Reviewer’s report

Title: Regional Myocardial Strain Analysis via 2D Speckle Tracking Echocardiography: Validation with Sonomicrometry and Correlation with Regional Blood Flow in the Presence of Graded Coronary Stenoses and Dobutamine Stress

Version: 0 Date: 09 Nov 2019

Reviewer: ELENA GALLI

Reviewer's report:

In the article "Regional Myocardial Strain Analysis via 2D Speckle Tracking Echocardiography: Validation with Sonomicrometry and Correlation with Regional Blood Flow in the Presence of Graded Coronary Stenoses and Dobutamine Stress", Stendahl et al. use an experimental model to correlate circumferential and radial strain with coronary flow variations and myocardial function assessed by sonomicrometry.

The topic is of interest because the role of STE in disclosing subclinical coronary artery disease is a matter of interest and debate.

The article is well written, images are nice and useful to explain the experimental procedures and results.

Nevertheless, some concerns remain which should be solved in order to make the article suitable for publication.

Major
1) In the methods the authors states that "ED was defined by the peak of the QRS complex on ECG. The systolic cycle length from invasive pressure measurements was used to determine ES". Nevertheless, it is not clear what kind of strain was finally assessed. Did the authors assessed end-systolic strain, or peak systolic strain, or peak strain? This should be clarified because it has a pivotal important for data interpretation and also for clinical practice.
2) Previous studies have shown (Voigt JU et al.) have shown that ischemic segments have a particular strain pattern characterized by a delayed strain peak after aortic valve closure. This pattern, called post-systolic shortening, is evident also in your experimental model (Figure 5). The post-systolic shortening phenomenon allows the calculation of the post-systolic index (PSI) that is better correlated to myocardial perfusion/ischemia than peak systolic strain. The authors should assess this parameter and correlate it with myocardial blood flow.
3) In the discussion you state that: "The results of the current study and these prior experiments suggest that regional circumferential 2D STE strain measurements correlate and agree with reference sonomicrometer values at levels that are slightly more favorable than regional radial measurements, but inferior to regional longitudinal measurements". Nevertheless, in your study longitudinal strain was not assessed. Please correct this statement accordingly.
4) I think the authors should clarify the clinical utility of their findings and resume them in a specific
5) In the discussion you state that "Most often, post-systolic deformation related to delayed myocyte contraction and/or passive mechanisms leads to overestimation of ES strain. Actually, in ischemic situation end systolic strain (ESS) is often lower that peak strain (PS) because of the post-systolic shortening phenomenon which is also evident in your pictures. Please amend or explain you statement.

5) Discussion in redundant and should be shortened of at least one third. Moreover, I advise the authors to divide the discussion in several paragraphs on different topics and to include a paragraph on the clinical utility of their findings as indicated above.

Level of interest
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