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Usefulness of 3VTV Parameters as Screening Triggers for Fetal Coarctation of the Aorta

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1.Introduction

Fetal coarctation of the aorta (CoA) is notoriously difficult to diagnose prenatally due to the favorable ductal-dependent circulation. Standard sagittal arch views are often technically challenging to obtain. This study aims to evaluate the diagnostic utility of a simplified 3VTV-based scoring system for efficient first-line screening.

2.Materials & Methods

- Subjects:** 93 fetuses (CoA: n = 12, Normal controls: n = 81) examined at Tokyo Metropolitan Tama Medical Center.
- Study Population & Imaging:
- Retrospective cohort of confirmed CoA cases and normal controls.
 - Standardized 3VTV acquisition via upper mediastinal transverse sweeps to visualize great arteries, ductal arch, and aortic arch.
 - RV/LV ratio and Ao/DA ratio measured based on validated screening criteria [1, 2].
 - CoA Screening Score (0–4 pts):
 - Ao/DA ratio ≤ 0.7 (2 pts)
 - RV/LV ratio > 1.3 (1 pt)
 - Non-visualization of V-shape confluence (1 pt)
 - Ethical Approval: Tokyo Metropolitan Tama Medical Center IRB (Approval No:2026-48).

3.Results

- All 3VTV structures were clearly visualized.
- Ao/DA and RV/LV ratios differed significantly ($p < 0.05$).
- Scores of 3–4 strongly predicted CoA. [ROC Analysis Summary]
- AUC: 0.914 (95% CI: 0.810–1.000)
- Optimal Cut-off: 2.0
- Sensitivity: 75.0% | Specificity: 96.3%

Discussion:

- Overcomes technical limitations of sagittal views, providing rapid and accessible risk stratification in routine screening.
- Limitations:** Retrospective, single-center study with a small CoA cohort (n = 12). Larger prospective studies are needed for validation.

Conclusion:

- The 4-point 3VTV scoring system is a highly accurate, practical first-line screening tool for fetal CoA.

1.Pasquini L, et al. Ultrasound Obstet Gynecol 2007; 30: 182-186.
2.Carvalho JS, et al. Ultrasound Obstet Gynecol 2013; 41: 348-359. (ISUOG Guidelines)

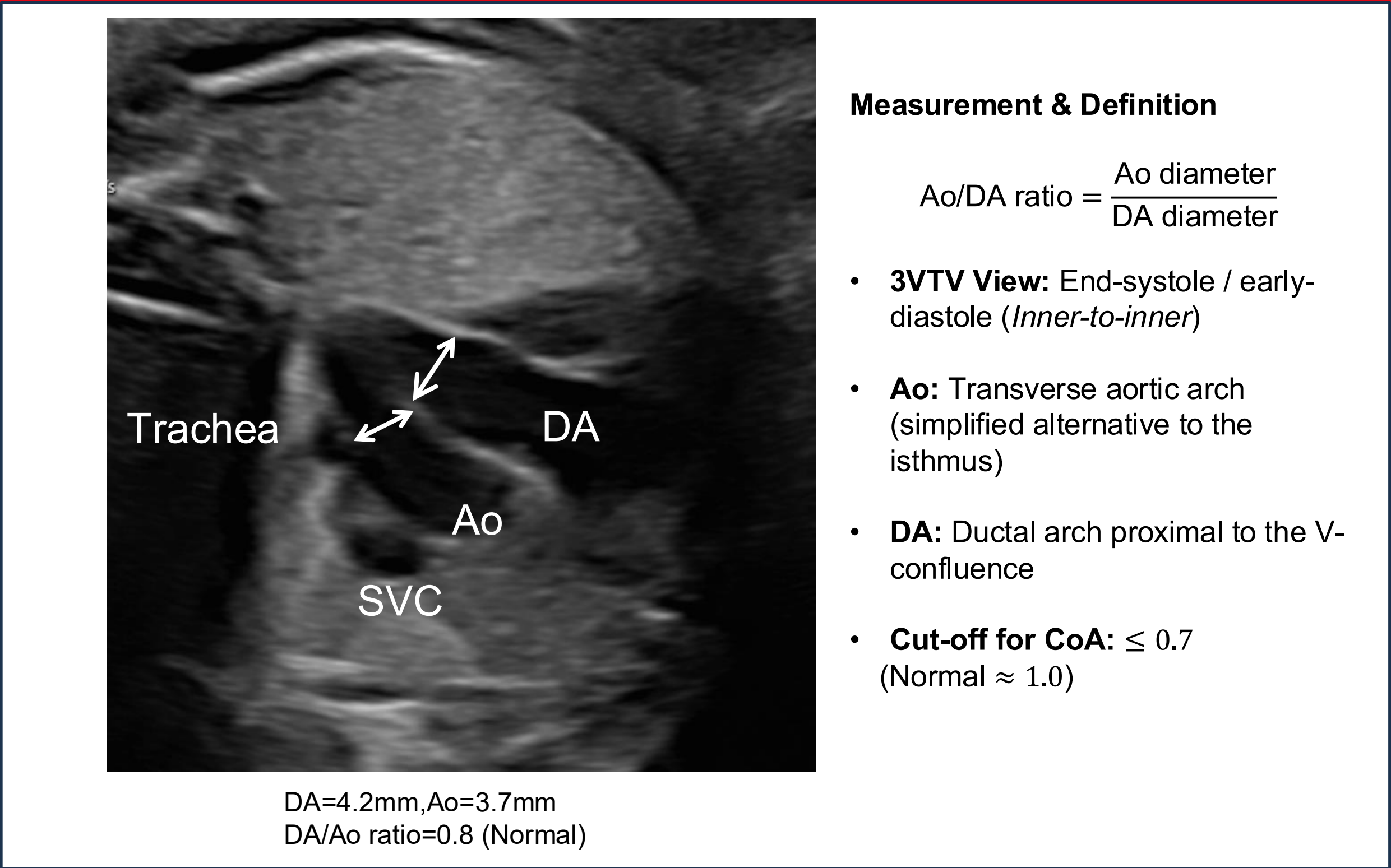


Figure 1. Measurement Plane for the Three-Vessel and Trachea View (3VTV)

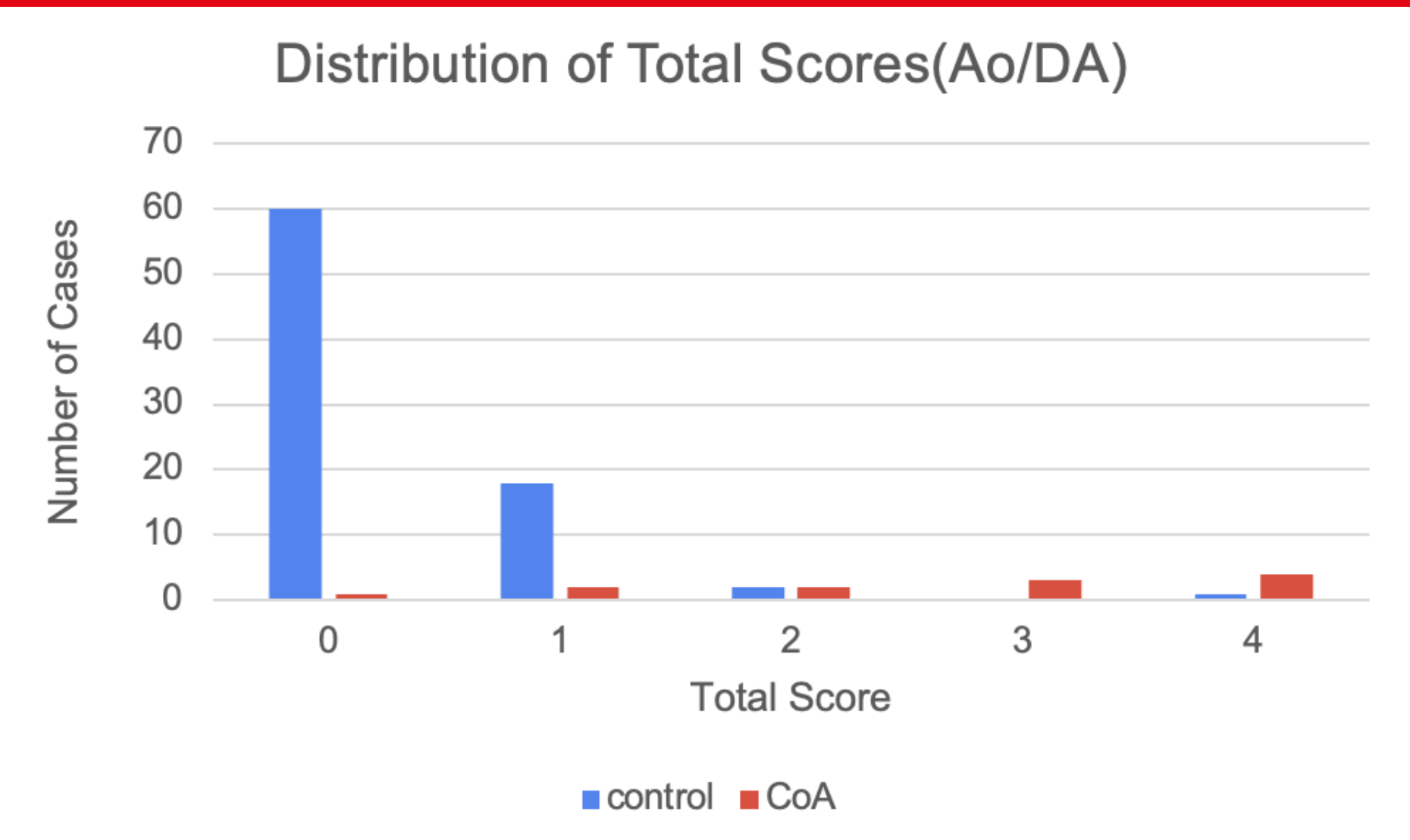


Figure 2. Distribution of Total 3VTV Scores in CoA vs. Normal Controls.

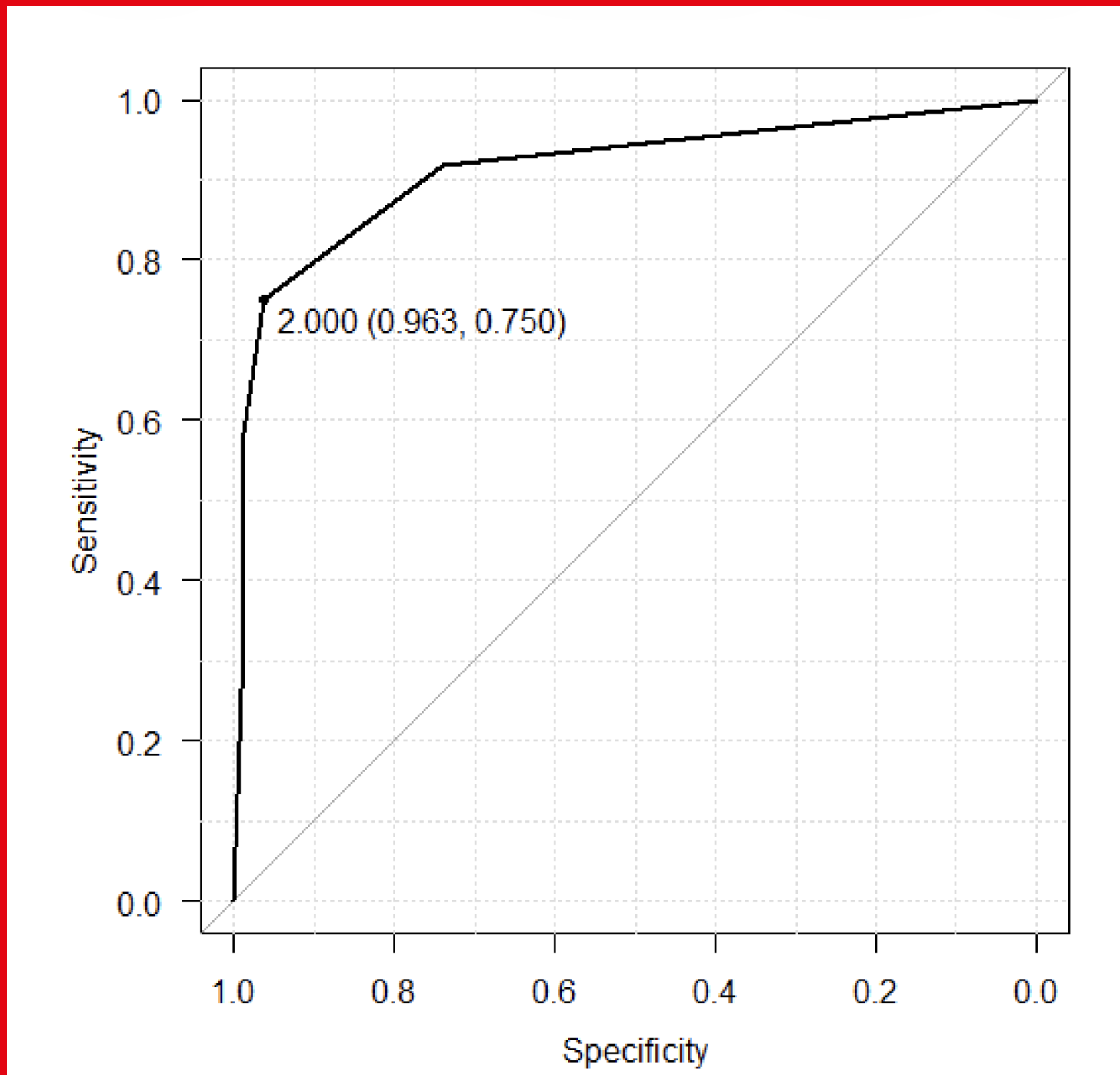


Figure 3. ROC Curve for Predicting Fetal CoA Using the 4-Point Scoring System (Ao/DA ratio-based).