

HEMODIAFILTRATION DOES NOT HAVE ADDITIONAL BENEFITS OVER HEMODIALYSIS ON ARTERIAL STIFFNESS, WAVE REFLECTIONS AND CENTRAL AORTIC PRESSURES

P.I. Georgianos,^{1,2} P.A Sarafidis,³ A. Karpetas,¹ V. Liakopoulos,¹ D.N. Stamatiadis,² A. Papagianni,³ A.N. Lasaridis¹
1) Section of Nephrology and Hypertension, 1st Department of Medicine, AHEPA University Hospital, Thessaloniki, Greece
2) Hemodialysis Unit, General Hospital of Serres, Serres, Greece
3) Nephrology Department, Hippokratio University Hospital, Thessaloniki, Greece

Background and Aims: Hemodiafiltration was proposed to have advantages over hemodialysis with regards to intradialytic blood pressure (BP) and hemodynamic stability [1-3]. Previous studies evaluating the impact of dialysis procedure on arterial cushioning function never explored any potential effect of dialytic modality on arterial stiffness, wave reflections and central aortic pressures [4,5]. This study includes comparative evaluation of hemodiafiltration versus hemodialysis on arterial cushioning function during first and second weekly dialysis sessions.

Material and Methods: Twenty-four patients receiving hemodiafiltration and another 24 age- and sex-matched controls receiving hemodialysis were included. All patients were evaluated before and after the first and second weekly dialysis sessions. Applanation tonometry of peripheral arteries was applied to determine aortic and brachial pulse wave velocity (PWV), as measures of arterial stiffness. Heart rate-adjusted augmentation index (AIx(75)) was calculated as measure of wave reflections. Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS 17.0) for Windows XP. Comparisons between start and end of dialysis in the hemodiafiltration and hemodialysis groups were performed with the paired samples t-test. Comparisons of intradialytic changes in parameters under study between groups were performed with the unpaired samples t-test. Univariate and multivariate linear logistic regression analysis was performed to explore possible determinants of the intradialytic change of AIx(75).

Results: As shown in Table 1, no significant differences in baseline demographic parameters and in pre-dialysis AIx and aortic PWV levels were evident between the hemodiafiltration and hemodialysis groups. In the first dialysis session of the week, hemodiafiltration and hemodialysis reduced AIx(75), but not aortic and brachial PWV (Table 2). With regards to aortic pressures, hemodiafiltration was associated with numerically higher intradialytic reductions in aortic systolic BP than hemodialysis, without significant difference between groups (Figure 1). Similarly, intradialytic reductions in AIx(75) did not differ between hemodiafiltration and hemodialysis in first (-9.5±1.6 vs -7.8±1.6%, p=0.679) and mid-week dialysis (-4.9±1.1 vs -4.5±1.2%, p=0.842) (Figure 2). Changes in aortic and brachial PWV were similar in both dialytic modalities. In multivariate linear regression, predictors of intradialytic reduction in AIx(75) were changes in body weight (β =0.208, p<0.05), central aortic systolic BP (β =0.275, p<0.01) and ejection duration (β =0.547, p<0.001), but not dialytic modality (β =0.136, p=0.383) (Table 3).

Conclusion: This study showed that hemodiafiltration has similar effects with hemodialysis on wave reflections and stiffness. Degree of volume withdrawal is main determinant of intradialytic reduction in AIx(75) irrespective to dialytic modality.

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Table 1. Baseline characteristics of study participants.

Parameter	Hemodiafiltration group	Hemodialysis group	P
N	24	24	
Age (years)	52.7±12.9	52.5±12.9	0.947
Gender (M/F)	17/7	17/7	1.0
BMI (kg/m ²)	24.9±3.5	24.9±3.7	0.401
Dry weight (kg)	75.5±11.0	69.9±10.8	0.159
AIx(75) (%)	23.3±6.7	26.0±7.5	0.243
Aortic PWV (m/sec)	9.3±2.1	9.0±1.9	0.728

Table 2. Changes in aortic pressures, wave reflection and arterial stiffness parameters during the first dialysis session of the week in the hemodiafiltration and hemodialysis groups.

Parameter	Hemodiafiltration group (N=24)			Hemodialysis group (N=24)			Comparison P
	Start	End	P	Start	End	P	
Body weight (kg)	78.7±2.2	75.7±2.2	<0.001	72.7±3.3	70.2±3.3	<0.001	0.210
Aortic SBP (mmHg)	129.8±3.6	121.3±4.8	<0.01	138.1±3.5	132.5±3.4	<0.05	0.571
Aortic DBP (mmHg)	80.3±2.4	79.6±2.7	0.725	83.3±2.7	82.1±2.2	0.506	0.852
Aortic PP (mmHg)	48.8±3.1	41.7±3.2	<0.01	54.8±2.9	50.4±3.1	<0.05	0.494
AIx (%)	29.5±2.6	17.6±3.6	<0.001	31.3±1.9	22.2±1.7	<0.001	0.274
AIx(75) (%)	27.1±1.9	17.7±2.7	<0.001	28.9±1.5	21.1±1.4	<0.001	0.478
Augmentation pressure (mmHg)	15.2±1.8	8.9±1.3	<0.001	17.6±1.7	11.6±1.3	<0.001	0.891
Aortic PWV (m/sec)	9.4±0.5	9.7±0.6	0.274	9.3±0.4	9.1±0.4	0.375	0.164
Brachial PWV (m/sec)	7.7±0.2	8.0±0.2	0.335	7.8±0.2	7.9±0.2	0.454	0.389

Figure 1. Comparison of change in aortic SBP during the first and second weekly dialysis sessions between the hemodiafiltration and hemodialysis groups.

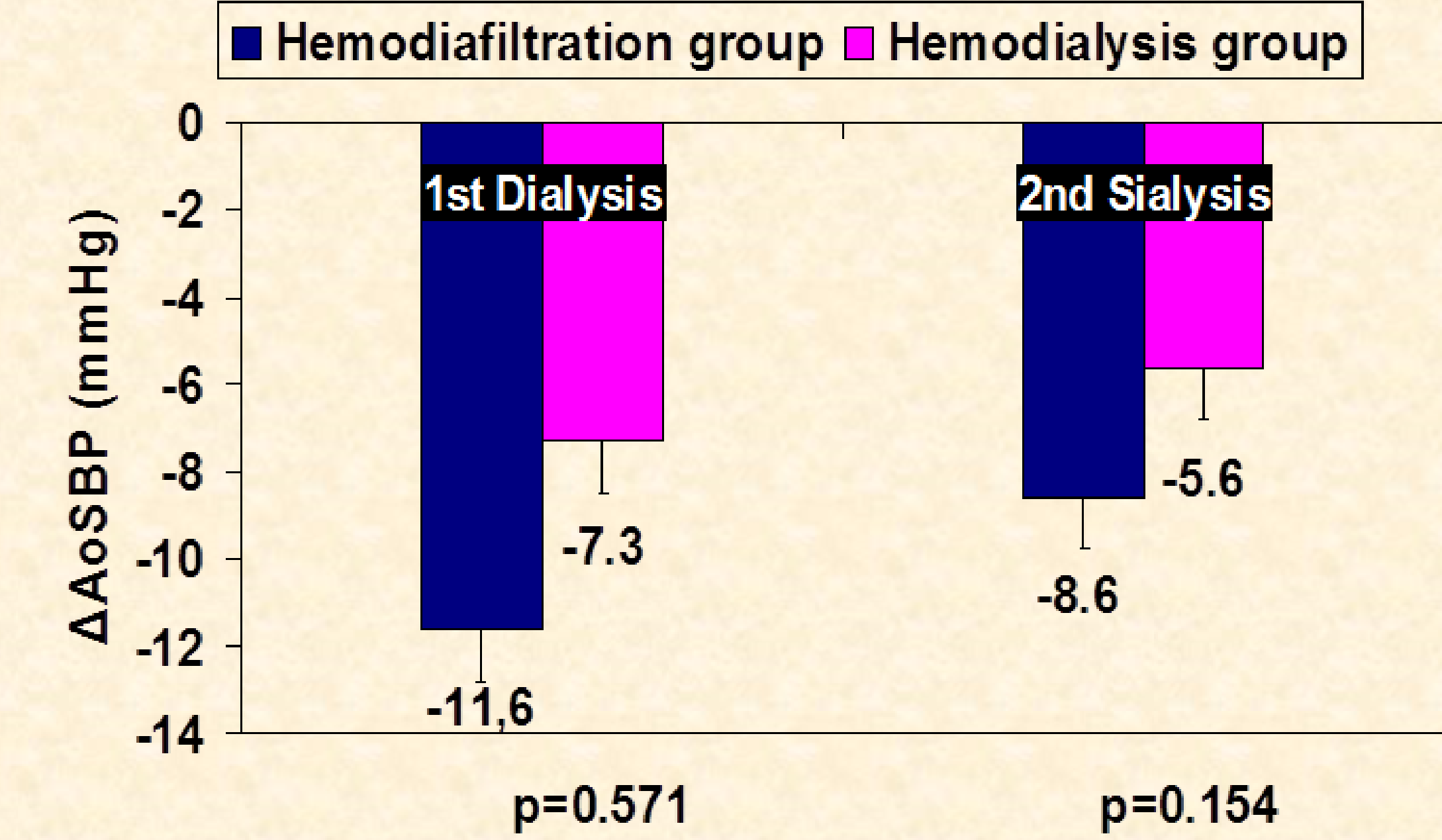


Figure 2. Comparison of change in AIx(75) during the first and second weekly dialysis sessions between the hemodiafiltration and hemodialysis groups.

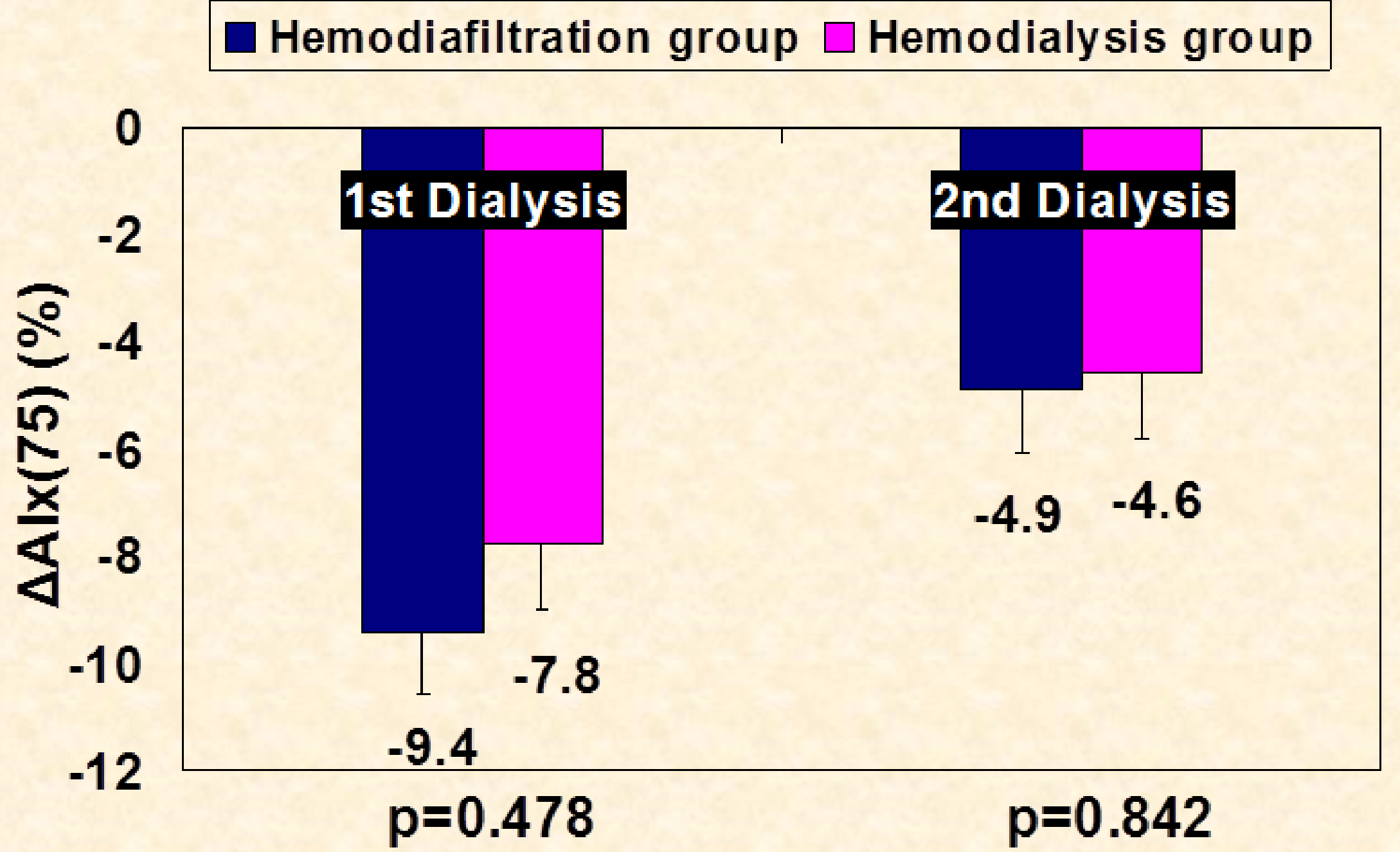


Table 3. Univariate and multivariate linear regression analysis of factors determining the intradialytic change in AIx(75).

Parameter	Univariate analysis		Multivariate analysis	
	Correlation coefficient (r)	P	Regression coefficient (β)	P
Age	0.150	0.215	0.041	0.351
Gender	0.134	0.086	0.152	0.117
Body weight	-0.134	0.096	-0.109	0.285
Mode of dialysis	-0.169	0.151	0.136	0.383
Δ Weight during dialysis	0.348	<0.001	0.208	<0.05
Δ AoSBP during dialysis	0.381	<0.001	0.275	<0.01
Δ Ejection Duration during dialysis	0.476	<0.001	0.547	<0.001
R ²			0.619	<0.01