Transperitoneal Removal of Osteocalcin, Calcitonin and Parathyroid Hormone in Patients Treated by CAPD

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Dear Sir,
Renal osteodystrophy is a major complication of end-stage renal disease (ESRD) [1]. Determinations of Ca and P, as well as hormones regulating kinetics of these minerals provide a reliable index of bone metabolism. CAPD was introduced originally as a procedure with superior clearance of low molecular mass proteins, as compared to hemodialysis. Considering the relatively small size of the molecules of parathyroid hormone (PTH), calcitonin (CT) and osteocalcin (OC), a remarkable peritoneal removal of these polypeptides might be expected.

In order to estimate peritoneal fluxes of hormones and their impact on the corresponding blood levels, serum and dialysate levels of PTH, CT and OC were determined in 20 patients with ESRD on CAPD treatment for 3-19 months. CAPD was performed by standard technique, with a dialysis fluid containing 1.75 mmol/l calcium and 0.75 mmol/l magnesium. Of the four bag exchanges, generally 3 were with dextrose solution 1.5% and only one with dextrose 4.25%. All patients were on unrestricted diet except for potassium, phosphate and fluid intake. Aluminum-containing phosphate binders were only prescribed when repeated serum phosphate measurements were > 2.0 mmol/l.

Immunoreactive CT and C-terminal PTH were determined by commercialRIA kits from Byk-Mallinckrodt, Germany, while OC measurements were performed by a kit from Sorin Biomedica, Italy. Blood samples were drawn at 07:00 h, and peritoneal fluid samples collected at the end of each of four daily exchange periods. Results are expressed as means ± SEM. Statistical significance was estimated by Student’s t test for paired data.

Fig. 1. PTH, CT and OC removal in four daily exchanges of CAPD treatment.
Table 1. Calcium, phosphate, OC and calcium-regulating hormones in CAPD patients
daily loss by peritoneal fluid was detected to be $4.48 \pm 1.22 \mu g$ for PTH, $113.3 \pm 17.8 \text{ng}$ for CT and $42.2 \pm 9.2 \mu g$ for OC.

Altered serum levels of PTH, CT and OC in ESRD patients were reported previously [1-4]. Among various factors inducing PTH elevations, phosphate retention, hypocalcemia, decreased synthesis of 1,25-dihydroxyvitamin D, skeletal resistance to PTH and impaired degradation of PTH are of the greatest importance. OC rise was observed to correlate with that of PTH and could reflect increased skeletal production, decreased renal clearance, or both [2, 5]. OC is a sensitive and specific humoral marker of bone formation [6]. However, the transperitoneal removal of OC was relatively small and probably clinically unimportant.

The present data indicate normal CT serum levels in our CAPD patients, as well as a relative insufficiency of CAPD treatment to correct serum PTH alterations.

References


Osteocalcin, Calcitonin and PTH Removal by CAPD
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