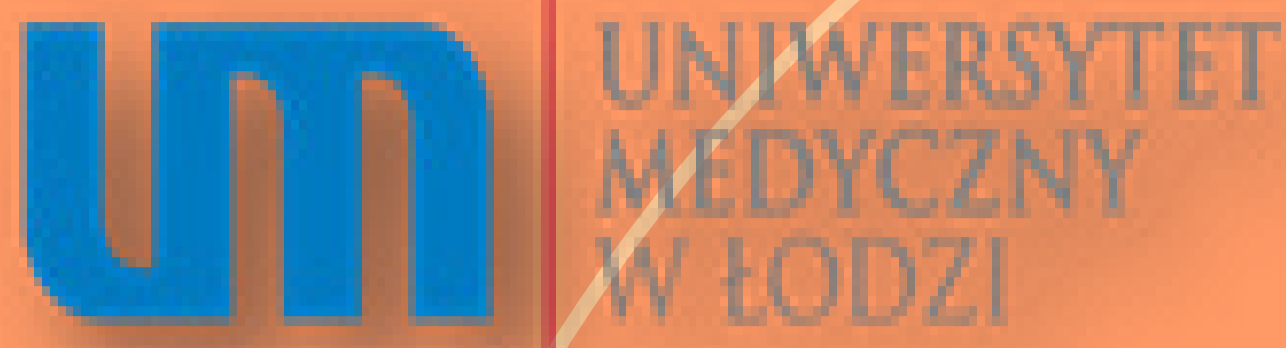




INFLUENCE OF HEMODIALYSIS ON CENTRAL HEMODYNAMICS AND ARTERIAL WALL PROPERTIES IN PATIENTS WITH AND WITHOUT INTRADIALYTIC HYPOTENSION



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Introduction

Intradialytic hypotension (IDH) is a common complication of hemodialysis¹⁻². IDH is a common complication of hemodialysis. It is defined as a decrease in systolic blood pressure by more than 20 mmHg or a decrease of mean arterial pressure by 10 mmHg, accompanied by clinical symptoms including but not limited to abdominal discomfort, yawning, sighing, nausea/vomiting, muscle cramping, restlessness, dizziness/fainting, or anxiety. This disorder is usually complex and has multifactorial etiology¹⁻³. Prevention and treatment of IDH is challenging and needs to be individualized.

Objectives

The aim of the study was to compare the pattern of the changes of peripheral and central arterial pressure, arterial stiffness and hemodynamic parameters in patients with and without IDH.

Methods

Thirty patients were included; 15 with IDH and 15 without IDH. Clinical characteristics of the patients is shown in Table 1. The hemodynamic parameters were recorded at the start of a mid-week hemodialysis session, after 2 hours and at the end of dialysis (for peripheral systolic pressure P_SP, peripheral diastolic pressure P_DP, central systolic pressure C_SP, central diastolic pressure C_DP, pulse wave velocity PWV, heart rate corrected central augmented pressure C_AP_HR75) or recorded continuously during dialysis (for cardiac output CO, ejection fraction EF, heart rate HR, systemic vascular resistance index SVRI, left cardiac work index LCWI, thoracic fluid index TFI). Each measurement was taken twice in consecutive weeks. Parameters related to the arteries stiffness and the peripheral and central pressure was measured non-invasively by applanation tonometry with Sphygmocor (AtCorMedical Pty Ltd, Sydney, Australia). Hemodynamic parameters were recorded continuously using a thoracic bioimpedance with PhysioFlow Enduro (Manatec Company, Folschviller, France).

Table 1. Clinical characteristics of the patients with and without intradialytic hypotension

Parameters	All	Patients with intradialytic hypotension	Patients without intradialytic hypotension	Difference between groups (p-value)
Population	Female	19	11	0.34
	Male	11	4	
Age [years]	60.6±13.3	66.9±9.2	54.2±13.7	0.008
Body Height [cm]	167.7±10.3	165.5±10.2	170.1±9.9	0.67
Body Mass [kg]	71.1±13.9	70.3±12.5	71.8±15.2	0.45
BMI [kg/m ²]	25.1±3.9	25.7±4.1	24.6±3.8	0.87
Dialysis vintage [month]	25±12	27±10	23±6	0.46
Ultrafiltration [kg]	3.2±1.6	2.7±1.0	3.5±1.7	0.25
Kt/V	1.42±0.21	1.44±0.26	1.41±0.16	0.73
Time of HD session [h]	3.9±0.5	3.9±0.6	4.1±0.3	0.91
Smoking status	Smoker	9	6	0.23
	Non smoker	21	9	
Type 2 diabetes	Diabetic	12	5	0.46
	Nondiabetic	18	10	

HD - hemodialysis

Figure 1. Changes of: A) systolic pressure SP and diastolic pressure DP, B) central systolic pressure C_SP and diastolic pressure C_DP, C) pulse wave velocity PWV, D) central augmentation pressure normalized to 75HR C_AP_HR75 during hemodialysis session for with IDH group and without IDH group.

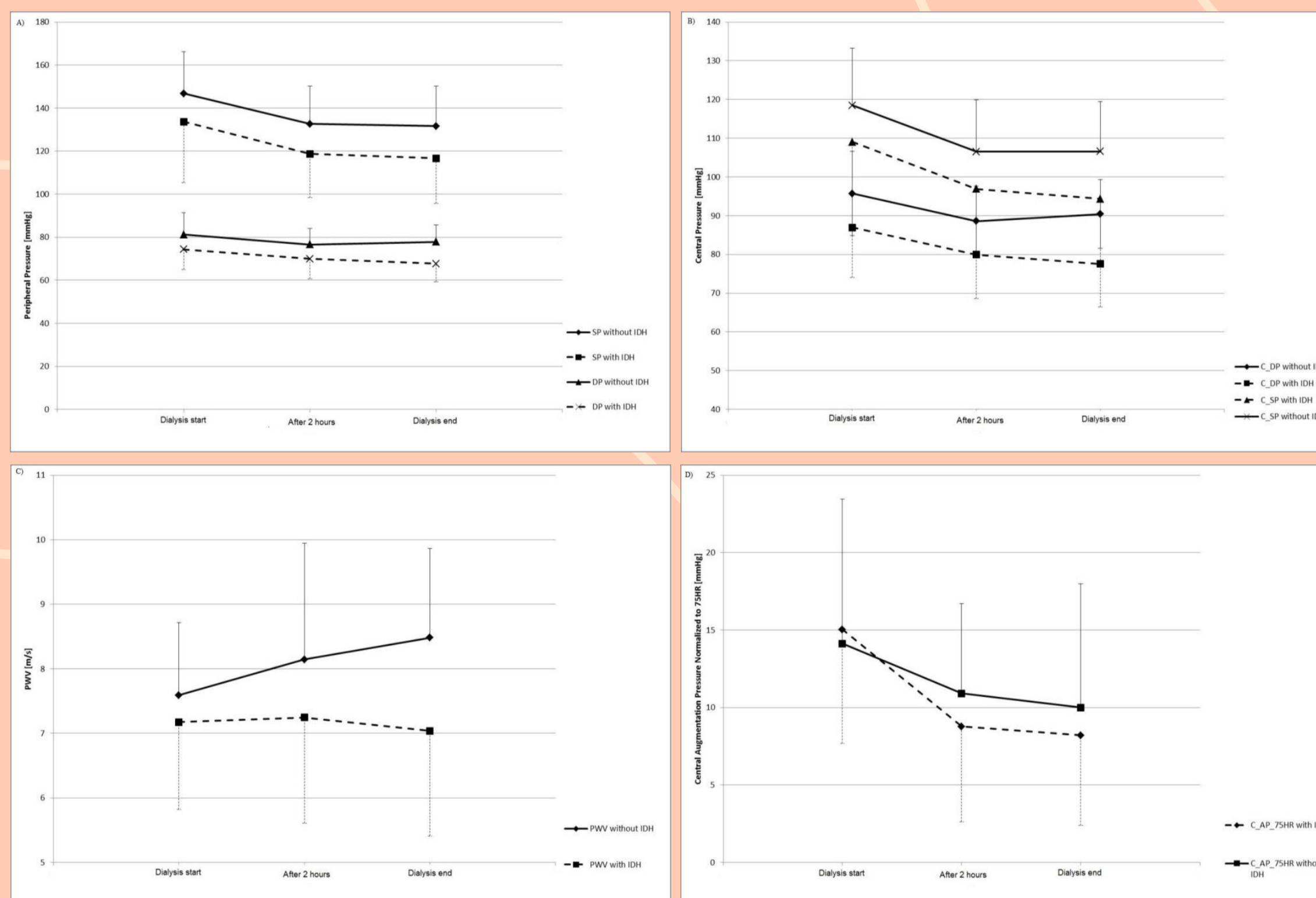
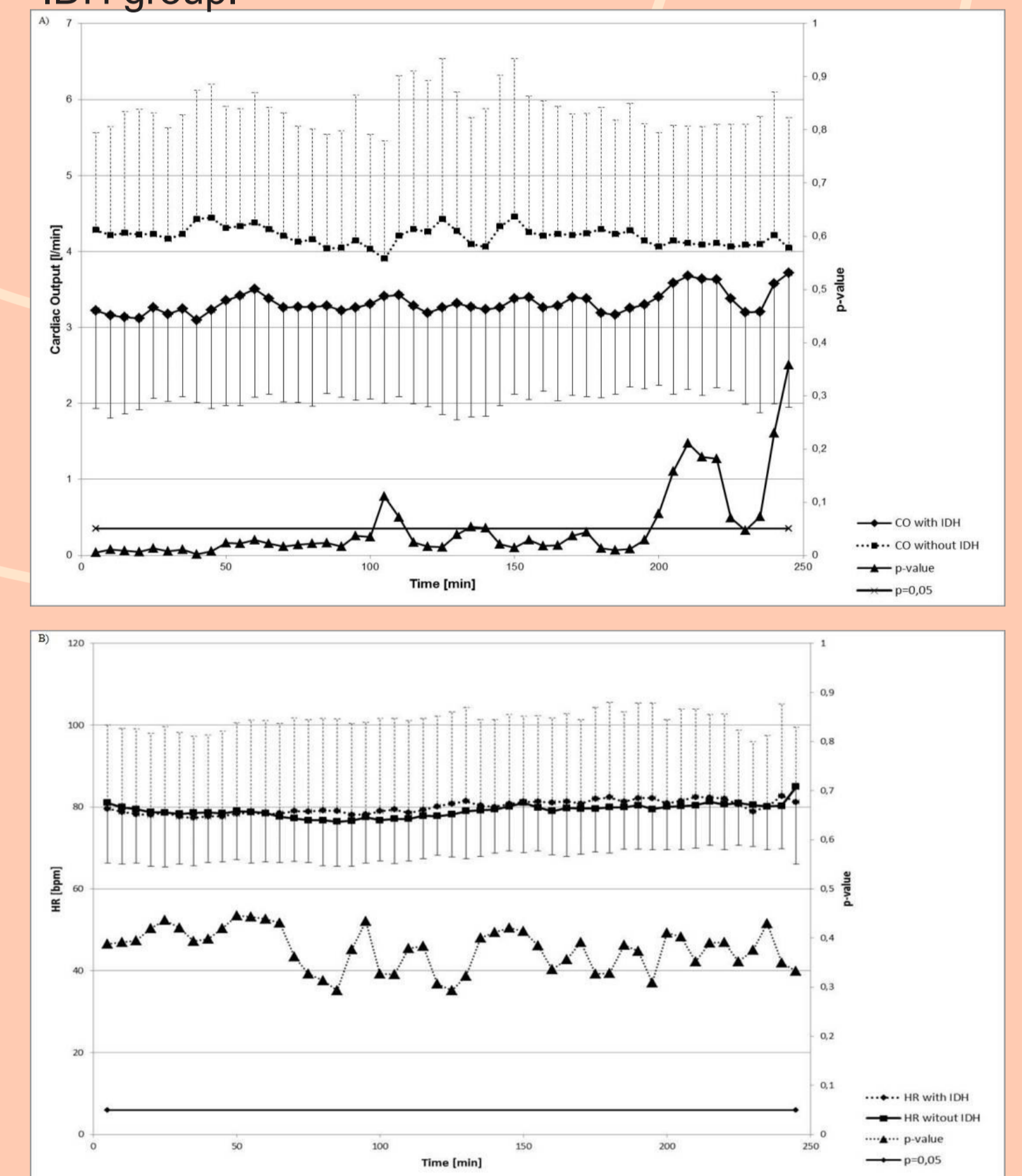


Figure 2. Changes of: A) CO, B) HR during hemodialysis session for with IDH group and without IDH group.



Results

Peripheral and central blood pressure did not differ significantly between groups (Fig. 1 A, B). PWV did not differ significantly at the beginning of hemodialysis session between groups. After two hours of hemodialysis PWV tended to increase in the reference group, but these differences did not reach statistical significance. At the end of the session significant difference was observed for PWV between both groups (7.04 ± 1.62 m/s vs. 8.48 ± 1.38 m/s, respectively; $p < 0.001$). While in the non-IDH group PWV decreased during dialysis by on average 0.13 ± 0.5 m/s in IDH group the opposite effect was observed as PWV increased by 0.89 ± 0.6 m/s (Fig. 1 C). Significant difference was observed in case of C_AP_HR75 after 2 hours of hemodialysis the ratio dropped rapidly in IDH group compared to non-IDH group ($p=0.02$) (Figure 1 D). CO showed a statistical difference between groups from the beginning of the session. The significant difference was present till 200 minute of the session then it lost statistical significance (Fig. 2A). At the end of dialysis the differences were no longer observed. HR (Fig. 2 B) did not differ between groups.

Conclusions

Altered arterial wall properties may be responsible for the phenomenon of intradialytic hypotension.

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