The Characteristics of The Physiological Development of Placental Chorionic Villous Vessels Between 19 and 38 Weeks Described Using Super Micro-vascular Imaging

Takashi Horinouchi, Toshiyuki Yoshizato, Yutaka Kozuma, Masato Yokomine, Kimio Ushijima
Maternal and Perinatal Medical Center, Kurume University Hospital, Japan

Introduction and Objective
Superb Micro-vascular Imaging (SMI) is a new technology for describing high-resolution Doppler images. The aim of this study is to analyze the characteristics of physiological development of the placental villous vessels (VVs) using SMI.

Materials and Methods
The subjects consisted of 6 cases of normal singleton. The observations were made longitudinally in all cases at 19-21, 29-31 and 36-38 weeks’ gestation using the transabdominal ultrasonography (Aplio i800, Canon Medical Systems, Japan).

The vessels were defined as primary, secondary and tertiary villous vessels (PVV, SVV, TVVs) according to the branching structures (Fig. 1).

In each scan, 5-6 VVs the branching vessel of which clearly delineated from primary to tertiary VVs were sampled and the following evaluations were made.

1) Branching characteristic of VVs
2) The distances between PVVs on the chorionic plate
3) The lengths of PVVs and SVVs

The statistical analysis was made with the Kruskal-Wallis one-way ANOVA on ranks test and the Dunn’s test using JMP 11.0 (SAS Institute Inc., Cary, North Carolina, USA) and the significance was set at P<0.05.

Results
Two patterns of VVs were evident: “tree” and “shrub” types (Fig.1).

The distances between PVVs at 19-21 weeks became elongated at 29-31 weeks, but no change thereafter at 36-38 weeks (Fig. 2, top).

The lengths of PVVs/SVVs at 19-21 weeks extended at 29-31 weeks, but showed no change thereafter at 36-38 weeks (Fig. 2, middle, bottom).

Conclusions
Primary and secondary villous vessels grew horizontally and vertically until 29-31 weeks and no changes thereafter. These changes of the branching vasculature would express the physiological development of the stem villi.