

Hemodynamic assessment and perinatal management of biventricular afterload increase due to coarctation of the aorta and premature ductal constriction

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Introduction

Great vessel obstruction increases ventricular afterload and causes fetal cardiac dysfunction. Precise assessment of morphology, function and hemodynamics is essential for perinatal decision-making.

Case

A fetus of 32 weeks' gestation with right aortic arch, CoA, left-sided ductus arteriosus, and premature ductal constriction.

Fetal echocardiography

Right ventricular enlargement and severe systolic dysfunction (FAC 11.2%), severe tricuspid regurgitation, The ascending aorta to the right of the trachea, with a hypoplastic aortic isthmus (1.7 mm, z score -6.7) and accelerated flow across the coarctation (2.4 m/s). The left-sided ductus arteriosus was narrowed (1.7 mm, z score -4.4), with accelerated flow reaching 1.66 m/s, LCO: 360 mL/min, RCO: 280 mL/min, CCO: 324.9 mL/kg/min (<450 mL/kg/min).

Conclusion

In fetuses with biventricular afterload elevation, longitudinal evaluation of ventricular performance and systemic perfusion is crucial. Even with severe right ventricular dysfunction, stable CCO and careful echocardiographic assessment enable optimized timing of delivery and perinatal management.



Figure 1. The ascending aorta coursed to the right of the trachea (arrow), and the ductus arteriosus to the left (arrowhead), with continuous accelerated flow.

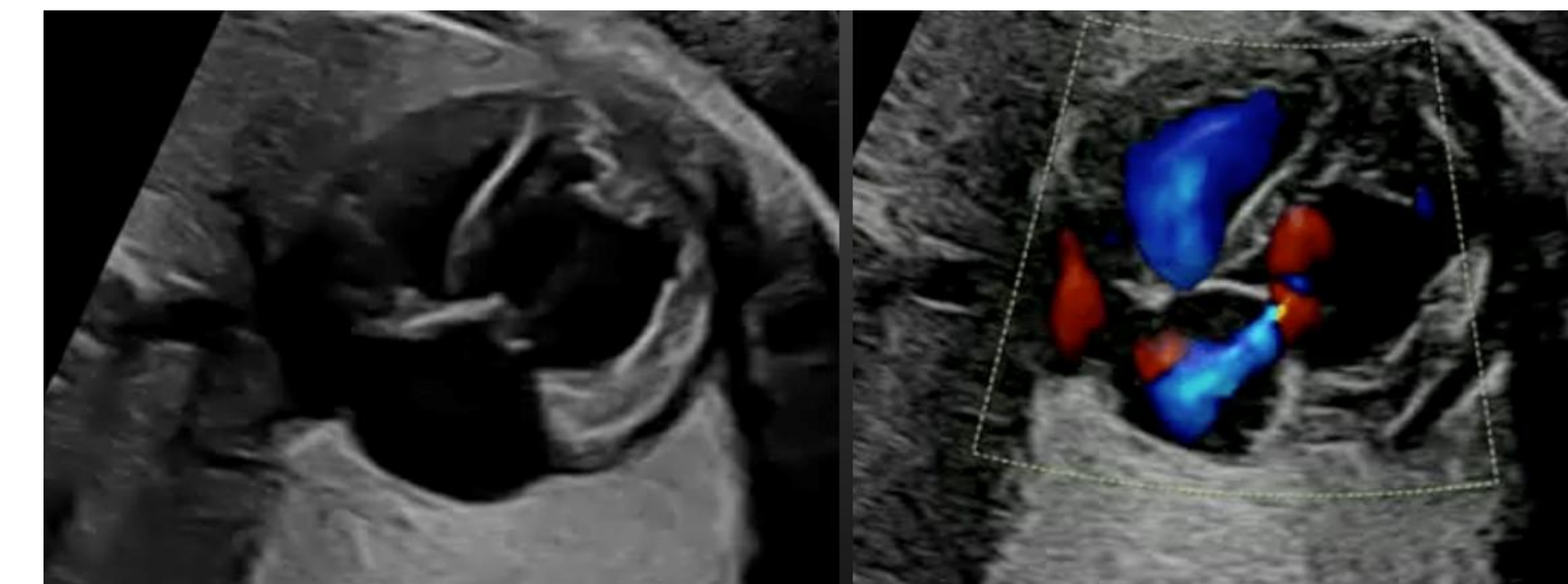


Figure 2. CTAR 38.2%, TCD: 33 mm, moderate-to-severe tricuspid regurgitation, with a peak velocity of 3.9 m/s.

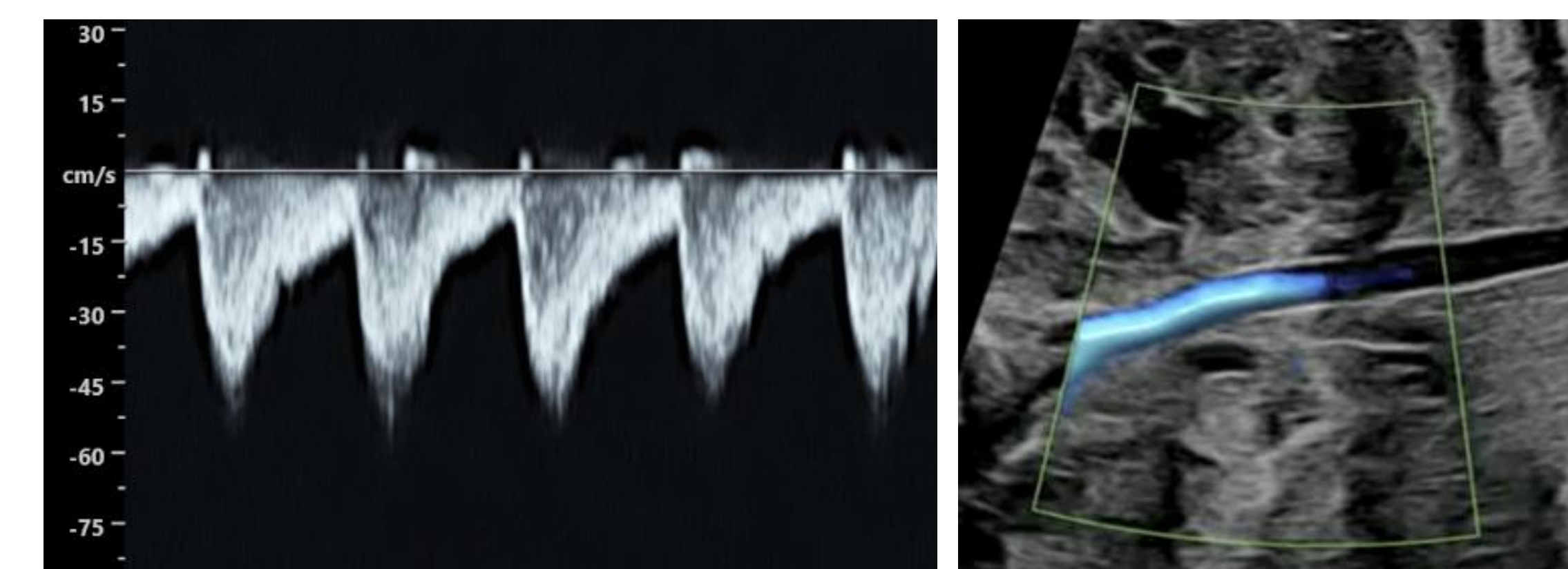


Figure 3. Descending aortic flow velocity: approximately 45 cm/s, with a sawtooth pattern.

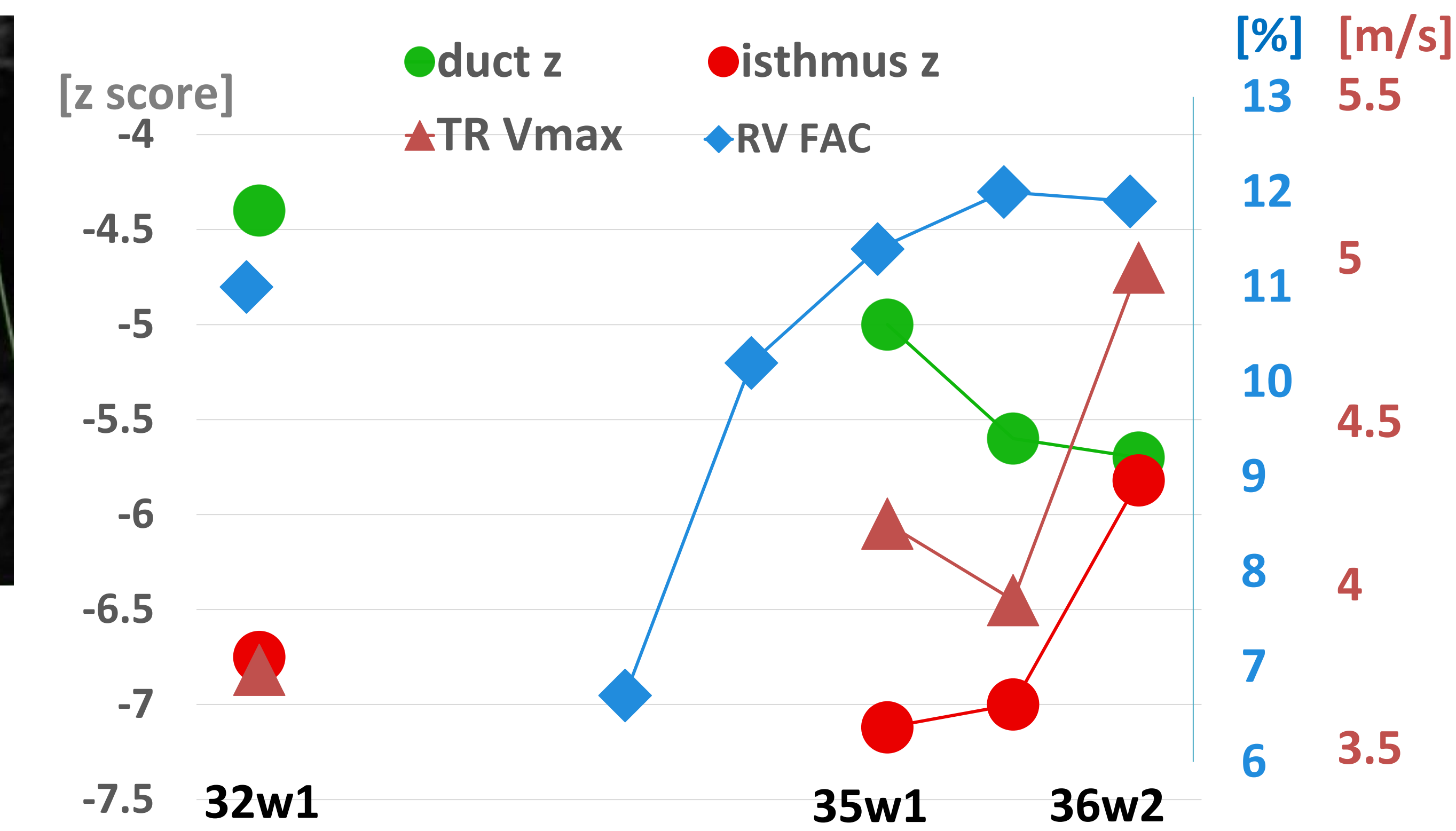


Figure 4. Clinical course and serial changes in fetal cardiovascular parameters.

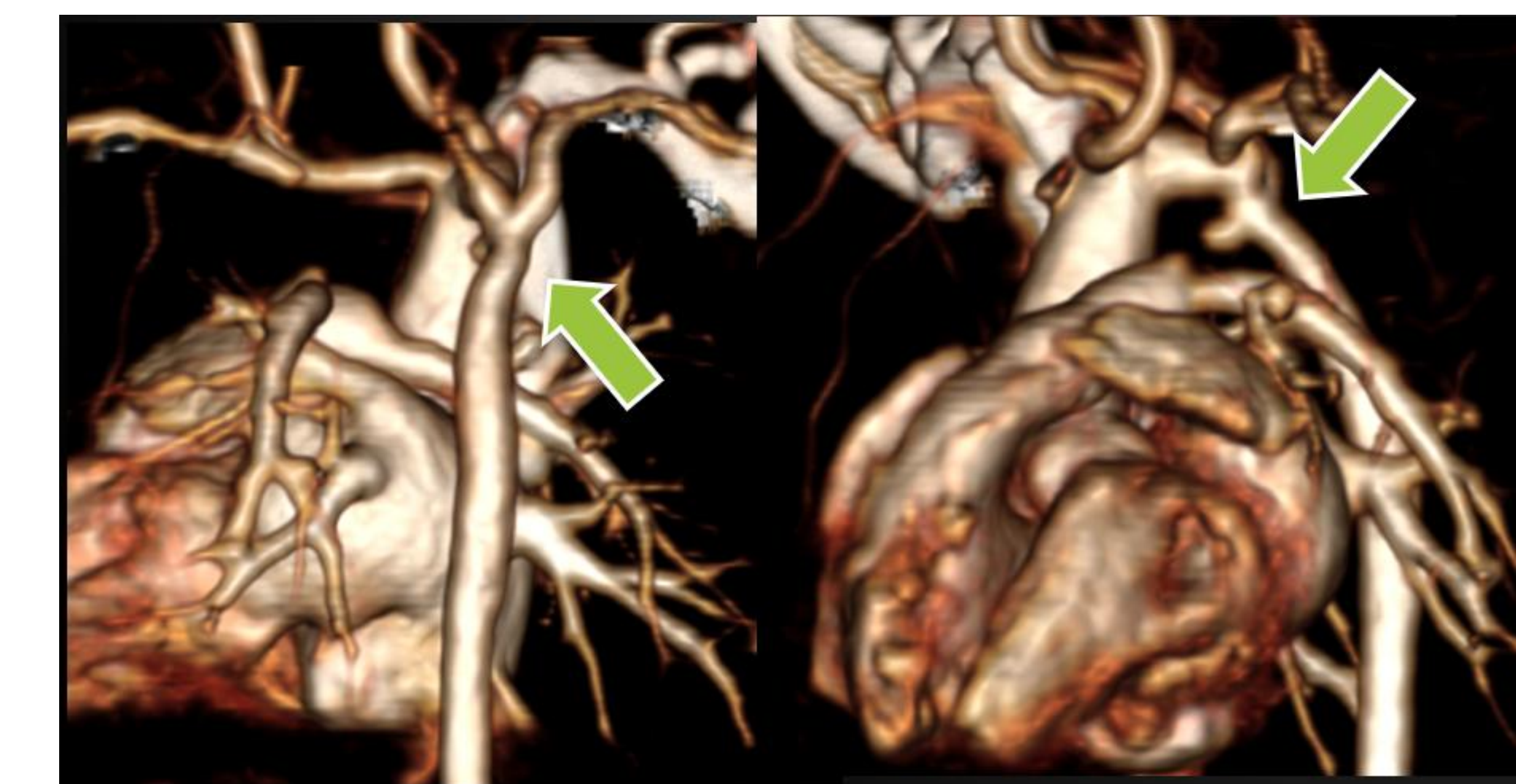


Figure 5. Contrast-enhanced CT image; The CoA was mild, and lower-body perfusion remained preserved. The most severe narrowing was observed at the site of ductal insertion and near the origin of the vertebral artery.