Fetal cardiac arrhythmia - haemodynamic consequences, and clinical significance

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Fetal cardiac arrhythmia is a relatively common finding in pregnancy. The present study gives an account of the clinical experience gained from a large group of fetuses with various types of cardiac arrhythmia.

MATERIAL AND METHODS

During four years 94 pregnancies with fetal cardiac arrhythmia were examined. In all of them fetal ECG was recorded and an examination of the fetal anatomy with special concern to the fetal heart was performed using real-time ultrasound. In 52 pregnancies fetal phonocardiogram was recorded and in 48 pregnancies fetal blood flow in the descending aorta and in the intraabdominal part of the umbilical vein was measured by means of a non-invasive ultrasonic method combining real-time ultrasonography and pulsed Doppler technique (1).

RESULTS AND COMMENTS

Clinical significance of fetal cardiac arrhythmia. Distribution of the various types of fetal cardiac arrhythmia in the group of 94 pregnancies is given in Table I. The median gestational age at the time of the first detection of the fetal arrhythmias was 34 weeks (range 22-42 weeks). In five cases the arrhythmia was detected during labour. In 26 fetuses the arrhythmia persisted postnatally. Thus, in about 70% of all fetuses with antenatally detected arrhythmia, the arrhythmia disappeared spontaneously before delivery. The outcome of pregnancies was as follows: Three of the fetuses died *in utero* (one because of multiple heart malformation with a circulatory failure, two fetuses because of an acute abruptio placentae); one preterm neonate died shortly after delivery because of cardiomyopathy. Two children having severe heart malformations died within one month. Frequency of intrauterine fetal distress was increased compared to the general population as was the frequency of operative deliveries.

Table I. Types of fetal cardiac arrhythmia

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Supraventricular arrhythmia	
Atrial premature beats	58
Paroxysmal tachycardia	16
Atrial flutter/fibrillation	1
Sinus bradycardia	3
Atrioventricular block	
Second degree block	3
Third degree block	2
Ventricular arrhythmia	
Ventricular premature beats	11
Total	94

Four of the fetuses were treated with digoxin *in utero* because of imminent or established heart failure. Two of them had paroxysmal tachycardia, one had atrial flutter/fibrillation and one total atrioventricular block. In all of them the treatment was successful as demonstrated by the diminishment or disappearance of the signs

of heart failure (ascites, hydrothorax, heart enlargement). Six of the newborns required digitalis treatment postnatally; antiarrhythmic drugs had to be used in five children.

Haemodynamic consequences of fetal arrhythmia were evaluated by measuring fetal aortic and umbilical blood flow. In all but three fetuses the time-average blood velocity and the mean blood flow were within the normal range. One of the fetuses with low blood flow died in utero because of severe heart malformation and heart failure. The other two fetuses were digitalized in utero (one with atrial flutter and one with a total atrioventricular block) and in both of them a normalization of the aortic blood flow was demonstrated. The analysis of the blood flow velocity traces of the fetuses with supraventricular and ventricular premature beats indicated that the postextrasystolic potentiation of the myocardial contraction is present already in utero and that the fetal heart compensates the less haemodynamically effective beats according to the Frank-Starling law.

CONCLUSIONS

Pregnancies with fetal cardiac arrhythmia have an increased perinatal mortality and morbidity and should be considered an obstetric high-risk group. Investigation of the fetuses with arrhythmia should include ECG and phonocardiography for typing of the arrhythmia and real-time echography and fetal blood flow measurement for evaluation of the haemodynamic consequences. In fetuses with atrioventricular block a heart malformation is often present. Both these fetuses and fetuses with supraventricular tachyarrhythmias are at risk of intrauterine heart failure. In some of them, intrauterine pharmacological therapy might be necessary. The effect of such therapy may be followed by longitudinal measurements of fetal blood flow. Supraventricular and ventricular premature beats are usually clinically less important and dissappear in most of cases spontaneously.

1. S.H. Eik-Nes et al., J. Biomed. Engng. 4:28-36, 1982.

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