GMR Genetics and Molecular Research
Online Journal
ISSN:1676-5680

Three-dimensional digital visible heart model and myocardial pathological characteristics of fetal single ventricle connected with aortic coarctation

B. Ren[1]*, Y. Jiang[1]*, H.M. Xia[1], X.Y. Li[1], L.W. Tan[2], Y. Li[2], Q.Y. Li[2], X.S. Li[2] and Y.H. Gao[1]

[1]Department of Ultrasound, Second Affiliated Hospital, Third Military Medical University, Chongqing, China
[2]Department of Anatomy, Third Military Medical University, Chongqing, China

*These authors contributed equally to this study.
Corresponding author: H.M. Xia
E-mail: bryjcn@163.com

Genet. Mol. Res. 12 (4): 5247-5256 (2013)
Received May 9, 2013
Accepted September 10, 2013
Published October 30, 2013
DOI http://dx.doi.org/10.4238/2013.October.30.9

ABSTRACT. This study aimed to provide data for imaging diagnosis and clinical surgical plans by reconstructing a three-dimensional (3-D) digital visible heart model of single ventricle (SV) connection with aortic coarctation (CoA) and characterizing the myocardial and vascular wall pathological characteristics. Fifteen miscarried fetus cadavers with SV and CoA were selected. Fourteen cardiac specimens were systematically reviewed for segmental anatomy and conventional histological examinations. One fetus cadaver was used to obtain the structural dataset of the fetal body and to reconstruct a 3-D digital visible heart model. Specimen pathological dissection indicated hypertrophic myocardium SV, significant aortic wall thickening, and localized coarctation area elevation. Ten cases of SV with left ventricular morphology displayed a large muscle ridge and solitus

normally aligned great arteries. Five cases of SV with right ventricular morphology had coarse, parallel trabeculations and received a common atrioventricular valve. The reconstructed 3-D heart and the main internal structures were realistic, which were beneficial for clinical and image teaching of fetal heart development. The change of characteristics of the myocardium and great vascular wall was obvious and may be the critical cause leading to progressive dysfunction in the postnatal heart.

Key words: Digital visible heart model; Cardiomyopathy; Prenatal echocardiographic diagnosis

