

EP08.45 TRENDS IN CEREBROVASCULAR & PLACENTAL DOPPLER INDICES IN FETAL HYPOPLASTIC LEFT HEART SYNDROME & TRANSPOSITION OF THE GREAT ARTERIES

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Introduction:

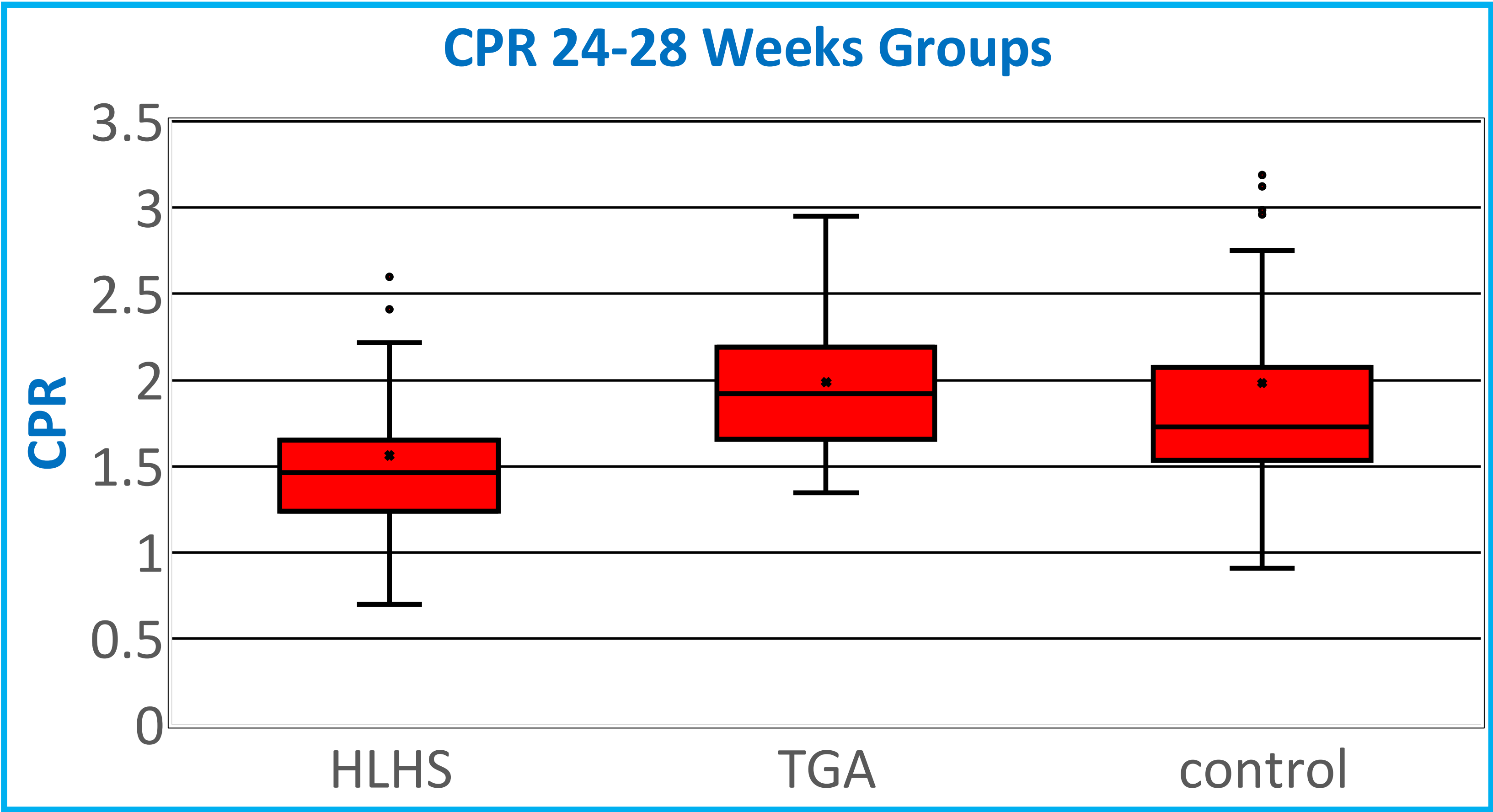
Congenital heart disease may be associated with differences in cerebral and placental fetal/maternal vascular resistance indices. This may be due to primary differences in the vasculature or vasoreactivity through alterations in blood flow distribution and oxygen delivery. We investigate gestational age (GA)-based serial trends in cerebral and placental vascular indices in fetuses with hypoplastic left heart syndrome (HLHS) and transposition of the great arteries (TGA).

Methods:

Serial evaluations of middle cerebral artery (MCA), umbilical artery (UA) and uterine artery (UTA) pulsatility indices (PI) were performed in **141 fetuses with HLHS, 79 TGA, and 929 GA-matched normal controls**. Subjects were divided into 3 groups: GA1=18-24 weeks, GA2=24-28 weeks, and GA3=28-34 weeks. Cerebroplacental vascular ratio (CPR) was calculated as MCA/UA PIs. Indices were analyzed using Kruskal-Wallis statistics.

Results:

HLHS consistently show pronounced hemodynamic alterations, characterized by early and persistent elevation in placental vascular resistance ($\uparrow$ UA PI) combined with progressive cerebral vasodilation ($\downarrow$ MCA PI) at all GA groups indicating both placental insufficiency and adaptive brain-sparing. This results in markedly reduced CPR at GA1, GA2 and GA 3 ($p<0.001$ compared to controls). In contrast, fetuses with TGA demonstrate largely preserved placental Doppler flow parameters. However, cerebral Doppler adaptations in TGA emerge later in pregnancy, notably $\downarrow$ MCA PI at GA3 ($p<0.05$), suggesting selective brain-directed hemodynamic compensation in response to altered fetoplacental oxygenation rather than primary placental dysfunction. TGA CPR was no different than normal throughout all GA groups. UTA PI was significantly higher at GA2 and GA 3 for HLHS ($P<0.05$) but not for TGA.



HLHS vs TGA $p=0<0.001$
HLHS vs Control $p=0<0.001$
TGA vs Control $p=0.158$

Conclusions:

Placental vascular resistance differences at both fetal & maternal ends are common in HLHS but are fully preserved in TGA. MCA flow is consistently altered at all GA in HLHS and is impacted only at late GA in TGA. Exploration of individual GA-based trends as predictors of neurodevelopmental outcomes is warranted.