Peer Review File

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Reviewer A

The beneficial effect of TAVR has been patients regardless of baseline left ventricular systolic function. Reverse left ventricular functional recovery includes improvement is systolic function parameters, mass reduction and even volumes reduction for some patients. The changes of diastolic function post-TAVR. Largest cohort showed improvement of DD by at least one grade 30-days following TAVR. Lower DD grade post-TAVR; which is attributed to the acute pressure overload retraction.

Thank you for your valuable feedback. As you kindly pointed out, there are studies verifying the post procedure TAVR. However, while the focus of many studies lies in mid- or long-term postoperative recovery, data on immediate post-valve deployment functional changes are limited. Addressing this gap, the current study specifically explores the intraoperative changes in LV systolic and diastolic functions during TAVR, revealing significant improvement immediately after valve deployment, especially in patients with preprocedural low LVEF. The above explanation has been stated in the discussion section in our manuscript.

I think this study is very interesting, but you need more sample and clarified the understanding mechanism.

As you kindly pointed out, the number of cases analyzed in this study is relatively small. However, the study was designed to access precise echocardiographic measurements by selecting a study period when echocardiologist-led transesophageal echocardiography (TEE) under general anesthesia was consistently performed for all TAVR procedures. Recently, TAVR has mainly utilized transthoracic echocardiography under local anesthesia, often without an echocardiologist present. The current trend of performing TAVR procedures under local anesthesia without TEE assessments presents challenges in our data accumulation. Therefore, data collection from multi-

institutional studies would be beneficial to enhance the generalizability of the analysis. This has been described in the limitations section of our manuscript.

Why do they have immediate diastolic improvement in patients with low ef AS?

Although hypothetical, the immediate diastolic improvement in patients with low EF AS following TAVR could be attributed to several key factors. First, TAVR alleviates the high afterload caused by AS, reducing wall stress and allowing for better LV relaxation and filling. This reduction in afterload significantly decreases wall stress, improving LV relaxation and filling more effectively. Additionally, the sudden reduction in afterload leads to immediate improvements in diastolic filling patterns, as evidenced by echocardiographic parameters like the E/e' ratio. Moreover, TAVR enhances myocardial perfusion by improving coronary blood flow, which reduces ischemia and benefits both systolic and diastolic functions. Lastly, while significant LV remodeling typically occurs over weeks to months, early beneficial changes could begin immediately after TAVR. These early changes can improve LV compliance and relaxation, contributing to better diastolic function. These combined factors—reduced afterload, load-dependent changes, improved myocardial perfusion, and early reverse remodeling—could collectively explain the rapid diastolic function improvements observed in patients with low EF following TAVR. The exact mechanism for the lack of immediate improvement in the Normal EF group remains unclear, requiring further investigation, which has been stated in the discussion section.

Reviewer B

Comment #1: the results are interesting, but limited by the small sample size.
Optimally, the authors should expand the number of included patient.

Thank you for your valuable feedback. This is similar to one of Reviewer A's comments. As you kindly pointed out, the number of cases analyzed in this study is relatively small. However, the study was designed to access precise echocardiographic measurements by selecting a study period when echocardiologist-led transesophageal echocardiography (TEE) under general anesthesia was

consistently performed for all TAVR procedures. Recently, TAVR has mainly utilized transthoracic echocardiography under local anesthesia, often without an echocardiologist present. The current trend of performing TAVR procedures under local anesthesia without TEE assessments presents challenges in our data accumulation. Therefore, data collection from multi-institutional studies would be beneficial to enhance the generalizability of the analysis. This has been described in the limitations section of our manuscript.

Reviewer C

This study revealed significant intraoperative improvements in systolic and diastolic functions immediately after valve deployment in TAVR patients with low preprocedural LVEF. These immediate improvements were not observed in patients with normal LVEF.
My comments are as follows:
What is the clinical implication of the study, does the finding has any clinical impact on TAVR procedure?

Our study highlights that immediate cardiac function improvements can occur intraprocedurally, immediately after valve deployment, especially in patients with lower LVEF, filling a knowledge gap in the timing of functional improvements. Few studies have addressed the intraprocedural improvement of cardiac function immediately after aortic valve deployment during TAVR. We believe that our results provide new clinical implications regarding immediate functional changes post-valve deployment, which could guide clinicians in their perioperative care, including intra- and immediate post-procedural hemodynamic management.

Authors might observe if immediate functional change is related to long-term outcome post TAVR.

Thank you for your valuable feedback. Unfortunately, we did not collect data on the long-term outcomes associated with the immediate functional changes. Our focus was on the immediate functional change after valve deployment to fill a knowledge gap, as long-term outcomes, including functional changes after TAVR, have been previously studied. Additionally, to ensure the most accurate data possible, we only used data from TEE performed and interpreted by a staff

echocardiologist. Most follow-up echoes are TTE, not TEE, and are conducted without the presence of a staff echocardiologist, which could compromise data accuracy and consistency. Regardless, we appreciate your feedback and agree that it would be ideal to collect data on the long-term outcomes associated with intraprocedural immediate functional changes in future investigations.

The patient sample is too small.

Thank you for your valuable feedback. This is similar to one of Reviewer A's and B's comments. As you kindly pointed out, the number of cases analyzed in this study is relatively small. However, the study was designed to access precise echocardiographic measurements by selecting a study period when echocardiologist-led transesophageal echocardiography (TEE) under general anesthesia was consistently performed for all TAVR procedures. Recently, TAVR has mainly utilized transthoracic echocardiography under local anesthesia, often without an echocardiologist present. The current trend of performing TAVR procedures under local anesthesia without TEE assessments presents challenges in our data accumulation. Therefore, data collection from multi-institutional studies would be beneficial to enhance the generalizability of the analysis. This has been described in the limitations section of our manuscript.

Reviewer D

-the authors performed a retrospective study on the left ventricular (LV) systolic and diastolic function changes immediately after valve deployment in TAVR patients, distinguishing between those with normal and impaired LV ejection fraction (LVEF). The authors found significant intraoperative improvements in systolic and diastolic functions immediately after valve deployment in TAVR patients with low preprocedural LVEF. These immediate improvements were not observed in patients with normal LVEF.

-these findings are in expectation for patients with low and normal LVEF, respectively.

**A major flaw of this study is its analysis, using only univariate analysis. Would suggest using multivariable regressions to control for confounding variables.*

We appreciate your valuable suggestion to incorporate multivariable regression analysis to control for potential confounding variables. However, we believe that univariate analysis is sufficient and appropriate for the following reasons in the current study:

1. The within-patient comparison before and after valve deployment inherently controls for individual baseline characteristics and minimizes the impact of confounders.
2. Since we are comparing values immediately before and after TAVR, conditions that could significantly impact the outcomes (e.g., comorbidities) are unlikely to change significantly during this brief interval, thus reducing the need for adjustment.
3. The sample size of our study is relatively small, and introducing multiple covariates in a multivariable regression model could lead to overfitting and unreliable estimates. Univariate analysis provides clear and interpretable results, focusing on the primary outcomes without the complexity of multivariable models.

Based on these considerations, we believe that the univariate analysis presented in our study sufficiently addresses the research question. However, we acknowledge that the number of cases analyzed in this study is relatively small. Therefore, expanding data collection from multi-institutional studies would be beneficial to enhance the generalizability of the analysis, where multivariable regression analysis could provide valuable insights. This limitation of small sample size has been stated in the limitations section of our manuscript.

-Would the authors be able to provide follow-up in these patients after 1wk, 1mo, etc to see how the immediate improvement correlate with the long-term outcomes?

Thank you for your valuable feedback. This is similar to one of Reviewer C's comments. Unfortunately, we did not collect data on the long-term outcomes associated with the immediate functional changes. Our focus was on the immediate functional change after valve deployment to fill a knowledge gap, as long-term outcomes, including functional changes after TAVR, have been previously studied. Additionally, to ensure the most accurate data possible, we only used data from TEE performed and interpreted by a staff echocardiologist. Most follow-up echoes are TTE, not TEE, and are conducted without the presence of a staff echocardiologist, which could compromise data accuracy and consistency. Regardless, we appreciate your feedback and agree that it would

be ideal to collect data on the long-term outcomes associated with intraprocedural immediate functional changes in future investigations.