Perinatal left ventricular torsional mechanics in normal term fetuses

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Introduction: Left ventricular (LV) twist and torsion are important aspects of cardiac mechanics and fundamental to normal ventricular function. Myocardial rotational mechanics of perinatal adaptation have never been previously explored. The aim of this study was to evaluate perinatal LV rotational mechanics in normal term fetuses.

Methods: A prospective study of 40 women with uncomplicated term pregnancies. Fetal and neonatal LV rotation data derived by 2D speckle tracking echo in short axis views at the base and apex of the heart were obtained a few days before and within hours of birth.

Results: There are three unique patterns of LV twist in term fetuses, from the lowest torsional values in the reversed apex-type, through to the infant-type LV twist and highest values in the adult-type LV twist. Patterns of LV twist were significantly associated with cardiac geometry and functional indices. Perinatal evaluation revealed a significant increase in LV torsion in fetuses exhibiting reversed apex-type LV twist and a significant decrease in fetuses with adult-type LV twist following birth.

Abbreviations: LV, left ventricle; RV, right ventricle; cw, clockwise; ccw, counterclockwise; C-SR, circumferential systolic strain rate.

Conclusion: Differences in patterns of LV twist may reflect compensatory myocardial adaptation to the physiological loading conditions of late gestation in fetuses and perinatal cardiac adjustments in neonates. Specific pattern of LV twist could be a diagnostic marker of subclinical changes in fetal and neonatal myocardial performance.