

Venous wave protraction time is shorter in pre-eclampsia than in normal third trimester pregnancy

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Background

Venous pulse waves, as obtained by Duplex Ultrasonography, are a reflection of cardiac right atrial function.

The time-interval between cardiac electrocardiographic signals (ECG) and venous Doppler waves is the so-called Venous Wave Protraction Time (VWPT).

Aim

To compare hepatic vein VWPT between normal third trimester pregnancy (NP) and pre-eclampsia (PE).

Methods

Cross-sectional study in 2 groups of 10 women with NP or PE at gestation of 28-33 weeks.

Three consecutive venous Doppler waves were recorded at the craniocaudal midportion of the liver from each of the three main branches of the hepatic vein, simultaneously with an ECG.

The time-interval between the ECG P-wave and corresponding A-deflection of venous Doppler waves was measured, without or with correction for gestation-induced changing heart rate (PA and PA/RR respectively), illustrated in figures 1 and 2.

For each group, means and standard deviations (table 1) were calculated and compared statistically using conventional F-tests for linear mixed-effects models (SAS procedure MIXED).

Results

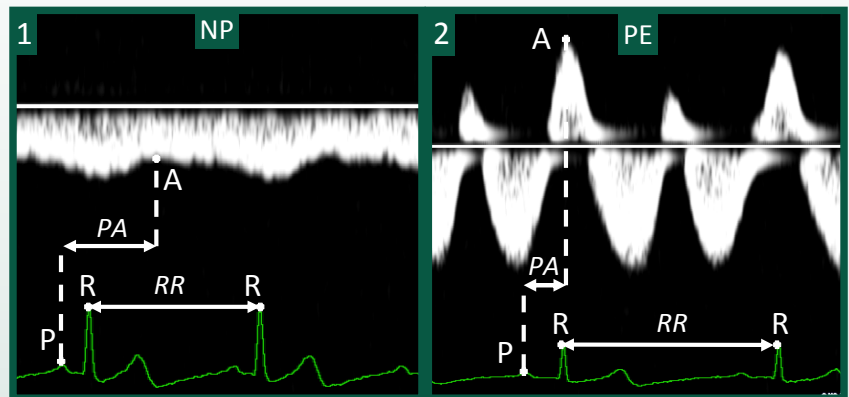
VWPT was significantly shorter in PE than in NP (figures 3 and 4). This difference persisted under antihypertensive treatment (table 1).

Conclusion

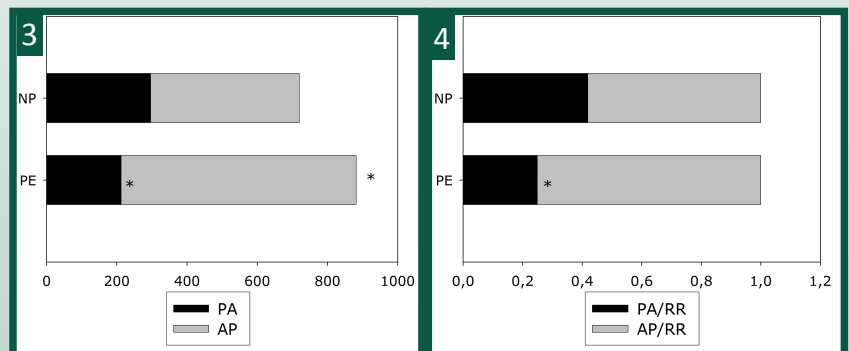
VWPT is significantly shorter in pre-eclampsia than in normal third trimester pregnancy. This observation probably results from PE-related maternal cardiovascular maladaptation.

Our study illustrates that VWPT may be a potential new parameter to study venous hemodynamics during pathological pregnancies, in particular pre-eclampsia.

Hepatic VWPT



Maternal hepatic vein Doppler wave with a simultaneous ECG in a (1) normal third trimester pregnancy (NP) and in a (2) pre-eclamptic pregnancy (PE).



Representation of (3) PA and AP (PP-PA) and (4) PA/RR and AP/RR. Differences ($p < 0.05$) are indicated by an asterisk.

table 1	p-value	Means and SD			p-value
	NP vs. all PE	all PE	NP	PE + treatment	NP vs. PE + treatment
PA (msec)	0.0345	213±68	297±93	187±73	0.0173
PA/RR	0.0042	0.25±0.09	0.42±0.14	0.23±0.10	0.0066

Means and SD of PA time-interval (msec) and PA/RR-ratio for NP (n=10), all PE patients (n=10) and PE patients under hypertensive treatment (n=6). Comparisons are expressed in p-values. Differences ($p < 0.05$) are highlighted.