122

3D Speckle tracking for characterizing transmurality of myocardial necrosis.

Delphine Hayat (1), Martin Kloeckner (1), Julien Nahum (1), Caroline Dussault (1), Jean-François Deux (2), Jean-Luc Dubois Rande (1), Pascal Guéret (1), Pascal Lim (1)
*(1) CHU Henri Mondor, Cardiologie, Creteil, France – (2) CHU Henri Mondor, Imagerie médicale, Créteil, France*

Background: The aim of the study was to compare the accuracy of 3D strain for characterizing myocardial transmurality necrosis.

Methods: The study included 17 patients (12 males, 64±14 years) with ischemic left ventricular dysfunction (38±9%). Longitudinal, circumferential, and radial strain by 3D speckle tracking, 3D area strain were computed from baseline 3D echocardiography data and compared to transmural necrosis by MRI.

Results: On the whole, 232 segments (85%, 232/272) were analyzable by 3D and MRI. Decrease in radial strain occurred lately when transmural necrosis was >75% (9±9% vs.18±14%, p<0.001). In contrast, longitudinal strain decreased early when transmural necrosis was >25% (-9±6% vs. – 6±5%, p=0.001) and remained stable thereafter without significant difference between 25% and 75%. Interestingly, circumferential and 3D area strain were able to differentiate all stages of necrosis <25%, 25-75% and >75% (See Figure).

Conclusion: 3D strain values by speckle tracking analysis are consistent with the anatomical fibers distribution and correlates with the transmurality of myocardial necrosis assessed by MRI. Circumferential and 3D area strain provides a continuous assessment of transmural necrosis.
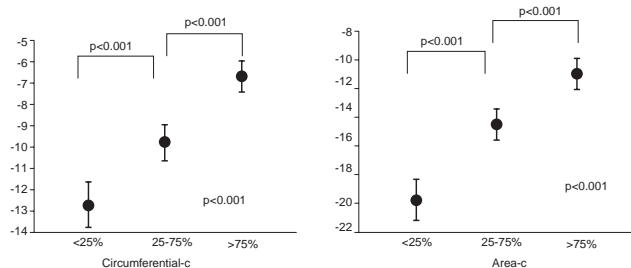
123

Right ventricular involvement in Tako-Tsubo cardiomyopathy detected by 2D speckle tracking echocardiography

Nicolas Mansencal, Nacéra Abbou, Rami El Mahmoud, Rémy Pillière, Olivier Dubourg
Hôpital Ambroise Paré, Service de Cardiologie, Boulogne, France

Background: Tako-Tsubo cardiomyopathy (TTC) is characterized by transient stress induced transient left ventricular (LV) dysfunction. Right ventricular (RV) involvement may occur and is associated with bad outcome. Assessment of RV function may be difficult using echo. Velocity vector imaging (VVI) is a new echo technology that measures myocardial velocity and deformation using 2D speckle tracking. The aim of this study was to assess RV involvement in TTC by VVI.

Methods: We prospectively studied 80 pts divided in 3 groups: 30 pts with TTC (group 1), 30 pts with CAD defined as a documented LAD occlusion (group 2) and a control group (n=20, group 3). Groups 2 and 3 were age and gender matched with group 1. RV function was assessed by RV angiography or MRI, allowing the calculation of RV ejection fraction (RVEF) and was considered as our gold standard. We systematically performed echocardiography, with the use of VVI technology, allowing to measure peak velocity (V), peak strain (S) and peak strain rate (SR) in basal, mid and apical RV free wall (FW) in apical 4-chamber view. RV systolic function was also assessed by the RV fractional area change (FAC) measured in apical 4-chamber view.

Results: Prevalence of RV involvement in TTC was 35% and NYHA class was significantly higher (p<0.05) and LVEF was lower (p=0.03) as compared to pts with TTC but without RV involvement. Values of V, S and SR in basal, mid and apical right ventricular FW were significantly lower in group 1 as compared to groups 2 and 3 (p<0.02 for basal FW and p<0.01 for mid and apical FW). Strong correlation was found between RVEF and global values of V (r=0.88, p<0.0001), whereas correlation between RVEF and FAC was weak (r=0.47, p=0.04). In TTC, RV dysfunction was found in all pts (n = 30 using VVI versus only 14 pts using the FAC method, p < 0.0001).

Conclusion: Our study suggests that VVI could be of interest for the assessment of RV involvement in TTC, allowing to individualize high-risk pts.

124

Peak systolic 2D strain may help to characterize arrhytmogenic right ventricular cardiomyopathy

Dimitri Stepowski, Baptiste Kurtz, Gaëlle Grezis-Soulie, Frédéric Anselme, Arnaud Savoure, Fabrice Bauer
Hopital Charles Nicolle, Cardiologie, Rouen, France

Background: Arrythmogenic right ventricular cardiomyopathy (ARVC) is an inherited disease characterized by progressive fibrofatty replacement of the right ventricle (RV). The diagnosis of ARVC remains a challenge for clinicians. We hypothesized that 2D strain imaging helps to differentiate ARVC from normals.

Material and Methods: 20 patients meeting both the Task Force and cardiac MRI criteria for ARVC were compared to 10 age-matched controls. From the apical-4 chamber view, we measured the end-diastolic RV area, the peak systolic S tissue velocity at the tricuspid level. A 2D strain region of interest including the RV free wall and the septum (occasionally diseased in ARVC) was manually traced, from which the averaged peak systolic 2D strain along 6 segments was calculated. Pulmonary systolic pressure as well as the systolic right atrial area were measured as surrogate for RV loading conditions. Overall, patients with ARVC had both larger right atrial and ventricular area (p<0.03 and p<0.02, respectively), compared to controls while pulmonary systolic pressure were similar in both groups (p=0.40). Peak systolic 2D strain was statistically deteriorated in ARCV patients (13±6 vs. 23±4 % in normals, p<0.001) so as peak systolic S tissue velocity (8±3 vs. 12±4 in normals, p<0.005). From the ROC analysis, a peak systolic 2D strain of 19.7% had a sensitivity and specificity of 82% and 86% (AUC = 90) while the peak systolic tissue velocity of 12 cm/s gave a sensitivity of 83% and a specificity of 71% (AUC=79).

Conclusion: Peak systolic 2D strain is deteriorated in ARVC patients and may help to characterize arrythmogenic right ventricular cardiomyopathy.