**Responses to Editor and Reviewer Comments**

***Editor***

1. I’ve proofread the manuscript to be sure that it is entirely correct. There are no spelling or grammatical errors.

2. These sections have been revised.

3. These changes have been made.

4. I have no idea how to accomplish this task nor do I know anyone who knows how to do it. I’ve left the figures in separate panels as a result.

5. The title has been simplified as requested.

6. An email address for each author has been included in the revised manuscript.

7. I’ve added the following short abstract as requested: “Here, we present a protocol to measure vortex formation time, an index of left ventricular filling efficiency, using standard transesophageal echocardiography techniques in patients undergoing cardiac surgery. We apply this technique to analyze vortex formation time in several groups of patients with differing cardiac pathologies.”

8. The Abstract has been rewritten to emphasize the methodology as requested.

9. The numbering of the Protocol has been adjusted to follow the JoVE Instructions for Authors as requested.

10. Spacing has been adjusted throughout the manuscript as requested.

11. All commercial language has been removed from the manuscript as requested. The Table of Materials and Reagents has been updated.

12. The protocol has been rewritten in imperative tense as requested.

13. Additional information has been added to the protocol as requested.

14. The dosages of all medications are now specified in the revised text.

15. Local anesthesia was administered subcutaneously using 1% lidocaine and its efficacy verified using a pinprick. This information has been added to the text as requested.

16. Supplemental oxygen was provided using a nasal cannula. This information has been added to the text as requested.

17. Additional details were added as requested.

18. The text was revised to include a description of how parameters were calculated.

19. The Representative Results section has been reviewed as requested. I’ve commented about how reproducible results were obtained using measurements of cardiac dimension and blood flow in several standard, easily obtained, transesophageal imaging planes. I’ve discussed figures 1, 2, and 3 in the text in this context.

20. I revised the Discussion to include commentary about the protocol, modifications/troubleshooting the technique, limitations to the technique, significance, and potential future applications as requested.

21. An acknowledgements section has been added as requested.

22. A disclosures section has been added as requested. The authors have competing financial interests or other conflicts of interest pursuant to this work.

23. The references have been reformatted as instructed.

24. See response above. The references have been changed to comply with the journal’s style.

25. The table of essential supplies, reagents, and equipment has been revised as requested.

***Reviewer #1***

Major Comments

1. The reviewer is correct that we did not visualize blood flow movement in the LV. This limitation has been inserted in the revised manuscript. The reviewer is also correct that transthoracic echocardiography cannot be performed during cardiac surgery in the presence of an open chest (this requires an epicardial approach instead); I’ve also commented on this limitation in the revised manuscript.

2. I respectively disagree with the reviewer’s assertion. The rapid increase in LV pressure that occurs in aortic insufficiency is known to attenuate early LV filling (see references #63-65). Our data indicate that mitral valve minor axis diameter was reduced in this setting, whereas atrial filling fraction and stroke volume (the other determinants of VFT) were unaffected (see reference #40).

Minor Comments

1. I’m not sure what to make of this comment. There doesn’t appear to be a question here. The control values of VFT in patients with coronary artery disease and normal LV ejection fraction was similar those previously reported in conscious healthy subjects (see reference #8).

2. The sample sizes are small, but power analyses indicated that the sample sizes were appropriate for the purposes of meaningful statistical comparison (see “statistical analysis” sections of references #38-41).

3. We did not conduct tissue Doppler analysis and cannot calculate E/e’ as an estimate of left atrial filling pressure as a result. Diastolic function was graded in the original papers (see references #38-41for details) using transmitral and pulmonary venous blood flow velocity profiles. This is standard practice in the operating room.

4. Measurement of diastolic dysfunction was not the primary objective of the current work or that of the cited papers. Transmitral blood flow velocity patterns were obtained to calculated atrial filling fraction. As mentioned, we also reported pulmonary venous blood flow velocity profiles in the original papers.

5. The reviewer should refer to the primary manuscripts (references #38 and 40) for details. The mitral valve dimension measurements to which the author refers are located in table 2 of each of these papers.

6. I respectfully disagree with this contention. The power analysis indicated that the sample size was adequate for statistical analysis. The regression analysis also provided a statistically inverse significant correlation between posterior wall thickness and VFT in patients with aortic valve stenosis (see reference #40).

7. The concluding sentence has been qualified with this potential limitation in mind.

***Reviewer #2***

Thank you for your kind comments about our manuscript. I’ve revised the Introduction modestly to include the reviewer’s two suggested citations.

***Reviewer #3***

Major Concerns

1. Kheradvar *et al* (reference #19) examined the relationship between VFT and E/A. They demonstrated that VFT is decreased in delayed relaxation, pseudonormal, and restrictive diastolic dysfunction. This topic was discussed in our other reports (references #38-41), and I’d prefer not to repeat it here (the readers can refer to these papers for additional details as desired). To my knowledge, VFT has not been directly compared with e’ or other tissue Doppler indices.

2. It is clear that VFT is an independent predictor of outcome in patients with heart failure (see reference #30). Whether VFT predicts morbidity or mortality in patients undergoing cardiac surgery is not clear at present, but we are conducting studies to address this hypothesis, as mentioned in the revised Discussion.

Minor Concerns

None.