Reviewer’s report

Title: Gated myocardial perfusion SPECT underestimates left ventricular volumes and shows high variability compared to cardiac magnetic resonance imaging - a comparison of four different commercial automated software packages

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Reviewer: Aliasghar Khorsand

Reviewer’s report:

In this study 100 patients with known or suspected CAD were analysed by gated perfusion SPECT and cardiac MRI. The study compared quantification of LV volumes (EDV, ESV, and SV) and ejection fraction (EF) by four different SPECT programs (QGS, MyoMetrix, ECTb and Exini) with each other and to MRI. The authors conclude that gated perfusion SPECT systematically underestimates LV volumes.

The information about underestimation of LV volumes by four SPECT methods in comparison to MRI is important because gated perfusion SPECT is routinely used for measurement of LV volumes and EF. However generalisation of study results as “approximately 30% for EDV, ESV and SV” and for all 4 programs as repeatedly presented along the paper is not precise. As presented in detailed results, the amount of underestimation of LV volumes are different between the four SPECT methods and between EDV and ESV values for the same method, which results in significant different LVEF values for the 4 SPECT methods. Differences between the 4 SPECT methods have not been sufficiently discussed and were not included in conclusion.

Major concerns:
1- The presented results for underestimation of LV volumes by the four SPECT methods are not consistent in different parts of manuscript as follows:
   a- Abstract (results and conclusion) and discussion (1.paragraph): systematically underestimation of LV volumes by approximately 30%
   b- Discussion (2.paragraph): underestimation of EDV 30%
   c- Discussion (3.paragraph): underestimation of ESV 10-30%
   d- Conclusion: underestimation of LV Volumes 20-40%
   e- Table 2: underestimation 22-34% for EDV, 12-37% for ESV, and 21-41% for SV

   The results should be summarized precisely and consistently in the whole manuscript and differences between the 4 methods and between EDV and ESV should be mentioned in the discussion and conclusion section.
2- Details of significances (P-values) concerning the difference between the 4
SPECT methods and MRI should be presented in the results section. The presented summarized P-values in the abstract section ("P <0.05 for means, P = NS for SD for all comparison") are not sufficient. Results should be stated more precisely, eg. is the difference between measured LVEF by Exini (61 ± 10%) and MRI (62 ± 11%) significant too?

3- The authors should present results of regression analysis of EDV, ESV and LVEF by SPECT methods and MRI, which in combination with Bland-Altman analysis gives more information about the quality of agreement of these methods with MRI. The use of plots of absolute difference between SPECT and MRI in two separate graphs as presented in figure 3 is not sufficiently substantiated by the authors and can not give the same information as regression and Bland-Altman analysis.

4- Page 9 second paragraph: The conclusion of the same limits of agreement for determining LVEF for all 4 programs as ±15% must be justified by the authors. The presented results in table 2 and figure 3 show differences between the 4 programs concerning the calculation of LVEF. The authors didn’t account the mean difference of these programs with MRI (-9, 6, -15 and 0) but only accounted for the standard deviation.

Minor concerns:

1- Page 9: first paragraph of the results section until “…each other.” explains patient population and should be moved to the part study population in the methods section.

2- Page 7 (line 6): Mean ± SD of date interval between SPECT and MRI should be presented too.

3- Presentation of mean ± 2SD in table 2 and figure 4 is unusual. The common method is to present in form mean ± SD.

**Level of interest:** An article of importance in its field

**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.

**Declaration of competing interests:**

I declare that I have no competing interests.