Tissue Doppler velocities for ruling out rejection in heart transplant recipients in the daily routine of the echocardiography laboratory: a feasibility study.

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Background: The sum of systolic and early diastolic myocardial velocities at lateral mitral annulus, evaluated by tissue Doppler (in absolute values, s'+e') in the apical four chambers view is a parameter whose value for ruling out acute cellular rejection (ACR) in heart transplant (HTx) recipients has been acknowledged by the European and Brazilian recommendations for the use of imaging in HTx. A recent study has shown its independent association with ACR in the context of classical and myocardial deformation variables, with a negative predictive value (NPV) of 98% for treatment requiring ACR (TR-ACR, grade ≥ 2R) for a cut-off point of ≥23 cm/s. This work was performed under experimental conditions (only one expert echocardiographer, only one high-end equipment).

Purpose: Our objective was to study the diagnostic utility of this parameter for ruling out rejection in HTx recipients in the daily routine of the echocardiography laboratory.

Methods: From October 2017 to May 2020, serial echocardiograms were performed to 33 consecutive HTx recipients, in the 3 hours after the routine surveillance endomyocardial biopsies (EMB), in the first year after HTx. Three sonographers, seven cardiology residents and six expert echocardiographers participated in the acquisition and interpretation of the images, with seven different echocardiographic machines in only one centre. We analysed the association of s'+e' with the presence of ACR, and the NPV of s'+e' ≥23 cm/s for ruling out TR-ACR was investigated.

Results: A total of 176 pairs of EMB and echocardiogram were obtained. The value of s'+e' was significantly lower with higher severity of rejection: 25.6 ± 5.5 cm/s, 23.8 ± 5.1 cm/s and 21.6 ± 3.5 cm/s for ACR grade 0R (n = 91, 52%), 1R (n = 67, 38%) and ≥2R (n = 18, 10%), respectively, p = 0.005. It was also lower when comparing studies with (≥1R) and without rejection (23.4 ± 4.9 cm/s versus 25.6 ± 5.5 cm/s, p = 0.005), or TR-ACR versus the rest of series (21.6 ± 3.5 cm/s versus 24.8 ± 5.3 cm/s, p = 0.01). The area under curve for the detection of TR-ACR was 0.67 (CI95% 0.56-0.78), p = 0.02. A cut-off point of ≥23 cm/s, present in 57% of the studies, showed a NPV of 95% for TR-ACR.

Conclusion: Lateral mitral annulus velocities showed an excellent NPV of 95% for TR-ACR detection in HTx recipients when evaluated in the daily routine of an echocardiography laboratory with a wide variety of operators and echocardiographic equipment. This finding could be useful for reducing the number of EMB in selected cases.