Case report

Haemodialysis in 'hepatorenal syndrome': report on two cases

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SUMMARY We report two patients with hepatorenal syndrome who recovered from oliguria and renal failure after temporary treatment with haemodialysis. Hepatorenal syndrome developed under diuretic treatment in both patients. Volume expansion, dopamine, and prostaglandin I₂ did not improve renal function. In the one patient with alcoholic cirrhosis, renal biopsy showed only minimal alterations of glomeruli, tubuli, and arterial vessels. In the other case, the deterioration and improvement in renal function paralleled changes in acute alcohol-toxic hepatic function. We conclude that haemodialysis should be considered for treatment of hepatorenal syndrome in selected patients where reversal of liver failure can be expected.

Hepatorenal syndrome is an acute renal failure of unknown pathogenesis occurring in patients with decompensated liver disease, usually alcoholic.¹⁻⁴ Renal failure in hepatorenal syndrome has a pure functional basis. This is best illustrated by two classical papers which show successful transplantation of cadaveric kidneys from patients with hepatorenal syndrome as well as restoration of renal function in hepatorenal syndrome after liver transplantation.^{5,6} Hepatorenal syndrome is considered a complication of terminal hepatic insufficiency, and haemodialysis is at present not included in the treatment recommended for this syndrome.²⁻⁴ Therefore, we want to report on two cases in whom hepatorenal syndrome was treated by temporary haemodialysis and where renal function recovered after spontaneous improvement of liver function.

Case 1

This 61 year old male patient (WS) was admitted to hospital because of confusion and haematemesis. The patient had had diabetes mellitus type II for 15 years but no diabetic retinopathy. A year before, the patient had received a side-to-side portocaval

shunt because of massive bleeding of oesophageal varices. Liver biopsy had revealed alcohol-toxic liver cirrhosis. At that time, plasma creatinine was only slightly raised to 132 $\mu\text{mol/l}$. Before the present admission, the patient was treated with spironolactone (100 mg) and butizid (10 mg) because of ascites. At the time of admission the patient was somnolent; spider naevi were present, but there was no jaundice, no ascites, no enlargement of the liver or spleen, and he was always normotensive. Endoscopy showed a bleeding peptic ulcer. Laboratory values were: haemoglobin 8.0 g%, thrombocytes 213 000 g/l, blood ammonia 94 $\mu\text{mol/l}$, SGOT 8, SGPT 9, alkaline phosphatase 196, and gamma-GT 30 U/l, serum protein 65 g/l, plasma albumin 30 g/l, bilirubin 12 $\mu\text{mol/l}$, prothrombin time 71%, urea 36 mmol/l, and plasma creatinine 967 $\mu\text{mol/l}$, and because urine volume was 1600 ml per day, non-oliguric renal failure was diagnosed.

The patient was treated with haemodialysis three times a week for six months. Renal ultrasound showed small but otherwise normal kidneys. Renal cortical necrosis was excluded by radiological angiography. Two renal biopsies eight and 16 weeks after admission showed unspecific moderate focal interstitial fibrosis and glomerular sclerosis, but no morphological signs indicative of intrarenal kidney failure (Fig. 1). Urine volume at that time was 400

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ml daily, and urine sodium was 1.4 mmol/day, urine potassium 27 mmol/day, and urine osmolality 133 mmol/day or 332 mosmol/kg. We measured a reduced renal plasma flow of 143 ml/min by a single shot J-123/J-131 PAH clearance, and a reduced glomerular filtration rate of 0.3 ml/min by a single shot inulin clearance. Dopamine (100 µg/min) did not increase either of these parameters, and addition of prostaglandin I₂ (2 µg/kg/min) only slightly increased the renal plasma flow to 183 ml/min and the glomerular filtration rate to 0.5 ml/min. After discharge, renal function continuously recovered, while no signs of hepatic encephalopathy were recorded. Haemodialysis could be discontinued, and plasma creatinine concentrations were 312 µmol/l without further haemodialysis.

Case 2

This 48 year old male patient (MR) was admitted to the hospital because of icteric hepatic failure. The patient had a 13 year history of heavy alcohol consumption. On admission, the patient was jaundiced, and hepatic fotor, spider naevi, tremor, ankle oedema, and massive ascites were noted. The liver was enlarged to 18 cm in the medioclavicular line. Endoscopy showed no oesophageal varices. Laboratory tests were: haemoglobin 12 g%, SGOT 24, SGPT 6, alkaline phosphatase 206, cholinesterase 937, and gamma-GT 348 U/l, prothrombin time 65%, bilirubin 87 µmol/l, serum creatinine 88 µmol/l, plasma protein 51 g/l, albumin 26 g/l, and

ascitic protein 16 g/l. The patient was treated with spironolactone (150 mg) and furosemid (40 mg). Liver function deteriorated, as did renal function (Fig. 2). Oliguria developed, and natriuresis decreased to 6 mmol/day. Renal ultrasound showed large kidneys with a reduced echogenicity of the parenchyma. Central venous pressure at that time was +4 cm H₂O. The patient was treated with human albumin (20 g/day), dopamine (300 mg/day), and furosemid (250 mg bolus) without success.

Haemodialysis was started 17 days after admission when plasma creatinine was 507 µmol/l, plasma urea 35 mmol/l, plasma bilirubin 810 µmol/l, prothrombin time 42%, and urine volume 650 ml per day. Haemodialysis was performed three times a week for five weeks, but liver function improved spontaneously, and plasma creatinine decreased to 122 µmol/l without further haemodialysis. At that time, laparoscopy revealed nodular liver cirrhosis with portal hypertension. A liver biopsy showed cirrhosis with alcoholic hepatitis of moderate activity. At that time, the size of the liver had decreased to 12 cm. Endoscopy now showed varices of the oesophagus and gastric fundus. The patient was discharged with a stable endogenous creatinine clearance of 58 ml/min without haemodialysis.

Discussion

Hepatorenal syndrome was diagnosed in our two patients because both had severe hepatic dysfunction, and natriuresis was below 10 mmol/day; both were under diuretic treatment, and other

Fig. 1 Renal biopsy in the first patient. Glomeruli showed slight and unspecific mesangial sclerosis. In the interstitium there was a medium grade, focal spreading with sporadic rare lymphohistiocytic cell infiltrations. Tubuli were partially dilated, and tubular epithelium showed flattening and partial degeneration. Vessel alteration corresponded with the age of the patient. Immunohistology was completely negative. This histological picture did not explain the renal failure.

Fig. 2 Time course of hepatic function (bilirubin and prothrombin time) and renal function (plasma creatinine and 24-hour urine volume) in the second patient. Natriuresis was decreased to 6 mmol/day, in agreement with diagnosis of hepatorenal syndrome. Deterioration and improvement in renal function paralleled changes in hepatic function.

causes of renal failure were excluded *ex juvantibus*. In the first patient, exacerbation of hepatic failure was assumed to be caused by gastrointestinal bleeding, and in the second patient, recovery of liver function was expected after prohibition of toxic alcohol consumption.

The pathogenesis of hepatorenal syndrome is still unclear. One possible precipitating factor is hypovolaemia caused by diuretic treatment, bleeding, or paracentesis. Increased renal cortical vasoconstriction due to circulating humoral factors and sympathetic activity is considered the other causative factor in hepatorenal syndrome.³⁻⁷ There is no definite conservative treatment for hepatorenal syndrome. Volume replacement, albumin infusion, dopamine, prostaglandins, ascites re-infusion, peritoneovenous and portocaval shunting have usually proved to be ineffective though dramatic recoveries from hepatorenal syndrome have also been reported.^{1,2,4,8-10}

Current literature does not consider haemodialysis as an alternative treatment in hepatorenal syndrome.^{2,4} In the textbook on *The kidney in liver disease*, the topic 'hemodialysis' is not indexed.¹¹ Some authors have even rejected haemodialysis treatment of hepatorenal syndrome.¹²

Kidney function in acute renal failure caused by tubular necrosis spontaneously may recover after a regeneration period of a few days or weeks. The kidneys in hepatorenal syndrome are capable of normal renal function, but recovery primarily depends on the restitution of liver function. Thus, improvement of kidney function can be expected in potentially reversible liver damage. The two cases described here provide evidence that haemodialysis may allow for spontaneous recovery of proven hepatorenal syndrome. This may be particularly true in patients with acute alcoholic hepatitis who survive the first three weeks and thereafter show signs of improvement. Therefore, temporary haemodialysis in selected patients with hepatorenal syndrome deserves further critical evaluation.^{7,13}

Addendum

Since submission of the paper, another patient with hepatorenal syndrome (63 years with alcoholic liver cirrhosis) was treated for three weeks by haemodialysis and also regained normal renal function. In this patient, hepatic decompensation and hepatorenal syndrome occurred after oesophageal variceal bleeding and enforced diuretic treatment.

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