

Abnormal cerebral and umbilical doppler flow values in the fetuses with hypoplastic left heart syndrome

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Introduction:

Recent publications show that many abnormalities exist in peripheral circulation in fetuses with structural heart defect.

Goals: Evaluation of cerebral and umbilical arterial flow parameters in the fetuses with selected CHD

Methods:

Retro- and prospective analysis of 127 fetuses (from 2007-2010) divided into two groups:

1. With left heart structural anomalies with reversal blood flow to ascending aorta (R), n=67:
R1- with left ventricle hypoplastic syndrome (HLHS), n=58, R2-with critical aortic stenosis (AS) n=12
2. Control group – without structural and functional defects (N), n=50

Peak systolic velocity (PSV), pulsative and resist indexes (PI, RI) and S/D and CPR for MCA and UA were analyzed.

The statistical correction was used to make indexes independent from gestational age (ANCOVA test and Z score indexes). The multiple comparison LSD and post-hoc GT2 Hochberg analysis were used

Results:

There were significant differences between groups for the UAPI and UAPS. The UAPI and UAPS values were higher in the R group compared with the control group ($P < ,001$ and $P = ,006$ respectively). The higher values of UAPI compared to healthy fetuses were observed both in the R1 and R2 subgroups. ANCOVA test in the main group demonstrated significant differences between MCARI, MCAPI, MCAPS and MCAS/D, for the Z-score for all the parameters without MCAPI. The comparison in subgroups with ANCOVA showed that the RI and PI indexes were lowered in the fetuses with HLHS compared to healthy fetuses ($P < ,001$ for MCARI and $= ,029$ for MCAPI). This dependence was not observed in the fetuses with critical AS. Similar results for the Z-score for MCARI, MCAS/D were received. Z-score for MCARI and MCAS/D were the lowest in the HLHS subgroup. Z-score for CPR was lower for the R1 vs. control group ($P < ,001$)

Conclusions:

1. Fetuses with congenital heart defects with retrograde flow in ascending aorta, mainly with LV hypoplasia presented changes in the arterial cerebral and umbilical flow patterns.
2. Autoregulative mechanisms in the fetuses with the most impaired cerebral flow are insufficient and abnormal indexes of middle cerebral artery flow could be an important marker of unfavorable changes in the central nervous system.