

Prenatal Predictors of Postnatal Cardiac Intervention and Intervention Timing in Fetuses with Congenital Heart Disease: A 15-Year Retrospective Cohort Study

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Background

Congenital heart disease (CHD) is the most common congenital anomaly and a leading cause of pediatric morbidity and mortality. Although advances in prenatal imaging have improved the detection of CHD, prenatal factors associated with the need for postnatal intervention and its timing remain unclear.

Objective

To identify prenatal predictors of postnatal intervention requirements and clinical management in fetuses with CHD.

Methods

This retrospective cohort study included 125 fetuses with CHD diagnosed at a tertiary referral center between 2010 and 2024. Prenatal evaluation was performed using two-dimensional grayscale and Doppler echocardiography. Definitive intervention was defined as surgical or catheter-based treatment, and time-to-intervention as the interval from birth to the first procedure. Logistic regression analyses were used to identify prenatal predictors of intervention and its timing.

Clinical implications

- Prenatal assessment can help anticipate not only whether intervention will be needed, but also the likely postnatal management pathway.
- Time-to-intervention is useful for prenatal counseling and multidisciplinary perinatal planning.

Results

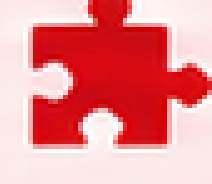
- **58/125** neonates (46.4%) underwent postnatal cardiac intervention.
- **67/125** (53.6%) were managed conservatively.
- Among treated infants, **29** underwent early intervention within 1 month after birth and **29** underwent delayed intervention beyond 1 month.



Cyanotic CHD was a strong independent predictor of postnatal Intervention (adjusted OR **11.15**, **p < 0.001**).



Among treated infants, cyanotic status was not independently associated with early intervention after adjustment (**p = 0.321**).



Greater anatomical complexity, reflected by the number of coexisting intracardiac anomalies, was associated with a lower likelihood of early intervention (adjusted OR **0.42**, **p = 0.007**).



Early intervention was associated with longer hospital stay (25 vs 8 days, **p = 0.006**) and longer intensive care stay (20 vs 4 days, **p < 0.001**).

Conclusion

Prenatal factors influence postnatal management in fetuses with CHD. Cyanotic CHD strongly predicts the need for postnatal intervention, but not the necessity for intervention within the first 30 days of life. Greater anatomical complexity is associated with a lower likelihood of early intervention. Recognizing time-to-intervention as part of the postnatal management course may improve prenatal counseling and multidisciplinary perinatal planning.

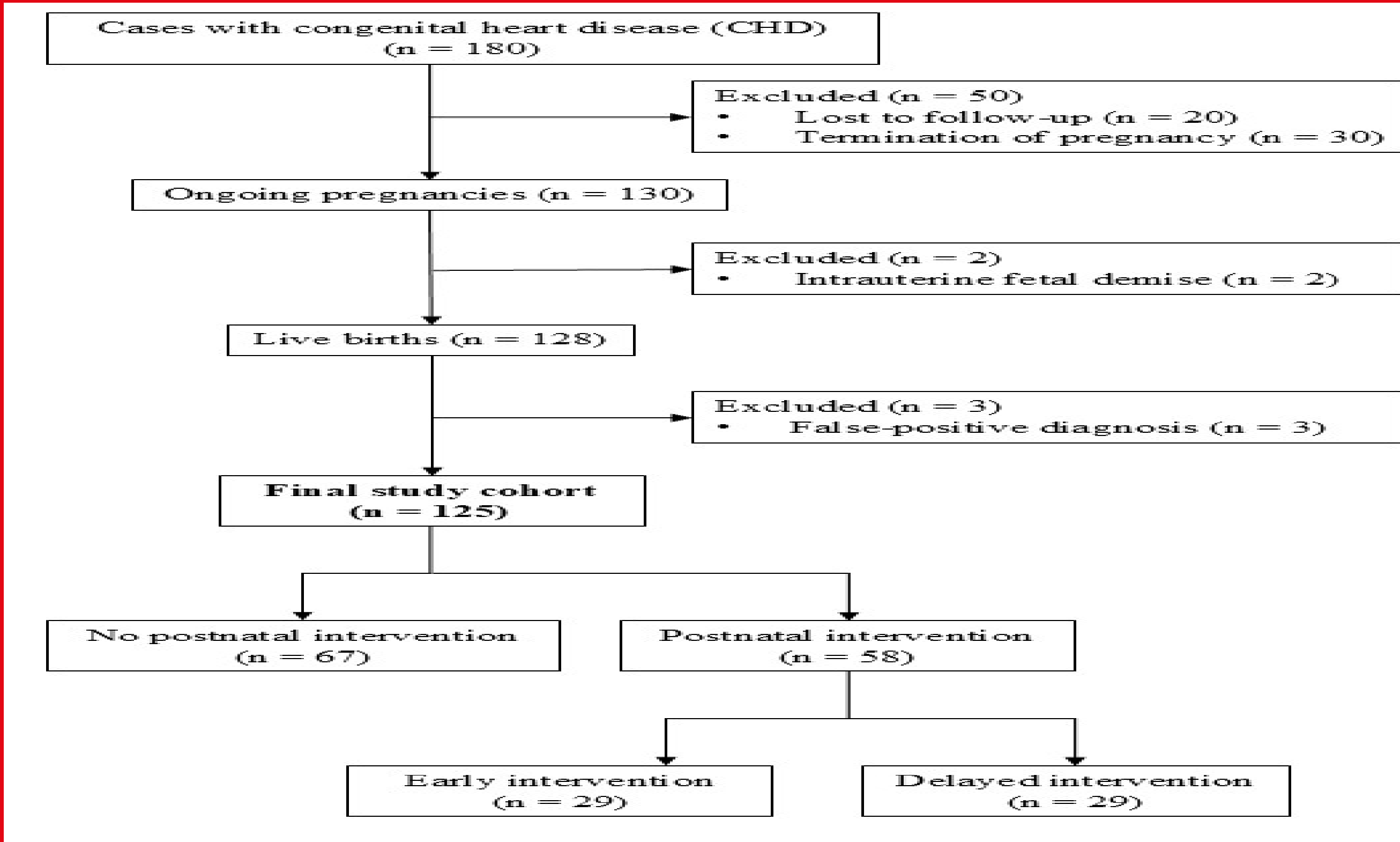


Figure 1. Flow diagram of the study population.

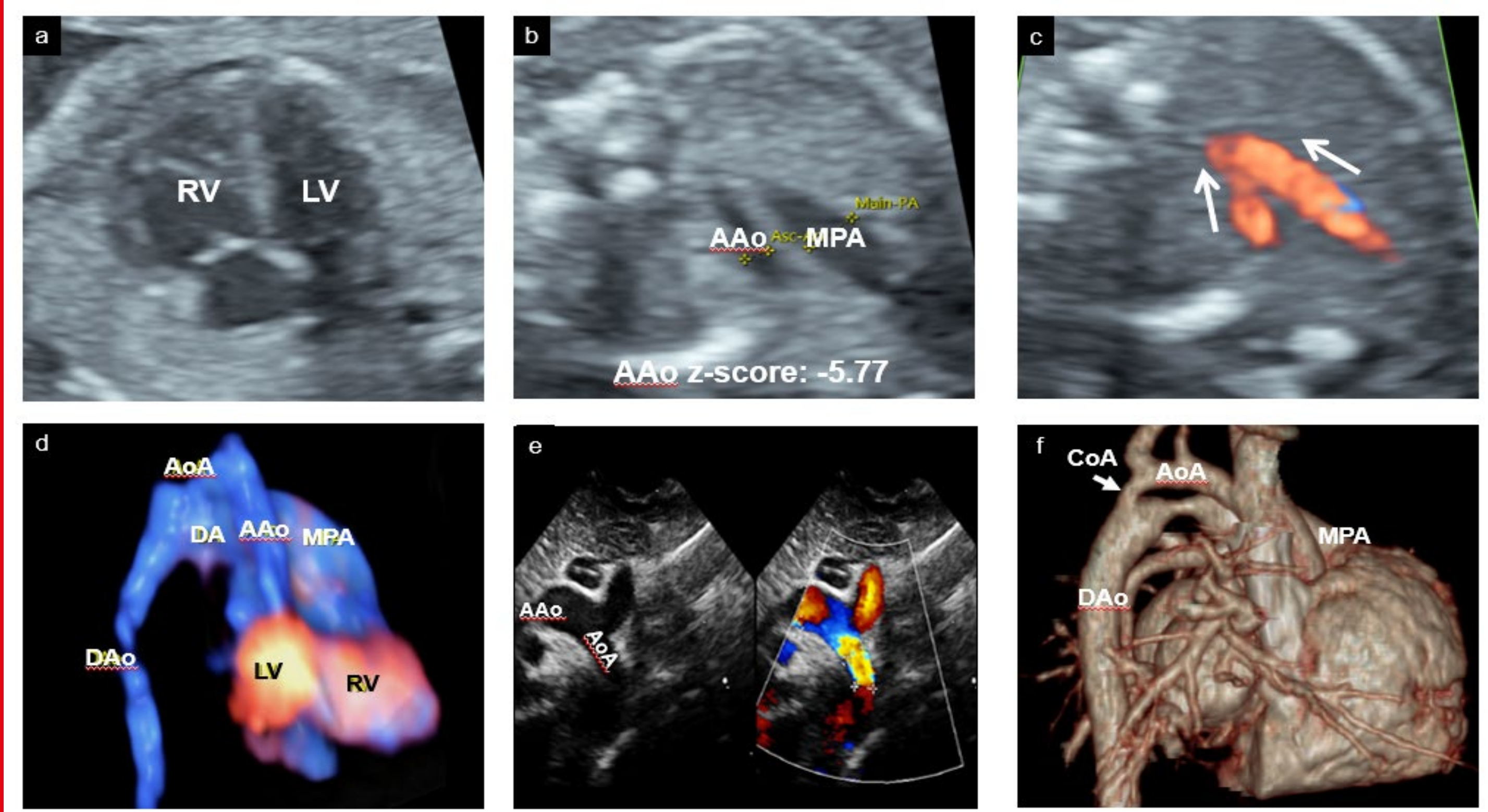


Figure 2. Prenatal and postnatal imaging of coarctation of the aorta (CoA)

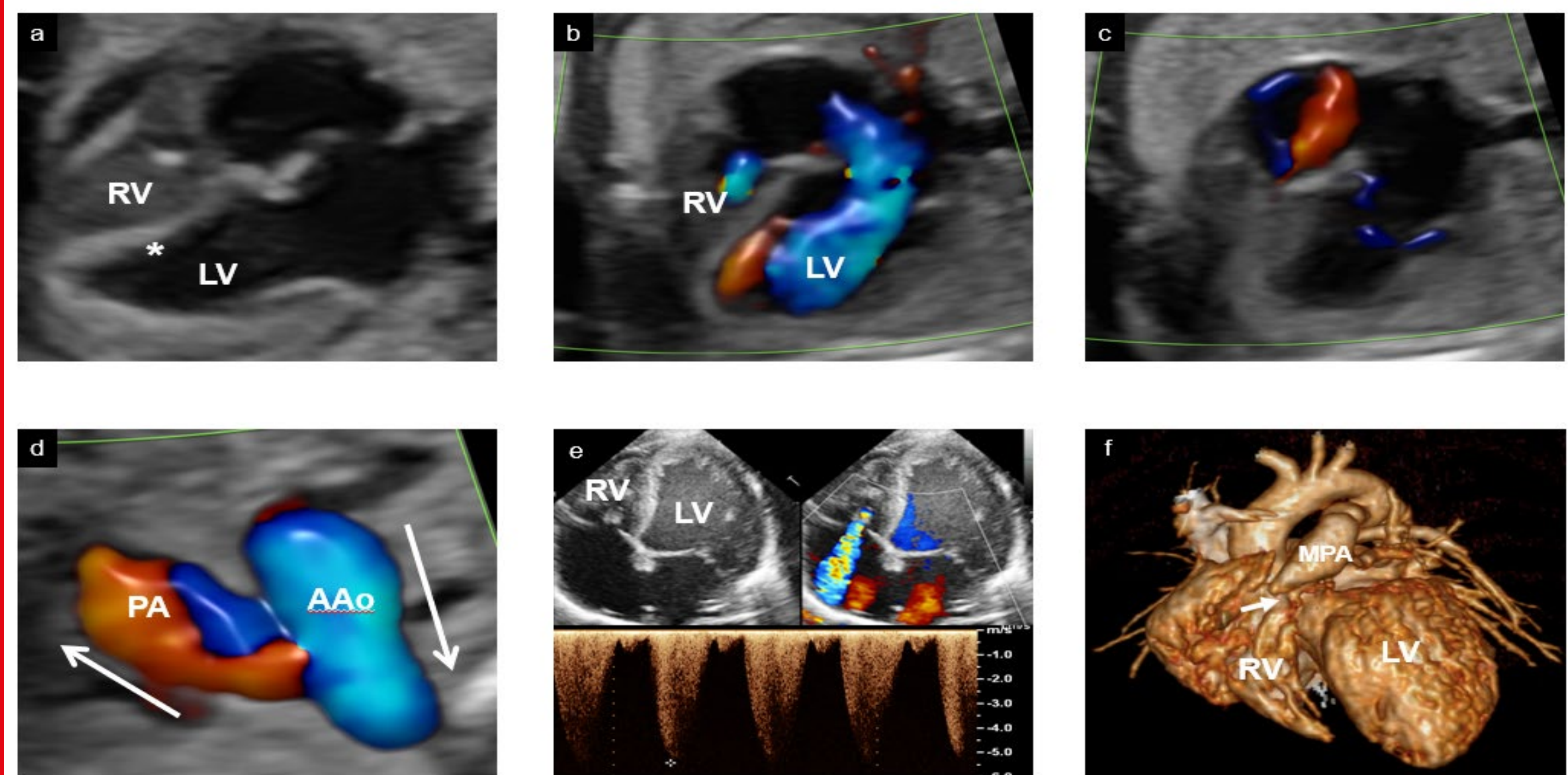


Figure 3. Prenatal and postnatal imaging of pulmonary atresia with intact ventricular septum (PAIVS).