

PATTERNS OF CHANGE IN CENTRAL AORTIC PULSE WAVEFORM PROFILE DURING A MID-WEEK DIALYSIS SESSION

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Background and Aims: Prospective cohort studies have demonstrated that arterial wave reflections are independent predictors of all-cause and cardiovascular mortality in hemodialysis patients [1,2]. Previous studies that investigated acute effects of hemodialysis on arterial cushioning function have never analyzed the pattern of change of augmentation index (Alx) parameters during dialysis [3,4]. Therefore, the aim of this study was to investigate potential differences in the pattern of intradialytic change of central arterial pressure waveform profile across hemodialysis patients and to identify clinical and laboratory parameters potentially affecting the type of intradialytic response.

Material and Methods: A total of 70 patients receiving maintenance hemodialysis were evaluated before and after the mid-week dialysis session. Radial artery applanation tonometry was performed with the use of the Sphygmocor device in order to determine central aortic pressures and heart rate-adjusted augmentation index (Alx(75)), as measure of wave reflections. Aortic pulse wave velocity (PWV) was assessed as measure of arterial stiffness. Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS 17.0) for Windows XP. Between groups comparisons for categorical variables were performed with the Chi Square (χ^2) test or Fisher's exact test and for continuous variables with one-way analysis of variance (ANOVA).

Results: Baseline characteristics of study participants are depicted in Table 1. Three different patterns of intradialytic change in central arterial pressure waveform profile were evident. Alx(75) was positive pre-dialysis and increased afterward in 13/70 patients (Group A); Alx(75) was positive pre-dialysis and decreased afterward, but remained positive post-dialysis in 49/70 patients (Group B); Alx(75) was positive pre-dialysis and became negative post-dialysis in 8/70 patients (Group C). As shown in Table 2, patients with intradialytic rise in Alx(75) (Group A) tended to be older, had higher dialysis vintage and received higher number of antihypertensive agents than patients who restored a normalized central arterial pressure waveform post-dialysis (Group C). As shown in Figure 1, patients in Group A had numerically higher aortic PWV than patients in the Group C, although this difference did not reach statistical significance. In addition, patients in the Group A experienced an increase instead of decrease in aortic systolic BP during dialysis ($+4.0 \pm 0.6$ vs -21.4 ± 11.3 mmHg, $P < 0.001$) (Figure 2).

Conclusion: This study shows for first time the presence of 3 different patterns of change in aortic pressure waveform profile during a mid-week dialysis session. Older age, longer dialysis vintage and higher aortic PWV may represent important factors determining this pattern of intradialytic response

Table 1. Baseline characteristics of study participants.

N	70
Age (years)	56.5±13.7
Sex (M/F)	46/24
Dry weight (kg)	70.8±15.6
BMI (kg/m ²)	25.1±3.8
WHR	0.93±0.1
Dialysis vintage (months)	54.3±7.9
Hemoglobin (g/dl)	11.3±1.2
Hematocrit (%)	34.9±3.6
Serum glucose (mg/dl)	107.4±19.1
Serum urea (mg/dl)	145.0±35.8
Serum creatinine (mg/dl)	9.2±2.7
Total serum protein (g/dl)	7.1±0.6
Serum albumin (g/dl)	4.1±0.4

Table 2. Comparison of demographic, dialysis-related and hemodynamic parameters between the groups of different pattern of intradialytic change in Alx(75).

Parameter	Group A (N=13)	Group B (N=49)	Group C (N=8)	P
Demographic parameters				
Age (years)	56±15.2	59.9±15.4	40.2±10.8	<0.01
Sex (M/F)	9/4	26/23	6/2	0.591
BMI (kg/m ²)	24.9±3.2	24.3±4.0	25.1±4.1	0.136
WHR	0.95±0.6	0.92±0.6	0.99±0.6	0.225
Dialysis parameters				
Dry weight (kg)	68.9±10.2	67.7±10.5	80.2±6.7	<0.001
Ultrafiltration rate (kg/h)	0.5±0.3	1.3±0.5	1.4±0.5	<0.05
Dialysis vintage (months)	59.7±8.3	47.4±7.1	35.8±5.5	<0.05
Hemodynamic parameters				
Pre-dialysis brachial SBP (mmHg)	138.5±26.3	145.4±21.1	143.7±18.2	0.602
Post-dialysis brachial SBP (mmHg)	142.5±27.8	133.6±21.8	123.6±17.8	<0.05
Pre-dialysis brachial DBP (mmHg)	76.5±12.6	76.6±12.0	84.1±16.0	0.289
Post-dialysis brachial DBP (mmHg)	79.2±12.4	72.2±13.4	73.8±11.6	0.231
Pre-dialysis aortic SBP (mmHg)	127.4±23.7	133.5±19.2	124.9±16.7	0.381
Post-dialysis aortic SBP (mmHg)	131.4±25.1	119.3±20.4	103.5±14.6	<0.01
Pre-dialysis aortic DBP (mmHg)	77.5±12.7	77.9±12.5	86.7±15.6	0.189
Post-dialysis aortic DBP (mmHg)	81.0±12.9	73.1±13.3	75.4±11.5	0.160
Antihypertensive treatment				
Number of antihypertensive agents	2.8±1.5	2.0±1.2	0.3±0.1	<0.001
RAS blockers	5/13	18/49	0/8	<0.05
Calcium channel blockers	10/13	33/49	1/8	<0.001
β-blockers	9/13	33/49	1/8	<0.01

Figure 1. Comparison of aortic PWV in the groups of different pattern of change in Alx(75) during dialysis.

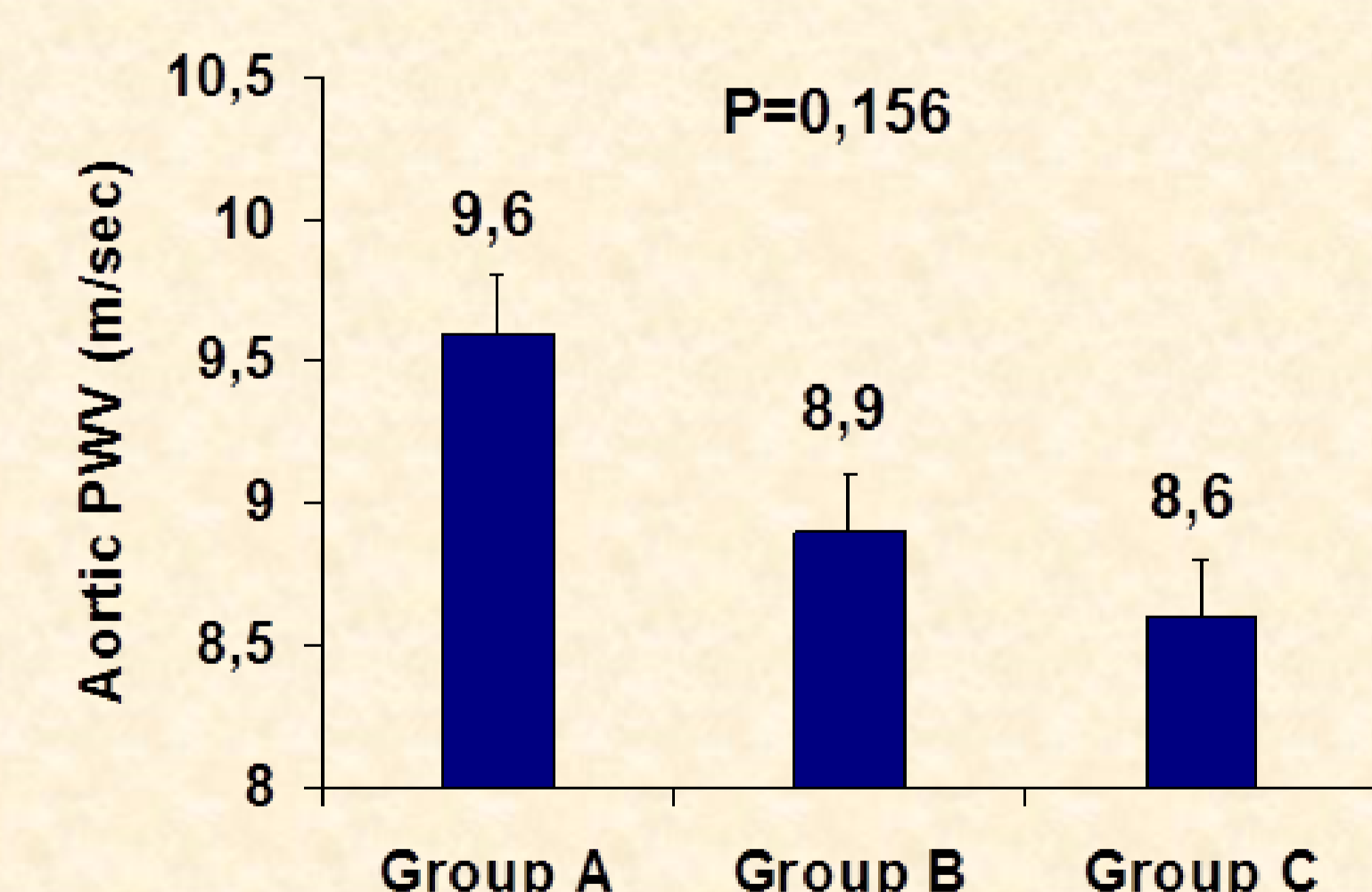
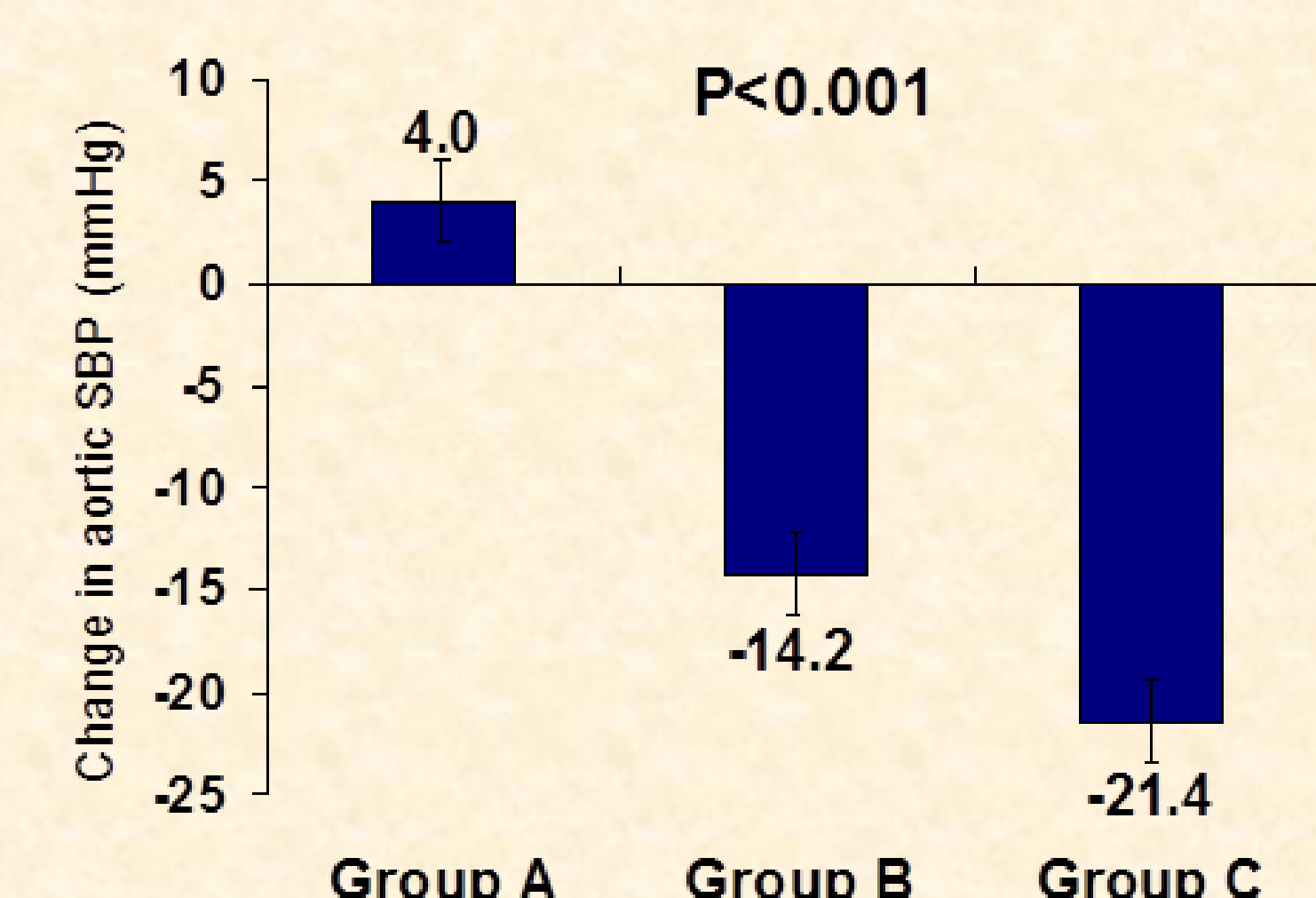


Figure 2. Comparison of intradialytic change in aortic SBP in the groups of different pattern of change in Alx(75) during dialysis.



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