

**Echocardiographic assessment of hemodynamics in fetus with transposition of the great arteries and intact ventricular septum: impact on immediate post natal desaturation.**

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Introduction: little is known about the physiology and distribution of ventricular flows in fetuses with transposition of the great arteries and intact ventricular septum (TGA-IVS), especially regarding the risk for immediate post natal desaturation. Ductal flow is the result of a complex interaction between left and right ventricular outputs as well as pulmonary and peripheral resistances.

Methods: longitudinal hemodynamic assessment of 30 fetuses with TGA-IVS was done 3 times during pregnancy at 18-22, 28-32 and 35-38 weeks of gestation. We measured the size of the inter-atrial defect and calculated left and right ventricular output as well as systolic and diastolic ductal flow. Fetuses were divided into 2 groups depending on their postnatal saturation. Fetuses with postnatal saturation < 65% at the upper extremities were included in group 1. Echocardiographic parameters were compared between the 2 groups.

Results: 3 fetuses had a restrictive ductus arteriosus with high velocity flow and were excluded from the calculations, they all had postnatal saturation <65%. Five additional fetuses had a postnatal saturation <65%. There was no difference in left or right ventricular output between the groups at first evaluation. At 28-32 weeks, the inter-atrial defect was smaller in group 1 ( $3\pm 0.3$  versus  $4\pm 0.8$ mm,  $p=0.012$ ) as well as left ventricular output (221 versus 307ml/min,  $p=0.05$ ). There was a correlation between left ventricular output and size of the inter-atrial defect ( $R^2=0,35$ ,  $p=0,003$ ). Ductal flow was lower in group 1 after 35 weeks (56 versus 130ml/min,  $p=0,007$ ), mainly due to a decrease in diastolic flow which was retrograde in group 1 ( $-7,1$  versus 22ml/min,  $p<0.004$ ). A total of 12 patients (4/5 in group 1) had a retrograde diastolic flow in the ductus arteriosus after 35 weeks. Retrograde ductal diastolic flow had a positive predictive value of 40% and a negative predictive value of 100% to predict saturation <65% at birth.

Conclusion: in third trimester, retrograde diastolic flow in the ductus arteriosus is possibly secondary to low vascular pulmonary resistance but also to decreased left ventricular output in case of small inter-atrial defect. Fetuses with this ductal flow pattern are at risk for postnatal inadequate inter-atrial mixing.