Changes in right ventricular function and growth after in-utero pulmonary valvuloplasty in fetuses with pulmonary atresia with intact septum or critical pulmonary stenosis

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Objectives: to assess the immediate effects of fetal pulmonary valvuloplasty on right ventricular (RV) size and function as well as in-utero RV growth and postnatal outcome.

Methods: Thirty-five fetal pulmonary valvuloplasties were performed in 23 fetuses with pulmonary atresia with intact ventricular septum (PAIVS) (n=15) or critical pulmonary stenosis (CPS) (n=8) at a median gestational age of 28+4 weeks (23+6 to 32+1). RV morphologic and functional parameters were obtained before and 1-2 days after the procedure and analyzed retrospectively. Longitudinal data was collected only from fetuses who were followed in our center. Outcome was assessed using a prediction-score for a non-biventricular outcome.

Results: There were no fetal deaths. Immediately after successful intervention RV/LV length ratio, TV/MV ratio, RV filling time, RV TVI*HR increased and tricuspid regurgitation velocity decreased significantly. In fetuses followed longitudinally to delivery (n=5) ratios of RV/LV and TV/MV remained constant or improved further. Fetuses with an unsuccessful intervention (n=2) became univentricular all others had either a biventricular (n=15), one and a half ventricular (n=2), or a still undetermined (n=4) outcome. Five of nine fetuses with a predicted non-biventricular outcome became biventricular while 3 of nine still have an undetermined circulation.

Conclusion: In selected fetuses with PAIVS or CPS in-utero pulmonary valvuloplasty leads to immediately larger RVs caused by reduced afterload and increased filling. This is followed by continued RV growth improving the chances for a biventricular outcome even fetuses with a predicted non-biventricular circulation.