**Author’s response to reviews**

**Title:** Comparison of conventional and primary sutureless surgery for repairing supracardiac total anomalous pulmonary venous drainage

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**Author’s response to reviews:**

Dear editor reviewers,

Thanks very much for your pertinent comments and suggestions. And all people in our team think that these comments and suggestions would be of great value to our work.

We have revised the manuscript according to the comments and suggestions of reviewers and editors, and responded, point by point, to the comments as listed below.

Answer: We have added the content as follow in the manuscript:

Replies to the REVIEW COMMENTS:

Reviewer #1: 1. This is an interesting article, but a few minor points might require correction or modification.

2. You may consider rephrasing the title of the article.

Answer: We have rephrased the title as “Comparison of Comparing conventional and primary sutureless surgery for repairing supracardiac total anomalous pulmonary venous drainage”

3. This line in page 5 line 19 may require rephrasing: ‘In sutureless group, PVS was assessed 0.2±0.5 in two groups, showing no statistic differences.’

Answer: We have rephrased the sentence as: PVS was assessed 0.2±0.5 in two groups and showed no statistic differences.
4. This line in page 7 line 33-34 may require rephrasing: 'However, we found no significant CPB or aortic cross-clamp time, and…'. Is the word 'difference' to be added after significant (i.e. 'significant difference')?

Answer: We have rephrased the sentence as: 'However, we found no significant difference on CPB time or aortic cross-clamp time, and…'

5. In Page 7 line 59 & page 8 line 1: '….. in their SL group relative to their SR group ……'. The elaboration of 'SL' & 'SR' are to be included in the list of abbreviation.

Answer: We have replaced the 'SL' & 'SR' with 'primary sutureless' & 'standard repair' and changed the sentence as: 'there was a lower PVO incidence in their primary sutureless group relative to their standard repair group.'

6. In page 8, the last line of the 'Conclusion' should be corrected or rephrased, particularly the word 'supposed'. ('Post-PVO supposed to be the main reason for postoperative mortality.')

Answer: We have corrected the sentence as: ‘The main reason for postoperative mortality is Post-PVO’.

Reviewer #2: The authors provide an interesting paper dealing with post-operative pulmonary vein obstructions in patients with total anomalous pulmonary vein connection. The findings of this article are important to those with closely related research interests.

However, there are some major and minor issues that need to be attended prior to publishing.

Major issues:

1. It would be great if the authors would provide more facts about the operating surgeons, mainly, with regards to the experience of the surgeons. How many TAPVC operations have they performed? Has the surgeon, who is using the sutureless technique, been using conventional technique and then made a switch to sutureless. The same question applies to the second surgeon, who is performing conventional operations, has he or she been doing sutureless repair, and made switch to conventional repair.

Answer: Both cardiac surgeons are experienced in sutureless technique and conventional technique. To the supracardiac TAPVD, 1 surgeon using the sutureless technique and 1 surgeon using the conventional technique. However, to the other type of TAPVD such as Infracardiac or mixed type TAPVD, The two cardiac surgeons both use the sutureless technique. And we changed the sentence as follow: ‘The patients were assigned on a rotating basis to 2 experienced cardiac surgeons, including 1 surgeon using the sutureless technique and 1 surgeon using the
conventional technique and both cardiac surgeons are experienced in sutureless technique and conventional technique now”.

2. Please provide more information about the post-operative evaluation of the patients. As the patients were examined using echocardiography, it would be beneficial to know whether the exams were performed by a single specialist or a team, were the patients examined by the same echo specialists prior surgery and then during the follow-up period?

Answer: All the exams were performed by an experienced team prior surgery and then during the follow-up period and we have added the sentence in the METHOD section.

3. Page 5, Line 19: "In sutureless group, PVS assessed 0.2 +/- 0.5 in two groups, showing no statistical differences”. This sentence needs revision. It is unclear, what pulmonary vein stenosis score was in each group.

Answer: We have rephrased the sentence as: PVS was assessed 0.2±0.5 in two groups and showed no statistic differences.

4. Page 5, Line 54: "Kolomogorov-Smirnov (K-S) " the test is used to the normality of the distribution of the data, not "analyze normal distributions”. K-S test, when testing for the normality of the distribution of data usually lacks statistical power. The authors have already collected the data and could also run more statistical test (like Shapiro-Wilk), visual analysis of the shape of the smooth density curve and / or histogram of the variables.

Answer: Because of small size in the research, we did not perform more statistical test and we consider to delete the sentence: “Kolmogorov-Smirnov (K-S) goodness-of-fit test was used to analyze normal distributions.”

5. Page 6, Line 46: "One patient in the ...” please elaborate on the treatment of the patients, who developed pulmonary vein obstruction and were re-operated.

Answer: We have changed the sentence as: “One patient in the sutureless group needed to undergo a second operation to treat PVO (5%) and survived to the last follow up without PVO, The same one in the conventional repair group (4.8%)”.

6. Page 6, Line 49: "One patient died ..." were the deaths in early post-operative period (30 post-operative days, or late post-operative period?

Answer: We have added the time of death in the three patients and changed the sentence as: “One patient died in sutureless group for postoperative PVO (5%) two months after the surgery,
one died in conventional group for postoperative infection (4.8%) one week after the surgery and another died in conventional group for postoperative PVO (4.8%) two weeks after the surgery.”

7. Page 6, Line 57: "Overall mortality or freedom from ..." what statistical methods were used to compare the mortality / freedom from re-operation data between the two groups? Could the authors provide Kaplan-Meier curves with a log-rank test?

Answer: Because of excellent mid-term follow up results and only three patients died in the two groups, so we did not perform the Survival Analysis and provide the Kaplan-Meier curves. Table 2 showed the follow up results of all the patients. If necessary, we can provide Kaplan-Meier curves with a log-rank test.

8. The authors mentioned that two cases in the sutureless group were performed utilising deep hypothermic circulatory arrest. It would be interesting if the authors could elaborate on these two cases.

Answer: Deep hypothermic circulatory arrest was adopted in the sutureless group because of much pulmonary venous return to the sutureless site and affected the anastomosis achieve. To ensure a more accurate repair we performed the DHCA. We added the sentence in the result: “Deep hypothermic circulatory arrest was performed on 2 patients (10%) in sutureless group because of much pulmonary venous return to the sutureless site affected the anastomosis achieve.”

Minor issues:

1. Missing abbreviations: post-PVO, TAPVC.

Answer: We have added the post-PVO in the Abbreviations and have replaced TAPVC by TAPVD.

2. Page 3, Line 19: "There were no differences on ICU stays ...". The sentence needs revisions. The authors probably mean that there were no differences in the length of stay in the ICU between the two groups.

Answer: We have changed the sentence as: There were no differences in the length of stay in the ICU, grades of PVS after surgery, LVEF and reoperation rate between the two groups.

3. Page 3, Line 51: "IN rare instances ...", the N in the word in needs to be lowercase.

Answer: We have corrected the N to n.
4. Page 4, Line 15: "Whether sutureless technique better than ..." and "Osami Honjo, Bobby Yanagawa ..." both sentences need grammatical revisions.

Answer: we have corrected the sentence as: “however, it remains unclear which technique is better…” and “Osami Honjo, Bobby Yanagawa and some other authors compared the two techniques in the repair of TAPVD, however the conclusions were controversial and no consensus have been reached”

5. Page 4, Line 4: "Exclusion criteria included ...", this sentence needs grammatical revision.

Answer: we have corrected the sentence as: “Cardiac, infracardiac and mixed-type TAPVD; single ventricle; associated congenital cardiac lesions, such as right atrial isomerism or hypoplastic left heart syndrome were excluded”

6. Figure 1 is just a CT 3D reconstruction of a single patient with supracardiac form of the total anomalous pulmonary connection. It does not provide any beneficial information.

Answer: Figure 1 is the CT 3D reconstruction of a single patient with supracardiac form of the total anomalous pulmonary connection, we want to showed the CT image of TAPVD, if unnecessary, we can remove the figure 1 in the manuscript.

7. Page 6, Line 37: "Average ICU stays of sutureless group was 11 days (range ..." if the distribution is normal then the authors should report the average +/- standard deviation, if the distribution is not normal, the authors should provide the median and the range or interquartile range. And again, the authors here probably mean the length of ICU stay in days.

Answer: we have replaced the “ICU stays” by the “length of ICU stay”

8. Page 3, Line 10: "... , but there was no differences in aorta clamped time" the sentence needs grammatical revision.

Answer: We have changed the sentence as: “….but there was no differences in aortic cross-clamp timeaorta clamped time between the two groups”

9. Instead of aorta clamped time (Page 3, Line 10), please use aortic cross-clamp time (in text and in tables).

Answer: we have corrected the aorta clamped time in in text and in table
10. Page 4, Line 9: "pulmonary vein." Please clarify, if the anastomosis was made between one single pulmonary vein (if this is true, then please explain which vein was chosen and why"), or was the anastomosis between the common pulmonary vein sinus and the left atrium performed?

Answer: The anastomosis was between the pulmonary venous confluence and the left atrium. We have replaced the “pulmonary vein” by the “pulmonary venous confluence”

11. Page 5, Line 35 "... common pulmonary vein confluence" - essentially a common pulmonary vein sinus?

Answer: We have corrected the common pulmonary vein confluence “pulmonary venous confluence”

12. The image quality of figure 2 is not sufficient. The handwritten text is hard to read.

Answer: The image resolution is 300 dpi according to the journal policy and handwritten text is just abbreviation

13. Table 1: "Crossclamp time" probably means aortic cross-clamp time. It would be great, if the authors would provide additional information of the CPB: the total duration of the CPB, aortic cross-clamp time, reperfusion time, cardioplegia type and count.

Answer: CPB time is the total duration of the CPB and crossclamp time is aortic cross-clamp time, the reperfusion time was twenty minutes in our hospital.

14. Table 1: the * showing statistical significance between the duration of the aortic cross-clamp between the two groups should be in the P value column.

Answer: we have corrected it.

15. Table 2: Change ICU stays to length of ICU stay.

Answer: We have corrected to the length of ICU stay

Best wishes,

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Comparing conventional and primary sutureless surgery for repairing supracardiac total anomalous pulmonary venous drainage in mid-term outcomes

This study by Zhu et al from Southern Medical University compared the differences in mid-term outcomes for those patients that received conventional surgery and those that underwent sutureless technique for the primary repair of supracardiac TAPVD. A total of 43 patients with supracardiac TAPVD underwent surgical treatment at were reviewed retrospectively. Primary sutureless repair was conducted in 20 cases (46.5%). The pulmonary vein scores, left ventricular ejection fraction (LVEF), baseline of the included patients, postoperative, and outcomes data were analyzed between the two groups.

The conclusion was that mortality, post-PVO, follow up results of supracadiac TAPVD showed no differences between sutureless and conventional techniques. Post- pulmonary venous obstruction (PVO) supposed to be the main reason for postoperative mortality.

This study has added some more experience in so-called sutureless or "atriopericardial" repair of TAPVC. The results are encouraging.

Major Critiques:

1. The major question is what this study adds to the already-known results of sutureless repair of TAPVC. The similar or the same conclusion was already reported in the original study by Yanagawa et al [Ref. 14]. The conclusion is a repetition of the previous studies and well known.

Answer: Although the results of our research are similar to the original study by Yanagawa et al, our research only focused on supracardiac TAPVD and we included more patients, we also showed the current situation of TAPVD treatment in developing country in one side.

2. The conclusion that "Post-PVO supposed to be the main reason for postoperative mortality," is not supported by the results.

Answer: There are three deaths in the two groups and the reason of the two deaths is Post-PVO, so The main reason for postoperative mortality is Post-PVO even in simple TAPVD such as supracardiac TAPVD.

3. What do you mean by "PVS was evaluated 0.1±0.3 in sutureless group, 0.1±0.3 in conventional group"? What is the unit for the number?
Answer: The pulmonary vein score (PVS) in the two groups were both 0.1±0.3 and there was no unit for the PVS. The pulmonary vein score for each individual vein, which used to evaluate the anomaly pulmonary vein before surgical intervene, was calculated as Yun TJ reported. Briefly, pre- and postoperative echocardiographic data were reviewed to quantify the degree of PVO: 0 = no stenosis (mean gradient < 2 mm Hg); 1 = mild stenosis (mean gradient 2.0–6.9 mm Hg); 2 = severe stenosis (mean gradient >7 mm Hg); and 3 = complete occlusion

4. The study does not tell what benefit of the sutureless method is. It has longer X-clamp time and CPB time (although statistically not significant) and same incidence of PVS. Why the method was used? This should be discussed.

Answer: We have added the sentences in the discussion section: “A potential advantage of sutureless technique is a more limited reactive intimal proliferation because the suture line is not directly on the pulmonary vein. There are also advantages with respect to no direct suture line distortion or narrowing of the veins, particularly if they are small. Optimal flow characteristics for a given vein are therefore intact”. And “sutureless technique allowed the aggressive resection of the obstructed pulmonary veins tissue and avoided surgically induced distortion of the pulmonary veins, which may help to prevent subsequent PVO.”

5. The original study suggests that application of the technique to high-risk patients may be beneficial. The sutureless technique is a useful addition to the surgeon's armamentarium, particularly for repair of difficult cases, such as infracardiac TAPVC. However, the present study ONLY used this technique for supracardiac TAPVC. Was there any infracardiac TAPVC in which the technique was used? Perhaps, in revision, it is better to emphasize that this method can be used for supracardiac TAPVC with good results.

Answer: The sutureless technique is better than conventional method in POST-PVO and high-risk patients, however to the simple TAPVD, few reports showed the differences between the two techniques, that is the reason we perform the reaserch. We have added the sentence in the conclusion: Sutureless technique can be used for supracardiac TAPVC with good results

6. The quality of the hand-drawing is poor. It should be done professionally.

Answer: The aim of hand-drawing in the paper is to briefly describe the difference between the conventional and primary sutureless surgery, if unnecessary, we can remove the figure 2 from manuscript.

Reviewer #4: DEAR AUTHORS,
I CONGRATULATE YOU AND THE GROUP FOR SUCH AN OBJECTIVE AND CONCISE MANUSCRIPT ABOUT A SUBJECT THAT IS ALWAYS A PROBLEM IF IT HAPPENS IN THE EVOLUTION OF PATIENTS SUBMITTED TO THE CORRECTION OF TAPV.D.

COMPARING THE 2 TECHNIQUES YOU DEMONSTRATED THAT BOTH PRESENT SIMILAR RESULT IN THIS PRIMARY ANALYSIS.

Answer: The sutureless technique is better than conventional method in POST-PVO and high-risk patients, however to the simple TAPVD, few reports showed the differences between the two techniques, that is the reason we perform the research. We have added the sentence in the conclusion: Sutureless technique can be used for supracardiac TAPVC with good results.

Reviewer #5: The accompanying manuscript is a report of 43 patients with supracardiac TAPVD who underwent conventional or sutureless surgical repair. The report sought to analyze if sutureless repair was associated with better outcomes. The authors have done a nice job of choosing a homogeneous cohort of patients from a single institution, which is the major strength of the paper. However, there are some fundamental issues that significantly deter the enthusiasm for this paper -

1. The most significant drawback in the study is the small number of patients with very few events (post-op PVO and death). The study was simply not powered to find a difference between the two surgical approaches. As mentioned by the authors, several prior reports (reference 14 and 20 for example) have attempted to show a difference between surgical techniques with larger patient numbers and longer follow-up. What do the authors feel is the novelty in their work?

Answer: our research only focused on supracardiac TAPVD between the two techniques, we also showed the current situation of TAPVD treatment in developing country in one side.

2. I have very specific concerns about the study cohort and design

   a. A median follow-up of under 3 years is very short and would not qualify as intermediate follow-up as reported by the authors.

Answer: we agreed with advice and delete the intermediate follow up in the title.

   b. How were patients followed? How was PVO diagnosed post-operatively?

Answer: Regular follow-up including transthoracic echocardiography, ECG, Chest-x-Ray were followed every six months after the surgical correction and PVO was diagnosis by the transthoracic echocardiography.
c. The median age of the patients is about 6 months, and it is not clear if any had obstructed TAPVD. This is not representative of the typical TAPVD patient cohort. Would their results be different if more patients were neonates or had obstruction?

Answer: In our research, few cases had obstructed TAPVD. The misdiagnosis of TAPVD and early death in neonates may be the reason.

d. A difference of 21 min in CPB time is not intuitively explained by the technical differences between conventional and sutureless repair. The authors imply in Page 7 line 42 that this could represent differences in surgical techniques, which is most likely true. In a non-randomized study, such unmeasured technical differences introduce additional bias when comparing techniques practiced by different surgeons.

Answer: Deep hypothermic circulatory arrest was adopted in the sutureless group, the two cases may prolong the CPB time and this may be different from cardiac surgeons.

3. Have the authors encountered patients in whom the confluence is completely retro-pericardial? If that were the case, how would they perform a sutureless repair?

Answer: we did not encounter patients in whom the confluence is completely retro-pericardial. If sutureless repair is hard to perform, we may consider the conventional repair.

4. There are other smaller issues that need to be addressed –

Answer: We have got the help from a professional English editor to revise our manuscript, grammatical mistakes and incorrect words were corrected.

a. In Page 6, line 55, the authors report that no death was cardiac - it is hard to argue that patients with recurrent PVO who died did so from some unrelated non-cardiac cause.

Answer: We have delete the sentence.

b. There are multiple grammatical errors and incomplete sentences throughout the manuscript that need to be addressed.

Answer: We have got the help from a professional English editor to revise our manuscript, grammatical mistakes and incorrect words were corrected.