

Title: Acute Changes in Myocardial Deformation in Recipient Twins After Selective Fetoscopic Laser Therapy of Twin-Twin Transfusion Syndrome

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Background: Twin-twin transfusion syndrome (TTTS) can impact fetal cardiovascular function in 10-15% of monochorionic twin pregnancies. Monitoring myocardial performance, particularly pre and post-therapeutic selective fetoscopic laser photocoagulation (SFLP), may aid in assessing TTTS severity and monitoring response to SFLP. Measures of myocardial mechanics, such as ventricular strain, have been shown to be abnormal in TTTS prior to therapeutic intervention. Our objective was to determine whether myocardial deformation is significantly altered after SFLP therapy in TTTS.

Methods: Fetal echocardiograms of 26 twin pairs (donor and recipient twins) with TTTS were compared pre and post-SFLP. Two-dimensional four-chamber views were acquired utilizing high frame rates (>30 frames/sec) and were interrogated offline using feature-tracking software for strain analysis. Baseline global longitudinal strain was measured in the right ventricles (RV) and left ventricles (LV) of donor and recipient twins. The RV and LV myocardial performance index (MPI) was recorded. Global systolic longitudinal strain and MPI were compared pre and post-SFLP.

Results: Twenty-six twin pairs had initial fetal echocardiographic evaluation at 21.7 ± 2.7 weeks gestation. Median time between initial study and SFLP was 1 day (interquartile range (IQR) = 1, 11), and median time for evaluation after SFLP was 4 days (IQR = 2, 13). Pre-SFLP, donor twin global longitudinal strain was higher compared to the recipient twin ($p < 0.001$). Post-SFLP the donor twin showed no significant change in strain, though the MPI decreased (Table). Recipient twins showed an acute improvement in global longitudinal strain and MPI after SFLP (Table).

Conclusion: After SFLP, there is an acute improvement in the global biventricular strain and MPI in recipient twins that reflect improvement in either myocardial function or loading conditions. Further work examining the relationship between myocardial deformation and outcome post-SFLP is warranted in the TTTS population.

Variable	Pre-SFLP	Post-SFLP	p-value
Recipient twin RV strain (%)	-13.3 +/- 4.4	-21.6 +/- 4.6	<0.0001
Recipient twin RV MPI	0.61 +/- 0.15	0.54 +/- 0.15	0.02
Recipient twin LV strain (%)	-11.9 ± 4.4	-16.8 ± 3.8	<0.0001
Recipient twin LV MPI	0.61 ± 0.13	0.51 ± 0.11	0.001
Donor twin RV strain (%)	-17.1 +/- 5.2	-19.7 +/- 5.1	0.04
Donor twin RV MPI	0.37 +/- 0.09	0.38 +/- 0.07	0.7
Donor twin LV strain (%)	-18.7 ± 4.7	-20.6 ± 4.1	0.06
Donor twin LV MPI	0.39 ± 0.09	0.31 ± 0.07	0.005