Transposition of Great Arteries Diagnosed at 20 Weeks of Gestation: HDlive Flow Features

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Abstract

We present a case of transposition of great arteries (TGA) diagnosed prenatally using HDlive Flow with spatiotemporal image correlation (STIC) at 20 weeks and 5 days of gestation. Right-sided stomach was noted on routine second-trimester screening. Ventricular septal defect, pericardial effusion, and parallel arrangement of great arteries were identified using two-dimensional fetal echocardiography and color Doppler. HDlive Flow with STIC clearly showed an aorta exiting the right ventricle and a pulmonary artery exiting the left ventricle in parallel. The diagnosis of TGA was confirmed antenatally. HDlive Flow with STIC should be an adjunctive technology to conventional fetal echocardiography for the prenatal diagnosis of TGA.

Keywords: 3D/4D fetal echocardiography, HDlive Flow, Prenatal diagnosis, STIC, Transposition of great arteries.

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Introduction

A number of studies have been published on the prenatal diagnosis of transposition of great arteries (TGA) with the application of three-dimensional (3D)/four-dimensional (4D) power Doppler, inversion mode or B-flow with spatiotemporal image correlation (STIC).[1–6] However, the resulting quality of images generated by these modalities was low. Recent advances in color/power Doppler technology have culminated in HDlive Flow with STIC, allowing 3D/4D reconstruction of normal fetal cardiac structures and congenital heart disease.[7–11] Up to the present, only three studies have used prenatal HDlive Flow with STIC to diagnose TGA.[12–14] Here, we describe a fetus with TGA diagnosed prenatally using HDlive Flow at a gestational age of 20 weeks and 5 days.

Case Description

Routine second-trimester screening was conducted at 20 weeks and 5 days of gestation for a 27-year-old pregnant Japanese woman, G (2), P (1). The gestational age was consistent with the fetal biometric data. Two-dimensional (2D) sonography led to the diagnosis of a right-sided stomach. A ventricular septal defect and pericardial effusion were also noted on 2D fetal echocardiography. A parallel arrangement of the great arteries was revealed by color Doppler (Fig. 1). HDlive Flow with STIC (Voluson E10 BT20, GE Healthcare, Zipf, Austria) clearly visualized an aorta left of the right ventricle and a pulmonary artery left of the left ventricle (Figs 2 to 5). Antenatally, the TGA was verified.

Both the patient and her husband wished for pregnancy termination, and so abortion was performed at 21 weeks and 6 days of pregnancy, with the male abortus weighing 420 g, with a height of 26 cm. In spite of comprehensive counseling, the parents did not consent to further work-up such as autopsy or chromosomal analysis of the baby.

Discussion

The capacity to prenatally diagnose TGA reduces infant mortality and morbidity in the initial postnatal year.[15] The TGA detection rate prenatally has significantly increased due to the introduction of a screening program and guidelines;[15,16] however, the rate is still under 50%, suggesting that strategies to increase rates of detection are insufficient.[17] 'Big-eyed frog' and 'I-shaped' signs using conventional techniques are typical markers for the antenatal diagnosis of TGA.[18,19] However, to realize an increase in detection rates, the development of further techniques may be necessary.

HDlive Flow with STIC generates useful, additional information for antenatal TGA diagnosis.[12–14] It promotes spatial understanding of the aorta left of the right ventricle and pulmonary artery left of the left ventricle. The use of HDlive Flow with STIC in fetal echocardiography has the potential to increase positional understanding of the great arteries, raise the accuracy of prenatal diagnosis, and improve rates of TGA detection.

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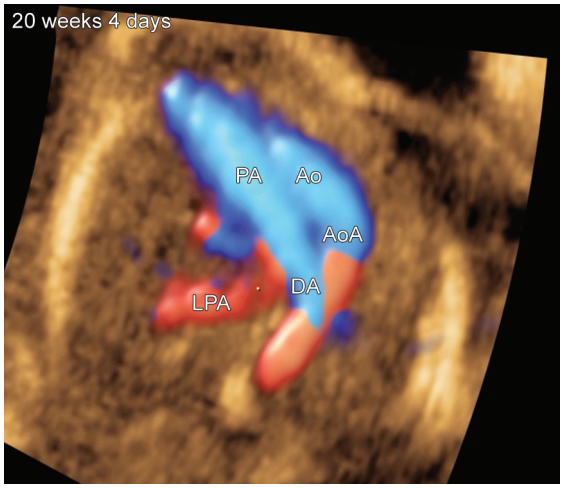

Fig. 1: Parallel arrangement of great arteries in a case of transposition of great arteries at 20 weeks and 5 days of gestation using color Doppler. Ao, aorta; AoA, aortic arch; DA, ductus arteriosus; LPA, left pulmonary artery; PA, pulmonary artery

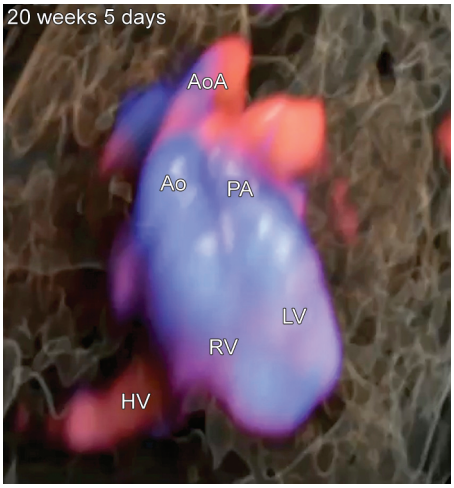

Fig. 2: HDlive Flow image of transposition of great arteries at 20 weeks and 5 days of gestation. Parallel arrangement of great arteries is clearly recognized. Ao, aorta; AoA, aortic arch; HV, hepatic vein; LV, left ventricle; PA, pulmonary artery; RV, right ventricle

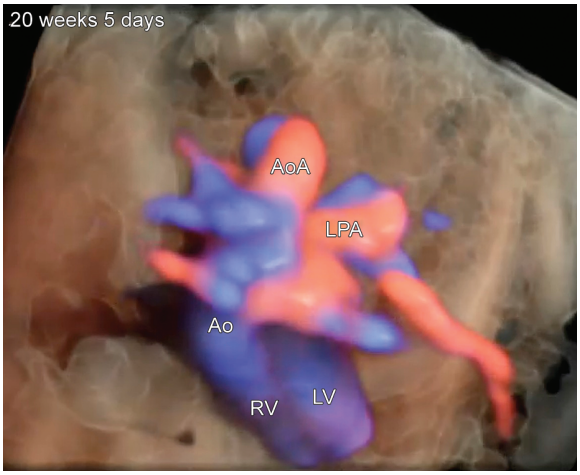

Fig. 3: HDlive Flow image of transposition of great arteries (spatial three-vessel view) at 20 weeks and 5 days of gestation. Ao, aorta; AoA, aortic arch; LPA, left pulmonary artery; LV, left ventricle; RV, right ventricle

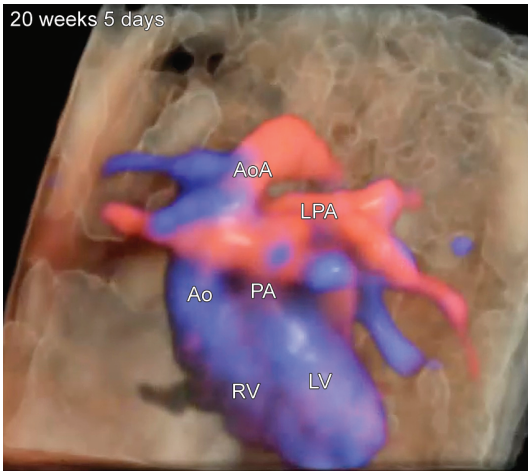

Fig. 4: HDlive Flow image of transposition of great arteries (spatial three-vessel view) at 20 weeks and 5 days of gestation. Parallel arrangement of great arteries is clearly recognized. Ao, aorta; AoA, aortic arch; LPA, left pulmonary artery; LV, left ventricle; PA, pulmonary artery; RV, right ventricle

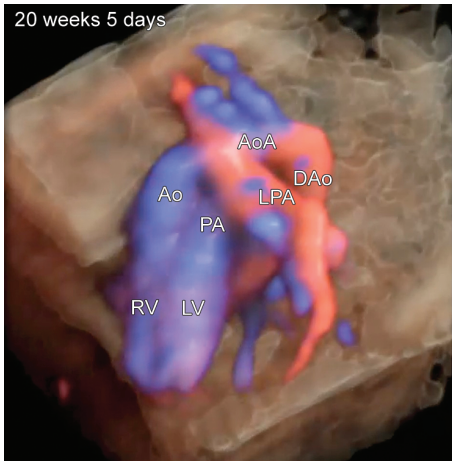

Fig. 5: HDlive Flow image of transposition of great arteries (panoramic view) at 20 weeks and 5 days of gestation. Parallel arrangement of great arteries is clearly recognized. Ao, aorta; AoA, aortic arch; DAo, descending aorta; LPA, left pulmonary artery; LV, left ventricle; PA, pulmonary artery; RV, right ventricle

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