drug, excess volume and correct the acidosis. Hypoglycaemia caused problems. She remained persistently acidotic with a low CO in spite of continuing aggressive treatment. The coagulopathy did not improve. Transfusion included, 35 units of blood, 21 of platelets and 21 of FFP. In spite of everything she died 36 h following admission.

Police enquiries established that she had only consumed one tablet of *Ecstasy*. With a single previous ingestion, she had felt unwell but recovered after a short while. Toxicology showed blood MDMA 0.424 mg/l, stomach 28 mg/l on admission and no other drugs.

Postmortem haemorrhagic abnormalities suggested disseminated intravascular coagulopathy. Muscle appeared macroscopically normal but microscopy showed non specific changes of type II fibre atrophy with mean type II to type I fibre diameter ratios of 0.87 and a mean internal nucleii count of 6.1%. There was no apparent rhabdomyolysis.

Table 1. Summary of reports of fatal or serious MDMA abuse

	Description	Sex	Age	Blood level of MDMA
1	Cardiovascular collapse, Wolff Parkinson White syndrome[2]	Male	32	0.2 mg/l
2	Electrocution[1]	Male	22	Present
3	Acute asthma[1]	Male	32	1.1 mg/l
4	Acute intoxication, cardiovascular collapse[1]	Female	18	1.0 mg/l
5	Hyperpyrexia, coagulopathy Survived[3]	Female	32	0.7 mg/l
6	Hyperpyrexia, coagulopathy This report	Female	17	0.424 mg/l

Discussion

Literature search reveals a few reports from the USA (Table 1). MDMA is a semi-synthetic hallucinogen. It reportedly produces a feeling of calm peace and heightened sensitivity with visual, auditory and tactile hallucinations generally associated with drugs such as lysergic acid diethylamide[4]. It is a controlled drug. Initially produced in 1914 as an appetite suppressant, suggested uses include treatment of alcoholism, depression and painful psychic experiences[5]. Only limited pharmacological studies are reported[6].

Fatalities resulting from abuse of amphetamines usually result from cardiovascular autonomic effects. Fatalities from hyperpyrexia, coagulopathy and rhabdomyolysis have been reported with amphetamines, but not with MDMA[7]. MDMA has central and peripheral sympathomimetic actions[6].

There is no definitive treatment for MDMA overdosage except supportive therapy. Choice of inotropes is difficult because of sympathomimetic actions[6,8,9]. Management should be aggressive and not delayed. Cooling and cardiovascular support may be required, together with correction of acidosis and coagulopathy.

Personal communication suggests two further fatalities in the UK since this report was initially prepared.

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