Clinical significance of global strain estimated by 3D speckle tracking acutely after onset of ST-elevation myocardial infarction on prediction of long term prognosis

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Topic(s): Echocardiography: Technology

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Background: Three-dimensional (3D) speckle tracking echocardiography (STE) is a novel method for assessing cardiac function because of free form out-of-plane motion effects.

Aim: To explore the role of 3D-STE for prediction of the long term prognosis in patients with a first-time ST elevation acute myocardial infarction (STEMI).

Methods: A total of 238 patients (mean age 64.6 years) with a first-time STEMI treated with reperfusion therapy were enrolled in our study. Twenty four hours after admission, standard 2D echocardiography and 3D full volume imaging were obtained and strain parameters (GLS: global longitudinal strain, GCS: global circumferential strain) were calculated using 4D LV analysis. Infarct size was measured with single-photon emission computed tomography imaging 7 to 14 days after onset. We followed them for median 94 months (inter quartile range: 69–109 months). The primary end point was the major adverse cardiac and cerebrovascular events (MACE: cardiac death, non-fatal MI, heart failure requiring intravenous diuretics administration and stroke). The patients with persistent chronic atrial fibrillation, poor image quality, emergency bypass surgery were excluded.

Results: During follow up periods, 78 patients experienced MACE (26 cardiac death, 48 heart failure, 29 non-fatal MI, 5 stroke) and 48 patients died (22 non-cardiac death). In multivariate analysis, 3D-GLS was the strongest predictor for MACE. Kaplan-Meier Curve demonstrated that 3D-GLS >−11.4 was the independent predictor for MACE (Log-rank χ²=73.818, p<0.0001). When combined with 3D-GCS >−19.2, the patients with higher value both of 3D-GLS and 3D-GCS were extremely high risk.

Conclusions: Global strain estimated by 3D-STE immediately onset of STEMI was useful tool for the prediction of long term prognosis.
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When combined with 3D-GCS >−19.2, the patients with higher value both of 3D-GLS and 3D-GCS were extremely high risk. The figure shows the Kaplan-Meier curve according to the 4 groups based on the cut-off values determined by ROC curves.

Conclusions: Global strain estimated by 3D-STE immediately on onset of STEMI was useful tool for the prediction of long term prognosis.

Kaplan-Meier curve for MACE according to the 4 groups based on the cut-off values determined by ROC curves

Event free survival rate

Log rank, p<0.001

- 3D-GLS<-11.4, 3D-GCS<-19.2
- 3D-GLS<-11.4, 3D-GCS ≥ -19.2
- 3D-GLS≥-11.4,3D-GCS<-19.2
- 3D-GLS≥-11.4,3D-GCS≥-19.2

months