

Growth of the aorta in foetuses with evolving hypoplastic left heart syndrome after prenatal aortic valvuloplasty

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Objectives: Foetal aortic valvuloplasty(FBAV) may alter natural history of critical aortic stenosis(AS) and prevent progression to hypoplastic left heart syndrome(HLHS). Despite prenatal intervention substantial subset of patients ends up with univentricular circulation. The aim of this study was to analyse whether the FBAV facilitated aortic growth in foetuses who ended as HLHS, and therefore improved surgical conditions for 1st-stage repair.

Methods: Between 2012–2015 we evaluated foetal and newborns' echocardiographic examinations of 26 patients after FBAV and 37 without intervention(evolution HLHS with patent mitral valve and AS or atresia with visible aortic valve leaflets)who ended with univentricular circulation. Growth of the aortic annulus(AOV), ascending aorta(AAO), and isthmus(AOI) was analysed.

Results: All dimensions were larger in FBAV group pre-intervention and in last prenatal examination (appropriately 24.and 34.weeks in both groups). Postnatal data from 22 newborns after FBAV and 23 HLHS showed significant difference in the diameter of AOV and AAO, but not the AOI. Growth rate of measured structures, expressed as a difference in absolute values over time(mm/week) was significantly bigger in the intervention group for AOV (0.02vs.0.01,p=0.008) and AAO (0.036vs.0.013,p=0.000007), with no difference for AOI (0.014vs.0.016,p=0.53). AOI diameter correlated better with size of the ductus arteriosus than with AOV in HLHS group.

Conclusions: Baseline aortic dimensions in foetuses suitable for the FBAV were larger than in those with HLHS. In spite of that, opening of the aortic valve seemed to be an important factor for the aortic growth, so update of indications for FBAV should be considered.. In neonates AAO in FBAV group was almost within normal limits, contrary to HLHS. Lack of impact on AOI size may be due to its dependence on ductal rather than aortic flow.

Exam	Parameter	FBAVgroup	HLHSgroup	P
1 st prenatal	AOV Z-score	-1.03±0.98	-4.19±2.13	<0.000001
	AAO Z-score	-0.60±1.54	-4.56±2.18	<0.000001
	AOI Z-score	-0.91±1.18	-1.86±1.28	0.0045
Last prenatal	AOV Z-score	-0.80±1.30	-4.65±2.53	<0.000001
	AAO Z-score	-0.57±1.15	-5.19±1.94	<0.000001
	AOI Z-score	-0.69±1.31	-1.99±1.32	0.0003
Newborn	AOV [mm]	5.4±0.8	3.7±1.0	<0.000001
	AAO [mm]	7.8±1.7	4.1±1.9	<0.000001
	AOI [mm]	4.1±0.8	4.3±1.0	0.52
	AOV Z-score	-2.65±1.68	-6.72±2.71	0.000001
	AAO Z-score	-1.75±1.99	-8.44±3.90	<0.000001
	AOI Z-score	-1.99±1.09	-1.75±1.32	0.55