Modification of Peritoneal Dialysis: Intermittent Automated Peritoneal Dialysis

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Dear Sir,

Both continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis (APD) have been established treatments of end-stage renal failure [1, 2]. It seems likely that CAPD should be performed every day, and the word 'continuous' in CAPD has been thought as wet condition during a day. We have recently reported that CAPD can be discontinued a few days during the week when a patient's residual renal function is relatively maintained [3]. We therefore substituted the word 'continuous' which means every day, by intermittent. Since there is a concept that APD should be performed every day as well, we attempted intermittent automated peritoneal dialysis (APDi) in a patient with remnant renal function, and the following results have been obtained.

In a 61-year-old male, hemodialysis was initiated because of end-stage renal failure due to chronic glomerulonephritis and severe pulmonary edema on October 19, 1995. His blood pressure was 175/106 mm Hg, his pulse was 112 beats/min, his temperature was 36.7°C, his height was 172.7 cm, and

his body weight was 59.3 kg. Examination of blood and urine yielded the following data: hemoglobin concentration, 6.5 g/dl; hematocrit, 19.8%; serum urea nitrogen concentration, 107.4 mg/dl; serum creatinine concentration (Cr), 9.3 mg/dl; serum uric acid concentration, 7.2 mg/dl; 24-hour creatinine clearance (CCr), 1.2 ml/min/1.73 m²; serum total protein concentration, 6.0 g/dl; serum sodium concentration, 138 mEq/l; serum potassium concentration, 5.0 mEq/l; serum total calcium concentration, 8.6 mg/dl; serum phosphate concentration, 4.2 mg/dl;

Table 1. Changes in serum concentrations of urea nitrogen (UN), Cr, uric acid (UA), sodium, potassium, total calcium, phosphate and bicarbonate (HCO₃⁻) and body weight (BW) after cessation of peritoneal dialysis

1

1

6L

7 22 7 7 22 7 7

(Monday) (Tuesday) (Wednesday) (Thursday)

Fig. 1. Weekly schedule of APDi.

22 7 7 o'clock

(Friday) (Saturday) (Sunday)

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pH, 7.354; PCO₂, 29.1 mm Hg; PO₂, 43.9 mm Hg, and HCC% 17.6 mmol/l. His body weight was reduced to 49.2 kg by intensive ultrafiltration, pulmonary edema disappeared. The patient selected PD and was therefore transferred to CAPD. Since his condition became stable 2 weeks after the introduction of CAPD and since his renal function improved, we discontinued CAPD during 48 h with the administration of diuretics and vitamin D metabolite (table 1). The levels of Cr, urea nitrogen, uric acid, K and Pi increased after cessation of CAPD, and the levels of Ca, HCO₃ and body weight gradually decreased with time. The results suggested that PD can be discontinued during 24-48 h without problems of underdialysis, hyperkalemia, metabolic acidosis and overhydration. The peritoneal equilibration test demonstrated a high average. Since the level of renal CCr was 5.6 ml/min/1.73 m² (56.4 liters/week/1.73 m²) at this time, we decided that the APD schedule be nightly intermittent peritoneal dialysis which consists of Dianeal PD-2 1.5% (Baxter) 2,300 ml, four exchanges in night time (9 h) per day. The level of peritoneal CCr was 6.2 liters/day/1.73 m². If APD was performed 3 days/per week, the peritoneal CCr was 18.6 liters/week/1.73 m² and the overall CCr became 75.0 liters/week/1.73 m². Since one of the tools for prescribing minimum adequacy of peritoneal dialysis is overall CCr of 50 liters/week/1.73 m² [4], we performed APDi during 3 days (Monday, Wednesday and Friday) per week with the same daily schedule (fig. 1). The patient has been on APDi during 3 months without any problem such as aggravation of clinical symptoms, underdialysis or overhydration.

We recommend the introduction of APDi in patients with sufficient residual renal function when the patients do not select CAPD. Even if the residual renal function will decrease, APDi can be continued for a long time by modulating dialysis volume, dialysis osmolality, dialysis time, dialysis exchange times and dialysis-free day times. Needless to say, APDi is dangerous in anuric patients.

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