Reviewer's report

Title: Functional measurements based on feature tracking of cine magnetic resonance images identify left ventricular segments with myocardial scar

Version: 1 Date: 21 October 2009

Reviewer: Pier Giorgio Masci

Reviewer's report:

This paper by Maret E at AI evaluates the utility of a relative new tool (feature tracking) in analyzing left ventricular regional function in patients with anterior myocardial infarction. The authors investigate an interesting approach to derive myocardial deformation and velocity parameters in radial and longitudinal directions using the cine MR images and echo derived software. The authors found that the so obtained parameters have good accuracy in detecting the infarcted myocardium as compared to the in-vivo reference standard, i.e. the delayed enhancement MR imaging. This approach also yields good inter- and inter-observer reproducibility, and seems to be promising representing an alternative to the time consuming tagged MR imaging by HARP. However, several considerations should be addressed by the authors:

Major Compulsory Revision:

1) Page 6, Methods section, Study population paragraph: inclusion criteria are confusing, please redefine this section. For example the authors stated that the inclusion in the study was based upon the presence or absence of extensive myocardial scar in myocardium in LAD perfusion territory. However, in the non scar group 7 patients had the culprit lesion in LAD/diagonal system.

2) Page 7-8, Methods section, paragraph Left ventricular size and function: in a separate paragraph, please provide detailed information of the software used for the analysis and pertinent references

3) Page 8, Methods section, Infarct size paragraph: why infarct area was determined using only 3 long views? The extent of necrosis/fibrosis could not have been comprised in the 3 long-axis views used for the analysis. The, infarct transmurality should have been determined in short axis orientation. It is not clear whether infarct transmurality was measured using long-axis or short-axis images. Please specify better how the authors define the adjacent and remote regions.

Which was the threshold used for the determination of infarct size? This is crucial. Usually it is recommended a signal intensity threshold of at least 5 SD more than that of the remote myocardium. This could not be the case since the authors found scar also in the remote non infarcted myocardium. Did these scars show an ischemic pattern? Were they really scars of just noise? This is closely related to the threshold used to measure the late gadolinium enhancement.

4) Page 10, Result section, Left ventricular volume and LVEF: the difference
between LV EF measured by short-axis cine MR imaging and that determined by biplane tracking is massive in the scar group but not in the non-scar group. How can the authors explain this divergence? Comments on this finding are needed.

5) Page 13, Discussion section, scar size and segmental scar area: this paragraph is not clear. The findings should be explained better and in more consistent way.

6) Page 13, Discussion section, functional measurements paragraph: the authors referred to differences in tissue contrast between MRI-HARP and VVI to explain the incongruence between the two methods (reference 21). This statement is not correct since HARP-MRI is based on the generation of non-magnetized lines which are able to tag the myocardium during the cardiac cycle. It is necessary to better substantiate the finding of higher remote deformation-velocity parameters as compared to those of anteroseptal regions in non scar patients.

7) The discussion is not focused in explaining and commenting the manuscript results but rather in explaining why remote region deformation was less in scar patients compared to that of the corresponding region in non scar patients. Please the discussion should comment the manuscript results.

Minor Essential Revisions:
1) Please use consistent abbreviations in both the abstract and text.
2) There are several orthographic and copy editing mistakes. Language revision by an English mother-tongue investigator is needed.
3) Page 6, Methods section, Study population paragraph: if needed, consider to use body surface area instead of height and weight.
4) Page 7, Methods section, MR imaging paragraph, please report the range of inversion time used in post-contrast MR imaging to null the normal remote myocardium.
5) Figure 4. Please use the same scale on the ordinate axis in the graphs displaying the radial and longitudinal displacement and also for the radial and longitudinal velocity. Please also choose a more appropriate ordinate axis scale. Strain graphs have also different scale increment (i.e. 10% increment for radial strain and 5% increment for longitudinal strain).
6) Page 14, Discussion section, functional measurements paragraph: the authors claimed that the deformation of the remote region is less in patients with infarcted and dysfunctional left ventricles as compared to the same region in non scarred patients. This statement is correct but needs to be substantiated by pertinent references (ex. Bogaert and Rademakers J Am Coll Cardiol)

Level of interest: An article whose findings are important to those with closely related research interests.
Quality of written English: Needs some language corrections before being published

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.