Characteristic changes of the time interval of ventricular inflow patterns in the fetal growth restriction.

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Introduction
Flow velocity waveforms (FVW) of ventricular filling pattern is a useful tool to assess the fetal circulation and cardiac function. The aims of this study were to investigate the time intervals of ventricular inflow patterns in fetuses with fetal growth restriction (FGR) and to compare these with those of normal fetuses using reference ranges.

Method
This study included 310 normal fetuses aged 18 to 38 week's gestation and 34 FGR fetuses. FGR was defined if the fetal growth were below -2.0 SD with elevated umbilical artery pulsatile index. We investigated the time interval from the peak of E-wave to the peak of A-wave though the tricuspid valve and though the mitral valve. We call this parameter Rt-EA and Lt-EA, respectively. We also assessed the correlation with gestational age and compare the parameter between normal fetuses and FGR fetuses.

Result

~correlation with GA~

\[ r = 0.356, \quad p < 0.001 \]

~comparison between normal and FGR~

\begin{align*}
\text{Normal} & : -0.48 (-0.34 - 0.24) \\
\text{FGR} & : 0.50 (0.13 - 1.15)
\end{align*}

\[ z = 0.006, \quad z = 0.012 \]

Discussion
Shortening of systolic time and prolongation of diastolic time of DV-FVW in donors of twin-to-twin transfusion syndrome may be lead by hypovolemic condition.

Tachibana et.al. Ultrasound Obstet Gynecol 2015; 45
In the FGR, time interval for the opening time of the intraventricular valves were significantly increased. Kurihara et.al. Eur J Obstet Gynecol Reprod Biol. 2016; 203

Our result, which EA interval prolonged in FGR fetuses, may be influenced from hypovolemia.

Conclusion
A prolonged time interval between E-wave and A-wave in both ventricles may reflect hemodynamic alterations in FGR fetuses.