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In-utero aortic valvuloplasty in fetuses with critical aortic stenosis and evolving hypoplastic left heart syndrome: effects on the fetal heart and on outcome. A single center analysis of 80 patients

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Objectives: to assess effects of fetal aortic valvuloplasty (FAV)in patients with critical aortic stenosis (CAS) and evolving hypoplastic left heart syndrome (eHLHS) on left ventricular (LV) dimensions, function and outcome and to look for predictors of biventricular (BV)outcome.

Methods: Echocardiograms of all fetuses who underwent FAV in our center since 2001 were analyzed retrospectively for ventricular and valvular dimensions, mitral regurgitation (MR) velocity, LV filling time and outcome (BV vs. univentricular (UV)).

Results: 95 FAV were performed in 80 patients (success-rate: 86.3%). Median GA: 26+3 weeks (21+3 to 33+1). 62 successfully treated patients were live-born and 74.6% of neonates were initially treated towards a BV circulation. After 28 days 42/58 (72.4%) and at final follow up (median 2 years (32 days to 13 years) 35/51 (68.6%) were alive with a BV circulation without elevated pulmonary artery pressure. BV outcome was significantly better when compared to a natural history cohort with similar inclusion criteria (10/35, 28.6%; P = 0.0004).
When the preintervention data was compared between the BV and the other groups (BV vs. UV/dead with BV) significant differences could be found in these parameters:

	BV (n=25)	UV + others (n=17)	P
RV/LV	1.073 (0.907-1.129)	1.173 (1.06-1.485)	≤ 0.00001
TV/MV	1.239 (1.089-1.453)	1.375 (1.237-1.594)	= 0.00005
LV inflow time	0.29 (0.12-0.49)	0.19 (0.12-0.43)	= 0.035
MR velocity	3.59 (2.00-5.07)	2.70 (1.55-4.64)	= 0.007

Successful intervention led to an immediate increase in RV/LV ratio in both groups (P = 0.0001 vs. P = 0.05) due to reduced LV lengths and an increased LV inflow time (P ≤ 0.0000001 vs. P = 0.004).

Conclusions: Successful FAV in fetuses with CAS and eHLHS improved morphologic and functional LV-parameters and BV outcome when compared to published natural history data. Existing criteria for intervention have to be further refined for a better patient selection and prospective studies are warranted.