

BACKGROUND AND OBJECTIVE

There is a lack of uniform methodology and clear landmarks for measuring the fetal aortic arch. Moreover, not all the segments of the aortic arch are measured nor is there consideration of different branching patterns of the aortic arch.

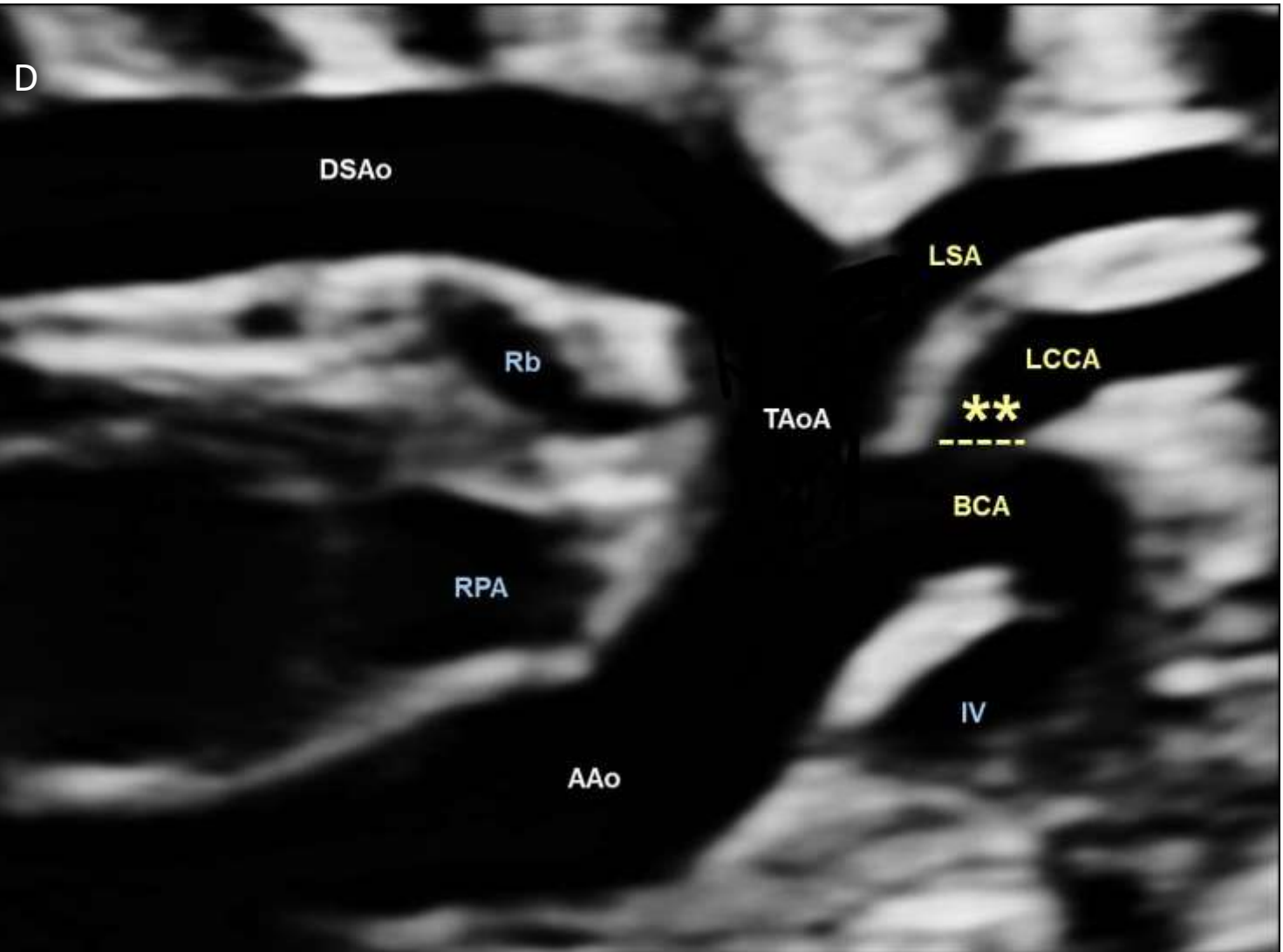
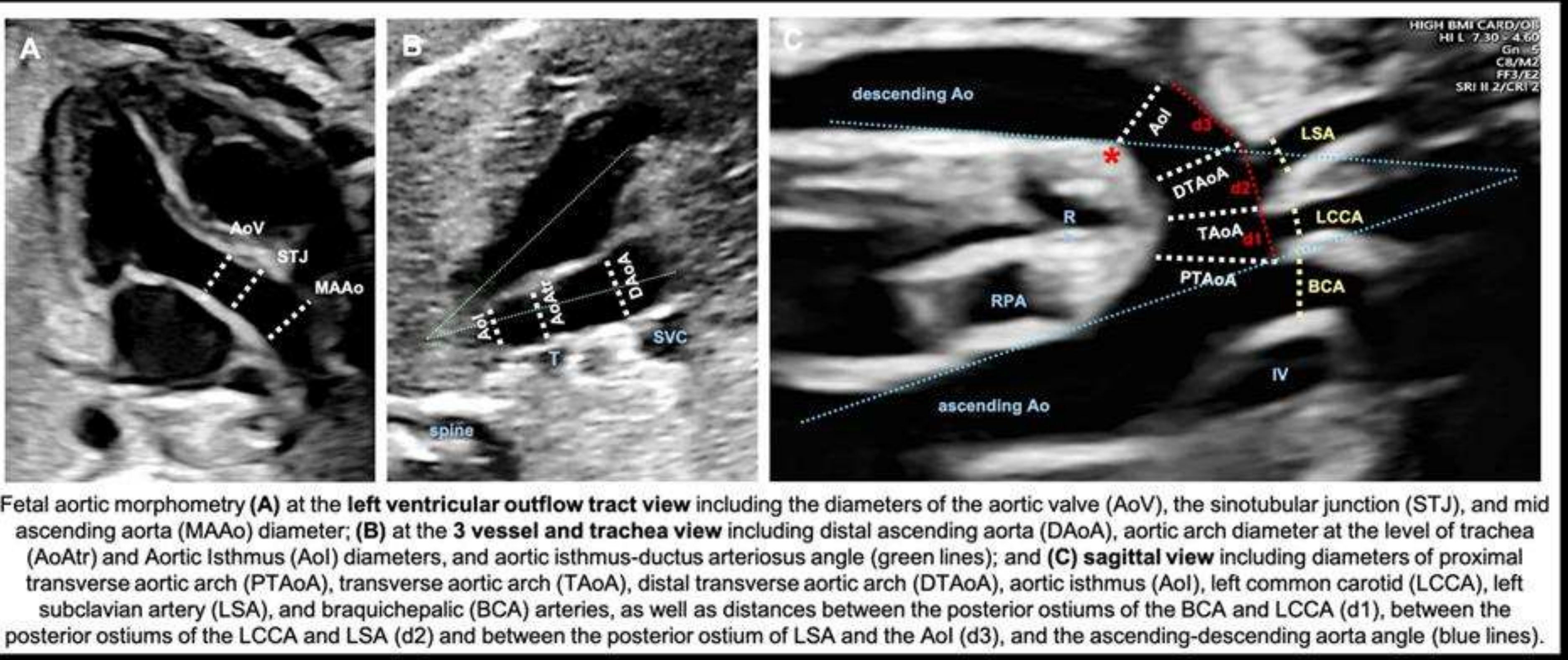
Our two main objectives were :

- To first establish a comprehensive nomenclature and standardized echocardiographic methodology for the multiplanar assessment of the fetal aorta.
- To evaluate the reproducibility of the key quantitative parameters proposed to assess aortic morphology using this protocol..

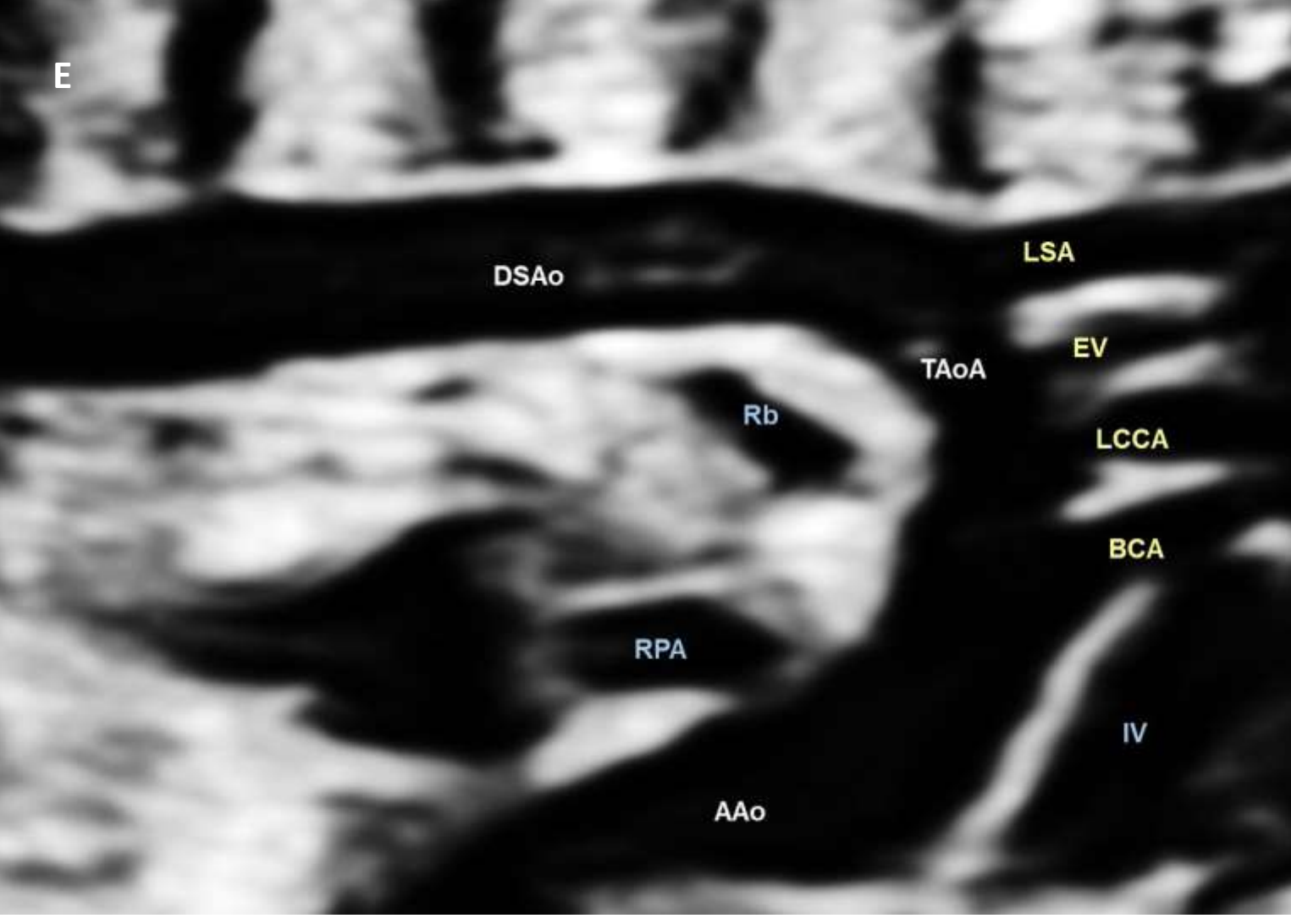
METHODS :

Prospective cohort study including singleton pregnancies from 18.0 to 40.0 weeks of gestation. ). All pregnancies were attended by the Maternal-Fetal Medicine Department of BCNatal (Hospital Clinic and Hospital Sant Joan de Déu) from January 2024 to November 2024. Fetal aorta was imaged at the LVOT, 3VT, and longitudinal aortic arch views. Anatomical variant was defined based on the origin of the supra-aortic trunks. Fetal aortic morphometry was assessed by measuring 2D diameters, distances and angles. Inter and intraobserver reproducibility were assessed using Intraclass Correlation Coefficients (ICC).

The 4D-STIC navigation allowed us to determine that the distal ascending aorta (DAAo) corresponds to the posterior border of the transverse section of the superior vena cava in the 3VT view, while the distal transverse aortic arch (DTAoA) is located posterior to the level of the trachea, very close to the level of the aortic isthmus (AoI), near the junction of the aortic arch with the ductus arteriosus . We evaluated the isthmus –ductal angle in the 2D 3 VT view .



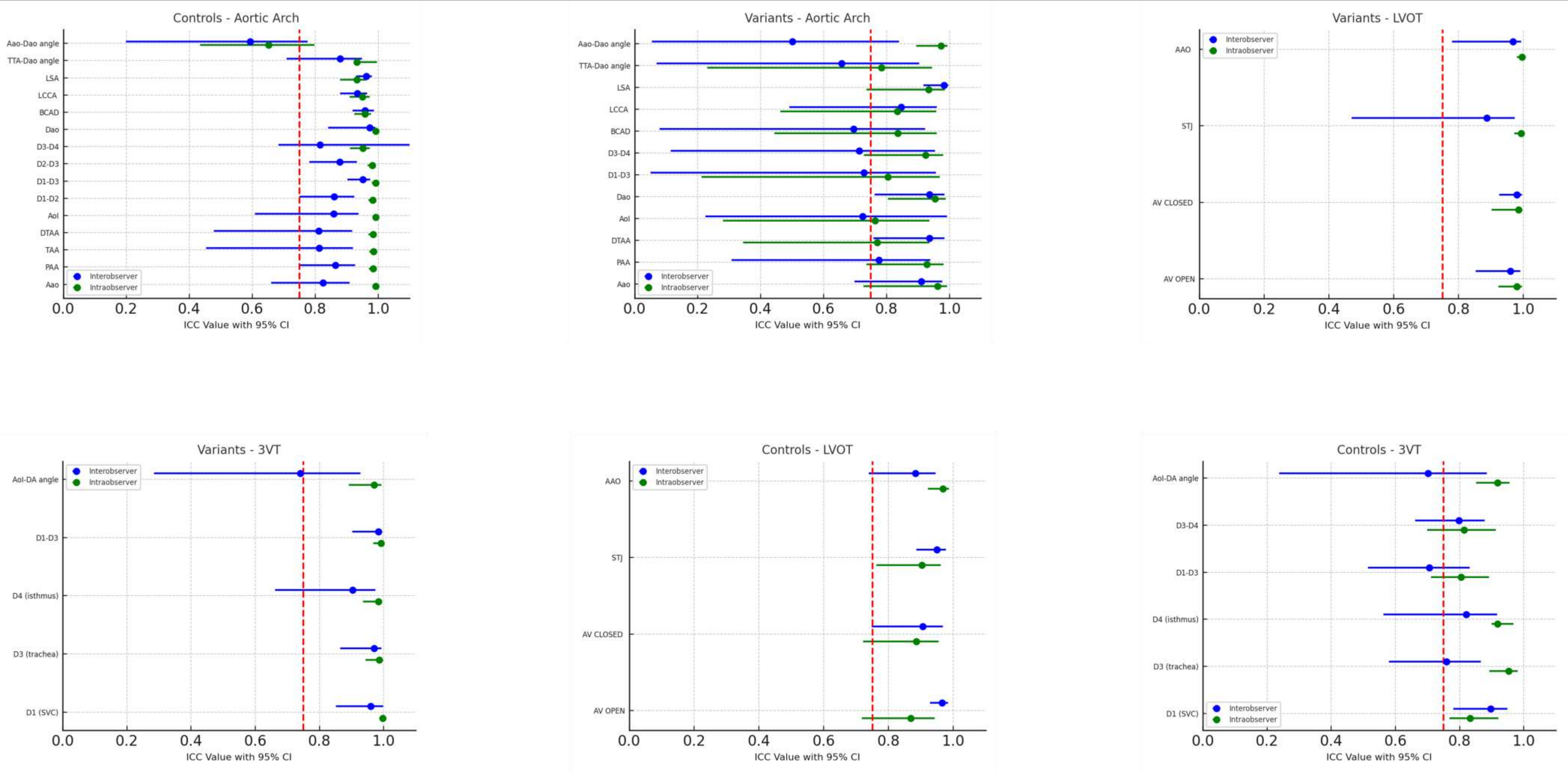
Fetal aortic arch variant with 2 supraaortic trunks



Fetal aortic arch variant with 4 supraaortic arch trunks

Results

Among 55 pregnancies, 10 fetuses showed variations in the branching pattern. Excellent 2D imaging was achieved in 95-97% of fetuses. Interobserver and intraobserver variability demonstrated good to excellent reproducibility (ICC > 0.7) in normal branching pattern fetuses. Lower reproducibility was observed in branching pattern variations, especially in angle measurements (e.g., Asc-Desc aorta angle ICC 0.501). The diameters measured in the LVOT view demonstrated good to excellent intra and interobserver reproducibility (ICC> 0.8-0.9). In the LVOT view the introduction of a new diameter of the aorta at the STJ also showed excellent intra and inter reproducibility (ICC>0.9) and thereby resulting in excellent intra and inter reproducibility of MAAo diameter. At the 3VT view, diameters of the DAAo, AAotr and AoI, showed good to excellent intra and inter observer reproducibility (ICC >0.75-0.9). Moderate interobserver reproducibility (ICC>0.8 – 0.9) was demonstrated for distances between the DAAoD and AAotr, and 3VTV angle . No statistically significant differences between operators were observed, nor was there any systematic bias for the studied Repro of AoI diameter between long and 3VT views ICC 0,87 (0.458-0.995)p<0.001.



Conclusions:

- Fetal aortic arch morphometry is feasible and reproducible, but less reliable in branching pattern variants.
- Standardized protocols and nomenclature improve consistency.
- 4D STIC imaging helps define accurate anatomical landmarks.
- Angle measurements show moderate reproducibility due to methodological variability.