Restriction of foramen ovale in fetuses with TGA – how to predict it?

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Objectives: Transposition of the great arteries (TGA) can be a lethal disorder for the neonate even with prenatal diagnosis. The aim of this study was to establish the optimal monitoring for fetuses with TGA to predict urgent balloon atrioseptostomy (BAS), as published criteria are of unsatisfying specificity.

Methods: We evaluated echocardiographic exams of fetuses with TGA diagnosed between 2003–2014 in the referral center for fetal cardiology. Follow-up data were collected from target pediatric cardiology departments.

Results: There were 85 fetuses (male/female ratio ≈ 3.5) with TGA, including 28 with VSD. Median time of diagnosis was 23 weeks (24 in TGA&IVS, 22 in TGA&VSD, ns), slightly decreasing with time. The number of diagnoses increased from 3 in 2003 to 20 in 2013 and 14 in 2014, with growing proportion of ‘abnormal 3-vessel-view’ as reason for referral. Karyotype was checked in 12 cases and was abnormal (46,XX,del(11)(q22.1)) in only one, otherwise dysmorphic fetus (associated defects motivated karyotype examination). Associated cardiovascular anomalies included: pulmonary stenosis or LVOTO(13), RAA(1), and MAPCAs(3). Appearance and blood flow across foramen ovale (FO) was assessed during every examination. In 36/73 fetuses, its character changed after 30 week of pregnancy. Limited interatrial blood mixing, usually associated with thick septum, was regarded as marker of restriction and predictor of BAS. 57 children were born in our institution, remaining group was excluded from further study. Follow-up was known in 51 cases. 36 newborns needed urgent BAS, which was predicted on fetal echocardiography in 21 cases (58%). Urgent BAS was more frequent in TGA&IVS vs. TGA&VSD group (75% vs. 63%). Hypermobile septum, sometimes described as predictor of BAS, was unspecific (present in 10/11 no-BAS and 27/40 BAS fetuses) and could coexist with both free and limited FO flow (57% and 43% appropriately).

Conclusions: FO flow in fetuses with TGA should be assessed repeatedly, especially just prior to delivery, as it can change during pregnancy. Neonatologists should be informed of suspected FO restriction in a newborn. Diagnosis of restrictive FO in TGA fetuses is difficult. Hypermobile septum is not specific sign of FO restriction. Thick septum primum and impaired blood mixing observed in color Doppler seems more important.