Hepatorenal syndrome (HRS)

Up to 10% of patients with liver disease can develop a poorly understood form of renal disease, called hepatorenal syndrome, which has a dismal prognosis. This disorder is distinct from both prerenal azotemia and acute tubular necrosis. It is characterized by a progressively rising serum creatinine that shows a lack of improvement after 48 hours of diuretic withdrawal and volume expansion with intravenous albumin, and diminished urine volume in the absence of shock, parenchymal renal disease, and use of nephrotoxic agents. HRS is usually fatal unless a liver transplant is performed, although various treatments, such as dialysis, can prevent advancement of the condition. HRS can affect individuals with cirrhosis, severe alcoholic hepatitis, or liver failure, and usually occurs when liver function deteriorates rapidly because of a sudden insult such as an infection, bleeding in the gastrointestinal tract, or overuse of diuretic medications.

Suspected causes of functional renal failure associated with liver disease include significant variceal hemorrhage, leading to vascular collapse and hypoperfusion. Decreased blood flow to the kidneys might also occur as a result of the peripheral vasoconstriction that occurs in response to ascites and the interstitial accumulation of fluid. Finally, the accumulation of toxins specifically damaging to the kidneys increases because the failing liver is unlikely to be performing biotransformation or detoxification adequately. Still, the major pathogenetic unit is considered the decrease in renal perfusion, thus a decrease in the GFR as well. The dilation of vessels in the abdominal region is attributed to the increased levels of certain vasoactive substances, namely NO, some prostaglandins, substance P, which usually are metabolised in the liver. Sympathetic vascular stimulation along with the RAA-system-mediated vasoconstriction seem to have stronger effect on the renal artery than on the splanchnic arteries.

Type 1 hepatorenal syndrome is rapidly progressive, with a doubling of the serum creatinine concentration to a level greater than 221 μmol/L (2.5 mg/dL) or a halving of the creatinine clearance to less than 20 mL/min over a period of less than two weeks. Quite often the cause of type 1 is bleeding (typically, variceal bleeding from the esophagus) leading to a rapid decrease in effectively circulating blood volume. The prognosis is >50% mortality within the first month.

Type 2 HRS is slower in onset and progression. It is defined by an increase in serum creatinine level to >133 μmol/L (1.5 mg/dL) or a creatinine clearance of less than 40 mL/min, and a urine sodium < 10 μmol/L. Probably the most typical sign of that type is diuretic-resistant ascites, because even if such drugs are being administered, the low GFR does not let the kidney excrete sodium and water effectively. The prognosis of type 2 HRS is also quite grim with an average survival period of approximately 6 months unless liver transplantation is being carried out.