

# Obstetrics

---

## Maternal hemodynamics at 11-13 weeks' gestation and risk of pre-eclampsia.

Khalil A, Akolekar R, Syngelaki A, Elkhoul M, Nicolaides KH.

**OBJECTIVE:** Women who develop pre-eclampsia are at increased risk of cardiovascular disease and stroke in the subsequent decades. Individuals with cardiovascular disorders have increased central aortic systolic blood pressure (SBP(Ao) ) and arterial stiffness, as assessed by pulse wave velocity (PWV) and augmentation index (Alx). The aim of this study was to examine the potential value of assessment of SBP(Ao) , PWV and Alx at 11-13 weeks' gestation in identifying women who subsequently develop pre-eclampsia.

**METHODS:** This was a screening study for pre-eclampsia in singleton pregnancies at 11 + 0 to 13 + 6 weeks' gestation. Maternal history and characteristics were recorded and PWV, Alx (adjusted to a heart rate of 75 beats per min (Alx-75)) and SBP(Ao) measured. We compared these parameters in women who developed pre-eclampsia (n = 181) with those in unaffected controls (n = 6766) and examined their performance in screening for pre-eclampsia.

**RESULTS:** In the pre-eclampsia group, compared to unaffected controls, there was an increase in Alx-75 (1.13 vs. 1.00 multiples of the median (MoM);  $P < 0.0001$ ), PWV (1.06 vs. 1.00 MoM;  $P < 0.0001$ ) and SBP(Ao) (1.09 vs. 1.00 MoM;  $P < 0.0001$ ). In screening for pre-eclampsia by a combination of maternal variables and log(10) Alx-75 MoM, log(10) PWV MoM and log(10) SBP(Ao) MoM, the estimated detection rate was 56.9% at a false-positive rate of 10%.

**CONCLUSION:** Compared with women who remain normotensive, women who develop pre-eclampsia have higher SBP(Ao) and arterial stiffness, which is apparent from the first trimester of pregnancy.

*Ultrasound Obstet Gynecol.* 2012 Jul;40(1):28-34.

## Maternal Hemodynamics at 11–13 Weeks of Gestation in Pregnancies Delivering Small for Gestational Age Neonates

Khalil A, Sodre D, Syngelaki A, Akolekar R, Nicolaides KH

**OBJECTIVE:** To examine aortic systolic blood pressure (SBP Ao) , pulse wave velocity (PWV) and augmentation index (adjusted to a heart rate of 75 beats per minute, Alx-75) at 11–13 weeks' gestation in pregnancies delivering small for gestational age (SGA) neonates with and without preeclampsia (PE).

**METHODS:** At 11+0 to 13+6 weeks' gestation, maternal history was recorded and PWV, Alx-75, SBP Ao, uterine artery pulsatility index (PI) and maternal serum pregnancy-associated plasma

protein-A (PAPP-A) were measured. We compared women with (n = 337) and without (n = 48) PE that delivered SGA neonates with unaffected controls (n = 6,429).

**RESULTS:** In the SGA group without PE, compared to unaffected controls, there was no significant difference in Alx-75 (1.03 vs. 1.00 multiple of the median, MoM), PWV (0.98 vs. 1.00 MoM) or SBP Ao (1.01 vs. 1.00 MoM), but uterine artery PI was increased (1.10 vs. 1.00 MoM) and PAPP-A decreased (0.85 vs. 1.00 MoM). In SGA with PE, compared to unaffected controls, there was increased Alx-75 (1.13 vs. 1.00 MoM), SBP Ao (1.09 vs. 1.00 MoM), uterine artery PI (1.40 vs. 1.00 MoM) and decreased PAPP-A (0.72 vs. 1.00 MoM), but no significant difference in PWV (1.05 vs. 1.00 MoM).

**CONCLUSION:** In pregnancies with SGA neonates, impaired placentation is reflected in low PAPP-A and high uterine artery PI at 11–13 weeks' gestation. In the SGA group with PE, but not in those without PE, there is increased SBP Ao and Alx-75.

**Fetal Diagn Ther** 2012;32:231–238

*Comment from the author (MI) of the Website:* In both studies Arteriograph was used.

## Prediction of iatrogenic preterm delivery in women with chronic vascular disease and/or previous early onset preeclampsia

Cockerill R, Shawkat E, Horn J, Chmiel C, Bernatavicius G, Jonhstone E, Crocker I, Jenny E, Myers JE

**OBJECTIVES:** To determine the utility of early-pregnancy vascular compliance measurements for the prediction of medically-indicated preterm delivery (<37 weeks) in women with vascular disease, renal disease and previous early-onset pre-eclampsia (PE).

**METHODS:** High-risk women were recruited to the Manchester Antenatal Vascular (MAViS) clinic. Pulse wave velocity (PWV) and central BP were measured at 14–18 and 18–24 weeks gestation using a Tensioclinic Arteriograph. Uterine artery Doppler (UAD) was performed at 22–24 weeks and plasma placental growth factor (PIGF) was quantified using Alere Triage at 14–18 weeks.

**RESULTS:** Data were available for 127 pregnancies (chronic hypertension = 82, diabetes (with vasculopathy) = 12, renal hypertension = 21, previous PE = 11) of whom 31 (24%) had a medically-indicated preterm delivery. Maternal age, BMI, ethnicity and PIGF (14–18 weeks) were not different between the preterm delivery and the comparison group (n = 96). Peripheral and central mean arterial pressure (MAP) were different at 14–18 weeks, peripheral 103.4

[95th CI 100.4–106.5) vs 99.2 [97.2–101.2] mmHg; p = 0.02 and central 100.0 [95.4–104.6] vs 94.4 [92.1–96.7] mmHg; p = 0.03). Only central MAP was different between the groups at 18–24 weeks (p < 0.01). PWV was significantly different between groups at both gestations (9.5 [8.7–10.3] vs 8.5 [8.2–8.7] m/s; p = 0.002 and 8.9 [8.2–9.6] vs 8.2 [7.9–8.4] m/s; p = 0.01). UAD revealed bilateral notching in 18/27(67.7%) of the iatrogenic preterm delivery group compared with 16/82(19.5%) in the comparison group (p < 0.001). Using logistic regression (adjusted for baseline disease, peripheral and central MAP, UAD and sampling gestation), PWV was significantly associated with iatrogenic-preterm delivery (OR 2.5 [1.2–5.3]; p = 0.01 (14–18) and 1.6 (1.00–2.5); p = 0.05 (18–24), the other covariates were not significant in the models.

**CONCLUSIONS:** PWV is a marker of vascular compliance and is a likely indicator of the degree of maternal vascular adaptation to pregnancy. Higher PWV in this cohort was associated with a significantly increased risk of preterm delivery indicated by maternal and/or fetal disease.

**Pregnancy Hypertension:** An International Journal of Women's Cardiovascular Health 5 (2015) 53–156 Abstracts