Reviewer’s report

Title: Novel foetal echocardiographic image processing software (5D Heart) improves the display of key diagnostic elements in foetal echocardiography

Version: 0 Date: 05 Oct 2019

Reviewer: Ying Zhang

Reviewer's report:

In this report, Hu et al. evaluated the value of "Fetal intelligent navigation echocardiography (5D heart)" in the display of key diagnostic elements in several cardiac views. The authors concluded that the new technique can significantly improve image equality of key diagnostic elements in fetal echocardiography with low operator dependency and good reproductivity. This is a good study in assessing the role of STIC technique in the diagnosis or screening of fetal cardiac anomalies. The results of the current study may have some impact on the spread of the new technique in the routine fetal screening program. However, I have some major concerns.

Major concerns:

1. In this article, the authors mentioned the concepts of "5D", 3D, and 4D. It may cause confusion. I strongly suggest that the authors make clarification for this point. For example, the authors should explain the concept for 5D, as it seldom mentioned in literature before. In addition, "3D volume" and "4D volume" were both mentioned in the manuscript. The authors should review the manuscript carefully and use a proper concept.

2. In the current report, the gestational age of the patients varied from 17 weeks to 38 weeks. To my opinion, the quality of the volumes could be greatly affected by large gestational weeks (ie. Inappropriate fetal position, increasing shadows of ribs and spine). Do you think it is necessary to evaluate the quality of cardiac volumes enrolling in the study and do you think the volume quality has some relationship with the displaying of the cardiac sections and elements?

3. According to the results of the study, the displaying rate of four-chamber view is 76.2%. As the volumes were acquired at four-chamber view (apical four-chamber or random four-chamber), the relatively low detection rate of four-chamber view retrieved by the volumes is interesting. I want to know whether the initial four-chamber view was good enough or not at the moment the examiner acquired the volume. The authors should add some points in the discussion section to explain this point.

4. If the cardiac apex is positioned between 5 to 7 o'clock, the cardiac volumes is good enough to enroll in the study? no shadowing distortion? In the results section, the authors mentioned that
they acquired 262 volumes in 209 fetuses, while 231 volumes in 182 fetuses were enrolled in the study. What about the standard of the enrollment of the cardiac volumes?

5. The discussion section is lengthy and some content of results were repletely written in the discussion section. The authors should highlight the technical innovations for their study. In addition, they should clarify which groups of doctors could use this technique in future? Screening sonographers or fetal echocardiographers?

Minor concerns

There are many mistakes in the current manuscript and I suggest a carefully review of the article.

1. How many diagnostic planes could be retrieved by the 5D method? Nine or eight? Is the LVOT view similar to five-chamber view? The descriptions should be consistent in the whole manuscript. For example, in the abstract, in the results, the authors mentioned 9 standard diagnostic views in line 41 while they stated 8 diagnostic sections in line 44. There are many similar mistakes in the article and need not to be listed one by one.

2. In abstract, in the conclusion, the authors stated that the 5D technique could significantly improve the image equality of diagnostic elements. Did the authors made comparisons of the 5D method with other modalities?

3. Is postnatal echocardiography performed for the patients enrolled in the study?

4. The descriptions of reference number in the main manuscript is inappropriate. For example, page 3, line 11, [17,12,18] should be written as [12,17,18]. There are many similar mistakes in the article and need not to be listed one by one.

5. There are some grammar and spelling mistakes which need to be corrected.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

Declaration of competing interests
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?
If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal