World Academy of Science, Engineering and Technology
International Journal of Health and Medical Engineering
Vol:18, No:07, 2024

Treatment and Diagnostic Imaging Methods of Fetal Heart Function in Radiology

Authors : Mahdi Farajzadeh Ajirlou

Abstract : Prior evidence of normal cardiac anatomy is desirable to relieve the anxiety of cases with a family history of congenital heart disease or to offer the option of early gestation termination or close follow-up should a cardiac anomaly be proved. Fetal heart discovery plays an important part in the opinion of the fetus, and it can reflect the fetal heart function of the fetus, which is regulated by the central nervous system. Acquisition of ventricular volume and inflow data would be useful to quantify more valve regurgitation and ventricular function to determine the degree of cardiovascular concession in fetal conditions at threat for hydrops fetalis. This study discusses imaging the fetal heart with transvaginal ultrasound, Doppler ultrasound, three-dimensional ultrasound (3DUS) and four-dimensional (4D) ultrasound, spatiotemporal image correlation (STIC), glamorous resonance imaging and cardiac catheterization. Doppler ultrasound (DUS) image is a kind of real- time image with a better imaging effect on blood vessels and soft tissues. DUS imaging can observe the shape of the fetus, but it cannot show whether the fetus is hypoxic or distressed. Spatiotemporal image correlation (STIC) enables the acquisition of a volume of data concomitant with the beating heart. The automated volume accession is made possible by the array in the transducer performing a slow single reach, recording a single 3D data set conforming to numerous 2D frames one behind the other. The volume accession can be done in a stationary 3D, either online 4D (direct volume scan, live 3D ultrasound or a so-called 4D (3D/ 4D)), or either spatiotemporal image correlation-STIC (off-line 4D, which is a circular volume check-up). Fetal cardiovascular MRI would appear to be an ideal approach to the noninvasive disquisition of the impact of abnormal cardiovascular hemodynamics on antenatal brain growth and development. Still, there are practical limitations to the use of conventional MRI for fetal cardiovascular assessment, including the small size and high heart rate of the mortal fetus, the lack of conventional cardiac gating styles to attend data accession, and the implicit corruption of MRI data due to motherly respiration and unpredictable fetal movements. Fetal cardiac MRI has the implicit to complement ultrasound in detecting cardiovascular deformations and extracardiac lesions. Fetal cardiac intervention (FCI), minimally invasive catheter interventions, is a new and evolving fashion that allows for in-utero treatment of a subset of severe forms of congenital heart deficiency. In special cases, it may be possible to modify the natural history of congenital heart disorders. It's entirely possible that future generations will ‘repair’ congenital heart deficiency in utero using nanotechnologies or remote computer-guided micro-robots that work in the cellular layer.

Keywords : fetal, cardiac MRI, ultrasound, 3D, 4D, heart disease, invasive, noninvasive, catheter
Conference Title : ICRMI 2024 : International Conference on Radiology and Medical Imaging
Conference Location : Washington, United States
Conference Dates : July 15-16, 2024

Open Science Index, Health and Medical Engineering Vol:18, No:07, 2024 publications.waset.org/abstracts/187696.pdf