Author's response to reviews

Title: Evaluation of left atrial volume and function using single-beat real-time three-dimensional echocardiography in atrial fibrillation patients

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Version: 1 Date: 31 May 2017

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BMIM-D-16-00187

Evaluation of left atrial volume and function using single beat real time 3-demensional echocardiography in atrial fibrillation patients

Qian Zhang; Ju-fang Wang; Qing-qing Dong; Qing Yan; Xiang-hong Luo; Xue-ying Wu; Jian Liu; Ya-ping Sun

Dear Emma Cookson,

The manuscript entitled “Evaluation of left atrial volume and function using single beat real time 3-demensional echocardiography in atrial fibrillation patients” (BMIM-D-16-00187) has been carefully revised according to the comments. We thank reviewers for the careful review of our manuscript. We have carefully proof-read the manuscript to minimize errors and considered the comments and suggestions. The changes in the revised manuscript are highlighted by using the track change mode. And the point-by-point response to the comments and suggestions are listed below. Please do not hesitate to contact us, if there are additional questions or errors.
Sincerely yours,

Ya-ping Sun

Editor Comments:

Comment 1. Since both reviewers have recommended language corrections, we suggest that you thoroughly proof read and copy edit the manuscript for English. Please see the foot of this email for details of the language editing services that we offer.

Response Thanks for your kind suggestion. We have carefully proof read the manuscript and asked the native English speaker to avoid the errors and improve the English edit in the manuscript.

Comment 2. Please change the heading of Materials and Methods to just ‘Methods’.

Response As per your kind suggestion, we have revised the heading of Materials and Methods to just ‘Methods’.

Comment 3. Please provide a statement in the Ethics approval and consent to participate section detailing the consent sought from the participants. Please state whether verbal or written consent was obtained and if the former please confirm that the ethics committee approved the use of verbal consent.

Response Thanks for your kind suggestion. Ethics approval and written consent were obtained before this study. We have revised the statement as “This study has been approved by the Ethics Committees of the Shanghai general hospital. All subjects have given their written informed consents prior to the study.”

Comment 4. Please amend the Availability of data and materials statement to include information on where data supporting the results reported in the article can be found. Please see our submission guidelines for more details: http://bmcmedimaging.biomedcentral.com/submission-guidelines/preparing-your-manuscript/research-article

Response According to the guidelines, we have revised the “Availability of data and material” section as follows:

“Availability of data and material: The datasets analyzed during the current study are available from the corresponding author on reasonable request.”

Reviewer reports:

Reviewer 1
Reviewer 1: Single center (100 patients, 50 normal and 50 Atrial Fibrillation) echocardiographic investigation evaluating the role of RT3D with 2D assessment of LA volume. Authors conclusions indicate good correlation between the two modalities. This conclusion is not compared with gold standard (MRI) or correlated with a clinical endpoint. Variations of this type of analysis has been previously published indicating the benefits of 3D ECHO for structure and function. The results of larger volume and lower function among patients with AFIB compared with controls is not surprising. Recommend editorial assistance with language and grammar throughout the manuscript.

Response: Thanks for your kind suggestion. In this paper, we just compared the effect of 2D and RT-3D measurement in evaluating the LA volume and function in the manuscript. The conclusion is not compared with gold standard (MRI) or correlated with a clinical endpoint, which is a limitation in our study and we have added in the manuscript. Further studies will be conducted in the near future. We have carefully revised the English in the manuscript and asked the English speaker improve the English edit in the manuscript.

Comment 1. Is it feasible to completely blind readers to AFIB status due to rhythm strip and ECHO features.

Response Thanks for your kind suggestion. The regional volume-time curve and segmental EF during cardiac cycle in patients of the control group were of orderly alignment, while in patient group, the curves were disordered, which suggested that it is feasible to completely blind readers to AFIB status due to rhythm strip and ECHO features. The related information has been mentioned in the manuscript.

Comment 2. Why would a cost be higher for 2D vs. 3D?

Response Thanks for your kind suggestion. 2DE method needs to measure the apical four chamber view and apical two chamber view to evaluate the left atrial volume and function, while the RT-3D E just needs to measure the apical four chamber view to acquire the related data. Thus, the procedure of 2DE Simpson’s measurement is more complicated and could cost more time than RT-3DE method. We have revised it in the manuscript.

Comment 3. What is the superiority of 3D compared with 2D (clinical)?

Response Thanks for your kind suggestion. 2DE method needs to measure the apical four chamber view and apical two chamber view to evaluate the left atrial volume and function, while the RT-3DE just needs to measure the apical four chamber view to acquire the related data. Thus, the procedure of 2DE Simpson’s measurement is more complicated and could cost more time than RT-3DE method. It is the superiority of 3D method to 2D.

Comment 4. How did image quality or heart size influence correlation or analysis.

Response Thanks for your kind suggestion. We have added the correlation analysis of the left atrium volume measured by 2D and RT-3DE method based on the left atrium volume and found that the left atrium volume measured by 2DE Simpson’s method is significantly correlated with
the RT-3DE measurement. Thus, we suggest that the heart size may not be a influence factor. But the heart size and image quality did not record in our study and was not able to evaluate the effect of these factors.

We have added the limitation in the discussion section such as “Moreover, the effects of 2DE and RT-3DE measurements were not compared with a gold standard such as magnetic resonance imaging; we will focus on this point in subsequent analyses and investigate the effect factors of image quality or heart size.”

Reviewer 2:

The paper compares 3D echo for left atrial volume assessment with conventional 2D echo using Simpson’s method. The paper includes 50 atrial fibrillation patients and controls. There are scientific value of the results but there are some major revisions that needs to be addressed.

Comment 1. "Currently, two-dimensional echocardiography (2DE) using Simpson’s method is commonly used to assess LA volume in clinical practice [7, 8]." Reference 7 does not use Simpson’s method for LA volume. Reference 8 is a CMR paper on volume measurements. Please change to references that support your statement.

Also, the two most common methods for LA size is the area in an apical 4-chamber view or a dimension in the parasternal view.

Simpson’s method is less common in clinical practice.

I suggest that you refer to guidelines (e.g. ESC or AHA) on how to report LA volumes.

Response Thanks for your kind suggestion. We have changed the references in manuscript for 2DE using Simpson's method [1, 2]. Simpson’s method has been widely used to evaluate the left ventricular function of patient with coronary heart disease complicated with regional wall motion abnormality. Simpson’s method is reliable for measuring the LA volume and function [1, 2]. ESC or AHA are not commonly used in our hospital, thus we did not refer to related guidelines to report LA volumes.

Comment 2. "It is safe, painless and appears to hold significant promise as a noninvasive technology to improve the assessment of ventricular myocardial function. Besides, 2DE is available to assess different cardiac structures and can be performed at the patients‘ bedside [9]." I suggest to delete this passage as this is a research manuscript and not a textbook.

Response According to your kind suggestion, we have deleted the passage mentioned above.

Comment 3. The word “non-stitched” is a technical term not easily understood by anyone outside of the 3D-echo field. Please avoid or explain the term.
Response: Thanks for your kind suggestion, we have used “integrated” instead of "non-stitched" in the manuscript.

Comment 4. Page 3 line 51 to page 4 line 12 has the feeling of a review article. This can be shortened substantially to state what is known and what is not known.

Response: Thanks for your kind suggestion, we have widely revised the text from Page 3 line 51 to page 4 line 12 as follows:

“Three-dimensional echocardiograph (3DE) is a recently developed technology that shows advantage in overcoming the geometric limitations of 2DE [3]. Single beat real-time three-dimensional echocardiography (RT-3DE) system has been widely used for the function to produce integrated, instantaneous and large volumes at high volume rates of 3D cardiac images in a single cardiac cycle, and to automatically measure the LA volume [4]. RT-3DE may be feasible for clinical application, superior to 2DE compared with conventional 2D echocardiography, for patient with severe mitral regurgitation [5] and aortic regurgitation [6]. However, rare studies have focused on the clinical application of RT-3DE for detecting the LA volume and EF, compared with 2DE.”

Comment 5. Page 3 line 20 introduces segmental EF in the aims. Please explain in a section above why we should care about segmental EF instead of inserting it in the aim.

Response: Thanks for your kind suggestion. We have added related information about segmental EF in the background, such as “Previous studies indicate that the measurement of LA volume is valuable for predicting AF recurrence [5, 6]. The segmental EF is a more sensitive index of segmental LV function than global EF in AF patients [7].”

Comment 6. Delete "Single beat RT-3DE was validated against 2DE Simpson‘s method." The next sentence has the same meaning.

Response: According to your kind suggestion, we have deleted the sentence of "Single beat RT-3DE was validated against 2DE Simpson’s method." in the manuscript.

Comment 7. Define what Dynamic electrocardiography (DCG) means and how that differs from ECG. It is not a standard method. Do you mean that you recorded ECG over time? If so, for how long. Do you mean ambulatory ECG?

Response: As per your kind suggestion, we have added the difference between DCG and ECG, and the detailed information for ECG measurement. The changes are listed as follows: “ AF was diagnosed by a combination of conventional electrocardiography (ECG) and dynamic electrocardiography (DCG). The conventional 12-lead ECG was used to record the rate and rhythm of heartbeats in the patients in resting condition, while DCG was recorded the ECG in resting state and in ambulatory state on CM 5 lead for 14 seconds every 15 minutes in the 24 hours.”
Comment 8. Page 7 line 33, "as compared with that of the case group" replace with "in contrast to…"

Response According to your kind suggestion, we have revised the sentence as ‘in contrast to that in case group, the curves were disordered’.

Comment 9. Results: Change Correlation to Bias.

Response Thanks for your kind suggestion, we have changed Correlation to Bias.

Comment 10. Page 9 "It offers a volume width of 90° × 90° and a depth of 16 cm". A degree measure does not mean a volumetric coverage. Please revise.

Response Thanks for your kind suggestion. We have revised the sentence as “It offers the 3D pyramid scanning of 90° × 90° and a depth of 16 cm” and we have also revised the method section as follows: “The detectable depth was 16 cm, and the 3D pyramid scanning was 90° × 90° with the temporal resolution ≥ 40 frames/sec.”

Comment 11. Page 9. "In our study, the regional volume-time curves and segmental EF of LA generated by RT-3DE system were disorder in the case group, which provided valuable information for LA function in AF patients visually." Delete this sentence as this is not supported by data and "valuable information" is not a quantified measure

Response As per the kind suggestion, we have deleted the sentence.

Comment 12 Delete the sentence "Moreover, measurements of beat-to-beat variation in LAEF by 2D and RT-3D will be performed in our next study."

Response We have deleted the sentence of “Moreover, measurements of beat-to-beat variation in LAEF by 2D and RT-3D will be performed in our next study.”

Comment 13 Conclusion. Delete "Collectively" and change "proved" to "showed" and "a highly positive correlation" to "low bias". Change "virtual" pathologic anatomy to "3D anatomy"

Response Thanks for your kind suggestion. We have revised the conclusion as follows “In summary, this study showed that semi-automated measurement by single beat RT-3DE method showed a low bias with 2DE Simpson’s measurements in assessing LA volume and function in AF patients. RT-3DE showed the advantage in displaying the 3D anatomy directly compared with 2DE method. With greater experience, it may be more acceptable and feasible in clinical practice in AF patients than conventional 2DE measurements.”

Comment If improvements to the English language within your manuscript have been requested, you should have your manuscript reviewed by someone who is fluent in English. If you would like professional help in revising this manuscript, you can use any reputable English language editing service. We can recommend our affiliates Nature Research Editing Service (http://bit.ly/NRES_BS) and American Journal Experts (http://bit.ly/AJE_BS) for help with
English usage. Please note that use of an editing service is neither a requirement nor a guarantee of publication. Free assistance is available from our English language tutorial (https://www.springer.com/gb/authors-editors/authorandreviewertutorials/writinginenglish) and our Writing resources (http://www.biomedcentral.com/getpublished/writing-resources). These cover common mistakes that occur when writing in English.

Response Thanks for your kind suggestion. We have carefully revised the English in the text and ask the native English speaker to avoid the errors in English edit.

Editorial Policies

Comment Please read the following information and revise your manuscript as necessary. If your manuscript does not adhere to our editorial requirements, this may cause a delay while this is addressed. Failure to adhere to our policies may result in rejection of your manuscript.

Response Thanks for your kind suggestion. We have carefully revised the manuscript according to the editorial requirements.

Comment In accordance with BioMed Central editorial policies and formatting guidelines, all manuscript submissions to BMC Medical Imaging must contain a Declarations section which includes the mandatory sub-sections listed below. Please refer to the journal’s Submission Guidelines web page for information regarding the criteria for each sub-section (https://bmcmedimaging.biomedcentral.com/).

Response Thanks for your kind suggestion, we have carefully revised the manuscript based on the journal’s Submission Guidelines.

Comment Where a mandatory Declarations section is not relevant to your study design or article type, please write "Not applicable" in these sections.

Response Yes, we know.

Comment For the ‘Availability of data and materials‘ section, please provide information about where the data supporting your findings can be found. We encourage authors to deposit their datasets in publicly available repositories (where available and appropriate), or to be presented within the manuscript and/or additional supporting files. Please note that identifying/confidential patient data should not be shared. Authors who do not wish to share their data must confirm this under this sub-heading and also provide their reasons. For further guidance on how to format this section, please refer to BioMed Central’s editorial policies page (see links below).

Response According to your kind suggestion, we have rearranged the ‘Availability of data and materials‘ section in the manuscript.

References in the responses


