

Umbilical artery pulsatility index and half-peak systolic velocity deceleration time in fetuses with trisomy 21

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Abstract

Objective:To analyze placental vascular resistance and the role of placental insufficiency in the etiology of reduced fetal growth in fetuses with trisomy 21 as determined by umbilical artery (UA) Doppler velocimetry. **Methods:**Second- and third-trimester UA Doppler ultrasound studies were performed in fetuses with trisomy 21 at the time of clinically indicated obstetric ultrasound assessment. The UA pulsatility index (PI) and half-peak systolic velocity deceleration time (hPSV-DT) were measured and recorded. Perinatal outcome was reviewed and the results from UA Doppler velocimetry were compared with birthweight according to gestational age at the time of the delivery. **Results:**A total of 60 fetuses with trisomy 21 were studied and information from 147 UA Doppler studies was analyzed. Overall, at least one of the UA PI and hPSV-DT values was abnormal in 82% (n = 49) and 90% (n = 54) of the cases, respectively. The incidence of abnormal UA PI values increased with gestational age from 39% (7/18) before 21 weeks to 78% (18/23) after 35 weeks (p < .05). The increase was even more evident for UA hPSV-DT values from 28% (5/18) before 20 weeks to 91% (21/23) after 35 weeks (p < .01). After exclusion of four fetuses with hydrops or isolated hydrothorax/ascites, 16 (29%) were classified at birth as small for gestational age (SGA), 34 (61%) as adequate for gestational age, and six (11%) as large for gestational age, with a mean birthweightz-score of -0.36. When only considering the last Doppler ultrasound assessment prior to delivery, UA PI and hPSV-DT values were abnormal in 73% (41/56, meanz-score = +1.72) and 82% (46/56; meanz-score = -2.18) of the cases, respectively. Mean gestational age at delivery and birth weight were significantly lower in the group with abnormal compared to normal UA PI and hPSV-DT values. Similarly, the incidence of SGA fetuses was significantly higher in the group with abnormal compared to normal UA PI and hPSV-DT values, with 94 (n = 15) and 100% of the 16 SGA newborn infants having abnormal UA PI and hPSV-DT values prior to delivery, respectively. **Conclusions:**Trisomy 21 fetuses have a progressively higher incidence of abnormal UA impedance indices throughout pregnancy, which suggests developing placental vascular resistance as the pregnancy progresses. This alteration likely begins around the mid second trimester and increases with gestational age; however, increasing placental vascular resistance seems to produce a discrete decrease

in fetal growth, despite severe alteration of the UA Doppler impedance indices. As a general hypothesis, we postulate that trisomy 21 fetuses have increasing placental vascular resistance but there may be some factors that protect these fetuses from severe fetal growth restriction.

Palabras clave

Palabras clave de autor:[Doppler studies](#); [fetal aneuploidy](#); [fetal growth restriction](#); [fetal ultrasound](#); [half-peak systolic velocity deceleration time](#); [placental insufficiency](#); [pulsatility index](#); [small for gestational age](#); [trisomy 21](#); [umbilical artery](#)

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