

GW26-e2137**Characterization of hemodynamics in Great Arteries of Wild-type Mouse using CFD based on Ultrasound Images**

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OBJECTIVES Hemodynamic factors in cardiovascular system are hypothesized to play a significant role in causing structural heart development. It is thus important to improve our understanding of velocity characteristics and parameters. We present such a study on wild-type mouse to characterize the vessel geometry, flow pattern and wall shear stress (WSS) in great arteries.

METHODS Micro-ultrasound imaging for small animals was used to measure blood boundary and velocity of the great arteries. Subsequently, specimens flow boundary conditions were used for 3D reconstructions of great artery and aortic arch dimensions and blood flow velocity data were input into subject-specific computational fluid dynamics (CFD) for modeling hemodynamics.

RESULTS Measurement by Micro-ultrasound imaging showed blood velocities in great artery and aortic arch had strong correlations with vascular sizes, while blood pressure had a weak trend in relation to vascular size. Wall shear stress magnitude increased when closer to arterial branches and reduced proximal to the root aorta and descending aorta, and the parameters were related to the fluid mechanics in branches in some degree.

CONCLUSIONS We developed a method to investigate fluid mechanics in mouse arteries, using a combination of micro-ultrasound and CFD, and demonstrated its ability to reveal detailed geometric, kinematic and fluid mechanics parameters.

GW26-e2140**The Study of Ebstein's Anomaly in Fetus Echocardiography**

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OBJECTIVES Prenatal diagnosis and assessment of Ebstein anomaly (EA) requires quantitative measurement of displacement of tricuspid valve. In this study, we assessed the traditional and new measures to evaluate EA and to attempt to define the cut-off values in fetuses for diagnosis of EA

METHODS A total of 15 fetuses with EA, 34 with moderate to severe tricuspid regurgitation, 34 with mild tricuspid regurgitation and 34 with structural normal hearts between October 2010 and October 2014 at our institution were studied. Nine variables were measured in four chamber views, including: 1) mitral-tricuspid valve distance (MTD), 2) distance from tricuspid valve (TV) septal insertion to the apex, 3) distance from TV septal insertion to right atrium roof, 4) distance from mitral valve (MV) septal insertion to the apex, 5) distance from MV insertion to left atrium roof, 6) area of right atrium (RA), 7) area of functional right ventricle (RV), 8) area of left atrium (LA) and 9) area of left ventricle (LV). All the variables were analyzed between the EA group and the other 3 groups using Mann-Whitney rank test. The optimal cut-off values were obtained using ROC curve analyses.

RESULTS In the fetuses with EA, the septal leaflets and anterior leaflets of TV were displaced apically and the posterior leaflets prolonged. The 6 variables measured in EA fetuses, including MTD, 2)/3), 3)/5), 7)/6), 6)/7)+8)+9) were 8.98 ± 3.27 cm, 0.26 ± 0.11 , 0.48 ± 0.17 , 0.25 ± 0.21 , 0.52 ± 0.27 , and 1.25 ± 0.67 , which were significantly different from the other three groups ($p < 0.01$). The areas under ROC curve were 1.000, 0.995, 0.995, 0.927 and 0.924, respectively. And the Youden Indexes are 1, 0.961, 0.941, 0.857 and 0.890 respectively. And the optimal cutoff thresholds were 0.51 cm, 0.78, 0.72, 0.72 and 0.54, respectively.

CONCLUSIONS Quantitative measurements and analyses of prenatal echocardiographic variables in EA provide valuable tools for diagnosis and longitudinal follow-up of fetuses with EA.

GW26-e2146**An Analysis of Echocardiographic Characteristics of Ventricular Diverticula: from fetuses to adults**

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OBJECTIVES To retrospectively analyzed echocardiographic characteristics of ventricular diverticula in fetuses, children and adults.

METHODS Echocardiographic characteristics of ventricular diverticula in 8 fetuses, 3 children and 12 adults were summarized, including the position, type, and size of the diverticula, other cardiac and extracardiac abnormalities. Meantime, the clinical histories, other accessory examinations, intraoperative findings of the cases were collected, and outcomes of the 8 fetal cases were followed up.

RESULTS There were 3 muscular and 5 fibrous diverticula of the 8 fetal cases. 2 cases were born, 3 cases were terminated pregnancy, and 3 cases were lost to follow up. 1 muscular diverticulum, 2 fibrous diverticula were found in the 3 children cases. Of the 14 adult cases, there were 17 diverticula founded including 2 cases with multiple diverticula. The cardiac and extracardiac abnormalities in fetal and children diverticula were ventricular septal defects, pericardial effusion, single umbilical artery and atrioventricular valvular regurgitation. All the fibrous diverticula in adults had ventricular arrhythmias. No such complications as cardiac rupture, thromboembolism, and sudden death were found. 2 children and 5 adults were underwent cardiac operations for diverticula.

CONCLUSIONS Congenital ventricular diverticula are rare. Fibrous diverticulum is more common than the muscular type in fetus, child, and adult period. The main complications in fetuses and children are structural abnormalities, whereas in adults are ventricular arrhythmia. The surgical results of diverticula are good. Echocardiography is a useful method to diagnose ventricular diverticulum, especially for fetus.

GW26-e1231**Preparation and Evaluation of SDF-1-targeted Ultrasound Contrast Agent**

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OBJECTIVES To prepare contrast-enhanced ultrasonography that targets Stromal cell-derived Factor -1(SDF-1) using a biotin-streptavidin way and evaluate its stability in vivo and in vitro.

METHODS To prepare microbubbles carrying SDF-1 antibody using the biotin-streptavidin way. The physiochemical properties of microbubbles were evaluated by appearance, pH, particle diameter, optical and fluorescence microscope and flowcytometry test. Establishment of AMI the model, the stability of microbubbles were assessed by immunofluorescence test in vivo.

RESULTS SDF-1 and microbubbles can be combined by biotin-streptavidin. In vitro appearance is translucent yellow or green, stratification after placed. pH: non-targeted contrast agent was 7.02 ± 0.12 , targeted microbubbles contrast agent was 6.10 ± 0.19 . Optical microscope: the two groups of contrast agents has no obvious difference between shape. Fluorescence microscope: the distribution and size of targeted microbubbles is uniform, and the microbubbles is surrounded by bright and ring shaped green fluorescent. Surface fluorescence has no obvious change after volatility. Particle diameter: targeted contrast agent microbubbles diameter size is about 2422.6 ± 238.8 nm after carrying the SDF - 1 antibody. Flowcytometry test: carrying rate of targeted contrast agent is stable in different periods. The binding rate of SDF-1 antibody before and after shaking was no significant different ($78.2\%\pm 4.2\%$ VS $76.5\%\pm 3.2\%$, $P=0.85$). In vivo test, targeted microbubbles gathered in vascular endothelial cell surface after acute myocardial infarction(AMI).

CONCLUSIONS The carrying SDF-1 monoclonal antibody microbubbles by biotin-streptavidin can be combined with vascular endothelial cells. The combining rate is high and stable in vitro and in vivo.

GW26-e2131**Fetal echocardiography in diagnosis of cardiac mass**

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OBJECTIVES To investigate the value of fetal echocardiography in diagnosis of fetal cardiac tumor.

METHODS Fifteen patients with cardiac tumor from 5968 fetal echocardiography examinations were analyzed. The tumors' location, numbers, the influence on intracardiac flow, intracardiac and extracardiac abnormalities were recorded.

RESULTS The incidence of cardiac tumor in our center was 0.25%. In 15 fetuses with cardiac tumor, 11 were single and 4 were multiple tumors. The most involved chamber was left ventricle (LV). One case was reported restriction of foramen ovale, one was found obstruction