Reviewer's report

Title: Estimation of Cardiac Output and Pulmonary Vascular Resistance by Contrast Echocardiography Transit Time Measurement: a Prospective Pilot Study

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Reviewer: Ariane Testuz

Reviewer's report:

Summary
In this prospective pilot study, the authors aim to establish a non invasive method for measuring cardiac output (CO) and pulmonary vascular resistance (PVR). In 27 patients they assessed correlation of standard invasive measurements with standard echo measurements and time of transit of contrast (Definity) through the pulmonary circulation measured by echocardiography. Their findings show poor correlation with standard echo measurements, but good correlation for CO and moderate correlation for PVR derived from contrast transit time study.

General comments
This manuscript is well written, but overall lacks details on some important points. The subject is very interesting as there is no reliable non-invasive method for measuring CO and PVR. The method proposed seems applicable in routine use, but as the authors report, requests some training in order to have the adequate acquisition technique, one of the limitations of the study, which lead to exclusion of a substantial number of patients. Moreover the risk of side effect of contrast use is not discussed, neither reported for the 27 patients. The patient selection is adequate, as for choosing subject without right ventricular pathology in a pilot study. While the results seem encouraging, the authors don’t explain with enough detail how they defined the different times of contrast progression after injection, and how they derived the values of PVR. And as they underline, these results need further validation. Finally this study interestingly confirms the bad correlation of standard echo methods for CO and PVR estimation with invasive measurements, but this is not mentioned in the discussion.

Specific comments

Major Compulsory Revisions
Abstract and Introduction: no major revision.

Methods:
Image analysis:
1. What do the authors mean by « peak LV/RV opacification » in opposition to « full opacification », and how did they define those two different stages of opacification. This is not clear in the text or in figure 1. Please give more details.
Results:
2. Which formula (linear regression analysis) allowed to assess PVR? The authors explain that these values correlate, but how do they obtain a PVR value? This was explained for CO but not for PVR.

Discussion:
The discussion is very short and does not fully cover the results obtained.
3. There is little explanation/hypothesis regarding why one interval rather than the other best reflects CO or PVR, and no clear practical summary of how to perform the measurements despite the difficulties the authors met during their study. Please develop.
4. Also no mention of the poor performance of the standard echo measurements. Please develop.
5. Regarding the contrast agent, there is no discussion regarding potential side effects. Please provide some information about safety of the contrast agent used.

Limitations:
No major revision

Minor Essential Revisions
Abstract and Introduction: no minor revision.
Methods:
6. Regarding the excluded patients, the authors refer to 5 patients who did not meet inclusion criteria, but in brackets 4+1+1 = 6). Please make the correction.

Level of interest: An article of importance in its field

Quality of written English: Acceptable

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