

2D-Speckle-Tracking-Echocardiography (STE) in Fetuses with Pulmonary Atresia and Intact Ventricular Septum (PAIVS) throughout the Course of Gestation

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Introduction

This study aims to assess both atrial and ventricular strain using 2D-STE in fetuses with pulmonary atresia and intact ventricular septum (PAIVS).

Methods

30 fetuses prenatally diagnosed with PAIVS were analyzed. Apical or basal 4-chamber views were evaluated using 2D-STE between January 2008 and January 2025. Both the left and right ventricles (LV, RV, *Fig. 1*), as well as the left and right atria (LA, RA, *Fig. 2*), were systematically assessed wherever possible.

Results

95 STE examinations, 45 in 2. trimester and 50 in 3. trimester:

- global LV contractility **increased**³
(mean values $-23.5 \pm 8.1\%$, $p < 0.01$)
- global RV contractility **decreased** slightly³
($-15.4 \pm 19.1\%$, $p < 0.01$)
- global LA and RA contractility **decreased**³
($28.5 \pm 15.8\%$ and $28.8 \pm 12.5\%$, $p < 0.01$).
- Linear regression analysis showed a progressive decline in left atrial speckle-tracking parameters with advancing gestation, most notably in global left atrial longitudinal contractility. (*Fig. 3*)

Conclusion

Fetuses with PAIVS showed increased global longitudinal LV contractility, unchanged or slightly reduced RV contractility, and significantly reduced LA and RA contractility, compared to the control group. In particular, the reduced atrial contractility during pregnancy highlights the increased volume load and allows for a reliable assessment of diastolic function.

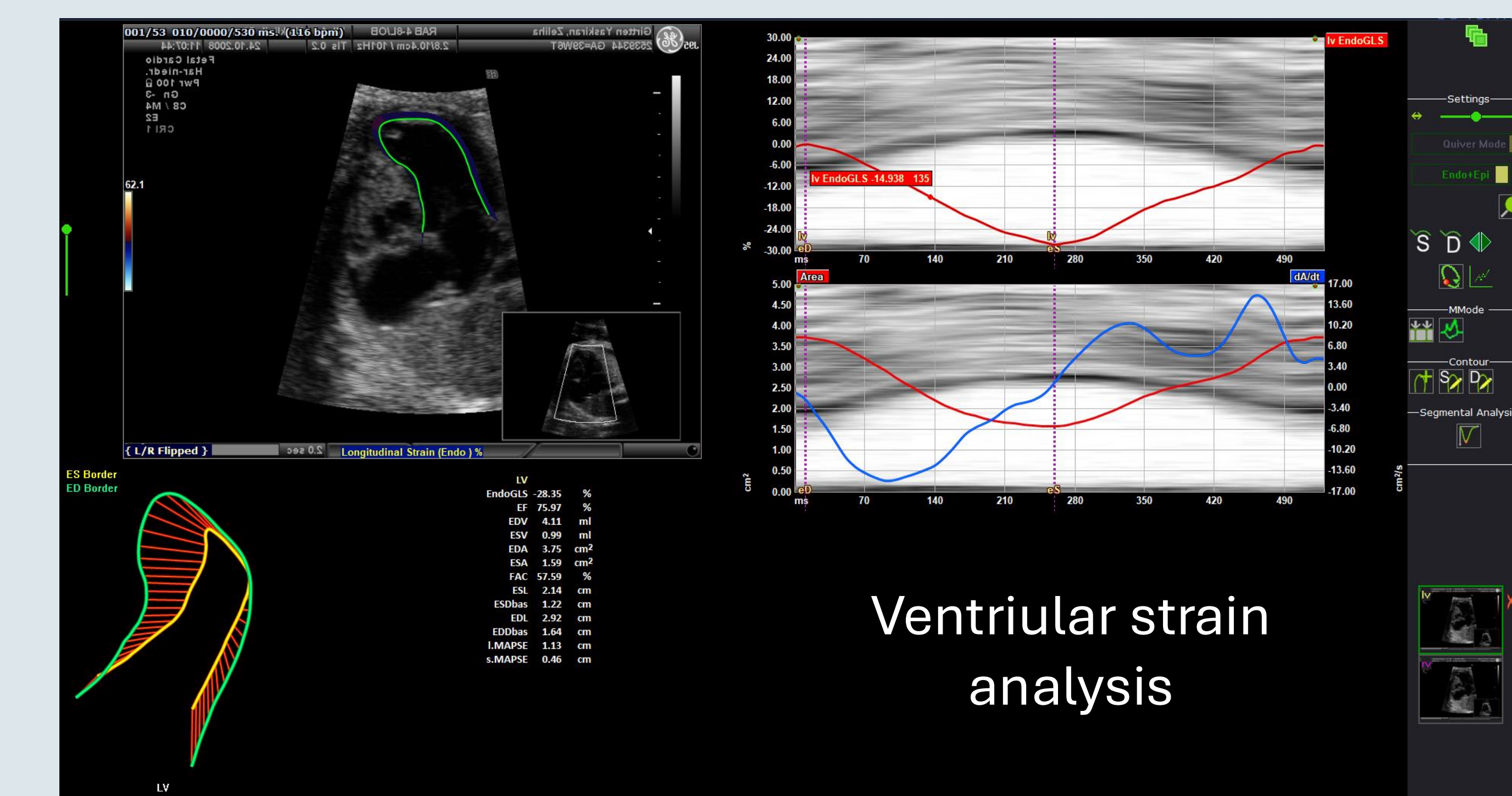


Fig. 1

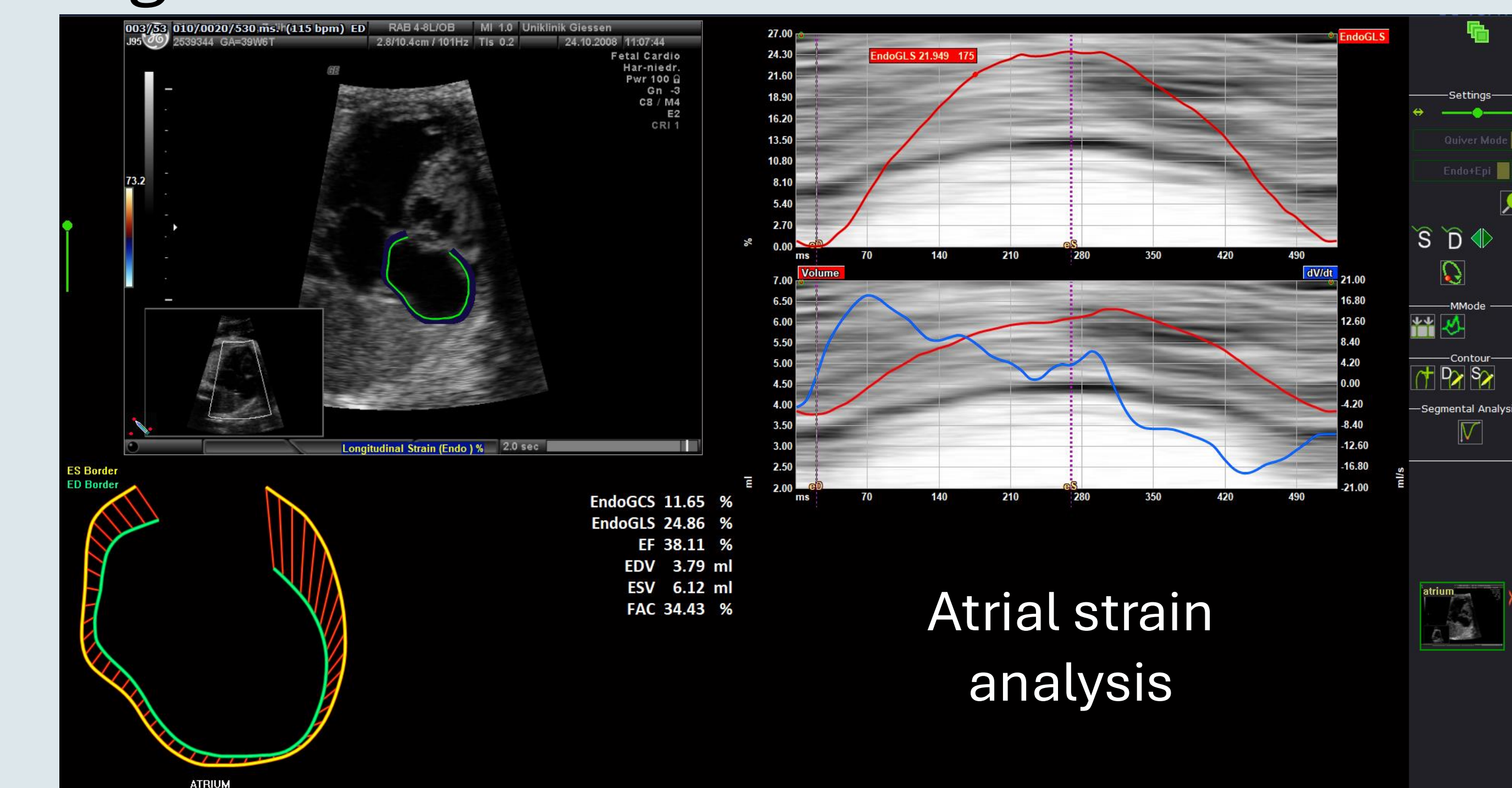


Fig. 2

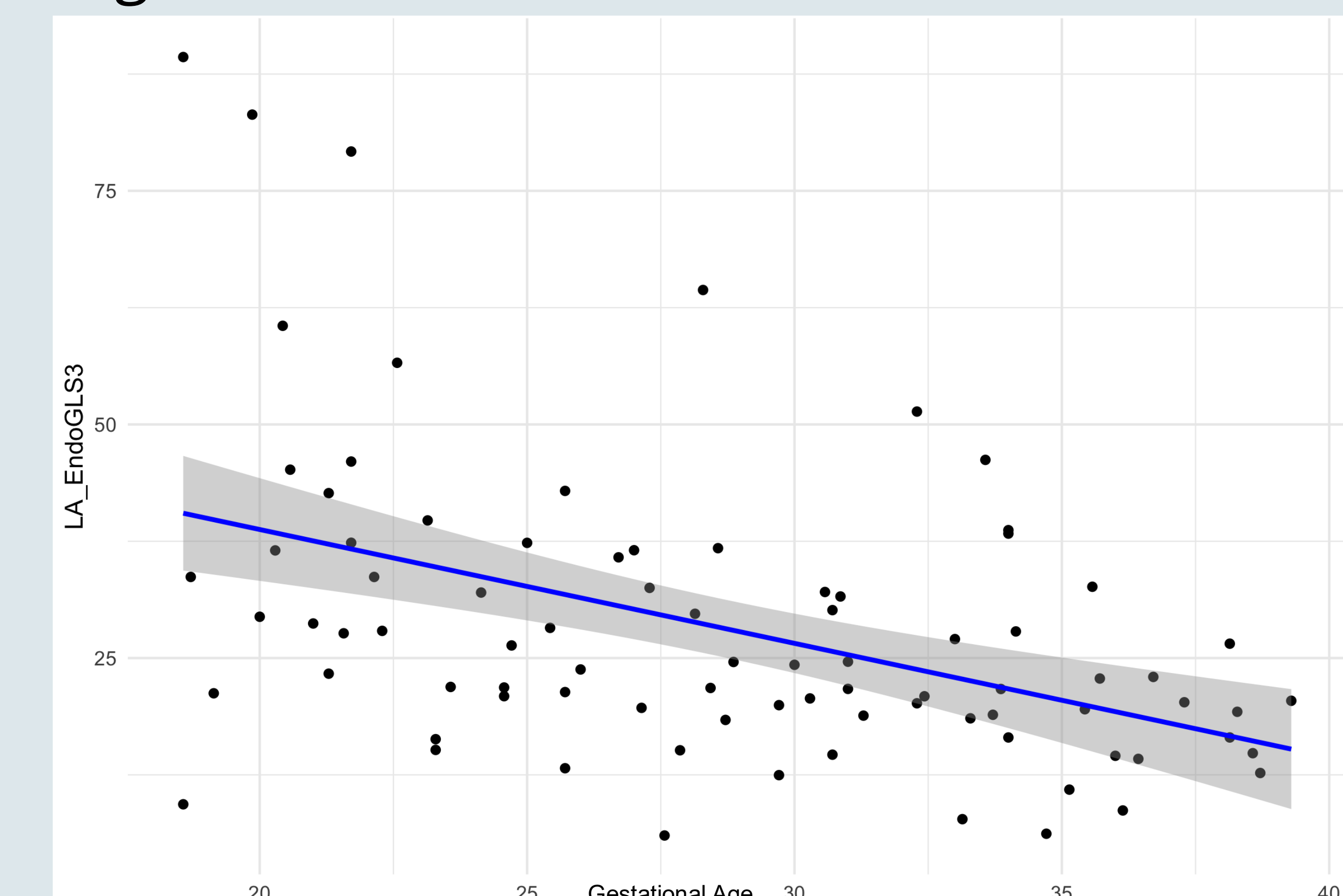


Fig. 3: Linear regression left atrial strain

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3. Controls in: "Atrial and Ventricular Deformation Analysis in Normal Fetal Hearts Using Two-Dimensional Speckle Tracking Echocardiography", Meister et al. (2020)