

Influence of Dialysis Duration, Peritoneal Transport Parameters, and Gender on Effluent CA125 Concentration in Patients on Peritoneal Dialysis

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Keywords. peritoneal dialysis, mesothelial cells, peritoneal membrane efficacy, creatinine clearance, CA125, peritonitis

Introduction. Peritoneal effluent *cancer antigen 125* (CA125) concentration is a marker of mesothelial cell mass in patients on continuous ambulatory peritoneal dialysis (CAPD). Accordingly, we aimed to observe the effects of CAPD duration, sex, and peritoneal membrane efficacy on CA125 levels in peritoneal effluent.

Materials and Methods. In 30 patients who were on CAPD for 6 months, concentrations of CA125 were determined in the 4-hour effluent peritoneal dialysate at the 6th and 12th month of CAPD initiation. The laboratory results were assessed in relation to the patients' sex and peritoneal membrane efficacy which was measured by the peritoneal equilibration test, weekly creatinine clearance, and the Kt/V.

Results. The patients were 16 men and 14 women with a mean age of 34.3 years (range, 17 to 56 years). With increasing the duration of CAPD, dialysate CA125 levels decreased significantly ($P < .001$). Whereas, there were no significant changes in Kt/V and creatinine clearance at 12 months. In the men, the CA125 levels were significantly lower 6 months after the start of CAPD compared to the women ($P = .047$). In low transporter and low average transporter patients, peritoneal effluent had slightly higher levels of CA125 in comparison with those in high transporter and high average transporter patients ($P = .08$).

Conclusions. We found that peritoneal effluent CA125 level decreases in both men and women with increasing of CAPD duration, without any association with peritoneal transport parameters. Of interest, there was a gender difference in the CA125 levels in our series.

IJKD 2007;1:78-81
www.ijkd.org

INTRODUCTION

The mesothelial layer decreases friction between the abdominal organs and prevents from adhesion.¹ These cells can produce various vasoactive substances such as cytokines and chemokines,²⁻⁵ and they can ingest bacteria.⁶ *Cancer antigen 125* (CA125) is a high-molecular weight glycoprotein that presents in the mesothelial cells.^{2,7,8} In stable patients on continuous ambulatory peritoneal

dialysis (CAPD), peritoneal effluent CA125 can be considered as a marker of viable mesothelial cells mass and their turn over.⁹⁻¹³ Large amounts of these cells are found during peritonitis due probably to necrosis of the mesothelial cells.² Turhan and colleagues reported that during peritonitis in children on CAPD, dialysate concentrations of CA125 showed a reversible 3-fold increase.¹⁴

The majority of studies found no relationship

between dialysate CA125 and peritoneal transport parameters.^{2,9} This confirms the physiologic observation that the mesothelium is not an important barrier to transport of solute and fluids.⁹ However, in some investigations, progressive loss of ultrafiltration and a decreased level of CA125 in dialysis fluid was noted due to loss of the mesothelial cells that may not be necessarily associated with systemic inflammation.^{15,16} Lai and coworkers reported that there was no correlation between CA125 and the number of mesothelial cells in stable patients on peritoneal dialysis, whereas a significant correlation was observed between CA125 and different parameters of peritoneal transport.¹⁷ On the other hand, chronic exposure to peritoneal dialysis solution is associated with a low-grade local inflammatory state of the peritoneum.² It is also reported that dialysate concentration of CA125 can be used as a marker for the effects of peritonitis on the peritoneum of CAPD patients *in vivo*.¹⁸

This prospective study was designed to determine concentration of CA125 in 4-hour effluent peritoneal dialysate in patients recently started on CAPD and to analyze the relationship between CA125 with duration of dialysis, sex, and peritoneal membrane efficacy.

MATERIALS AND METHODS

In a prospective research, we studied on patients with end-stage renal disease (ESRD) who were on CAPD for 6 months at Qhaem Hospital, in Mashhad, Iran. From 2003 to 2005, we recruited 34 patients and obtained informed consent from all the participants. The study was approved by the local ethics committee. Patients with a recent peritonitis episode (in the previous 3 months) or those who underwent kidney transplantation during the course of the study were excluded from the study. Dialysis was performed 4 times a day, utilizing 1.36% dextrose solution with lactate buffer.

Six and 12 months after beginning of CAPD, concentrations of CA125 were determined in the 4-hour effluent peritoneal dialysate, and the relationships between the CA125 levels and the duration of dialysis, patient's sex, and peritoneal membrane efficacy were assessed. Peritoneal membrane efficacy was determined by the peritoneal equilibration test, weekly creatinine clearance, and the Kt/V, all measured at 6 and 12 months.

The paired *t* test was used to evaluate changes in dialysate concentration of CA125 and the Mann-Whitney test and *t* test were used for comparison of continuous variables between groups, as appropriate.

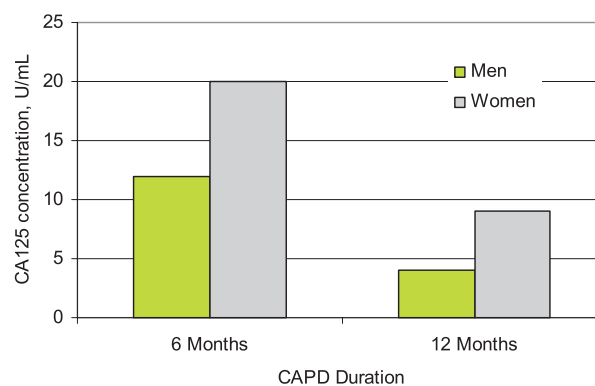
RESULTS

Thirty-four patients on CAPD entered the study. Three patients experienced peritonitis and 1 underwent transplantation, and thus, were excluded from the study. Overall, 30 patients remained in the data analyses. They were 16 men and 14 women with a mean age of 34.3 years (range, 17 to 56 years).

With increasing the duration of CAPD, dialysate CA125 levels decreased significantly; the mean CA125 level measured 12 months after the initiation of CAPD was significantly lower than that 6 months after the start of the therapy (6.33 ± 6.83 U/mL versus 15.73 ± 15.27 U/mL; $P < .001$). In the men, the CA125 levels were lower both at 6 months and 12 months than those in the women ($P = .047$ and $P = .06$, respectively; Figure 1).

The mean Kt/V and weekly creatinine clearance at 6 and 12 months are depicted in the Table. There were no differences between the men and the women in terms of these two parameters. Also, the Kt/V and creatinine clearance did not change significantly at 12 months of CAPD.

Peritoneal equilibration test was done for all of the patients and in low transporter and low average transporter patients, peritoneal effluent had a slightly higher mean level of CA125 in comparison with high transporter and high average transporter patients (18 U/mL versus 14 U/mL, $P = .08$).



Relationship between CA125 levels and duration of peritoneal dialysis according to sex of the patients. At 6 months the difference between men and women was significant ($P = .047$)

Mean Values of Kt/V and Creatinine Clearance at 6 Months and 12 Months in Patients on CAPD*

Parameter	Dialysate CA125	
	6 months	12 months
Kt/V		
Women	1.9	2.35
Men	1.8	2.16
All	1.85	2.25
Creatinine Clearance, mL/min		
Women	61	58
Men	60	55
All	60.5	56.5

*None of the parameter had a significant change at 12 months compared with 6 months. CAPD indicates continuous ambulatory peritoneal dialysis.

DISCUSSION

The CA125 concentration is a marker of mesothelial cell mass or turnover in patients receiving CAPD.⁹⁻¹³ The reverse relationship between the CA125 level and the duration of peritoneal dialysis can possibly be explained by vanishing of the mesothelial layer, as it has been reported in patients on long-term CAPD.^{19,20} Likewise, in our study, the mean CA125 value 6 months after the initiation of CAPD was significantly higher than that at 1 year. It was reported that in acute episodes of peritonitis, the level of dialysate CA125 markedly increased,²¹ due probably to necrosis of mesothelial cells²; therefore, we omitted patients with recent episodes of peritonitis.

Interestingly, we found that the CA125 concentrations were higher in the women than in the men, which had not been reported before. Passadakis and coworkers reported no statistically significant correlation between age, sex, or peritonitis incidence and the serum and dialysate CA125 levels,²² but in our study, there was a significant difference in dialysate CA125 between the men and the women.

Peritoneal dialysis in our patients was being done with 1.36% dextrose solution. In many studies, it has been reported that change of dialysis solution from classical solution to newer ones with neutralized pH and lactate buffers results in a higher concentration of CA125 in peritoneal dialysis effluent indicating that normal cell function in the peritoneal cavity is restored by the use of these solutions as compared with classical glucose solutions.¹²

Ultrafiltration failure is the most frequent transport abnormality in long-term peritoneal dialysis.²³ We found, like other studies,^{2,11} in spite

of decrease in CA125 after 6 months of peritoneal dialysis, there were no significant differences in peritoneal transport parameters such as Kt/V, weekly creatinine clearance. Hence, it appears that CA125 is not a marker of the efficacy of dialysis. It has been reported that sudden decrease in CA125 in the patients precedes peritoneal sclerosis,²⁴ but it needs further study.

CONCLUSIONS

Our findings showed that dialysate CA125 level in peritoneal effluent decreases in both men and women by CAPD duration and men have a significantly lower CA125 level than women on CAPD. However, we failed to show any relationship between the CA125 level and peritoneal transport parameters.

ACKNOWLEDGMENTS

We would like to thank Dr Reihani, Mrs Pooryamoot, and Mrs Yazdanpanah in the CAPD center of Qhaem Hospital for helping us to conduct the study.

CONFLICT OF INTEREST

None declared.

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Received July 2007
Revised August 2007
Accepted August 2007