Prognostic Factors of Perinatal Short-term Outcome in Severe Placental Insufficiency Using Doppler Sonography to Assess End-diastolic Absent and Reverse Blood Flow in Umbilical Arteries

Original title: Prognosefaktoren des perinatalen Kurzzeitergebnisses bei schwerer Plazenta­insuffizienz mit dopplersonografisch enddiastolischem Null- und Rückfluss in der Art. umbilicalis

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Patients and Methods: A total of 364 Doppler examinations were undertaken in 58 high risk pregnancies with umbilical absent or reverse end-diastolic flow velocities (methods published elsewhere). The mean observational period was 12.8 days, with an average of 6.3 Doppler ultrasound examinations. Infants were described as healthy if they survived with no respiratory distress syndrome, bronchopulmonary dysplasia, necrotizing enterocolitis, or intraventricular hemorrhage grade III or IV.

Results: Fifty four live births occurred between 24 + 1 and 36 + 1 weeks of gestation; four died intra-utero, and seven in the post­natum. Of the live births, 87 % (47/54) survived, with a total survival rate of 81 % from the start of the Doppler examinations.

Perinatal outcomes and absent or reverse end-diastolic blood flow in the umbilical arteries: The mortality in the group with reverse end-diastolic flow was 26.7 % (8 of 30 fetuses) and 10.7 % (3 of 28 fetuses) (p = 0.182) in the group with absent end-diastolic velocity. The only significant difference of the two subgroups was an increased normoblast count in those with umbilical reverse end-diastolic blood flow.

Perinatal outcomes and Ductus venosus blood flow profile: The total mortality was significantly higher in the fetuses with absent or reverse end-diastolic blood flow (6/15) than in those with a positive end-diastolic flow (5/43) (p = 0.025) and than in the subgroup with a pathological pulsatility index (3/28, p = 0.046). After birth, those with venous absent or reverse end-diastolic flow had significantly poorer arterial pH, base excess, 10 min. Ap­gar score as well as a significant rise in the normoblast count.

Morbidity and mortality with regard to birth weight and gestational age: A birth weight of 590 g (sensitivity 62.5 %; specificity 93.5 %) and a gestational age of 28 + 5 weeks (sensitivity 87.5 %; specificity 90.3 %) were found to be the optimal cut-off points between healthy survival and survival with serious neonatal complications.

Effect of pathological Doppler velocities on the perinatal outcomes with regard to gestational age: Three groups of about the same size were formed depending on the gestational age. Before 27 + 0 weeks of gestation, no infant survived healthy; between 27 + 0 and 30 + 6 week, only 33 % (3/9) with umbilical reverse end-diastolic flow survived healthy although 100 % (9/9) of those with absent end-diastolic flow did. This is a significant difference. (p < 0.005). From 31 + 1 weeks, the rate of healthy survivors was 90 % (9/10), even in those with reverse end-diastolic blood flow.

With regard to the profile of the blood flow in the Ductus venosus, healthy survival also starts from the 27 + 0 week, even in the case of a positive arterial wave (with or without a raised ductus venosus pulsatility index). Between 27.0 and 30.6 weeks gestation, only 33.3 % (2/6) of those with venous absent or reverse end-diastolic velocity survived compared to the group with positive arterial flow in which survival rose to 83.3 % (10/12) (p > 0.05). From 31 + 0 weeks, 2 of the 3 (66.7 %) with venous absent or reverse end-diastolic velocity were healthy.

Conclusion: Before 27 + 0 and from 31 + 0 weeks of gestation, gestational age is the determining predictor for healthy survival. Between 27 and 31 completed weeks of gestation, there is a relationship between post partum morbidity and the extent of changes in the arterial and venous blood flow velocity seen with Doppler ultrasound.

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