Recovery of renal function after renal failure due to cholesterol crystal embolism

Sir,

Cholesterol crystal embolism (CCE) is not a widely recognized cause of kidney failure [1]. Previous reports have emphasized the progressive nature of renal insufficiency from this cause [2], and reports of improvement of renal function after CCE are rare [2–4]. We present a case of CCE with secondary kidney failure, livedoid lesions and lower limb intermittent claudication, in which complete recovery of renal function occurred after several months.

Case. A 53-year-old male, with a long-standing history of hypertension and ischaemic cardiopathy was admitted for cardiological evaluation. He was a non-smoker, and was chronically treated with 50 mg/day atenolol, 40 mg/day isosorbidemononitrate and 200 mg/day aspirin. On admission, serum creatinine level was 106 µmol/l, proteinuria was absent and the urine sediment was normal. No other relevant data were found. Coronary angiography via the femoral artery was performed, and a critical stenosis of the left anterior descending coronary artery was detected. One month later, he complained of headache, intermittent claudication of the lower limbs at 50–100 m and diffuse abdominal tenderness that did not respond to antiacids and analgesics. Blood pressure was 200/120 mmHg and livedoid lesions were evident in the abdominal wall and the legs. No bruits were detected. Feet pulses were preserved and symmetric. Malignant oedema without lovea was present. Laboratory evaluation revealed 29.4 mmol/l urea, 256.3 µmol/l serum creatinine, 51 UI/l creatine kinase, 18 UI/l AST, 338 UI/l LDH, 6.45 mmol/l total cholesterol, 2.04 g/l triglycerides and 547.2 µmol/l uric acid. The white blood cell count was 8.500/µl with 11.1% of eosinophils. ESR was 62 mm/h. Tests for ANA, ANCA, antiphospholipid antibodies, syphilis, cryoglobulins, hepatitis B and C virus and HIV antibodies were negative. Urinalysis showed: 192 mmol/24h Na⁺, and a worse prognosis for the recovery of renal function. Conversely, improvement of renal function is uncommon, in no more than 11.5% of the cases, and it occurs in those patients having less deterioration of renal function per high-power field. Proteinuria was 1.2 g/day. Urine culture was negative. Fundoscopy showed splinter haemorrhages without Hollenhorst plaques. Doppler sonographic study of carotid and femoral arteries was normal. Scintigraphy study with 99mTc-MAG3 revealed poor perfusion and loss of excretory function in both kidneys.

A livedoid skin lesion was biopsy revealing the presence of cholesterol crystal emboli that occluded the lumen of the dermis media arterioles. Renal function deteriorated later and serum creatinine increased to a peak of 574.2 µmol/l on day 82 after the coronarography. Later, a slow and progressive recovery of the renal function was detected with a urea level of 18.3 mmol/l and serum creatinine level of 203 µmol/l at 6 months. A further improvement was detected and at the 24 month-follow-up, the urea level was 11.3 mmol/l and the serum creatinine was 123 µmol/l. Proteinuria was negative and the urine sediment was normal. Intermittent claudication of the lower limbs improved after the third month. Treatment during this time period included 10 mg/day amloidipine, 50 mg/day atenolol and 4 mg/day doxazosine. The renal function has remained stable after 24 months of follow-up (Figure 1).

Comment. Although partial improvement of renal function has been described after CCE [2–4,5], almost complete recovery of renal function has only been reported in five cases in the literature [3,4] (MEDLINE, 1980–1998), but none of them returned completely to the previous renal function. In most of these patients a nephrotoxic component of the contrast media could not be ruled out in the pathogenesis of the kidney failure, particularly when the renal function declined immediately after the surgical or radiological procedure [2]. Renal insufficiency due to CCE usually sets in 6.45 mmol/l total cholesterol, 2.04 g/l triglycerides and 547.2 µmol/l uric acid. The white blood cell count was 8.500/µl with 11.1% of eosinophils. ESR was 62 mm/h. Tests for ANA, ANCA, antiphospholipid antibodies, syphilis, cryoglobulins, hepatitis B and C virus and HIV antibodies were negative.

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Fig. 1. Evolution of renal function.
and in those without associated renal injuries [2–4]. This improvement is usually gradual, over several months, and there is no specific treatment that modifies the spontaneous course. The therapeutic measures are directed at withdrawing anticoagulant treatments, controlling hypertension and hyperlipidemia, as well as avoiding nephrotoxic insults.

In our patient, the progressive increase in blood urea and creatinine levels 1 month after the coronariography makes it very improbable that radiocontrast-agent nephrotoxicity was the cause of the renal failure, and the findings in the skin biopsy were diagnostic of CCE. This case is remarkable because of the near complete recovery of the glomerular filtration rate, despite the severe deterioration of renal function. Previously normal renal function, the patient age, and probably the limited atherosclerotic disease could favour the almost complete recovery of renal function after CEE [2]. Concomitant to the improvement of the renal function, livedoid skin lesions progressively disappeared, and the intermittent claudication of the lower limbs also improved. This evolution could be related to the recanalization of the organized thrombus, weeks or months after cholesterol crystal embozation, as has been shown in animal and human studies [6]. Nevertheless, recovery may be due to other factors including partial, instead of total, occlusion of the vasculature by the cholesterol crystals, as well as resolution of concurrent acute tubular necrosis in borderline ischemic areas, the development of collateral flow, or hypertrophy of surviving nephrons [2–4]. The evolution of our patient suggests that transitory renal insufficiency due to CCE could be more frequent than it has been recognized, and the 2 year follow-up shows that long-term stable renal function can be maintained, particularly in patients with preserved initial renal function.

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