Progression to first-degree heart block in preschool children fetally exposed to anti-SSA/Ro52 autoantibodies

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Conclusions

- Fetally anti-SSA/Ro52 exposed children with transient perinatal signs of impaired AV conduction may progress to 1°AVB during the preschool years even if ECG in the neonatal period is normal.
- Children at risk can be identified by prenatal Doppler echocardiography

Introduction

Isolated congenital complete atrioventricular block (AVB) is associated with transfer of maternal anti-Ro/SSA autoantibodies to the fetus and has a high mortality and morbidity. The importance of first- and second degree AVB and its long term prognosis is, however, less well studied.

Purpose

To study outcome of children fetally exposed to maternal anti- SSA/Ro52 antibodies in terms of signs of impaired atrioventricular (AV) conduction or myocardial disease and to correlate prenatal Doppler findings to outcome.

Patients and methods

A cohort of 57 children fetally exposed to anti-SSA/Ro and examined by weekly fetal echocardiography from 18 to 24 weeks of gestation, during 1999 to 2007, was identified and grouped in accordance to
(1) prenatal Doppler signs of first-degree AV block (1°AVB) = group A ,or
(2) normal findings = group B
and examined by ECG, 24 h holter and echocardiography.
Definition of fetal 1°AVB: AV time intervals > +2SD **(fig 1)**

Results

-Six cases of 1°AVB (one with intermittent 2°AVB) and one case of intermittent 1°AVB developed in group A, progressing from normal sinus rhythm at 1 month of age; none in group B (normals)

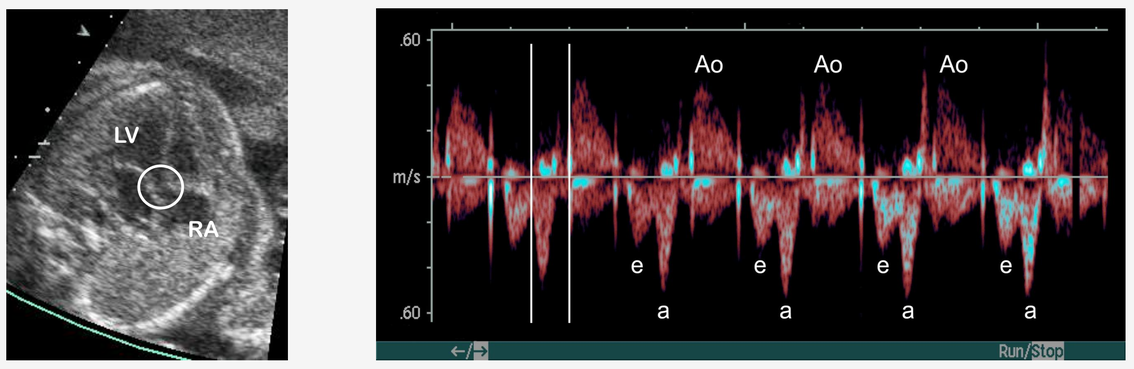
-Estimated prevalence of 1ºAVB (95% c.i.) at follow up in our cohort was 10,5% (4.4-22.2%).

-Apart from a slightly higher myocardial performance index (MPI) value in group A, the groups were similar regarding flow doppler measurements as well as tissue doppler imaging (TDI).

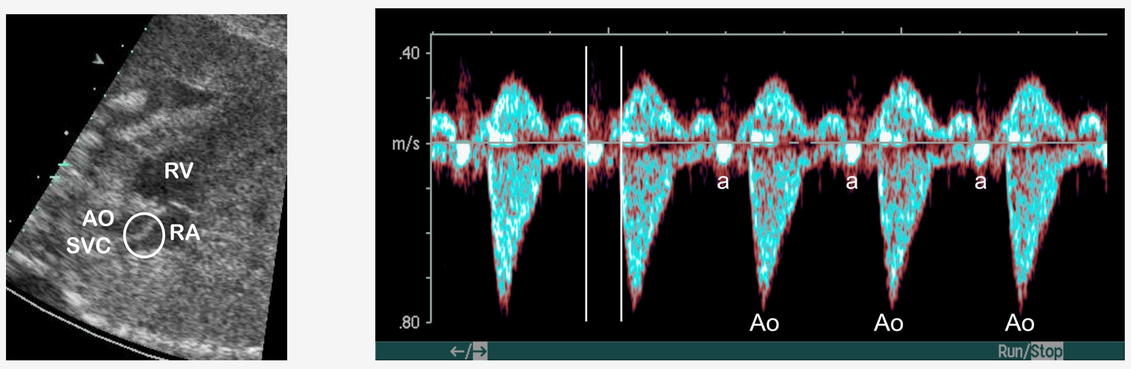
-Prenatal Doppler predicted development of 1°AVB at follow-up with a sensitivity of 100 %, PPV 37.5%, LR+ 5.1 and NPV 100%

-All children were asymptomatic at follow-up

Figure 1. Doppler atrioventricular time intervals measured on recordings from the mitral valve/aortic outflow (left) and superior vena cava/ascending aorta (right). a, mitral filling wave or retrograde SVC flow due to atrial contraction; e, passive mitral filling; Ao, aortic flow profile. Vertical lines denote time intervals.



MV-Ao time interval



SVC-Ao time interval

Table 1. Demographic data, ECG and Holter findings at follow-up grouped in respect to presence of prenatal signs of first-degree AV block (group A) or not (group B).

	Group A (n=16)	Group B (n=41)	P-value
Demographic data			
Male/Female, n	7/9	19/22	NS
Age, years	4,0 (0.8-7.3)	3,6 (0.8-8.0)	NS
Weight, kg	17.8 (9.0-38.5)	16.5 (10.0-27.0)	NS
Length, cm	100 (72.0-140)	99 (72.0-128)	NS
ECG			
HR, bpm	105±28	105±19	NS
PR, ms	141±23	121±13	p < 0.01
QRS, ms	73±8.8	71±7.0	NS
QTc, ms	401±21	405±17	NS
Holter			
HR mean, bpm	105±17	104±11	NS
HR, Min, bpm	76±17	75±11	NS
HR, max, bpm	165±14	173±14	NS
R-R max, s	1.18±0.18	1.16±0.12	NS
PR at HR mean, ms	155±35	129±15	p < 0.01

Values are mean with range or mean ± SD. HR, heart rate; PR at HR mean, PR interval in Holter ECG measured at 24 hour mean heart rate.

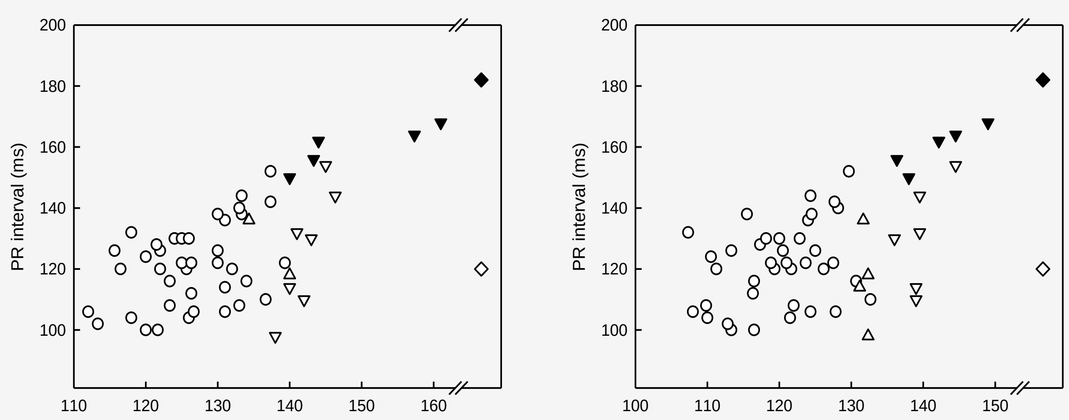


Figure 2. Prenatal AV time intervals, measured by the MV-Ao (left panel) and SVC-Ao (right panel) Doppler methods against PR intervals on ECG at follow-up. Triangles denote individuals with prenatal atrioventricular (AV) time intervals exceeding the upper 95% (pointing up) or 99% (pointing down) confidence limits for normal fetuses. Diamonds represent the two cases with fetal second-degree AV block, reverted to first-degree AV block during transplacental betamethasone treatment, and circles cases with normal prenatal findings. Filled symbols are individuals with age related PR intervals defined as first-degree AV block at follow up.

Table 2. Mitral valve (MV)- doppler- and tissue doppler (TDI) findings at follow-up grouped in respect to presence of prenatal signs of first-degree AV block (group A) or not (group B).

	Group A (n=16)	Group B (n=41)	P-value
MV-doppler			
Peak E, m/s	0.84±0.14	0.86±0.12	NS
Peak A, m/s	0.53±0.09	0.55±0.08	NS
E/A	1.61±0.32	1.57±0.23	NS
IVCT, ms	38.4±7.4	35.7±5.9	NS
IVRT, ms	48.2±5.7	46.5±5.0	NS
ET, ms	246±31	248±20	NS
MPI	0.35±0.03	0.33±0.02	P < 0.05
TDI, basal septum			
E'/A'	2.16±0.44	1.92±0.39	NS
IVCT', ms	59.0±19.1	47.6±9.2	P < 0.05
IVCT'c, ms	72.5±17.6	60.6±8.8	P < 0.05
IVRT', ms	47.9±6.6	43.6±4.3	NS
IVRT'c, ms	59.0±10.4	58.3±7.8	NS
ET', ms	259±25	250±20	NS
MPI'	0.40±0.05	0.36±0.03	P < 0.05

Values are mean ± SD. E', maximum velocity of the E wave; A', maximum velocity of the A wave; IVCT', isovolumetric contraction time; IVRT', isovolumetric relaxation time; c, corrected for heart rate; ET', ejection time; MPI', myocardial performance index, MPI'=(IVCT'+IVRT')/ET'.

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