The abnormal fetal growth pattern in fetuses with different anatomic and haemodynamic profile of heart defects on the base of analysis the selected anthropometrical parameters

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Background: The publications show that peripheral especially cerebral blood flow may impact brain development and pattern of head and body growth in fetuses with heart defects. This possibility is supported by identification of neuropathological abnormalities in neonates with heart anomalies prior to surgery.

Aim: Definition of the connection between haemodynamical types of heart defects and anomalies of anthropometric parameters in the fetus and the newborn.

Material: 185 fetuses diagnosed at the Prenatal Cardiology Departments in Lodz and in Cracow were analysed in the three groups:
1. R; n=67-with “reversal” flow in ascending aorta (R1; n=58: hypoplastic left heart syndrome, HLHS, R2; n=9: critical aortic stenosis, SA)
2. A; n=54- with “antegrade” flow to the ascending aorta (A1; n=42 mixed defects, A2; n=12 transposition of great arteries, TGA)
3. N-control group; n=50.

Methods: The two time-points data were analysed:
Prenatal period- estimated fetal weight (EFW), head circumference (HC) biparietal diameter (BPD), femoral length (FL), abdominal circumference (AC), HC/EFW and HC/AC indexes.
Postnatal period- birth weight (BW), birth length (BL), head and thorax circumference (HC, TC) HC/TC and HC/BW indexes.

Data were standardized to make results independent from the gestational age using covariance analysis and of the Z-score indexes for EFW and HC. The LSD multiple comparison and post-hoc GT2 Hochberg analysis were used. Fetal parameters: there were no significant differences in the main groups. Higher parameters of AC were observed in the fetuses with TGA (P = .032) and lower of HC values in the R group (borderline significance: P = .055).

Neonatal parameters: BL was the lowest in the fetuses with HLHS and SA (P = .004) and the highest in etuses with TGA (P = .001), BW was lowest in the SA subgroup, (P = .021); HC/AC indexes were lowest in the newborns with TGA, and lower in the newborns with HLHS compared with SA subgroup (P = .008).

Conclusions:
The abnormal growth pattern probably due to abnormal model of aortic flow may concern fetuses and newborn with some heart defects. The mechanisms, physiologic implications and neurodevelopmental impact of abnormal cerebral flow in fetuses with CHD require further study.