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Hypertension in the Fetus: Evaluation before Conception and Intrauterine Treatment

Ellen Kernsa*

Nanjing Prevention and Treatment Center for Occupational Disease, Nanjing, P.R China

Introduction

Fetal arrhythmias account for 10–20% of referrals to fetal cardiology and occur in 1–3% of pregnancies. Atrial bigeminal ectopic beats (3/45, 6.7%), premature ventricular contractions (PVCs), supraventricular tachycardia (SVT) (5/45, 11.1%), ventricular tachycardia (1.2%), second-degree atrioventricular (AV) block (2.2%), and atrial bigeminal ectopic beats (28/45, 62.2%). A 10-year study of pregnant women found 29 cases of foetal arrhythmias, including 12 (41.4%) cases of foetal tachycardia (10 with SVT, 2 with AF), 5 (17.2%) cases of foetal bradyarrhythmia (5 with AV block), and 12 (41.4%) cases of foetal irregular cardiac rhythms (premature atrial beats). SVT and total AV block are uncommon malignant fetal arrhythmias [1].

Those with benign arrhythmias, such as sinusal tachycardias and PACs with less than 11 beats per minute (bpm), did not require treatment before or after birth; However, due to the fact that these arrhythmias can lead to preterm birth, those with postnatal hemodynamic fluctuations did so. Hydrops fetalis, cardiac dysfunction, and possibly fetal death are all increased by persistent foetal arrhythmias. Prenatal therapy is therefore necessary to increase fetal survival rates. Prenatal screening and intrauterine therapy for foetal arrhythmias are a complicated and challenging subject, and the purpose of this study is to investigate them [2].

Description

Diagnosis

Early detection in the first trimester, an unfavorable foetal position, hydrops fetalis, foetuses with cardiac contractile malfunction, and obese pregnant women can all affect the characteristics of the diagnosis. M-mode ultrasonography can detect the AV and ventriculoatrial (VA) gaps, foetal heart rate, AV conduction, and even the percentage of ejection. Crowley and co utilized M-mode data and a two-dimensional scan head to diagnose fetal arrhythmias. Researchers used semilunar and AV valve opening and closing points, as well as a waves and ventricular wall movements, to measure the heart rate and rhythm of the fetus. Two-dimensional echo was used to find arrhythmias in two foetuses in their patient context. The simultaneous display of two-dimensional real-time images in anatomic M-mode views makes it possible to trace the atria and ventricles with greater precision than with standard M-mode views [3].

The atrial and ventricular waves can be recorded simultaneously using doppler ultrasound. Mechanical VA intervals can be categorized as short or long in SVT. Doppler echocardiography can help differentiate between AV nodal re-entrant tachycardia and permanent junctional bidirectional tachycardia, which both have short VA intervals and long VA intervals, respectively. Doppler ultrasound is superior to M-mode at capturing flow velocity waveforms in the ascending aorta and superior vena cava. A typical Doppler flow velocity pattern with 1:1 AV conduction and a tall A wave overlaid on the aortic ejection wave may be seen in fetuses with transient VA tachycardia. A fast-conducting re-entrant tachycardia of the AV accessory pathway was identified.

Prior to the aortic ejection wave in protracted VA tachycardia, an A wave with a normal amplitude and AV time interval may be detected. Doppler waves collected in the inferior vena cava and descending aorta aid in the simultaneous acquisition of atria and ventricles systoles. If the foetus is not in the right position for simultaneous recordings, the results may be compromised. Doppler echocardiography can detect arrhythmic patterns and rhythm discrepancies between the spectra by detecting the flow imaging frequency band of the pulmonary arteries and veins. This method can easily determine the PR interval and distinguish between atrial and ventricular systoles [1].

Because it detects the signal averaging of electrocardiographic complexes, foetal electrocardiography (ECG) does not provide beat-to-beat analysis. Folate rhythm and conduction anomalies cannot be detected with it in patients with irregular cardiac rhythms.

Foetal Magnetocardiography (MCG) can identify and classify arrhythmias in real time with higher signal quality than electrocardiography because magnetic signals have better transmission characteristics than electrocardiography. Foetal arrhythmias such as complete AV block, premature contractions, paroxysmal SVT, Wolff-Parkinson-White syndrome, and long QT syndrome can be diagnosed prior to pregnancy. Using the magnetic equivalent of an ECG, on the other hand, requires a magnetically protected environment. The cardiac time intervals known as the QRS and QT intervals can be obtained from both the MCG and the ECG [4].

Prognosis

Foetal arrhythmia can take many different forms, each with a different outlook. Individualized and clinical treatment should be based on the individual. Premature contractions are the most common type of foetal arrhythmia. These contractions have no effect on the growth and development of the fetus and have a good short- and long-term prognosis. SVT is the most common rapid foetal arrhythmia, affecting between 0.4% and 0.6% of all foetuses. Most rapid foetal arrhythmias are caused by a temporary, nonorganic lesion. Foetal bradycardia was initially treated with steroids and/or plasmapheresis, but its efficacy is still debated. The kind and severity of the heart defect typically determine the patient's clinical outcome and prognosis. It is essential to pay close attention when a foetal arrhythmia, particularly a foetal bradycardia, is detected to check for any heart structural abnormalities. In terms of outcomes and prediction, appropriate clinical measures should be taken into consideration [5].

Conclusion

Premature contractions and sinus tachycardia are examples of benign foetal arrhythmias that do not necessitate perinatal treatment. Because they have the potential to result in hydrops fetalis, cardiac dysfunction, or even fetal death, sustained foetal arrhythmias must be treated as soon as possible. Depending on the type of tachyarrhythmia, its cause, and the conditions of the foetus (hydrops fetalis, cardiac function, maternal autoantibody positivity, etc.), intrauterine therapy may be beneficial. A significant conversion rate

***Address for Correspondence:** Ellen Kernsa, Nanjing Prevention and Treatment Center for Occupational Disease, Nanjing, P.R China, E-mail: EllenKernsa45@gmail.com*

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was observed when first-line antiarrhythmic medications were administered transplacentally. In patients who are resistant to drugs or have hemodynamic problems, fetal cardiac pacings are a good way to get sinus rhythm back. A post pregnancy pacemaker ought to be embedded immediately in recalcitrant circumstances.

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