

DIABETES/HTN/MEDICAL-SURGICAL COMPLICATIONS

Abstracts 44 – 52

Moderators: Daniel O’Keeffe, MD; Haywood Brown, MD; Norman Gant, MD, Honorary Moderator

44 First trimester prenatal diagnosis of decreased fetal cardiac performance correlates with hyperglycemia in pregestational maternal diabetes

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OBJECTIVE: In vitro animal studies suggest that hyperglycemia impairs fetal cardiac function early in gestation. We aimed to study if evidence of first trimester myocardial dysfunction can be detected in fetuses of women with pregestational diabetes mellitus (DM).

STUDY DESIGN: Women with DM underwent fetal echocardiography at 11-14 weeks’ gestational age (GA). Cardiac structure was studied in a segmental approach. Cardiac preload, diastolic function, global myocardial performance and placental afterload were studied by Doppler of the ductus venosus (DV), mitral and tricuspid E/A ratios, left and right ventricular Tei index and umbilical artery (UA) respectively. DM patients were matched for GA, UA and DV Doppler with normal controls.

RESULTS: After exclusion of structural cardiac anomalies 60 DM and 60 controls were studied at 12.6 weeks (11.1-13.6). UA and DV pulsatility indices (median 2.22 and 0.99) and nuchal translucency was (median 1.5 mm) were similar between cases and controls. DM patients had lower mitral E/A ratios than controls [0.55 ± 0.08 vs 0.52 ± 0.08 , $p=0.03$]. Left and right ventricular Tei indices were significantly higher in diabetics than in controls [0.51 ± 0.08 vs 0.48 ± 0.1 ; 0.51 ± 0.08 vs 0.45 ± 0.08 , $p<0.04$ and <0.001]. This lower global myocardial performance was due to prolonged myocardial relaxation which was most marked in diabetics with a HbA1c >8 . (0.001 for all parameters). No correlation between cardiac Doppler parameters and DV and UA indices were observed.

CONCLUSION: We demonstrate significant differences in first trimester diastolic myocardial performance in fetuses of diabetic mothers compared with non-diabetic controls. In addition, among the diabetics the decrease in myocardial performance was more marked with increasing hyperglycemia, and appears independent of preload and afterload. Our ability to document these changes this early in pregnancy opens potential new avenues to monitor and modify maternal glycaemic control before cardiac remodeling such as myocardial hypertrophy develops.

0002-9378/\$ – see front matter • doi:10.1016/j.ajog.2009.10.059

45 Effects of magnesium on central arterial compliance in preeclampsia

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OBJECTIVE: To investigate the effect of MgSO₄ infusion on central arterial compliance, using noninvasive radial artery pulse wave forms by applanation tonometry in women diagnosed with preeclampsia (PRE).

STUDY DESIGN: This is a prospective observational study. Women diagnosed with PRE were recruited prior to receiving MgSO₄. Measurements of the radial pulse waveform were obtained longitudinally. Using a validated internal transfer function, the aortic waveform was derived and the indices Augmentation Pressure (AP) and Augmentation Index corrected @75bpm (AIx@75) were calculated. The AP and

AIx@75 are surrogate measures of arterial stiffness. We compared the time periods: prior to MgSO₄ (t1), 1hr after MgSO₄ bolus (t2), 4hrs after MgSO₄ maintenance infusion (t3), 24hrs after delivery and MgSO₄ completion (t4). An 80% power assuming an increase in compliance of 25%, $\alpha=0.05$, required 70 subjects. Statistical analysis was performed using differences of least squared means with Tukey Kramer adjustment. Institutional IRB approval was obtained.

RESULTS: Data was analyzed from seventy women. AP and AIx@75 at t2-t4 were significantly lower compared with t1, (pvalue =.008, <.001, and .002) and (pvalue =.039, <.001, and .005) respectively, with greatest decrease in arterial stiffness at t3- 4hrs after MgSO₄ maintenance. AP and AIx@75 at t3 was significantly lower when compared with t2 (p-value<.001 and .001). AP at t3 was significantly lower compared with t4 (p=.018). No significant difference in AIx@75 was noted between t3 and t4.

CONCLUSION: In women with PRE, MgSO₄ improved central arterial compliance. This effect was most exaggerated after 4hrs of infusion and remained 24hrs following MgSO₄ completion following delivery. This suggests either a sustained vascular compliance effect from MgSO₄ or resolution of the vasoconstrictive effect of preeclampsia. Further, MgSO₄ may improve perfusion to end organs by decreasing arterial stiffness, this information could be used to direct future management, suggesting a benefit of its use beyond seizure prophylaxis. 0002-9378/\$ – see front matter • doi:10.1016/j.ajog.2009.10.060

46 Maternal serum PP13 and ADAM12S as first trimester predictors of adverse pregnancy outcome

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OBJECTIVE: To investigate the value of first trimester maternal serum measurements of A Disintegrin And Metalloprotease 12-S (ADAM12s) and Placental Protein 13 (PP13) in the prediction of preeclampsia (PE), pregnancy induced hypertension (PIH) and intra-uterine growth restriction (IUGR).

STUDY DESIGN: A retrospective case-control study of samples taken between 2004 – 2007 was conducted. Gestational age ranged from 9+0 to 13+6 weeks. All samples were collected as part of the national program for Down Syndrome Screening. All PE, PIH and IUGR cases were matched for exact gestational age and maternal age with three control cases. The serum concentration of ADAM12s and PP13 were analyzed ‘blind’ to outcome. Results were expressed in multiples of the median (MoM). MoM values were compared using Mann-Whitney U test and receiver-operator-characteristics (ROC) curves were used to assess screening performance.

RESULTS: 165 controls samples, 17 cases of PE, 30 cases of PIH and 8 cases of IUGR were identified. Median ADAM12s concentrations for controls versus cases were significantly reduced: 405 vs. 324 nG/L (MoM 1.00 vs. 0.80 ($p < 0.05$)). In PP13 no significant difference was found: 57.7 vs. 54.6 pG/L (MoM 1.00 and 0.95). Median MoM levels for ADAM12s were 0.90, 0.77 and 0.88 for PE, PIH and IUGR respectively; MoM levels for PP13 were 0.77, 0.95 and 0.89 respectively. ROC analysis yielded areas under the curve (AUC) for ADAM12s and PP13 of 0.63 and 0.59 for PE, 0.68 and 0.57 for PIH and 0.59 and 0.62 for IUGR, respectively. Combined ADAM12 and PP13 did not improve AUC. If specificity was set at 0.80, the corresponding sensitivity of ADAM12s was 52% for PIH.