

Fetal premature atrial contractions: natural course, risk factors and adverse outcomes

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INTRODUCTION

- Fetal arrhythmias complicate 1-2% of pregnancies, PACs are the most common.
- PACs are usually benign, but can occur with congenital heart defects (CHDs) and supraventricular tachycardia (SVT).
- We explored the incidences of complications.

METHODS

- Retrospective cohort study at fetal medicine unit (FMU) of Amsterdam UMC in 2007-2022.
- Fetuses diagnosed with PACs were included, cases with pre-existent CHDs or other arrhythmias were excluded.
- All cases underwent routine anatomy screening before referral for irregular heart rhythm.

RESULTS

- 939 fetuses were included, in which 64 cases an adverse outcome occurred (6.8%).
- CHDs were diagnosed in 14 cases (1.5%), resulting in an OR of 1.8 compared to baseline.
- Tachyarrhythmias occurred in 32 cases (3.4%) of which eight (25.0%) showed signs of cardiac failure and in 23 (71.9%) antiarrhythmic therapy was required.
- Risk factors for tachyarrhythmias were PACs with short runs of SVT (OR 99), blocked PACs (OR 30), PACs in bigeminy (OR 22), frequent PACs (1 per 5-10 beats)(OR 6.9), signs of cardiac failure (OR 14), foramen ovale aneurysm (OR 5.0).

DISCUSSION

- Fetal PACs are commonly benign and their complication rate is low, but advanced ultrasonography is necessary to detect CHDs.
- When risk factors are identified, weekly monitoring of the fetal heart rate is advised.
- In absence of risk factors, standard care may be sufficient.

Analysis of possible risk factors for the development of tachyarrhythmias in fetuses with PACs					
	Tachyarrhythmia (n = 32)	No tachyarrhythmia (n = 907)	p-value	OR	95%-CI
Use of medication	7 (21.9)	160 (17.6)	0.500	1.3	0.6 - 3.2
Smoking during pregnancy	3 (9.4)	75 (8.3)	0.744	1.1	0.3 - 3.9
Male fetal gender	19 (59.4)	462 (51.1)	0.358	0.7	0.3 - 1.5
GA at diagnosis	29 ⁺² (24 ⁺⁶ - 33 ⁺⁶)	31 ⁺⁶ (27 ⁺² - 35 ⁺⁴)	0.074		
Type of PAC					
Simple (<1 per minute)	2 (6.3)	323 (39.2)		reference	
Moderate (1 per 10-20 beats)	3 (9.4)	269 (32.6)	0.664	1.8	0.3 - 10.8
Frequent (1 per 5-10 beats)	4 (12.5)	93 (11.3)	0.027	6.9	1.2 - 38.5
Trigeminal	0	53 (6.4)		-	
Bigeminal	5 (15.6)	37 (4.5)	<.001	21.8	4.1 - 117
Blocked	6 (18.8)	32 (3.9)	<.001	30.3	5.9 - 156
Runs of SVT	11 (34.4)	18 (2.2)	<.001	98.7	20.3 - 479
Foramen ovale aneurysm	12 (37.5)	98 (10.8)	<.001	5.0	2.4 - 10.4
Signs of cardiac failure	4 (21.9)	10 (1.5)	<.001	14.2	4.1 - 49.1

In fetuses with extrasystoles and no risk factors for SVT, standard obstetric care may be sufficient.



Incidence of adverse outcomes

Adverse outcome	Prenatal		Postnatal	
	N	% (95%-CI)	N	% (95%-CI)
CHD	9	1.0 (0.5-1.8)	14	1.5 (0.9-2.5)
Tachyarrhythmias	25	2.7 (1.8-3.9)	12	1.3 (0.7-2.2)
SVT	25		7	
VT	-		5	
Other arrhythmias	14	1.5 (0.9-2.5)	9	1.0 (0.5-1.8)
Bradycardia due persistent blocked PACs	10		-	
AV-block	2		2	
PVC	2		6	
LQTS	-		1	
Antiarrhythmic therapy	15	1.6 (1.0-2.6)	13	1.4 (0.8-2.4)
For tachyarrhythmia	14		11	
For other arrhythmias	1		2	
Fetal death	2	0.2 (0.1-0.8)	-	
Neonatal death	-		1	0.1 (0.0-0.6)
Infant death	-		1	0.1 (0.0-0.6)
Total incidence of adverse outcomes			64	6.8% (5.4-8.6)

Detailed description of CHD cases

Case no.	Type of PACs	Prenatal diagnosis	Postnatal diagnosis	Postnatal course
1	Runs of SVT	Coarctation aortae	Not confirmed	Normal cardiac anatomy (FP)
2	Moderate	VSD	VSD	Spontaneous closure of VSD
3	Blocked	VSD	2x VSD	Pediatric/cardiac FU
4	Runs of SVT	VSD	2x VSD	Pediatric/cardiac FU
5	Bigeminy	PLSVC	PLSVC	No FU indicated
6	Blocked	PLSVC	PLSVC	No FU indicated
7	Simple	Coarctation aortae	Borderline small left ventricle	Prostin after birth, in pediatric/cardiac FU
8	Frequent	TGA	TGA	Surgery on day nine with good outcome, in pediatric/cardiac FU
9	Moderate	Ebstein's anomaly	Ebstein's anomaly	Severe cardiac failure, neonatal death after two hours
10	Runs of SVT	-	ASD type II	Surgical closure
11	Unknown	-	ASD + VSD	No FU available
12	Blocked	-	VSD	Spontaneous closure of VSD
13	Frequent	-	Multiple VSDs, PDA, pulmonary hypertension	Pediatric/cardiac FU
14	Bigeminy	-	Rhabdomyoma	Spontaneous resolved rhabdomyoma, no tuberous sclerosis found.
15	Trigeminy	-	TGA	Surgery on day three with good outcome, in pediatric/cardiac FU



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