Carotid-subclavian artery index to predict coarctation of the aorta in the second trimester of gestation

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Objective
Prenatal diagnosis of coarctation of the aorta (COA) is challenging due to the fetal circulation characteristics. Different gestational age-specific scoring systems based on the combination of cardiac size parameters have been proposed to improve its prenatal detection. Carotid-subclavian artery index (CSAI) is a novel promising parameter for prenatal diagnosis of COA. A cut off < 0.78 has shown a high sensitivity (92.3%) and specificity (96.8%) when applied in the third trimester of pregnancy. The objective of our study was to explore the feasibility of the CSAI in fetuses with a suspicion of COA before 28 weeks of gestation.

Methods
Retrospective study including 11 fetuses with prenatal suspicion of COA before 28 weeks of gestation and postnatal confirmation. Prenatal COA suspicion was defined by the presence of a significant right dominance (right to left ratio higher than 1.3) with an aortic isthmus size < -2 z-score adjusted by gestational age. Aortic arch morphology and flow characteristics at the level of the aortic isthmus by color Doppler, were also evaluated in all cases. Aortic arch diameter at origin of the left subclavian artery (D1) and distance between left carotid and left subclavian artery (D2) were measured from stored ultrasound clips to retrospectively calculate the CSAI (D1/D2).

Results
Mean gestational age at ultrasound was 22.5±2.5 weeks, with 72.7% of the cases evaluated before 24 weeks. Mean right to left ratio at 4-chamber view and outflow tracts level were 1.73±0.79 and 1.91±0.69, respectively. Mean aortic isthmus diameter was 1.66±0.47mm, which corresponded to a mean z-score adjusted by gestational age of -3.22±1.69. Only one third of the cases (36.4%) showed reversed aortic isthmus flow. Mean left carotid to subclavian artery distance was 3.35±0.83 mm. CSAI measurement could be successfully obtained in all our cases with a mean value of 0.47±0.18. In almost all cases (10/11) CSAI was < 0.78.

Conclusion
CSAI seems to be a feasible parameter in fetuses with suspicion of COA in the second trimester of pregnancy. Further studies are needed to prospectively evaluate its clinical utility.