Pump-Assisted Hemofiltration in a Small Infant with Congenital Heart Disease and Multiorgan Failure

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Dear Sir,

Small infants with acute renal failure often are on peritoneal dialysis. But infants undergoing peritoneal dialysis are affected by many problems, such as peritonitis, ultrafiltration failure, or intraperitoneal hemorrhage. Continuous hemofiltration – assisted by a low-speed blood pump – provides a slow and gentle removal of fluid and exactly corrects metabolic abnormalities. A 32-day-old female infant was admitted with severe jaundice and mild cyanosis. She weighed 2.2 kg and was under assisted ventilation since birth. An echocardiogram revealed double-outlet right ventricle, patent ductus arteriosus, and ventricular septal defect. Peritoneal dialysis was started for oliguria and hyperammonemia caused by fulminant hepatitis. At the age of 42 days, she became edematous and had a poor ultrafiltration rate. We performed pump-assisted hemofiltration instead of peritoneal dialysis (2 days, 10 and 7 h, respectively). For blood access the posterior tibial artery was cannulated with a 24-gauge, 20-mm catheter and the femoral vein with a 22-gauge, 30-mm catheter. We used a 0.1-m² hemofilter (Asahi Medical) and bicarbonate-buffered ultrafiltrate substitution fluid (Fusou Yakuhin KK). The ultrafiltrate substitution fluid contained 140 mmol/l sodium, 3 mmol/l potassium, 3.5 mg/dl calcium, 1.5 mg/dl magnesium, 100 mg/dl glucose, 110 mmol/l chloride, 35 mmol/l bicarbonate, and 0.5 mmol/l acetate. A low-speed blood pump produced blood flow rates of 6–8 ml/min and ultrafiltration rates of 8–10 ml/h. We employed continuous administration of nafamostat mesylate (10 mg/h) as an anticoagulant. The treatment was well tolerated, and systemic edema was reduced, but the plasma ammonia level remained high (386–266 µg/dl). Peritoneal dialysis was well tolerated after treatment. Continuous arteriovenous hemofiltration is used in newborns [1], in premature infants with acute renal failure [2], and in children with postoperative cardiac failure [3]. Spontaneous continuous arteriovenous hemofiltration often fails to control azotemia in small infants due to poor blood flow [4]. Continuous hemofiltration, assisted by a low-speed blood pump, can provide adequate blood and ultrafiltrate flow. No side effects, such as severe hypotension or early hemofilter clotting, occurred after adequate blood flow and use of anticoagulant. Pump-assisted hemofiltration can control azotemia and reduce hypervolemia in small infants with

acute renal failure and congenital heart disease, but it cannot reduce the plasma ammonia in infants with severe liver damage.

References

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