Potential Added Value of Bidimensional Myocardial Strain in Prenatal Diagnosis of Aortic Coarctation

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Introduction: Prenatal diagnosis of coarctation of the aorta (CoA) is difficult. Strain (S) and strain rate (SR) imaging is a new non-invasive ultrasonic technique able to quantify regional myocardial deformation properties. It has a superior sensitivity over that of standard echocardiography and myocardial velocity for non-invasive assessment of ventricular function. Aim of our study was to assess the ability of bidimensional myocardial S and SR analysis in prenatal diagnosis of CoA.

Methods: We studied 35 consecutive foetuses (mean gestation age 28 ± 4.9 weeks) with RV and PA prevalence. In all foetuses we studied, left ventricle (LV) to RV ratio, Aortic (Ao) to PA ratio and average global peak systolic RV S and SR. RV prevalence and PA prevalence were defined as a ratio <5° percentile for gestational age. Normal value for S and SR were obtained comparing with normal value previously established by our group in 100 consecutive normal foetuses.

Results: Among 35 consecutive foetuses with RV and PA prevalence, 8 (22.8%) had CoA at echocardiographic evaluation in the neonatal period, 27 had no cardiac abnormalities at postnatal echocardiographic evaluation.

- LV/RV was not significantly lower in foetuses with CoA (mean value 0.68 vs 0.69; p = 0.13).
- Ao/PA was significantly lower (mean value 0.60 vs 0.68; p < 0.05).
- LV/RV ratio inferior to 0.67 showed a sensitivity of 42% and a specificity of 72.9%.
- Ao/PA ratio inferior to 0.68 showed a sensitivity of 68% and a specificity of 66.7%.

-Peak systolic RV S showed normal values (-24% ± 4) in the 27 foetuses with no CoA at post-natal evaluations, whereas it was significantly reduced in CoA group with (-15 ± 3.7, p < 0.0001), with a cut-off value of -18% (sensitivity 85.7%, specificity 86.7% at ROC, Figure 1).

Conclusions: Precise diagnosis of CoA during fetal life remains difficult. Our preliminary data suggest that 2D-strain could be a helpful approach to improve the prenatal diagnose CoA.