Role of Peritoneal Membrane Hydration in UF Capacity of Patients on CAPD

SUMMARY

Of 72 uremic patients who entered our CAPD program, 11 showed a reduction or loss of ultrafiltration capacity (UF) of the peritoneal membrane (PM). Treatment with a high oral dose of furosemide (F) was used to stimulate residual urine output. Seven responded to drug administration with a significant increase in urine volume (UV), Na excretion and, within a week attained their dry body weight (BW).

In the remaining four patients F given either orally or intraperitoneally (IP) was ineffective, and fluid removal was obtained only by hemofiltration (HF).

In both groups an increase in the UF capacity of PM was noted when the patient reached the dry BW, either by pharmacological or technical methods.

These results support the assumption that overhydration of the PM plays a major role in maintaining the UF process.

INTRODUCTION

Increasing clinical experience has shown that CAPD is an effective modality of treatment for uremic patients in the short and intermediate term. Nevertheless, long-term CAPD patients, even with normal peritoneal clearances, are often not able to maintain satisfactory water and electrolyte balance.

PATIENTS AND METHODS

Of 72 CAPD patients, 11 (15%) had reduction or loss of the UF capacity of the PM. They had been on CAPD from 16–54 months (average 27.2) and had progressive water and salt retention with a mean BW increase of $7.3 \pm 0.6$ Kg.

The clinical picture included ankle edema, inability to control blood pressure, and intercurrent
dyspnea. The schedule of bag exchange was modified with 4–5 daily hypertonic solutions (2 L 4 g/dl dextrose, four times a day and 1 L during the night). The usual composition of dialysate was: Na+ 135–137, K+ 0–1, Ca++ 4, Mg++ 0.5–1, Cl- 103.5, acetate 38.5 mEq/L using our double bag system described elsewhere.1

Acetate was temporarily substituted at the same concentration as lactate to assess its effect on UF capacity in "nonresponders." The incidence of peritoneal infection was not different from the overall average (one episode/18.2 pt/month) of our CAPD population. The residual renal creatinine clearance ranged between 0.7–7 ml/min, with an average 3.5 ml/min.

The investigation was carried out during hospitalization, by administering a high dose of F (15 mg/kg/day) IV and measuring daily urine volume (UV), UF, Na, urea, creatinine, phosphorus, uric acid removal with dialysate, and protein losses. Routine lab data were performed under basal conditions and every 2–3 days during the observation period. In order for nonresponders to reach their dry BW, HF treatment was performed, and the same lab tests as above were carried out. These subjects were also studied after IP administration of F (40 mg/L) with different osmolality and buffers solutions, when volume overloaded and after dehydration.

RESULTS

Among our 11 patients, seven responded to F therapy as shown by a significant increase in urine volume (UV) from 380 ± 154 to 1270 ± 475 ml/24 h (p < 0.001) and in Na excretion, from 32 ± 10 to 110 ± 28 mEq/24 h (p < 0.001) (Fig. 1). A BW decrease mean of 1.2 ± 0.3 Kg/day was observed in these patients.

After reaching dry BW, we observed a progressive increase in the UF capacity of the PM: significant fluid removal was already seen in the third day of diuretic therapy (from 288 ± 123 to 1220 ± 154 ml/24 h) (p < 0.001) (Fig. 2), leading to ideal BW within a week, and subsequent return to a dialysis schedule of one or two hypertonic bags/day.

Subsequently, the patients were discharged, and at home they have been taking an oral dose of F (500 mg) two or three times a week. No side effects were observed, while satisfactory water and electrolyte balance was maintained. The four nonresponders, in whom residual UV and UF remained unchanged either by oral or IP administration of F,