



COARCTATION OF THE AORTA: a new echocardiographic marker in prenatal diagnosis

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Background

Coarctation of the aorta (CoA) represents **one of the most common congenital cardiac ductal-dependent disease**, but prenatal diagnosis is still challenging.

Only 1/3 of CoA cases is detected before birth.

Improving the prenatal diagnosis rate can decrease neonatal mortality and morbidity.

Prenatal diagnosis can allow a better management of pregnancy and delivery, in order to *increase the survival rate of neonates* with this condition and *reduce their morbidity* through a timely prostaglandin infusion and surgery.

The **aims** of this study are:

- to evaluate known ultrasound markers of CoA;
- to introduce a new index in order to reduce false-positive diagnosis.

Materials and Methods

Between November 2019 and August 2020, we have enrolled **28 fetuses with prenatal suspicion of CoA**.

Statistical analysis was performed for each echocardiographic marker for CoA (measurement of the calibers of the aortic isthmus and transverse aortic arch, systolic peak velocity on the ascending aorta, right to left ventricular ratio, pulmonary artery-aorta ratio, isthmus-ductus arteriosus ratio, and others), comparing cases with post-natal confirmed CoA (true-positive group) and cases in which CoA was not confirmed (false-positive group).

For each sonographic marker, specificity, sensibility, positive and negative predictive values have been evaluated, and the most statistically significative cut-off have been analyzed.

Results

Among the 28 fetuses with prenatal suspicion of CoA, **the diagnosis was postnatally confirmed in 12 neonates.**

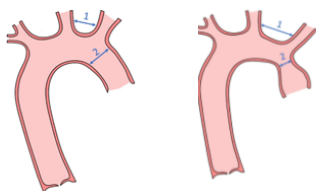
The Z-score of all evaluated parameters has been calculated according to the gestational age.

A new echocardiographic marker was proposed, the **"Isthmus/Carotid-Subclavian Index" (ICS Index)**. It represents the **ratio between aortic isthmus** (2 in the figure) and **left carotid-subclavian distance** (1 in the figure) obtained from a 2D scan of the aortic arch. **ICS Index appears significantly reduced in the group of patients with postnatally confirmed CoA.**

In our study, the best results in terms of specificity and sensitivity were obtained by setting a **cut-off of ICS index ≤ 1** .

Cut-off = 1 \rightarrow sensibility = 100%

specificity = 87.5%



Conclusion

The measurement of the calipers of the aortic isthmus and transverse aortic arch, and the systolic peak velocity on the ascending aorta, allows to greatly increase the sensitivity of CoA detection.

Among all variables studied, the **Isthmus/Carotid-Subclavian Index shows the highest sensibility and specificity values, improving CoA prenatal diagnosis and decreasing false-positive cases.**

Larger studies will be needed to validate this result, which now seems to be able to envisage a new prospective in prenatal diagnosis of this vascular anomaly.