Quantified discordant placental echogenicity in twin-twin transfusion syndrome and anemia polycythemia sequence in correlation with peak systolic velocity middle cerebral artery Doppler values

Objective: Discordant echogenicity and thickness between the donor and recipient placenta has been proposed as an additional sonographic sign of twin-twin transfusion syndrome (TTTS) and twin anemia polycythemia sequence (TAPS). TAPS is mainly defined by postnatal intertwin hemoglobin difference above 8 g/dL. Prenatal criteria of TAPS are increased (>1.5 MoM) peak systolic velocity in the middle cerebral artery (MCA-PSV) in the donor twin and a decreased (<1.0 MoM) MCA-PSV in the recipient without amniotic fluid imbalance. The aim of this study was to quantify the placental echogenicity discrepancy in TTTS and TAPS cases correlated with MCA-PSV Doppler findings in both twins.

Methods: We retrospectively evaluated eight patients with TTTS and suspected anemia/polycythemia (n=6) or TAPS-alone (n=2) without or before fetoscopic laser treatment. All cases had difference in echogenicity of the placental part of the donor and recipient twin which were visible on the naked eye and shown on the same digital image. Prenatal placental echogenicity was quantified 40 times using an image processing program and the Doppler values of the MCA-PSV stored at the same examination were correlated to the placental brightness. The sonographic placental thickness was measured 42 times.

Results: All patients fulfilled the prenatal TAPS criteria regarding increased MCA-PSV in the donor twin and decreased MCA-PSV in the recipient co-twin. The mean placental echogenicity in the donor twin group was significantly higher than in the recipient group, 132.9 (STD 19.8) versus 52.7 (STD 19.1), respectively (p < 0.0001). Furthermore, we found a positive correlation between placental echogenicity and MCA-PSV in the entire group (R = 0.79, p < 0.0001). Placental region belonging to the donor was abnormally thick compared to the recipient area (58±14 mm versus 30±13 mm, p < 0.0001). The neonatal hemoglobin differences in the two TAPS-alone cases without laser treatment were 18.9 g/dL and 17.6 g/dL.

Conclusions: The significant discrepancy of echogenicity between the placenta of the recipient and the donor correlates with the MCA-PSV, respectively. The prenatal quantification of sonographic placental brightness and thickness may help to investigate the severity of anemia/polycythemia in monochorionic twins.