

isuog2025.12e052f

Pilot study on the improvement of fetal cardiovascular anatomy visualization in the first trimester with slow flow Doppler

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Objectives

To evaluate the utility of slow flow in first-trimester cardiac screening to improve the visualization of fetal cardiovascular structures and its correlation with neonatal outcomes.

Methods

A prospective pilot study was conducted on 100 pregnancies between 11-14 weeks of gestation from 2023 to 2025. The scans were performed abdominally with ultrasound GE Voluson E8. Slow Flow Doppler was used to evaluate fetal cardiovascular anatomy, including the 4-chamber view, aortic and pulmonary artery outflow, the 3-vessel-trachea view, and the aortic arch. The average scan time was measured, and the influence of maternal BMI on image quality was analyzed. Follow-up was conducted in the second and third trimesters, with postnatal confirmation of the findings.

Results

Slow Flow significantly improved the visualization of cardiovascular structures compared to conventional methods, especially in patients with high BMI. The assessment was only limited by the fetal position. In the follow-up, 96 neonates were confirmed to be healthy. Tricuspid dysplasia was identified in the second trimester and 3 cases of muscular ventricular septal defect were missed in the initial evaluation.

Conclusions

This pilot study demonstrates that Slow Flow is an effective tool for optimizing the visualization of fetal cardiovascular structures in the first trimester, achieving greater diagnostic accuracy in less time. Its utility is particularly notable in patients with high BMI, where conventional screening presents greater limitations. Further large-scale studies are needed to validate these preliminary results.

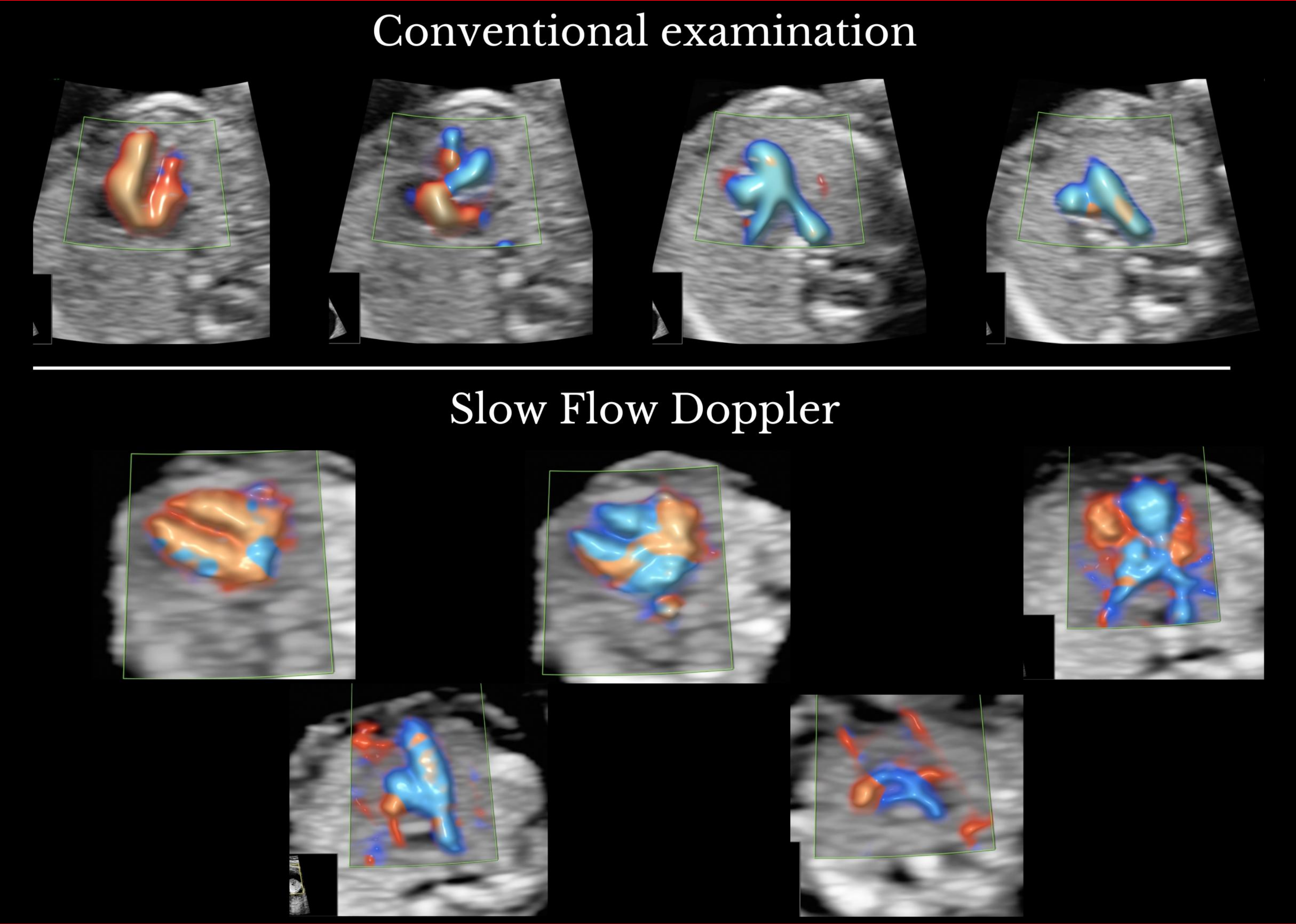


Figure 1. Comparison between traditional cardiac screening and the proposed cardiovascular screening with Slow Flow Doppler.

Evaluated Parameter	Conventional Screening	Slow Flow Doppler
Four-chamber visualization	82%	96%
Pulmonary venous return	75%	94%
Pulmonary artery outflow	70%	92%
Internal mammary arteries	65%	90%
Subclavian & 3-vessel trachea	68%	93%
Exploration time (min)	7 ± 3	4 ± 2
Limitation due to high BMI	High	Low

Table 1. Comparison of cardiac anatomy assessment in traditional screening vs. Slow Flow Doppler.