Patterns of cardiac remodelling in foetuses with late-onset growth restriction and their assessment using speckle tracking foetal echocardiography

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Objective. To investigate the patterns of cardiac remodelling in foetuses with late-onset foetal growth restriction (FGR) and evaluate the foetal cardiac function with respect to the cardiac remodelling phenotype using speckle tracking foetal echocardiography (STE).

Materials and Methods. Prospective study conducted on singleton pregnancies complicated by suspected late-onset FGR. 2D ultrasound clips of the 4-chamber view of the foetal heart were prospectively collected. The offline STE echocardiographic assessment and measurement of the cardiac biometric indices were performed by one single member of the research team.

Results. 54 cases and 166 ultrasound clips were included. Morphometric assessment revealed the presence of three cardiac remodelling phenotypes: phenotype 1, corresponding to a morphologically normal heart (13 cases, 24%); phenotype 2, corresponding to a morphologically elongated heart (23 cases, 43%); phenotype 3, corresponding to a morphologically globular heart (18 cases, 33%). The comparison of the STE parameters showed a higher left ventricular strain in phenotype 1 compared to phenotype 2 [LV MyoGLS (-18.14 ± 3.90 *vs* -16.74 ± 2.80, p = 0.02), LV EndoGLS (-22.12 ± 4.29 *vs* -20.34 ± 3.35, p = 0.02)] and a higher LV MyoGLS in phenotype 1 compared to phenotype 3 (-18.14 ± 3.90 *vs* -15.48 ± 4.15, p = 0.01). Additionally, the RV MyoGLS was higher in phenotype 1 compared to phenotype 2 (-15.94 ± 3.78 *vs* -13.61 ± 3.91, p = 0.01) and in phenotype 1 compared to phenotype 3 (-15.94 ± 3.78 *vs* -13.40 ± 4.16, p = 0.01).

Conclusions. This study has shown the existence of three cardiac remodelling phenotypes in foetuses with late-onset FGR. Morphological phenotypes are associated with differences in terms of right and left ventricular strain which can be demonstrated using STE.