Aortic coarctation: a feasible prenatal diagnosis

Deiros-Bronte L., Rubio D., Diez-Sebastian J., Rodriguez R., Labrandero C., Polo L., del Cerro M.J, De la Calle M., Gutierrez-Larraya F.
La Paz University Hospital, Madrid, Spain

Introduction: Aortic coarctation may be associated with significant neonatal morbidity and mortality. Prenatal diagnosis may improve survival and reduce morbidity but it is still associated with a high rate of false negatives/ false positives.

Methods: Between 2002-2008, we carried out a retrospective review of collected echocardiography data base for all fetuses evaluated at our unit in whom a suspicion of coarctation was the cause of referral. From 01/01/ 2008 to 31/08/2012 the data was collected prospectively. Fetuses with abnormalities of the cardiac connections were excluded. Of the 65 fetuses who fulfilled these inclusion criteria, 4 were excluded because incomplete outcome data. All of them had a postnatal echocardiography/ autopsy study. The diameters of the atrioventricular valves, pulmonary/aortic valves and their ratio were measured. We obtained the diameter of the aortic isthmus and duct in the 3-vessel and trachea view; the isthmal to ductal diameter ratio, and their Z scores related to gestational age were calculated. Receiver operating characteristic (ROC) curves were created for all these measures. Diagnoses of ventricular septal defect (VSD), bicuspid aortic valve (BAV) and persistent left superior caval vein were identified; logistic regression (LR) was used to test their association with fetal coarctation. Aortic arch hypoplasia (transverse aortic arch z-score<2) was studied.

Results: Coarctation was confirmed in 35/61 neonates (57.3%). Mean gestational age at presentation was higher in normal fetuses as compared to fetuses with coarctation (p<0.005). Good separation was found of isthmal/ductal ratio, pulmonary/aortic valve and isthmal z-score for cases with coarctation from falses positives (p<0.001). ROC curves showed an excellent area under the curve (AUC) for isthmal-to-ductal ratio (0.927, IC 95% 0.86-0.99) and for isthmal z-scores (0.852, IC 95% 0.74-0.96).

Stepwise LR model only included SAB and VSD and this combination, showed an excellent AUC (0.92, IC 95%0.85-0.991). Aortic arch hypoplasia was found in 74.7% of true cases.

Conclusions: The isthmal to ductal ratio and the isthmal z-score, combined with gestational age at diagnosis and secondary cardiac defects as VSD and BAV, may improve the accuracy of fetal coarctation diagnosis and reduce false positives. The rate of aortic arch hypoplasia is high in fetal/neonatal coarctation.