Analysis of heart rhythm distrubances

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Abstract

Objective: The dissertation was focused on prenatal cardiology. Prenatal cardiology is a relatively young field, which is focused on diagnosis and treatment of fetal heart. In the thesis, I focused on the issue of cardiac arrhythmias: pathophysiology, diagnosis and therapeutic management of prenatally heart rhythm disturbances. The most frequent type of prenatal arrhythmias are fetal isolated complete atrioventricular (AV) block and supraventricular tachycardia (SVT). Although these rhythm heart disorders are relatively rare, but can lead to heart failure and are important causes of fetal mortality.

Methods: We performed measurement of mechanical atrioventricular conduction time intervals in human foetuses assessed by Doppler echocardiography and provided reference values. We compared reference values with foetuses of mothers with anti-SSA Ro/SSB La autoantibodies, being in risk of isolated congenital heart block development.

We collaborated in a multinational, multicenter retrospective study of 175 fetuses diagnosed with AV block (2000 –2007) to analyse the influence of the treatment.

We compared 2 treatment protocols (Prague and London) to find out the optimal treatment strategy of fetuses with supraventricular tachycardia.

The severity of heart failure in each fetus with complete AV block or SVT was scored according to the Foetal Heart Failure Score (Falkensammer et al. 2001) to assess the impact of treatment. This multifactorial score combines assessment of direct and indirect markers of cardiovascular function.

Results: We found, that signs of heart failure improved in fetuses with complete AV block treated with fluorinated corticoids, however no effect on mortality was seen. Fetuses with isolated complete atrioventricular block have significant intra-uterine mortality. Risk factors associated with a poor outcome of fetuses with complete AV block were gestation <20 weeks, ventricular rate < 50 bpm, hydrops, and impaired left ventricular function.

By comparing two treatment protocols of fetuses with SVT (digoxin vs. flecainide), we found that initial treatment with digoxin more often required the additional antiarrhythmic drugs. The probability of a successful treatment was significantly lower in foetuses with the hydrops, decreased function of left ventricle and arrhythmias with long VA interval (ectopic SVT). Altered systolic function prior to the treatment was a significant predictor of failure of prenatal pharmacological treatment in our study.

Conclusions: Based on the results of this work, we have changed the treatment of SVT in fetuses with hydrops of digoxin on flecainide. In the absence of certificates of treatment effect forms a complete AV block using glucocorticoids and knowledge of their potential risk to the developing fetus, we completed an established treatment protocol and consider other treatment not indicated.