

A New Field of 'Fetal Sono-ophthalmology' by 3D HDlive Silhouette and Flow

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ABSTRACT

Diagnostic ultrasound technology has remarkably evolved and contributed to accurate prenatal diagnosis and management. HDlive silhouette and HDlive flow are new applications of three-dimensional (3D) ultrasound technology. The algorithm of HDlive silhouette creates a gradient at organ boundaries where an abrupt change of the acoustic impedance exists within tissues. HDlive silhouette and flow can be called as 'see-through fashion'. The advantages of this 'see-through fashion' imaging are comprehensive orientation and persuasive localization of inner structure as well as of fetal angiostructure inside the morphological structure. Picture of the month demonstrates the fetal eye at 19 weeks of gestation. The lens, vitreous body and hyaloid artery inside the vitreous humor are well demonstrated. The hyaloid artery is retrogressing during pregnancy and no remnant hyaloid artery is visible in most of mature neonates. Therefore, hyaloid artery can be observed in only young fetuses and immature neonates. HDlive silhouette and flow has enabled us to depict fetal eye and ocular vascularity three-dimensionally. This new technology has a great potential to open a new field of 'fetal 3D sono-ophthalmology', which has been never invented by conventional ultrasound technology.

Keywords: 3D, Fetus, HDlive flow, HDlive silhouette, Prenatal diagnosis, See-through fashion, Sono-ophthalmology, Ultrasound.

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SONO-OPHTHALMOLOGY IMAGE

HDlive silhouette and HDlive flow¹ are new applications of three-dimensional (3D) ultrasound technology. The algorithm of HDlive silhouette creates a gradient at organ boundaries, fluid filled cavity and vessels walls, where an abrupt change of the acoustic impedance exists within tissues. By HDlive silhouette mode, an inner cystic

structure with fluid collection can be depicted through an outer surface structure of the body and it can be called as 'see-through fashion'.² The advantages of this 'see-through fashion' imaging are comprehensive orientation and persuasive localization of inner structure as well as of fetal angiostructure inside the morphological structure.²

The HDlive silhouette/flow ultrasound image (Fig. 1) demonstrates the fetal eye at 19 weeks and 3 days. The lens, vitreous body and hyaloid artery inside the vitreous humor are well demonstrated. The hyaloid artery is retrogressing during pregnancy and no remnant hyaloid artery is visible in most of mature neonates. Therefore, hyaloid artery can be observed in only young fetuses and immature neonates.

Several reports on ultrasound observation of fetal eyes by two-dimensional ultrasound have been published.³⁻⁶ Thereafter, prenatal ultrasound added 3D technology. Three-dimensional sonoembryology has allowed

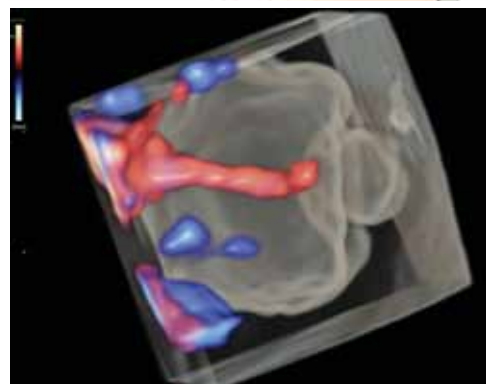
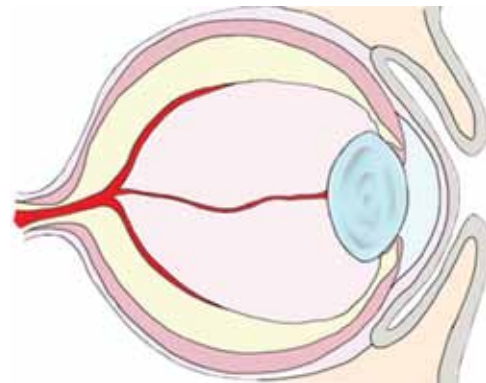


Fig. 1: Fetal vitreous body and lens by HDlive silhouette and hyaloid artery inside the vitreous humor by HDlive flow at 19 weeks of gestation. Bottom figure demonstrates vitreous body, lens and hyaloid artery by HDlive silhouette and flow. Top figure shows schematic picture of fetal eye. Hyaloid artery is rarely observed in mature neonates

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detailed anatomical visualization *in vivo* and is the basis for the assessment of anomalies as well as human development.⁷ The author demonstrated fetal cataract by 3D ultrasound.⁸ However, there has been limitation in objective demonstration of fetal eye. Inside vitreous humor, the central canal has been depicted by ultrasound but no reports have been published on 3D power/color Doppler demonstration of hyaloid artery as far as the author has searched. The algorithm of HD live silhouette and flow has enabled us to depict fetal eye and ocular vascularity three-dimensionally. This new technology has a great potential to open a new field of 'fetal 3D sono-ophthalmology', which has been never invented by conventional ultrasound technology.

REFERENCES

1. Pooh, RK.; Kurjak, A. Brand new technology of HDlive silhouette and HDlive flow images. In: Donald School Atlas of Advanced Ultrasound in Obstetrics and Gynecology. New Delhi, India: Jaypee Brothers Medical Publishers Private Limited 2015; p. 1-39.
2. Pooh, RK. See-through fashion in prenatal diagnostic imaging. Donald School J Ultrasound Obstet Gynecol 2015 Apr-Jun;9(2):111.
3. Zimmer EZ, Bronstein M, Ophir E, Meizner I, Auslender R, Groisman G, Meyer H. Sonographic diagnosis of fetal congenital cataracts. Prenat Diagn 1993 Jun;13(6):503-511.
4. Monteagudo A, Timor-Tritsch IE, Friedman AH, Santos R. Autosomal dominant cataracts of the fetus: early detection by transvaginal ultrasound. Ultrasound Obstet Gynecol 1996 Aug;8(2):104-108.
5. Achiron R, Keiser D, Achiron A. Axial growth of the fetal eye and evaluation of the hyaloid artery: in utero ultrasonographic study. Prenat Diagn 2000 Nov;20(11):894-899.
6. Mashiach R, Vardimon D, Kaplan B., Shalev J, Meizner I. Early sonographic detection of recurrent fetal eye anomalies. Ultrasound Obstet Gynecol 2004 Nov;24(6):640-643.
7. Pooh RK, Shiota K, Kurjak A. Imaging of the human embryo with magnetic resonance imaging microscopy and high-resolution transvaginal 3-dimensional sonography: human embryology in the 21st century. Am J Obstet Gynecol 2011 Jan;204(1):77.e1-e16.
8. Pooh RK. Three-dimensional sonoembryology. Donald School J Ultrasound Obstet Gynecol 2011 Jan-Mar;5(1):7-15.