Dopamine plus Frusemide in Cocaine-Associated Acute Myoglobinuric Renal Failure

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Dear Sir,

Rhabdomyolysis has several causes, both traumatic and nontraumatic [for references, see 1]. Up to 33% of patients with rhabdomyolysis develop acute renal failure (ARF). The recovery time may vary from 4 to 8 weeks depending on the degree of ARF. We report now on 3 patients who developed ARF, due to rhabdomyolysis, after the intravenous or intranasal use of a mixture of cocaine and heroine, treated with conventional therapy or with conventional therapy and subpharmacological doses of dopamine plus frusemide.

Patient 1

A 23-year-old male drug abuser was brought to the emergency room comatose and with hypovolemic shock after his last intravenous injection of a mixture of cocaine and heroine. The patient had been found lying on a beach where he had been for about 30 h. Examination revealed a marked edema of the right arm and leg. Initial laboratory values are shown on table 1. Oligoanuria was present. Therapy was started with fluid administration, sodium bicarbonate and loop diuretics as usual. On the 2nd hospital day hemodialysis was started. The oliguric phase persisted for 22 days and serum urea and creatinine peaked at 142.6 mmol/l (400 mg/dl) and 925.9 μ mol/l (10.6 mg/dl), respectively. The patient required 18 hemodialytic treatments. On the 46th hospital day the patient was discharged with normal renal function.

Patient 2

A 25-year-old male drug abuser was brought to our department with a 1-day history of anuria. He had been found lying on his right side for about 20 h after he had taken intranasally a mixture of cocaine and heroine. Examination revealed a marked edema of the right arm and leg associated to cutaneous hypoaesthesia and paralysis of the right arm. Temperature was 37.5 °C and the patient was totally confused. Blood pressure was 120/80 mm Hg. Initial laboratory values are shown on table 1. Therapy was started with fluid and sodium bicarbonate administration plus a continuous intravenous infusion of subpharmacological doses of dopamine (3 μ g/kg/min) and an intravenous bolus of frusemide (60 mg) 3 times a day. On the 2nd hospital day it was necessary to start hemodialysis. Oliguria persisted for 11 days during which urea and serum creatinine peaked at 107.7 mmol/l (302 mg/dl) and 1,065.7 μ mol/l (12.2 mg/dl),

respectively. 10 hemodialytic treatments were performed and the patient was discharged on the 21st hospital day with normal renal function.

Patient 3

A 22-year-old male was brought to the emergency room with a 1-day history of left leg pain and hypoaesthesia, abdominal pain

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and oliguria. He admitted to using cocaine and heroine for 5 years. He was found lying on his left side in the bathroom unconscious for about 10 h after he had taken intranasally a mixture of heroine and cocaine. Physical examination disclosed a swollen and tender left leg. Blood pressure was 125/70 mm Hg. Otherwise physical examination was unremarkable. Admission laboratory data are shown on table 1. Therapy was started with fluid and sodium bicarbonate administration plus a continuous intravenous infusion of subpharmacological doses of dopamine (3 µg/kg/min) and a bolus of frusemide (60 mg) intravenously 3 times a day. Despite therapy azotemia progressed and it was necessary to start hemodialysis on the 2nd hospital day. Oliguria persisted for 10 days during which 8 hemodialyses were performed and the patient was discharged on the 23rd hospital day with normal renal function. The role of traumas in rhabdomyolysis and consequent myoglobinuria was first recognized by Beawaters and Beall [2] during World War II. Since then there has been increasing evidence that not only traumas but also several nontraumatic causes can induce the onset of rhabdomyolysis. Both traumatic and nontraumatic rhabdomyolysis may develop complications with the onset of a slow developing ARF. The cases reported are similar both in cause and in clinical and metabolic features. All patients suffered from rapidly developing ARF and needed hemodialysis since the 2nd hospital day. The unusual rapid onset and the degree of renal damage probably depended on both the well-known toxic effect of myoglobin and the high blood levels of cocaine. We know, in fact, how cocaine may induce renal and muscular ischemic damage by inhibiting norepinephrine reuptake into nerve terminals, thus prolonging and potentiating its effects [3]. It is possible that cocaine-induced renal vasoconstriction might have produced a lowering of renal perfusion as associated with hypovolemia. In this situation cocaine might well be a predisposing factor for myoglobin-induced tubular injury. Although similar in onset and degree, ARF evolved differently in the patients. Patient 1 showed an oliguric period of 22 days and reached normal renal function by the 46th hospital day. Patients 2 and 3 showed an oliguric phase of 11 and 10 days, respectively, reaching normal renal function on the 22nd and 23rd hospital day, respectively. Patient 1 needed 18 hemodialyses while patients 2 and 3 needed 10 and 8 hemodialyses, respectively. Patient 1 received conventional therapy while patients 2 and 3 also received dopamine and frusemide boluses. Dopamine at subpharmacological doses plus frusemide in ARF therapy was first used by Lindner et al. [4] in 1979. Studies have shown that subpharmacological doses of dopamine interact with specific dopaminergic intrarenal receptors to reduce renal vascular resistance and improve cortical perfusion [5]. On the other hand, frusemide enhances synthesis of intrarenal vasodilating prostaglandins with a consequent redistribution of blood flow from the medulla to the cortex. As we know how cocaine-induced vasoconstriction and hypovolemia may be responsible for acute renal

damage, a combination of dopamine in low doses with frusemide seems to be a rational way to reverse oliguria in cocaine-associated myoglobinuric ARF.

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