

ATRIAL ELECTRICAL AND MECHANICAL DYSFUNCTION IN NON-DIABETIC, NONHYPERTENSIVE HEMODIALYSIS PATIENTS

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OBJECTIVES

Atrial fibrillation (AF) increases cardiovascular mortality rate in hemodialysis (HD) population. Therefore, it is crucial to determine the predisposing risk factors of AF in HD patients. Abnormalities in atrial conduction times and mechanical functions are considered as independent predictors of atrial fibrillation. However, there is no data in literature about functional parameters and electromechanical delay intervals in nondiabetic, non-hypertensive HD patients. We aimed to study atrial electromechanical conduction times and mechanical functions in this population.

	Hemodialysis group (n=42)	Control group (n=36)	P
LA diameter (mm)	41.5 ± 4.2	33.5 ± 1.9	<0.01
LAV _{max} (mL/m ²)	68.4 ± 17.1	27.7 ± 7.6	<0.01
LAV _{min} (mL/m ²)	33.5 ± 9.9	18.3 ± 3.1	<0.01
LAV _p (mL/m ²)	48.3 ± 13.2	21.1 ± 5.0	<0.01
LA passive emptying volume (mL/m ²)	20.1 ± 7.7	13.4 ± 3.7	<0.01
LA passive emptying fraction (%)	29.6 ± 8.8	49.4 ± 8.2	<0.01
LA active emptying volume (mL/m ²)	14.1 ± 5.5	8.7 ± 2.4	<0.01
LA active emptying fraction (%)	29.4 ± 9.0	39.8 ± 6.0	<0.01

	Hemodialysis group (n=42)	Control group (n=36)	P
PA _{lateral} (ms)	70.6 ± 9.1	55.3 ± 2.7	<0.01
PA _{septum} (ms)	50.8 ± 5.2	44.4 ± 2.1	<0.01
PA _{tricuspid} (ms)	39.0 ± 6.1	37.2 ± 1.8	>0.05
PA _{lateral} - PA _{tricuspid} (ms) ^a	31.6 ± 7.2	18.0 ± 2.6	<0.01
PA _{lateral} - PA _{septum} (ms) ^b	19.8 ± 7.9	10.9 ± 2.7	<0.01
PA _{septum} - PA _{tricuspid} (ms) ^c	11.8 ± 5.1	7.1 ± 1.2	<0.01

Data are mean standard deviation. PA: The interval measured by Tissue Doppler Imaging from the onset of the P wave on the surface electrocardiogram to beginning of the late diastolic (Am) wave.

^a Interatrial electromechanical delay

^b Left intra-atrial electromechanical delay

^c Right intra-atrial electromechanical delay

CONCLUSIONS

This is the first study enlightening deterioration in atrial mechanical and electromechanical functions in nondiabetic, non-hypertensive HD population. Results of the present study reflect not only negative effects of structural remodeling, which has been mentioned in previous studies in literature, but also negative effects of electrical remodeling. Prolonged inter- and intra-atrial electromechanical delay intervals should be the underlying pathophysiological factors increasing the rate of atrial fibrillation in hemodialysis population.

METHODS

Forty-two non-diabetic, normotensive hemodialysis patients and age- and sex-matched control subjects have been enrolled in the study. All subjects were younger than 60 years of age. We have enrolled the study clinically euvolemic, non-hypertensive, non-edematous, well controlled dry weight hemodialysis patients whose cardio-thoracic index (CTI) have been proved to be lower than 0.5. Standard and Tissue Doppler Echocardiography have been performed before mid-week dialysis session for HD group and on admission for control group.

RESULTS

PA lateral, PA septum durations of the HD group were significantly longer than control group (70.6 ± 9.1 vs 55.3 ± 2.7 , 50.8 ± 5.2 vs 44.4 ± 2.1 ; respectively, $p < 0.01$). Interatrial and left-right intraatrial electromechanical delay intervals were significantly longer in HD group compared to controls (31.6 ± 7.2 vs 18.0 ± 2.6 , 19.8 ± 7.9 vs 10.9 ± 2.7 , 11.8 ± 5.1 vs 7.1 ± 1.2 , respectively; all $p < 0.01$). Measurements of left atrial diameter, maximum, minimum and before atrial systole, volumes and passive-active emptying volumes were both elevated in hemodialysis group compared to controls (all $p < 0.01$). LA passive ($p < 0.01$) and active ($p < 0.01$) emptying fractions were significantly lower in HD group than the control group.

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