**Reviewer’s report**

**Title:** Cardiovascular magnetic resonance 4D flow analysis has a higher diagnostic yield than Doppler echocardiography for detecting increased pulmonary artery pressure

**Version:** 0 **Date:** 17 Dec 2019

**Reviewer:** Francisco Contijoch

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In the article, the authors compare CMR and echo-based estimates of increase PA pressure both quantitatively and categorically.

60 consecutive patients underwent both studies. MRI-based estimates of PA pressure were based on the presence of PA vortex duration while Doppler echo was used to measure TR and derive TRPG.

The authors quantify their findings with diagnostic yield (the fraction of identified cases).

While the comparison of these two approaches is interesting and has considerable clinical impact, several features of the approach limit interpretability of the findings.

The study does not include gold-standard assessment of PH via RHC. The authors appear to suggest (in the discussion) that the CMR findings closely approximate the RHC values (based on prior papers). However, throughout the manuscript it is unclear whether the higher yield identified via CMR is correct. Specifically, while the comparison of CMR and echocardiography in Table 3 is useful/important, the notion that the diagnostic yield is higher remains unproven. It remains a possibility that some, all, or a significant portion of the patients identified via CMR are incorrectly being referred for further evaluation.

Furthermore, as part of their comparison, two previously identified equations are used to derived mPAP from CMR and echo data, respectively. However, there is no analysis of whether the "higher yield" determined by CMR can be explained by a change in the fit or cutoff values. One significant contribution of this work could be that a "revised" cutoff of TR jet velocity is identified for more optimal identification of patients with elevated PA pressure.

Technically, the percentage of cardiac cycle that has vorticity is discretized based on the number of reconstructed phases in the CMR cine (35 phases) and to some extent, the acquired temporal resolution of the acquisition (36 ms). However, values derived from these discrete sampling
points appear to be treated as continuous variables. For example, mean values of vortex duration were 9.5 ± 9.7%. To improve clarity, the authors may consider describing both the number of frames labeled as well as the corresponding cardiac phase amount.

Along the same vein, when quantifying interobserver variability, each frame can be agreed or disagreed upon in terms of vorticity by the two observers. However, it does not appear that this was using to calculate the agreement.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

No

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No

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