

Hepatic venous wave protraction time is longer in late than in early 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 evaluate Hepatic Vein (HV) VWPT at different stages of gestation.

Methods

Cross-sectional study in 4 groups of 10 women at

- (1) 10-14 weeks,
- (2) 18-23 weeks,
- (3) 28-33 weeks and
- (4) ≥ 37 weeks (term) of gestation.

Three consecutive venous Doppler waves were recorded at the craniocaudal midportion of the liver from each of the three main branches of the HV, 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). This is illustrated in figure 1.

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).

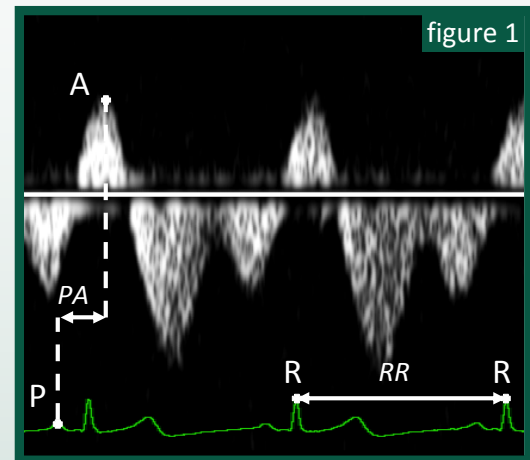
Results

PA and PA/RR were significantly larger at term than in the first trimester. When groups at early, mid- and late gestation were compared, VWPT increased gradually with gestational age. Differences ($p < 0.05$) are highlighted (table 1) and indicated by an asterix (figure 2).

Conclusion

VWPT is significantly longer in late than in early pregnancy. This observation probably relates to the maternal cardiovascular adaptation mechanisms, i.e. venous tone.

Hepatic vein VWPT

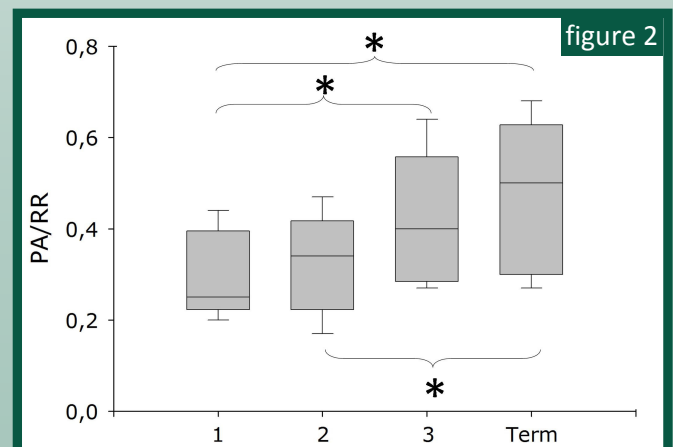


Maternal hepatic vein Doppler wave with a simultaneous ECG in a first trimester pregnancy.

table 1

Means & SD	1	2	3	4		
PA (msec)	220±47	258±65	297±93	337±74		
PA/RR	0.29±0.09	0.33±0.10	0.42±0.14	0.48±0.15		
p-values	1-2	1-3	1-4	2-3	2-4	3-4
PA (msec)	0.2426	0.0215	0.0008	0.2328	0.0182	0.2159
PA/RR	0.4489	0.0242	0.0009	0.1213	0.0069	0.2094

Means and SD of PA time-interval (msec) and PA/RR-ratio per gestational group. Comparisons between the groups are expressed in p-values. Significant differences are highlighted.



Representation of PA/RR by Boxplots: 97.5, 84, 50, 16 and 2.5 percentiles. Significant differences are indicated by an asterix.

Our study illustrates that VWPT may be a new parameter to study venous hemodynamics during pregnancy.