

Longitudinal Assessment of Umbilical Cord Cross-Sectional Components in Fetal Growth Restriction

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OBJECTIVES

- To longitudinally assess the cross-sectional areas (CSA) of umbilical cord (UC) components (umbilical vein; UV, umbilical arteries; UA, and Wharton’s jelly; WJ) in fetal growth restricted (FGR) pregnancies
- To analyze their associations with adverse perinatal outcomes.

STUDY DESIGN

- Retrospective cohort study
- Cohort of singleton non-anomalous pregnancy with growth restricted fetuses diagnosed after 20 weeks
- Serial ultrasounds were performed as per clinical standards and the values of UV-, UA (average)-, and WJ-CSA were calculated from images of adequate clarity. UC-CSA components by gestational age (GA) in our FGR cohort were compared with previously reported values for average for gestational age (AGA) cohort (Togni et al. 2007)
- Using Pearson correlation analysis, correlation coefficients (r) were calculated between CSA values and fetal biometrics (estimated fetal weight, EFW; abdominal circumference, AC; biparietal circumference, BPD; head circumference, HC; femur length, FL).
- With AGA-CSA values as controls, we calculated CSA percentiles, and values less than 10th percentile were labeled as abnormal. Odds ratios were calculated between abnormal CSA percentiles and adverse perinatal outcomes.

RESULTS

- This cohort includes 52 FGR pregnancies
- The values of UV- and UA-CSA in FGR cohort, respectively, were smaller than in AGA cohort ($p < 0.01$) (Figure 2 and 3)
- WJ-CSA values appeared to be similar in both cohorts (Figure 4)
- UV- and UA-CSA values, respectively, correlated well with EFW ($r\ 0.54$; $r\ 0.51$, $p < 0.01$), AC ($r\ 0.55$; $r\ 0.53$, $p < 0.01$), BPD ($r\ 0.52$; $r\ 0.52$, $p < 0.01$), HC ($r\ 0.53$; $r\ 0.53$, $p < 0.01$)
- The incidence of abnormal UV- and UA-CSA values was most frequently observed between 31 – 32 weeks GA (50% and 100%, respectively)
- Abnormal UV-CSA was associated with higher chances of preterm delivery (OR 6.61, 1.14 – 33.1; $p\ 0.03$).

Figure 1. Measurement of umbilical vein area, umbilical artery area, and Wharton’s jelly area (total area-[umbilical artery+ umbilical vein area])



ACKNOWLEDGEMENT

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RESULTS

Figure 2. Trends of UV-CSA (mm²) in FGR and AGA pregnancies between 24 – 39 weeks gestational age

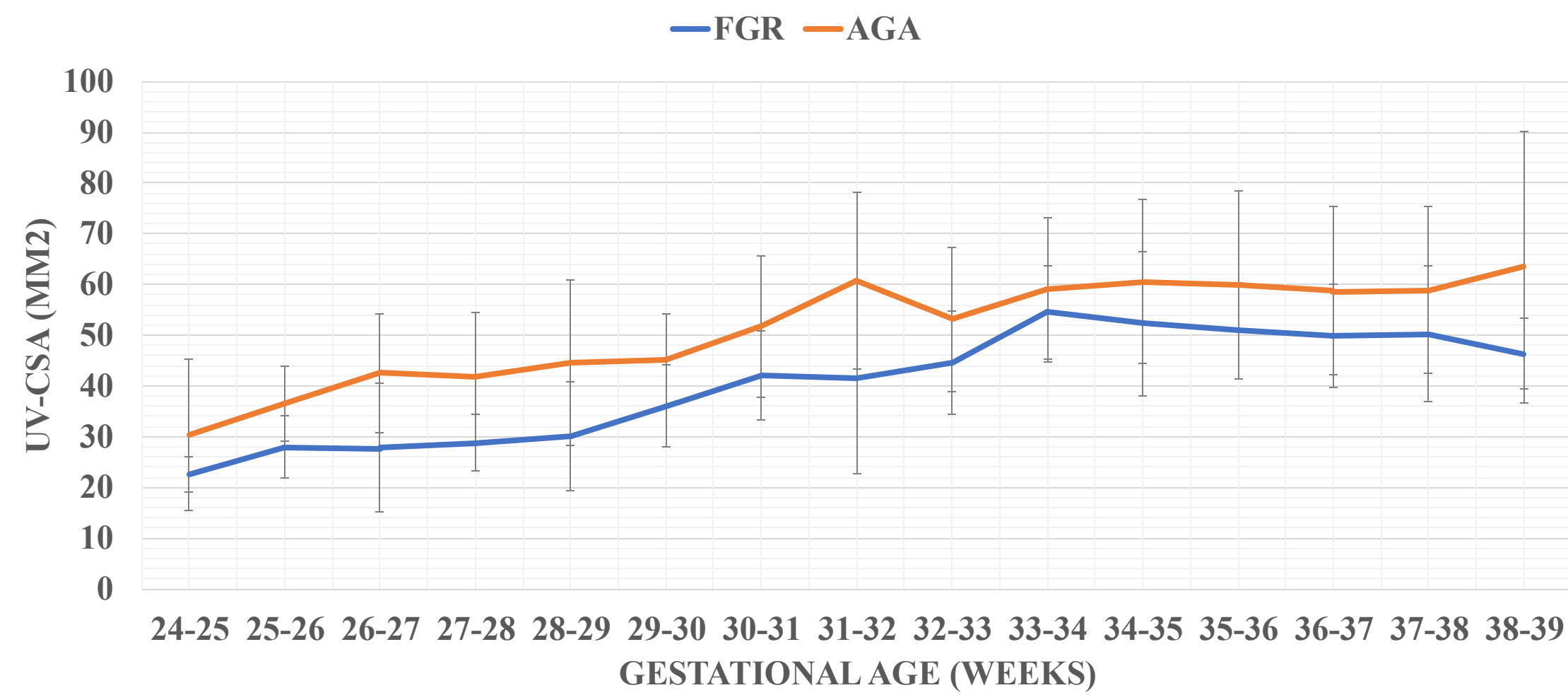


Figure 3. Trends of UA-CSA (mm²) in FGR and AGA pregnancies between 24 – 39 weeks gestational age

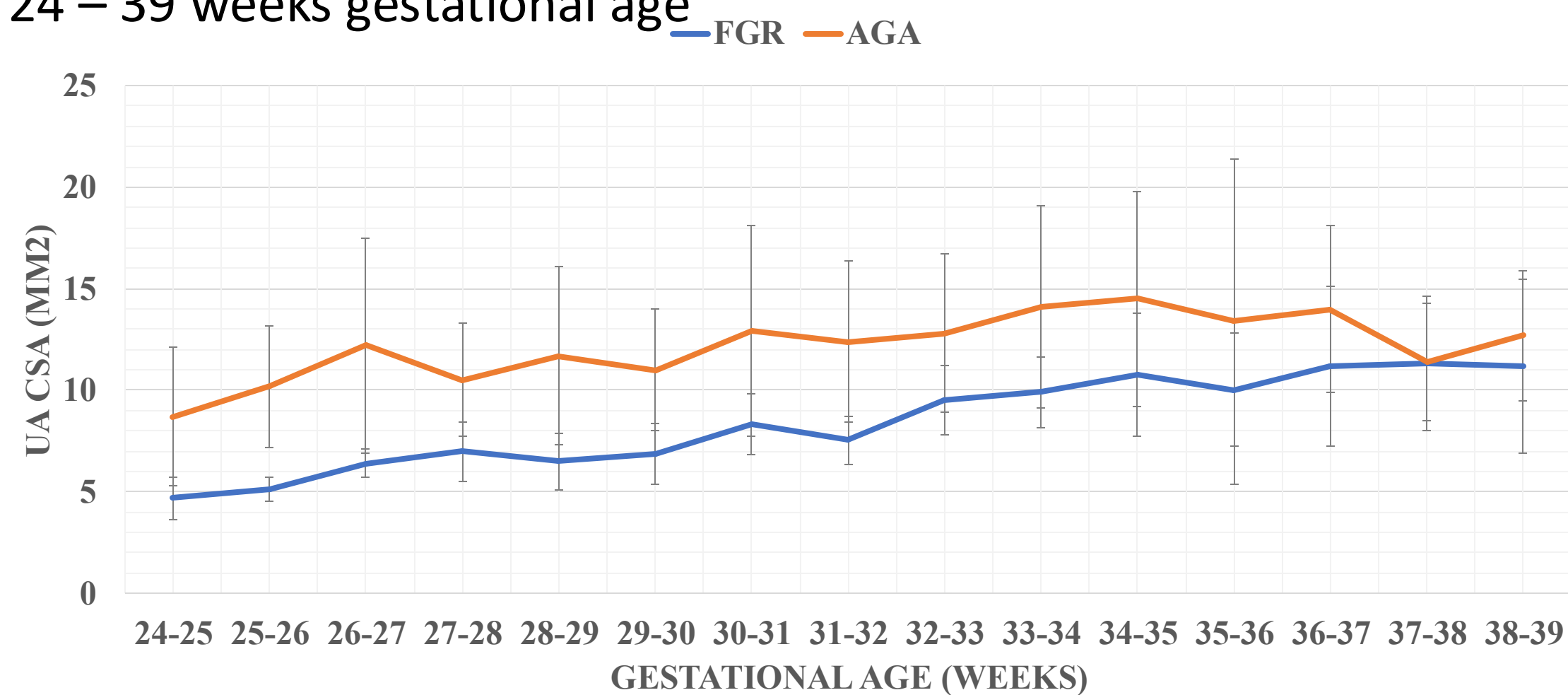
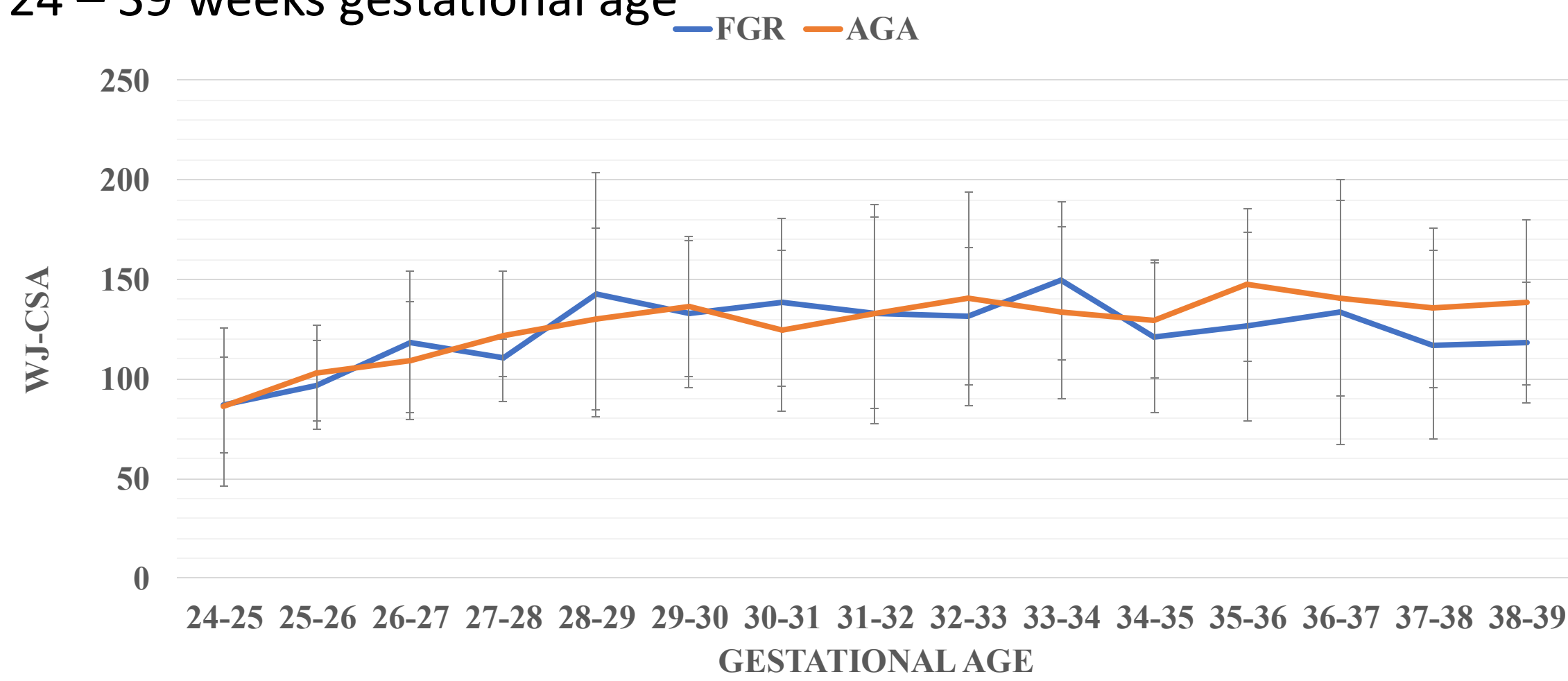


Figure 4. Trends of WJ-CSA (mm²) in FGR and AGA pregnancies between 24 – 39 weeks gestational age



CONCLUSIONS

- In FGR pregnancies, mean values of UA- and UV-CSA are lower than in AGA and are associated with poor perinatal outcomes
- Further prospective studies are warranted to confirm these findings