Reviewer's report

Title: Mitral Valve Analysis Adding a Virtual Semi-Transparent Annulus Plane for Improved Visualization of Prolapsing Segments

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Reviewer: Xin Zeng

Reviewer's report:

This study evaluated the feasibility of adding a virtual semi-transparent annulus plane using 3D echo dataset for visualization of prolapsing segments. The concept was first tested by phantom study in 10 pipe cleansers and 3 mitral annuloplasty rings then applied clinically in 10 patients with degenerative mitral valve disease.

This study is preliminary. The main limitations of the study include a small sample size tested in patients and lack of evidence of the incremental value of this novel method over traditional methods.

There are several comments for the authors to consider,

Background:
This study appears to be the continuation of the authors' previous work (reference 16), which demonstrated MV analysis using a holographic screen had a very high accuracy and precision to detect prolapsing segment. The rationale of adding a virtual annulus plane should be further explained in the Background section. What is the possible benefit or clinical advantages?

Methods:
It's unclear how the virtual plane is created. An additional figure demonstrating the creation of 3D virtual plane will help reader to understand. Details regarding the tracking algorithms need further explanation. For example, how many points in the mitral annulus are needed to generate this 3D virtual plane? As mitral annulus is dynamic during cardiac cycles, at what time frame in systole this plane is generated?

Results:
1. In phantom study, additional figures showing the Bland-Altman plot regarding the agreement between 3D VSAP and direct measurement would be helpful.
2. The patient study only included 10 patients with 16 prolapsing segments totally, resulting in selection bias and limited statistical power.
3. More details in the patients' characteristics are needed. How many have Barlow disease?
4. This study only compared the new method against surgical findings. This paper will be strengthened by adding the results of comparison between the 2D TEE, 3D TTE without annulus plane and 3D TTE with annulus plane. The incremental diagnostic value of this novel method over traditional methods needs data to support.

5. In patient study, no quantitative measurements on mitral annulus are provided.

Discussion:
It may be of reader interest to expand the discussion of the advantages of this new method, its clinical implication and how the new approach will help guide management.

Level of interest: An article of limited interest

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests