

Case Report

Acute renal failure due to accelerated hypertension following ingestion of 3,4-methylenedioxymethamphetamine ('ecstasy')

G. Woodrow¹, P. Harnden² and J. H. Turney¹

¹Renal Unit and ²Department of Histopathology, The General Infirmary at Leeds, Great George Street, Leeds LS1 3EX, UK

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Introduction

Ecstasy (3,4-methylenedioxymethamphetamine) is now a commonly used recreational drug. Despite claims by users that it is safe, there have been an increasing number of reports of serious and sometimes fatal adverse effects. These include convulsions, hyperpyrexia, hepatic dysfunction, rhabdomyolysis and disseminated intravascular coagulation, with the latter two resulting in acute renal failure in some cases. We describe the case of a 37-year-old man who developed accelerated hypertension with hypertensive encephalopathy, microangiopathic haemolytic anaemia and rapid onset of oliguric acute renal failure following ingestion of ecstasy at a 'rave party'. We believe that this is the first report of acute renal failure due to accelerated hypertension complicating the use of ecstasy.

Case report

A 37-year-old man presented acutely, 2 days after taking the drug ecstasy at a 'rave' party. He admitted to regular abuse of various recreational drugs in the past, including LSD, amphetamines and cannabis, but had no past history of medical illness. The day after ingestion of the drug he developed worsening generalized headache, abdominal pain and vomiting and was eventually admitted following a grand mal seizure. On examination, he had a blood pressure of 220/140 mmHg. He was unconscious and neurological examination revealed marked decerebrate posturing. His fundi were normal. He was apyrexial and the remainder of the physical examination was normal.

On investigation he had impaired renal function

with serum urea 18.9 mmol/l and serum creatinine 168 μ mol/l. Plasma sodium was 143 mmol/l, potassium 4.1 mmol/l and bicarbonate 27 mmol/l. Creatin kinase was slightly raised at 185 IU/l (normal <140) but urine myoglobin was not detected. Liver function tests were normal. A blood count revealed an elevated white cell count of $13.1 \times 10^9/l$ (neutrophils 12.1), haemoglobin of 9.1 g/dl, platelet count of $76 \times 10^9/l$ and reticulocyte count of 8.1%. A film showed features of a microangiopathic haemolytic anaemia with spherocytes and red cell fragments. Haemoglobin was present in the urine. Coagulation was abnormal with elevated prothrombin time of 18 s (control 12 s), APTT 43 s (control 33 s) and fibrinogen degradation products at 1 mg/l. Thrombin time and fibrinogen concentration were normal. Urinalysis showed the presence of blood 3+ and protein 1+. An electrocardiogram (ECG) was unremarkable, with no evidence of left ventricular hypertrophy. ANF was weakly positive with a normal concentration of double stranded DNA antibodies and negative ANCA. Protein electrophoresis revealed an acute phase response and concentrations of IgA, IgG and IgM were normal. Complement components were mildly depressed with C3 0.54 g/l (normal 0.75–1.65) and C4 0.15 g/l (normal 0.2–0.65). Computed tomography (CT) scan, electroencephalogram (EEG) and examination of cerebrospinal fluid (CSF) showed no focal or infective cause for his neurological condition, which was believed to be due to hypertensive encephalopathy.

He initially required ventilation and his blood pressure was controlled by intravenous infusions of labetalol and sodium nitroprusside. His neurological state improved, allowing him to be extubated after 2 days. He subsequently required a combination of atenolol, lisinopril, nifedipine and doxazosin to adequately control his hypertension. Although he initially maintained a good urine output, his renal function deteriorated over the next 7 days, with development of oliguria and he was commenced on intermittent haemodialysis.

A renal biopsy revealed the appearances of accelerated hypertension with mucoid widening of some arterioles with occlusion due to thrombi and fibrinoid change. Glomeruli showed collapse of the glomerular

Correspondence and offprint requests to: Dr G. Woodrow, Renal Unit, Leeds General Infirmary, Great George Street, Leeds LS1 3EX, UK.

tuft with ischaemic wrinkling of the basement membrane. Of 16 glomeruli, four showed either partial or complete infarction. There was also extensive tubular necrosis and some interstitial oedema. A DMSA isotope renogram showed very little renal perfusion and a subsequent renal arteriogram showed patent main renal arteries with lack of filling of distal vessels and absent nephrograms, in keeping with small vessel occlusion. The patient remains dialysis dependant 4 months after his initial presentation.

Discussion

Ecstasy (3,4-methylenedioxymethamphetamine) is a synthetic amphetamine derivative which was originally developed as an appetite suppressant. It has become a commonly used recreational drug, inducing feelings of euphoria and benevolence, as well as having a mild amphetamine-like stimulant effect [1]. It is commonly taken at 'rave' parties where prolonged strenuous exertion from dancing may add to its pharmacological effects. It is suggested that it is this pattern of use, rather than change in manufacture of the drug, or presence of impurities, which has resulted in the increasing number of reports of deaths and serious adverse medical effects [2]. These have included convulsions, hyperpyrexia, hepatic dysfunction, rhabdomyolysis and disseminated intravascular coagulation, with acute renal failure complicating the latter two [2,3].

Accelerated hypertension is a serious condition, which results in death in 1–2 years in most cases without treatment due to cardiac, renal or cerebrovascular complications [4]. Renal impairment in malignant hypertension follows one of four patterns [5]. Patients may suffer subacute deterioration of renal function over several weeks or months. There may be transient deterioration of blood pressure with the institution of control of hypertension and some patients may present with established end-stage chronic renal failure. Finally, there are rare reports of rapid deterioration of renal function with development of oliguric acute renal failure over a period of days [6,7]. As in this case, these are often accompanied by hypertensive encephalopathy, coagulopathy and microangiopathic haemolytic anaemia.

A transient rise in blood pressure and tachycardia are common after ingestion of ecstasy, peaking at about 1 h [8]. Although the mechanism is uncertain,

it is likely to be due to an amphetamine-like sympathomimetic effect. Amphetamines are indirectly acting sympathomimetic compounds with marked central as well as peripheral actions [9,10]. They cause α - and β -adrenergic effects by stimulating release of neurotransmitter vesicles, rather than having a direct effect on receptors. They may also block reuptake of catecholamines by presynaptic neurons and inhibit monoamine oxidase activity.

Acute renal failure has been reported following ingestion of ecstasy, with rhabdomyolysis and disseminated intravascular coagulation being the underlying causes. There were no hypertensive changes in the fundi or ECG of this patient, suggesting very recent onset of elevation of blood pressure, which we believe was initiated by ingestion of ecstasy. It is not possible, however, to exclude the presence of contaminating substances or deliberate ingestion of other drugs. The persistence of severe hypertension after the pharmacological effects of the ecstasy should have worn off may be due to the subsequent development of renal or vascular changes. We believe that this is the first report of acute renal failure due to accelerated hypertension after taking ecstasy.

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