Fetal Cardiac Pacemaker

When function of SN cells is compromised, fetal arrhythmia can arise and be detected using echocardiography. Transient fetal arrhythmias are more common than persistent fetal arrhythmias. However, persistent severe bradycardia and sustained tachycardia may cause a congestive heart failure. The progression of congestive heart failure to a hydropic state is related to an elevation of venous pressure resulting in an increased capillary permeability and edema. In the year 2000, perinatal mortality was still 100% in fetuses with heart block and bradycardia at the stage of full-blown hydrops. Fetal cardiac pacing systems were developed to save these fetuses and included pacing catheters and external pulse generators. These generators are located outside the uterus and a pacing catheter passes through the abdominal wall, uterine musculature, across the amniotic fluid directly to the heart of the fetus. However, most efforts to save a fetus so far met with failure due to either dislodging of the catheter or umbilical cord complications. Permanent fetal pacemaker will have the following features: a) to be implanted, the device does not use the umbilical vasculature and b) the cylindrical battery/pulse generator, was made short in length to avoid or decrease the chance of umbilical cord knotting or entanglement. Design for continuous fetal cardiac pacing, this pacemaker contains a pulse generator and a short pacing electrode with a spiral end, which straightens for insertion and widens after being implanted. The spiral end of the electrode maintains stable position once placed in the fetal thoracic cavity. New directions in fetal pacing-wireless pacemaker: Over the years development of cardiac pacing revealed the weakness of the wire component of the pacing system and led to the creation and manufacturing of the wireless or leadless pacemakers. However, despite the clear advantage of the leadless device, there are many technical problems still remain. Loel, et al. proposed a miniature pacemaker with a long electrode and a circuit board powered by a lithium battery. A charging system of this device works by using radio waves. The system is small and minimally interferes with fetal activity. This device is still under development and requires additional experiments to achieve optimal performance.

Biography

Boris Petrikovsky completed his postgraduate training at SUNY Downstate/Maimonides Medical Center (Brooklyn, NY) and his fellowship in Maternal-Fetal Medicine at the University of Connecticut in 1988. That same year, he was a visiting researcher at Kings College School of Medicine (London, UK), specializing in Fetal Medicine and Surgery. From 1992-1999, he served as a Chief of Maternal-Fetal Medicine at North Shore University Hospital. He serves as a member of the editorial board of journals of neonatal intensive care, ultrasound diagnosis in obstetrics and pediatrics. He also serves as a reviewer for the American Journal of Obstetrics and Gynecology and the Journal of Clinical Ultrasound and Obstetrics and Gynecology. His major research interests are fetal medicine, prenatal diagnosis, fetoscopy, fetal cardiology, Ob/Gyn sonography and invasive Ob/Gyn procedures. He is board certified in Obstetrics and Gynecology and Maternal-Fetal Medicine. He is a Professor of Obstetrics and Gynecology at NYU School of Medicine.

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