Effects of Protein Losses in Peritoneal Dialysis

Authors James Heaf, Christina Pedersen, Anders Elgborn

Hospital Dept. Nephrology, Copenhagen University Hospital at Herlev

OBJECTIVES & METHODS

Introduction
Several studies have shown that a high peritoneal albumin clearance is a risk factor for death in PD patients. This may be causal in that it may lead to increased protein loss, with consequent malnutrition, reduced immune competency, and death. We hypothesised that increased use of "dry" periods would reduce albumin losses, with consequent clinical benefit.

Methods
201 incident PD patients were included in a prospective investigation. Peritoneal characteristics, including the area parameter and large pore clearance (LPC) were determined shortly after initiation using the Personal Dialysis Capacity (PDC) algorithm and every 2 years thereafter. High transporters were preferentially treated with APD, slow with CAPD. Every six months standard Kt/V analyses were performed, including determination of peritoneal albumin losses and peritoneal albumin clearance. Factors affecting S-albumin and peritoneal albumin loss, and their effect on prognosis were determined.

RESULTS

- Factors disposing towards low S-albumin were high age, high comorbidity, a high large pore clearance (LPC), and a high albumin clearance.
- No independent effects of treatment prescription (APD/CAPD, dry/wet days) were seen.
- The use of dry days significantly reduced albumin loss, but usually only by <1 g/d.
- In patients treated with APD with wet days, albumin loss was significantly associated with dialysate volume.
- LPC fell by 3.4%/year.
- LPC was a significant independent risk factor for technique failure and death.
- There was no independent effect of albumin losses or treatment prescription on prognosis.

Patient Details

	Mean ±SD	Median (IQR)
Initial		
Age (yrs)	56.3 ±14.1	
Weight	73.5 ±16.1	
Body Mass Index	24.7 ±4.5	24.1 (21.6-27.4)
Initial Urine Creatinine Clearance (ml/min)	6.1 ±4.3	5.2 (3.5-8.5)
Follow-up		
PD Duration (yrs)	3.2 ±2.5	2.5 (1.4-4.4)
Patient Survival (yrs)		6.5 (3.3-13.4)
Patient Survival, censored for modality change (yrs)		6.5 (3.0-8.9)
Average Urea Kt/V	2.06 ±0.56	1.95 (1.70-2.35)
Average Creatinine Clearance (ml/min)	6.6 ±2.2	6.1 (5.1-7.6)
Average Diuresis (ml/d)	755 ±784	600(0-1200)
Average Renal Creatinine Clearance (ml/min)	3.4 ±4.2	2.3 (0-5.2)
Peritoneal Characteristics		
Area parameter (m)	193 ±759	178 (134-237)
Absorption (ml/min)	2.12 ±1.03	2.01 (1.40-2.70)
Large Pore Clearance (ml/min)	0 .105 ±0.080	0.090 (0.066--0.127)
4-hour Creatinine D/P	60 ±13	60 (52-69)
Average albumin values		
Peritoneal albumin loss (g/d)	4.0 ±2.9	3.5 (2.6-4.5)
Peritoneal albumin clearance (ml/d)	117 ±71	99 (78-136)
Urine albumin loss (g/d)	0.58 ±0.83	0.33 (0.10-0.68)
Urine albumin clearance (ml/d)	18 ±33	9 (3-20)
S-albumin	35.3 5.3	35.6 (32.3-38.8)

Treatment Prescription and Albumin Losses

	CAPD dry	CAPD wet	APD dry	APD wet
Peritoneal albumin loss (g/d)	4.27 ±3.58	4.37 ±2.82	3.41 ± 3.02[a]	3.93 ±2.75
Median (IQR)	3.25 (2.33-4.76)	3.91 (3.16-4.93)	2.95 (2.35-3.95)	3.29 (2.39-4.54)
Albumin Clearance (ml/d)	125 ±125	132 ±108	102 ±91[a]	118 ±82
Median (IQR)	89 (70-125)	112 (85-146)	88 (66-119)	97 (74-134)

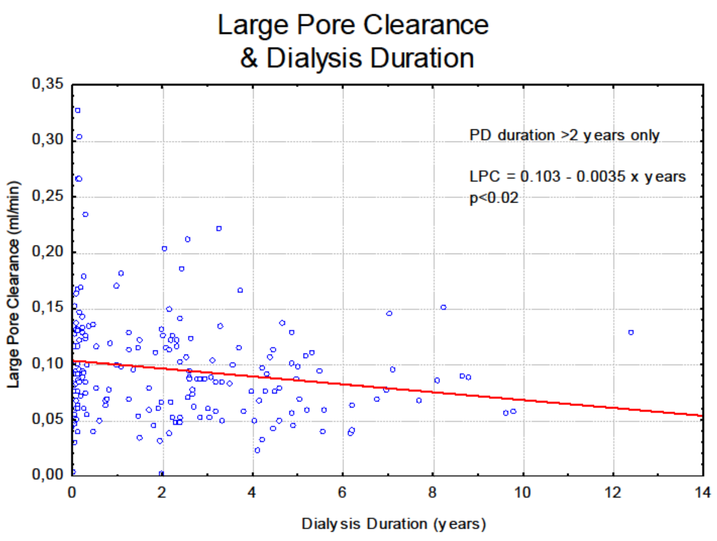
[a]:p<0.05 vs. CAPD wet

Significant univariate and multivariate correlations to plasma albumin (g/l), with examples.

Groups 1 & 2 are arbitrarily chosen groups at each end of the spectrum to illustrate the overall effect of the variable on S-albumin.

	Univariate Correlation Coefficient	Multivariate Correlation Coefficient	Group 1	S-albumin	Group 2	S-albumin
Age	-0.20[b]	-0.20[b]	<30 years	39.2 ±5.4	>70 years	34.9 ±5.1
Diabetic nephropathy	-0.16[a]	-0.21[c]	No	35.5 ±4.8	Yes	30.8 ±8.3
Heart disease	-0.20[b]		No	35.3 ±5.0	Yes	34.2 ±4.7
Arteriosclerosis	-0.10		No	35.3 ±5.0	Yes	34.2 ±4.5
Other comorbidity	-0.15[a]		No	35.5 ±4.7	Yes	34.2 ±5.1
Area Parameter	-0.19[b]		<150 m	35.5 ±4.8	>300 m	33.6 ±5.5
Large Pore Clearance	-0.24[c]	-0.19[b]	<0.05 ml/min	36.6 ±5.4	>0.25 ml/min	30.7 ±4.7
Peritoneal albumin loss	-0.30[c]		<5 g/d	34.8 ±5.1	>10 g/d	32.6 ±5.0
Peritoneal albumin clearance	-0.38[c]	-0.26[c]	<50 ml/d	37.4 ±4.4	>350 ml/d	29.9 ±9.0
Urine albumin loss	-0.13		<1 g/d	35.1 ±4.9	>5 g/d	28.6 ±3.0
CRP (mg/l)	-0.27[c]		<10 mg/l	35.5 ±5.0	>100 mg/l	29.8 ±8.1

[a]:p<0.05; [b]:p<0.01; [c]:p<0.001



Signficant relationships to patient mortality. Relative Risk (RR) in %

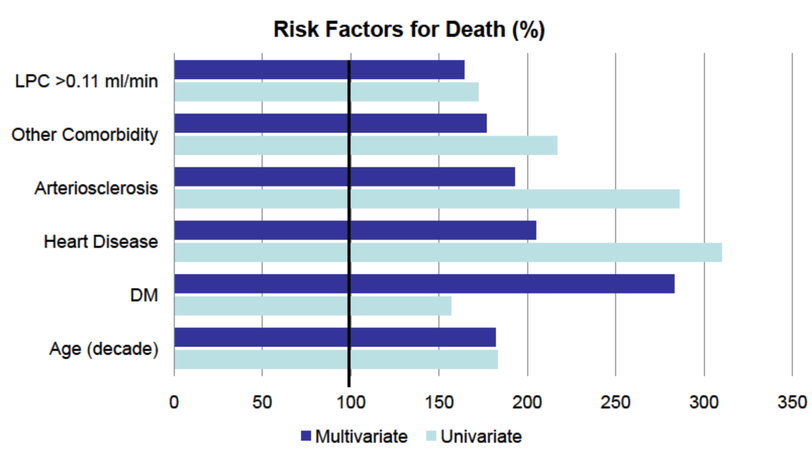
Dialysis Rx: No effect

	Univariate RR	Multivariate RR
Age (decade)	183 (154-217)[c]	182 (150-221)[c]
Diabetes mellitus	157 (100-247)[a]	283 (171-467)[c]
Heart Disease	310 (212-453)[c]	205 (136-309)[c]
Arteriosclerosis	286 (194-420)[c]	193 (130-287)[b]
Other comorbidity	217 (149-317)[c]	177 (119-264)[b]
Area (m)	100.3 (100.0-100.5)[a]	
LPC >0.11 ml/min	172 (117-255)[b]	164 (108-248)[a]

[a]:p<0.05; [b]:p<0.01; [c]:p<0.001

CONCLUSIONS

The results confirm previous findings that a high LPC is a risk factor for death and technique failure. Alterations in treatment regimes were able to alter albumin losses, but no independent clinical effects of albumin losses or treatment prescription were seen. The results suggest that a high LPC is a marker of peritoneal vascular pathology, and that attempts to reduce protein losses will have little clinical effect.
Large pore clearance falls by 3% per year, possibly due to increased fibrosis.



50ERA-EDTA
429--MP
Peritoneal dialysis - A
James Heaf
DOI: 10.3252/pso.eu.50era.2013
Poster presented at: ERA-EDTA 50th Congress Istanbul, Turkey May 15-21, 2013