Acute renal failure complicating Legionnaires' disease

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Summary

A 45-year-old man developed symptoms of pneumonia while on holiday in Spain. On his return home, a diagnosis of Legionnaires' disease was confirmed, complicated by acute renal failure. He was treated with dialysis and spontaneous recovery of renal function began on day 19.

Introduction

Although Legionnaires' disease was first described in the United States in 1977 (Fraser *et al.*, 1977; Kirby *et al.*, 1978) several outbreaks have now been recorded in the United Kingdom (Boyd *et al.*, 1978; Jenkins *et al.*, 1979). Acute oliguric renal failure requiring haemodialysis is associated with a high mortality although one elderly patient with moderately severe acute renal failure not requiring dialysis improved slowly but incompletely over many months (Kerr, Brewis and MacRae, 1978). A patient is now described in whom acute oliguric renal failure was treated with haemodialysis with complete recovery of renal function.

Case report

A 45-year-old man who had never been a cigarette smoker was admitted to hospital in May 1979 with a 7-day history of dry cough, breathlessness, fever and malaise which began while on holiday in Spain. He had returned from holiday 2 days before admission and had been treated at home with ampicillin without improvement in his symptoms. On admission his temperature was 38.9°C, but rose in 48 hr to a maximum to 41.2°C. His BP was 165/105 mmHg supine and tachypnoea, dehydration and herpes labialis were noted. There were signs of consolidation in the base of the right lung, confirmed by radiography. He was confused and areflexic with extensor plantar responses. He passed 70 ml of urine in the first 24 hr after admission. Numerous granular casts and red blood cells were seen in the urinary deposit.

The Hb was 14.3 g/dl; WBC $7.8 \times 10^9/l$; plasma urea 24.9 mmol/l and plasma creatinine 603 $\mu\text{mol/l}$. Initial urine osmolality was 319 mosmol/kg, and the urinary sodium concentration 96 mmol/l. Sputum and blood cultures were negative. The indirect fluorescent antibody titre to *Legionella pneumophila* rose from 1:32 on day 2 to 1:512 on day 7. His pneumonia was treated with penicillin and erythromycin.

The blood urea and creatinine rose rapidly (Fig. 1) in spite of peritoneal dialysis, and haemodialysis was therefore carried out on 8 occasions between days 9 to 18. Urine output began to increase by day 19, and the blood urea and creatinine levels fell to normal by day 33 and blood chemistry and urine microscopy were normal one month later. The pneumonia and encephalitis resolved completely and the patient returned to work as a fitter 10 weeks after the onset of symptoms.

Discussion

Transient mild abnormalities of renal function were common in the Philadelphia outbreak of Legionnaires' disease (Fraser *et al.*, 1977). In a subsequent review of 123 cases, 18 of them had acute renal failure in the course of their illness, and in many of these, renal failure was preceded by an episode of hypotensive shock. Asymptomatic minor elevations of blood urea were seen in 4 patients, and oliguric acute renal failure in 14, 3 of whom required dialysis. Eleven (78%) patients with acute renal failure died. Of all the non-respiratory complications of Legionnaires' disease, acute renal failure carries the poorest prognosis (Tsai *et al.*, 1979). Acute renal failure was present in 33% of patients at the time of admission to hospital in the Philadelphia outbreak before any episode of shock, in common with the patient reported here. In a group of non-Legionnaires who had sero-positive tests for Legionnaires' bacillus, 4 developed acute renal failure (Friedman, 1978) and they all showed microscopic haematuria

FIG. 1. Changes in (a) blood urea (■—■) and creatinine (●—●), (b) body weight and (c) urine output during the course of acute renal failure in a patient with Legionnaires' disease. The solid bar represents a period of peritoneal dialysis and the arrows indicate the days on which haemodialysis was performed.

and proteinuria. In other respects, reports from Britain do not suggest that advanced age, underlying chronic lung disease or cigarette smoking are encountered as frequently as in the U.S.A. (Jenkins *et al.*, 1979). In common with several other British patients (Boyd *et al.*, 1978), the present patient returned from holiday at an hotel in Spain.

The isotonic urine and high urinary sodium concentration in this patient suggested a diagnosis of 'acute tubular necrosis' and the clinical course was consistent with this. Renal biopsy was not considered justifiable once renal function began to improve but the presence of microscopic haematuria, as in several published cases, suggests that the renal

lesion may not be simple 'tubular necrosis'. Rhabdomyolysis has been suggested as the cause of acute renal failure in Legionnaires' disease (Friedman, 1978; Kurtz, 1978) but the specific renal lesion has not been found (Relman and McCluskey, 1978; McCluskey, 1978). A tubulo-interstitial nephritis has been reported (McCluskey, 1978) but an appropriate drug history is not found in all patients with renal failure. An alternative explanation is that the nephritis might represent an unusual renal response to infection although Legionnaires' bacillus has not been identified in renal tissue.

Complete recovery of renal function after dialysis for almost 3 weeks appears to be unique and

suggests that a vigorous approach to the management of Legionnaires' disease complicated by acute renal failure should be encouraged.

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