Reviewer’s report

Title: A summary of second systemic pulmonary shunt for congenital heart disease with pulmonary hypoxemia

Version: 0 Date: 22 Feb 2020

Reviewer: Karolis Jonas

Reviewer’s report:

Dear Authors,

First of all, I would like to congratulate you for the work you do, and for writing an interesting article.

However, there are some drawbacks in this version of your publication.

1. The statistics revisions:
   1.1. In the "Statistical Analysis" part, you state that normally distributed measurement data is expressed as a mean and standard deviation. Please provide a list of statistical methods used to test for the distribution of data.
   1.2. Please revise all variables and check their normality.
      1.2.1. Page 4, Line 47: age range 4 months to 18 years. Average 4 years, 8 months. With an interval this size, and a case count of 65, there is a high possibility, that this data is not distributed normally, hence, median and range or interquartile range would better represent your data.
      1.2.2. Page 4, Line 50: weight from 4.5 to 58.2 kg. As well, the range is very high, there is a high possibility, that the date is not distributed normally.
      1.2.3. The above statement is true for each and every continuous variable you report.
      1.2.4. Page 9, Line 48: "follow-up period of 402 +/- 330 days with a median of 450 (90, 2169)...." Please explain, what the numbers in the brackets represent? Is this the minimal and maximal values? Is this the 1 &amp; 3 quartiles?

2. Page 5, Line 17: "1.2.1 Patients with bypass blockage or stenosis" Please clarify what you mean by bypass blockage? It looks like you are talking about the modified B-T shunt, is that correct?

3. Page 5, Line 49: "Under extracorporeal bypass or ..." The term cardiopulmonary bypass is more mainstream. I suggest using this term (and the abbreviation CPB) here and elsewhere in the text.

4. Page 8, Line 6: "... heparin was continuously pumped" Please add a space between was and continuously. I would also suggest using the term infused, instead of pumped.

5. Page 8, Line 7: "... the ventilator was removed and aspirin was given orally ..." Change to the patient was extubated and ...

6. Page 8, Line 12: "... the heparin pumping was discontinued ..." The word pumping is not necessary. Either remove completely or change to infusion.
7. Page 8, Line 23: "... ventilator therapy, cardiotonic drugs, and volume enhancement ..."
Please provide the routine ventilation parameters which are used for these patients in your centre, what cardiotonic drugs are used, their doses and duration, how do you evaluate the volume status, do you measure CVP or other parameters? How do you enhance the volume of the patient (that is what fluids do you routinely infuse?).

8. Page 8, Line 28: "... adjusted to maintain the PCO2 in the blood gas ..." Please clarify which blood: arterial, mixed venous, capillary blood gas?

9: Page 8, Line 34: "Finally, cardiotonic drugs ..." Again, please list what drugs, what doses and for how long were they used?

10: Page 9, Line 3: "... blood oxygen saturation (SpO2)..." SpO2 is an abbreviation for Pulse-oximetry. A noninvasive method used to find out blood oxygen saturation. Please clarify, if this is the case. If the number here is from arterial blood gas analysis the correct abbreviation would be SaO2, and SvO2 for mixed venous blood saturation.

11: Page 9, Line 3 & 4: "... from (61.5 +/- 10.2)% before the operation to (81.7 +/- 9.2)% after ..." Neither set of brackets are necessary. Please remove them.

12: Page 12, Line 1 "... cardiac dissociation includesthe aorta firstsince..." I guess that you use the word dissociation for the term dissection (the act of dividing tissue). And please add a space between includes and the, and first and since.

13: Page 12, Line 23: "... the protection of the septal nerve ..." You probably mean the phrenic nerve. The nerve that provides neural impulses to the diaphragm?

14: Page 12, Line 28: "... secondary damages are relatively mild and the septal nerve..." change to phrenic nerve (here and elsewhere in the text).

15: Page 12, Line 31: "... Extracorporeal circulation ..." Maybe use the term cardiopulmonary bypass (CPB for short?).

16: Page 13, Line 39: "... shunts can be performed under off-pump procedures." Change to "shunts can be performed off-pump".

17: Page 13, Line 56: "If the accuracy of the shunt operation is compromised due to concerns about the side effects of extracorporeal circulation, the investigators consider that it's not worth it." This sentence does not make sense. Please revise the whole sentence.

18: Page 14, Line 2: "In the reoperation of the systemic-pulmonary shunt, most of the operations were performed under extracorporeal circulation, which was due to this concern". This sentence does not make sense. Please revise the whole sentence.

19: Page 14, Line 20: "It is important to note ..." This sentence does not make sense. Please revise the whole sentence.

20: Page 14, Line 31: "The view of the investigators ... After the first systemic-pulmonary shunts". The whole paragraph does not make any sense. Please revise the whole paragraph.
When the oxygen saturation is... Which saturation: noninvasive, arterial, mixed venous? Please revise the whole sentence.

"... of PCO2 in blood gas analysis ..., the SpO2 was..." please specify which blood (arterial or mixed venous, or just venous) was analyzed and use the correct abbreviations.

The abbreviation list is not complete. Please follow the guidelines of the journal and revise the list of abbreviations.

"... of skills in the..." Please add a space between word in and the.

"In order to prevent ventricular fibrillation ... we routinely place an external defibrillation electrode". By itself the external defibrillation electrode plate does not prevent ventricular fibrillation, but they provide an easy access to use a defibrillator if the ventricular fibrillation would occur. I believe that this was what the authors thought. Please revise this sentence.

The authors conclude the article with these conclusions: "In summary, systemic-pulmonary artery shunt can promote pulmonary vascular development, improve cyanosis symptoms, and increase the chance of radical treatment in children with congenital heart disease, pulmonary blood deficiency, and pulmonary vascular dysplasia. With the continuous improvement of skills in the reoperation process, a secondary systemic-pulmonary shunt is safe and feasible. While ensuring the patency of the shunt channel, early intensive monitoring and comprehensive treatment after the operation ensures successful surgery outcomes".

In these conclusions the authors state the well known truth: increasing blood flow in the pulmonary circulations helps those patients who have insufficient pulmonary blood flow and the more skillful is the surgeon the successful outcome is more likely. In page 14, line 55, the authors mention, that in their experience, an early radical correction of the congenital defect leads to a longer hospitalization, higher mortality and higher costs, but they do not provide any data. I would suggest the authors to revise this article (or maybe write a companion article) and to provide a more detailed analysis of this problem.

In my opinion, there are two principle points, that are left out of this publication: Firstly, the authors do not provide an insight why do they not perform a radical correct in elder patients. Why do the authors choose to redo a shunt in a patient, that weights 6.1 kg (the weight of the patient that is provided in page 13, line 17 example of shunt size selection for a patient). The authors state, that they choose the shunt size depending on the patient weight and age (page 13, line 3). Could the authors please provide a detailed explanation, why do they choose not to do a radical correction for patients who weight more then 5 kg? I could reason of doing a primary shunt for these patients, but is it necessary to do a secondary shunt in patient who weights more than 5 kilograms? Wouldn't it be more beneficial to do a complete repair in these patients? How many of these secondary shunt patients underwent a complete repair? What were the reasoning? What were the primary diagnoses of said patients?

Secondly, the authors do not provide any insight why the shunts have occluded or stenosed in the first place? Are the patients treated with antiagregants / anticoagulants after discharge? Is there any possibility of pro-thrombotic factors (genetic, epigenetic) present?
I suggest the authors do add these to points to the discussion section in this article.

Lastly, despite the fact of a long list of revisions that I suggest, I think that this is an article whose findings are important to those with closely related research interests and after revisions and extensive editing by a professional English language editor, it should be accepted to the Journal of Cardiothoracic surgery.

Best wishes,

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