

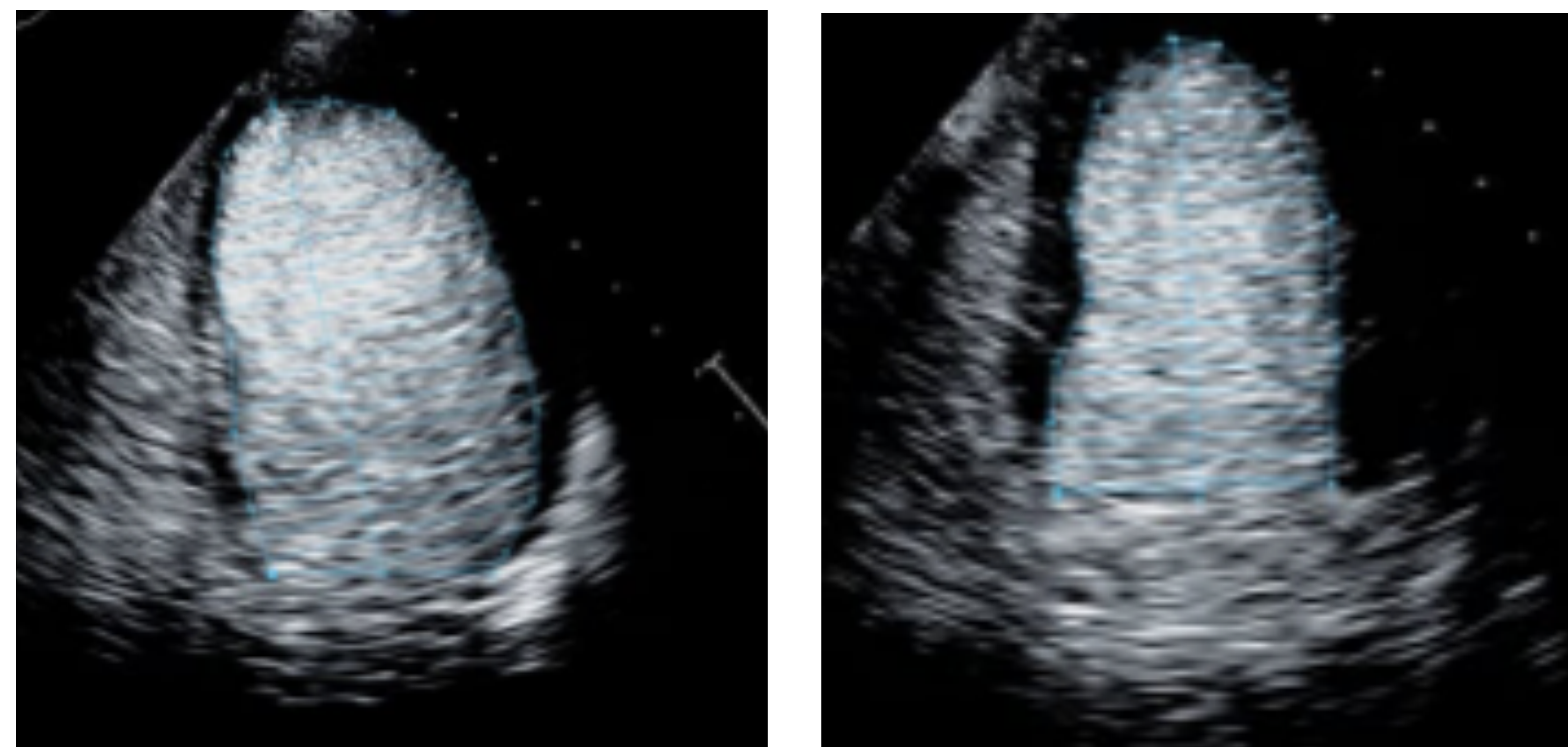
Background

Global longitudinal strain GLS measurements heavily depend on the quality of the 2D echocardiographic images. This excludes a substantial number of patients from assessment of GLS. Contrast echocardiography has been shown to improve endocardial definition and reduce the variability of EF measurements. However, performing GLS measurements on contrast echocardiograms using the software provided by the manufacturers is limited.

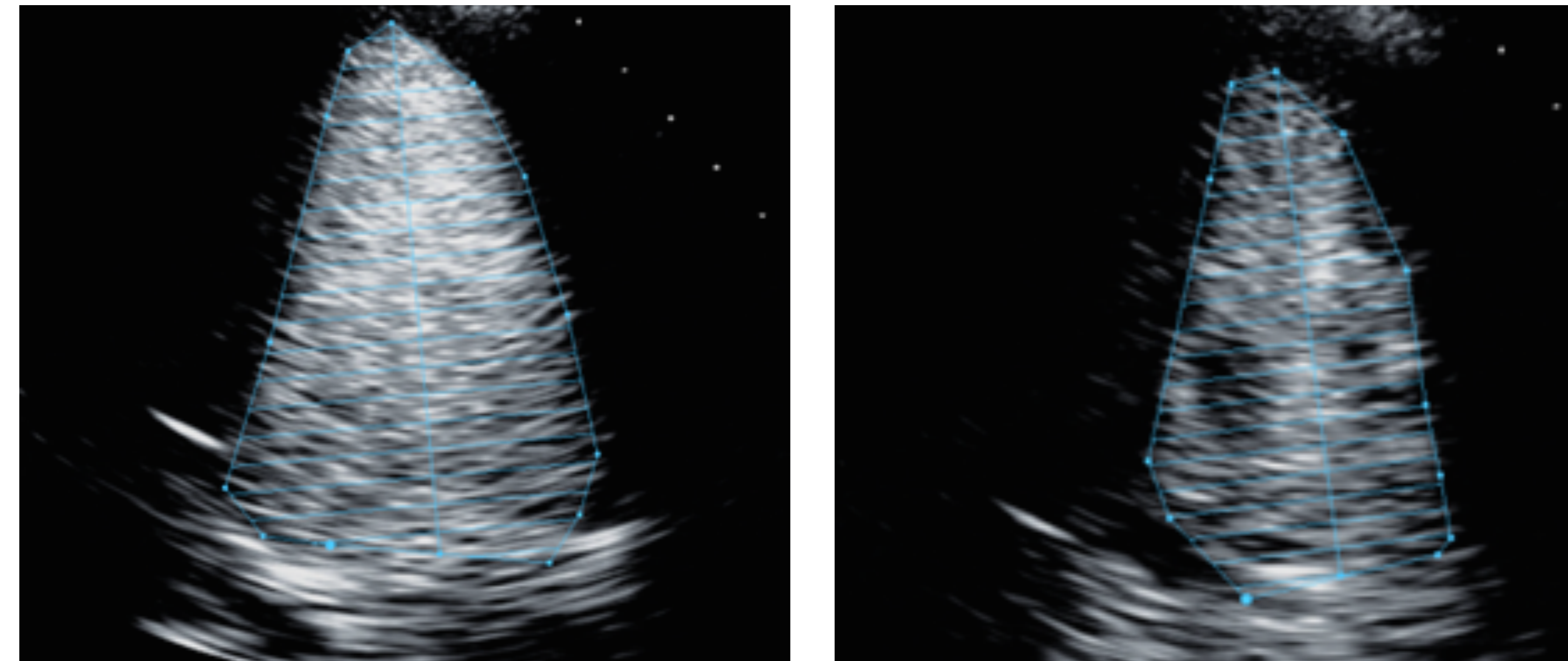
Therefore, we sought to develop a method for estimation of global longitudinal strain which can be used on every 2D scanner used for contrast echo.

Patients and Methods

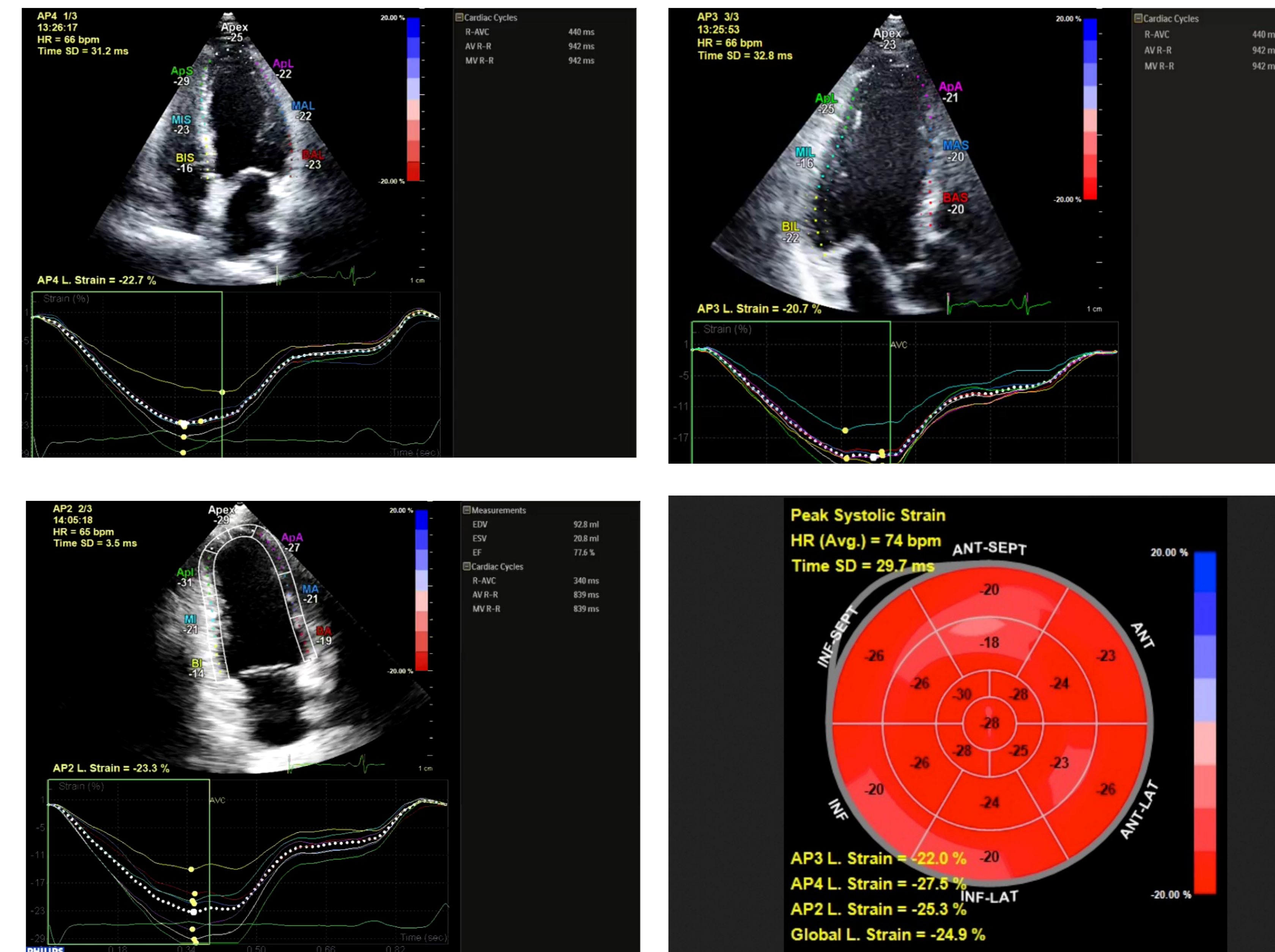
In 75 patients with good acoustic windows and no obvious foreshortening of the imaging planes, GLS measurements were performed according the ASE guidelines. In addition, simple contrast GLS (scGLS) was measured by manually tracing the end diastolic and end systolic endocardial contours of the 2D contrast echocardiographic loops similar to end diastolic and end systolic tracing for volume measurement but excluding the mitral ring diameter. This results in end diastolic and end systolic endocardial circumference (EDc,ESc). Peak systolic strain was calculated by (EDc-ESc)/EDc in each view and the average was reported as scGLS.



Measurement of simple contrast GLS (scGLS) in four chamber view



Measurement of simple contrast GLS (scGLS) in two chamber view



Measurement of GLS using the standard method for the same patient

Measurement of (scGLS) "average of 2C and 4C views" = - 22.6%
Measurement of GLS using the standard method = - 24.9 %

Results

Fig.1 shows the linear correlation between scGLS and GLS. Using Bland Altman plot there was a bias of 0.8% indicating only minor deviation of the scGLS measurements from the GLS measurements Fig.2

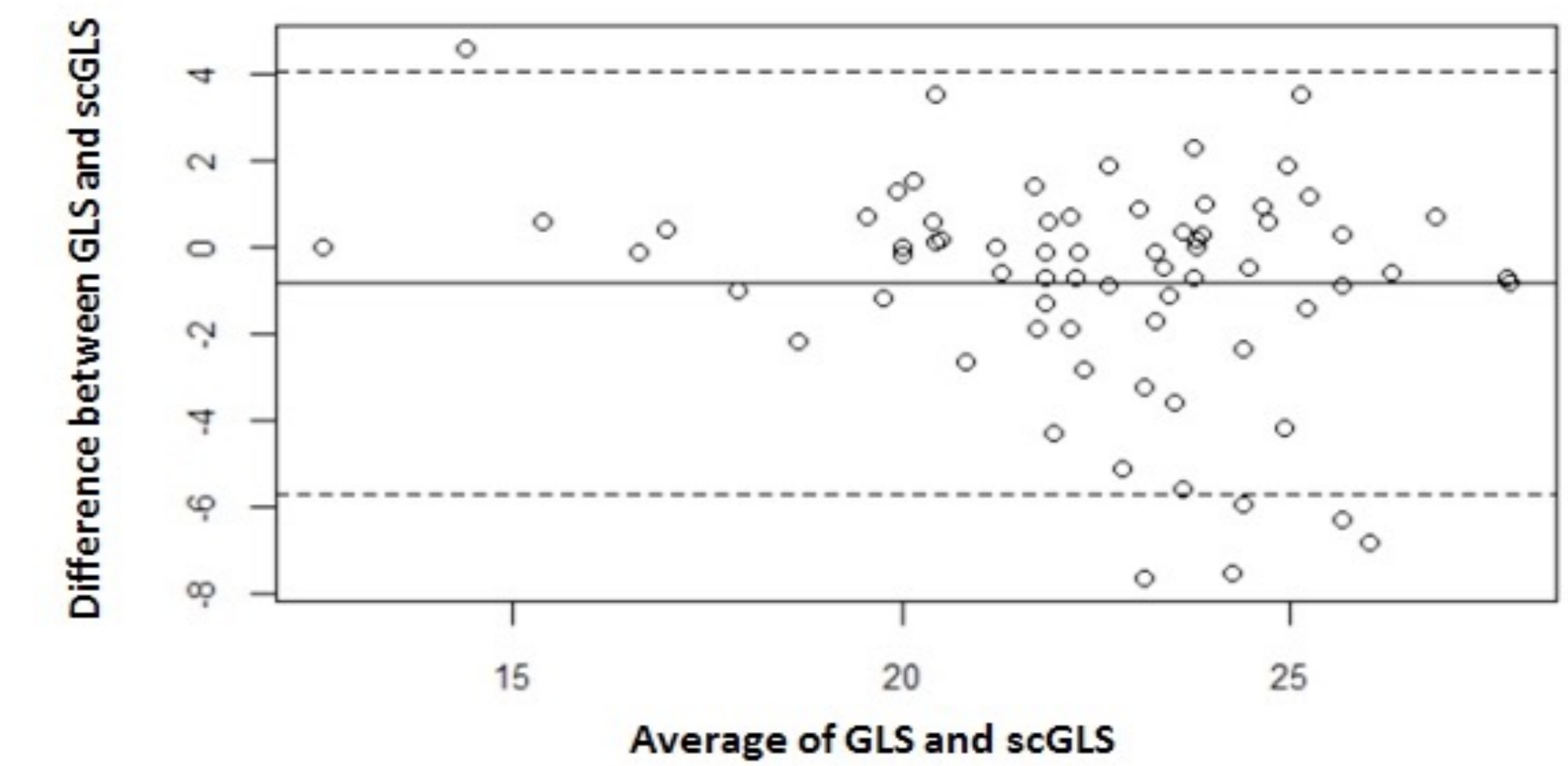


Figure 1. Bland – Altman analyses between GLS and scGLS

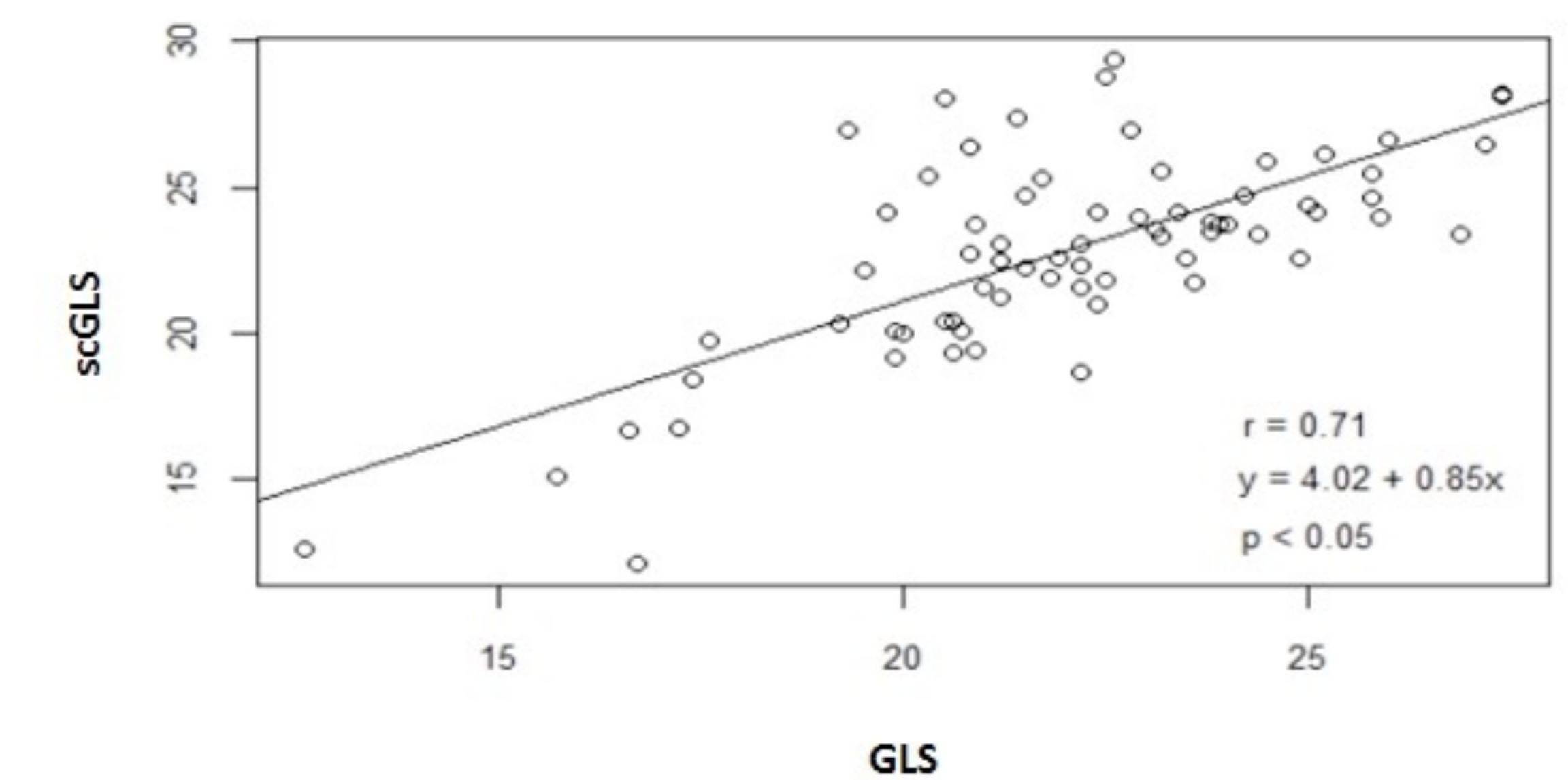


Figure 2. Linear regression of scGLS on GLS

Conclusion

GLS measurements using end systolic and end diastolic contrast echocardiographic frames (scGLS) showed good agreement with conventional GLS measurements. This will allow strain measurements in patients with poor acoustic windows when contrast agents are injected.