**Author’s response to reviews**

**Title:** Echocardiographic Predictors of Intraoperative Right Ventricular Dysfunction: A 2D and Speckle Tracking Echocardiography Study

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**Reviewer #1:**

The article clearly depicts the need of a multi-parametric evaluation of RV and its importance in the management of pts, even though 2D RV strain has a huge literature lasting 10 yrs (this could be a major point, the lack of originality).

Nevertheless it is valuable since: the intraoperative setting is often less considered than the postoperative one; the strain analysis was performed with a vendor-independent software; the
Response to Reviewer #1: We would like to thank this Reviewer for a careful reading of our manuscript and for comments that have proven extremely helpful in its revision. Detailed below is a point-by-point response to all issues raised:

Two minor issues:

38% with pre-op FAC<35% it's not a limited number, especially if 43% of pts underwent surgery for aortic graft only. Nevertheless the authors found that operation type had no impact on RV function.

Thank you for raising this point which sheds light on the lack of clarity regarding number of patients with aortic graft surgery in our original manuscript. 43% (n=23) actually included those who underwent aortic surgery concurrently with another operation (e.g. aortic graft/valve surgery, aortic graft/CABG). Only 4% (n=2) underwent aortic surgery alone. To clarify this issue, we have further classified aortic surgery to distinguish between “Concurrent Aortic Surgery” and “Aortic Surgery Alone.” This change is reflected in Table 1 as well as the text.

Regarding number of patients with pre-operative right ventricular dysfunction, the prevalence of RV dysfunction among patients undergoing cardiac surgery in our study population is similar to those reported in prior literature. For example, Lella et al. showed that CMR-evidenced RV dysfunction occurred in 44% (48/109) among patients undergoing elective CABG and valve surgery. Haddad et al. demonstrated echo-evidenced RV dysfunction to occur in 22% (11/50) patients undergoing aortic or mitral valve surgery. As the majority of patient in this cohort underwent CABG and/or valve surgery, we feel that our finding of 38% pre-operative RV dysfunction is not unexpected. The prevalence of pre-operative RV dysfunction is now addressed in the discussion section.

The manuscript now states:

“Regarding prevalence of RV dysfunction pre-operatively, we found that a large number of patients had RV dysfunction at time of surgery (38%). This prevalence is similar to that reported in the literature: for example, Lella et al. showed that CMR-evidenced RV dysfunction occurred in 44% (48/109) among patients undergoing elective CABG and valve surgery [19]. Similarly, Haddad et al. demonstrated echo-evidenced RV dysfunction to occur in 22% (11/50) patients undergoing aortic or mitral valve surgery [17]. Our population, the majority of whom are undergoing CABG and/or valve surgery, had similar high prevalence of RV dysfunction pre-operatively.” (Page 6, Lines 10-11)

I suggest to delete hyperlipidemia in Table 1 (no logical explanation for the link with RV dysfunction)
We thank the reviewer for this suggestion. Hyperlipidemia has now been deleted from Table 1.

Reviewer #2:

Rong et al described global and regional RV function in intraoperative setting of elective cardiac surgery. They demonstrated that RV function decline and that only 2D STE of RV predicts post operative RV dysfunction. The manuscript is very interesting and is well written.

Response to Reviewer #2 We would like to thank this Reviewer for a careful reading of our manuscript and for comments that have proven extremely helpful in its revision. In response to the specific points that were raised:

The data supporting the accuracy of the methods are largely impressive although some points could be clarified and other reported:

1. Morpho-structural pre and post-operative changes in RV and RA dimensions (diameters, area, volumes) This is important to have information about loading changes that may affect RV function.

Thank you for this suggestion. As recommended, we have performed additional RV analyses, inclusive of right ventricular end diastolic and end systolic area as well as right atrial area and volume. As shown in Table 2, right atrial and right ventricular size were similar among patients with and without right ventricular dysfunction.

The manuscript now states:

“Table 2 demonstrates LV, RA, RV and hemodynamic indices at baseline and post procedure in relation to RV dysfunction.” (Page 5, Lines 18-19)

2. Pulmonary flow data (RVOT AT, PVR and cardiac output)

Pre and post chest opening catheterization derived right ventricular cardiac output has been added. As shown, there is no significant difference between right ventricular cardiac output when stratified by post chest closure RV dysfunction. Regarding RVOT AT and PVR, as RVOT spectral pulsed Doppler signals were not uniformly acquired for this protocol, acceleration time and PVR could not be obtained/calculated.

3. Inter-intraobserver variability of 2D strain measurement

Thank you very much for this suggestion which has strengthened the manuscript. As suggested, inter and intra-observer variability of strain measurements were performed in 15 cases. As shown in Table 4, the intraclass correlation coefficient ranged from 0.92 between measurements and 0.85 between observers.
4. Biomarkers (BNP)

While cardiac biomarkers such as BNP were not routinely collected for this study, recorded invasive filling pressure (LVEDP) were obtained and have been included in the analysis. As shown, there is no difference in LVEDP between those with and without RV dysfunction.