

Global Left Ventricular Relaxation Index: a tissue Doppler indicator of positive biopsy in children post heart transplantation.

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Background: Cardiac catheterization with endomyocardial biopsy (EMBs) is the standard for evaluation after orthotopic heart transplantation (OHTx). We developed an echocardiographic index of global left ventricular relaxation (LVRI) which in a previously reported study by our group demonstrated 100% sensitivity and 90.9 % specificity for detecting OHTx patients with Grade 1R to 3R EMBs. In this study we tested the utility of the LVRI in an additional group of OHTx patients from a different institution in order to further evaluate our initial results. Both patient groups were combined.

Methods: LVRI was calculated as the sum of diastolic tissue Doppler imaging (TDI) velocities (E') of the left ventricular lateral, septal and posterior walls divided by the percentage of the left ventricular posterior wall (LVPW) thinning by M-mode. In this expanded study LVRI was measured in 70 OHTx patients and 50 patients with normal hearts. Of the 56 patients who underwent clinically indicated EMB, 22 had Grade 0R EMB, 18 had Grade 1R and 16 had Grade 2R to 3R biopsies. Sensitivity, specificity and predictive value of LVRI for discriminating Grade 1R to 3R EMB were calculated. LVRI was compared before and after OHTx rejection treatment and during the early and late post-transplant period. One-way analysis of variance was used to compare all groups.

Results: LVRI was measured in all patients although identification of the E' velocity on OHTx patients with bi-atrial anastomoses was challenging compared to those with bi-caval anastomoses. In this larger patient population we confirmed that: 1) LVRI < 0.8 selected OHTx patients with Grades 1R to 3R EMB; 2) LVRI was lower in patients with Grade 0R EMBs compared with normal subjects; 3) patients with Grade 1R to 3R EMBs had lower LVRI than those with Grade 0R EMBs; 4) LVRI recovered after rejection treatment; 5) LVRI normalized (LVRI \geq 0.8) between 90-120 days post-transplantation with patient variability.

Conclusion: LVRI is a TDI index of global left ventricular diastolic function. We demonstrated, in an expanded transplant patient population, its utility as an echocardiographic indicator of positive biopsy and for assessment of the natural recovery of diastolic function after transplantation.