CASE REPORT

HDlive Flow for the Diagnosis of Double Outlet Right Ventricle at 19 Weeks of Gestation

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ABSTRACT

We present a case of double outlet right ventricle (DORV) diagnosed prenatally using HDlive Flow with spatiotemporal image correlation (STIC) at 19 weeks of gestation. Bilateral choroid plexus cysts were noted on routine second-trimester screening. Ventricular septal defect, a small pulmonary artery, and parallel arrangement of great arteries were identified using conventional fetal echocardiography and Radiant Flow. HDlive Flow clearly showed a large aorta and small pulmonary artery leaving the right ventricle in parallel. Moreover, abnormal running of the aortic arch and descending aorta was depicted spatially. The diagnosis of DORV was confirmed antenatally. HDlive Flow may be an adjunctive technology to conventional fetal echocardiography for the assessment of normal and abnormal cardiac structures of the fetus *in utero*.

Keywords: 3D/4D fetal echocardiography, Double outlet right ventricle, HDlive Flow, Prenatal diagnosis, Spatiotemporal image correlation.

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INTRODUCTION

HDlive Flow is a novel color/power Doppler technology, which generates three-dimensional (3D)/four-dimensional (4D) reconstructions of normal and abnormal fetal cardiac structures,^{1–10} fetal blood vessels,^{11–15} normal and abnormal placentas,¹⁶ and gynecologic disorders.^{17–28} There have been only two studies on prenatal 3D color Doppler or HDlive Flow evaluation of double outlet right ventricle (DORV).^{29,30} However, ages at the examination in both cases were after 30 weeks of gestation. Moreover, the image quality of 3D color Doppler in the first case was poor.²⁹ In this study, we present a case of DORV diagnosed prenatally using HDlive Flow at 19 weeks of gestation and recommend the use of HDlive Flow for the prenatal diagnosis of congenital heart anomaly.

CASE DESCRIPTION

A 25-year-old pregnant Japanese woman, G (1), P (0), received a routine second-trimester screening at 19 weeks of gestation. Two-dimensional (2D) sonography revealed bilateral choroid plexus cysts. Fetal biometry was consistent with the corresponding gestational age. Two-dimensional fetal echocardiography and Radiant Flow showed a ventricular septal defect, small pulmonary artery, and parallel arrangement of great arteries (Figs 1 to 4). HDlive Flow spatiotemporal image correlation (STIC) (Voluson E10 BT20, GE Healthcare Japan, Tokyo, Japan) clearly demonstrated a large aorta and small pulmonary artery leaving the right ventricle in parallel (Fig. 5). Moreover, abnormal running of the aortic arch and descending aorta was depicted spatially (Fig. 6). The diagnosis of DORV was confirmed antenatally.

The patient and her husband desired to discontinue the pregnancy, and so abortion was induced at 21 weeks and 1 day of pregnancy, resulting in a male abortus weighing 349 g. The parents refused further workup, such as, autopsy and chromosomal analysis of the baby despite intensive counseling.

DISCUSSION

Conventional 2D sonographic characteristics of DORV are transposed parallel great vessels both arising from the right ventricle,³¹ and the

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aorta is displaced anteriorly and more to the right than normal on a three-vessel view.³² However, it is very difficult to differentiate DORV from other conotruncal abnormalities, especially tetralogy of Fallot.³¹ In the current case, the antenatal diagnosis of DORV was suspected by conventional fetal echocardiography. HDlive Flow provided additional useful information on the antenatal diagnosis of DORV. Its unique characteristics are spatially transposed parallel great vessels both arising from the right ventricle, and abnormal running of the aortic arch and descending aorta. In the normal fetal heart, criss-cross arrangements of the pulmonary artery from the right ventricle and aorta from the left ventricle are evident (Fig. 7). The 3D/4D shape of DORV using HDlive Flow is completely different from that of the normal fetal heart. HDlive Flow in fetal echocardiography may facilitate a greater understanding of the complex cardiac morphology, such as, DORV and more accurate prenatal diagnosis. Moreover, this technique may lead to a

Fig. 1: Four-chamber view of double outlet right ventricle at 19 weeks of gestation. Ventricular septal defect (arrow) is noted. DAo, descending aorta; LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle

Fig. 2: Four-chamber view of double outlet right ventricle at 19 weeks of gestation using Radiant Flow. LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle; VSD, ventricular septal defect

Fig. 3: Three-vessel view of double outlet right ventricle at 19 weeks of gestation. Ao, aorta; PA, pulmonary artery; SVC, superior vena cava

Fig. 4: Parallel arrangement of great arteries in case of double outlet right ventricle at 19 weeks of gestation using Radiant Flow. Ao, aorta; PA, pulmonary artery; DAo, descending aorta

Fig. 5: HDlive Flow image of double outlet right ventricle (spatial three-vessel view) at 19 weeks of gestation. The parallel arrangement of great arteries is clearly recognized. Ao, aorta; AoA, aortic arch; DAo, descending aorta; LV, left ventricle; PA, pulmonary artery; RPA, right pulmonary artery; RV, right ventricle; SVC, superior vena cava

Fig. 6: HDlive Flow Silhouette image of double outlet right ventricle (spatial three-vessel view) at 19 weeks of gestation. The parallel arrangement of great arteries is clearly shown. Ao, aorta; AoA, aortic arch; DAo, descending aorta; LV, left ventricle; PA, pulmonary artery; RV, right ventricle; VSD, ventricular septal defect

Fig. 7: HDlive Flow image of the normal fetal heart (spatial three-vessel view) at 18 weeks and 6 days of gestation. The criss-cross arrangement of great arteries is clearly recognized. Ao, aorta; AoA, aortic arch; DAo, descending aorta; HV, hepatic vein; LPA, left pulmonary artery; LV, left ventricle; PA, pulmonary artery; RA, right atrium; RV, right ventricle; SVC, superior vena cava

better understanding of complex congenital heart anomalies for beginners or sonographers unfamiliar with fetal echocardiography.

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