Reviewer’s report

Title: In-vivo assessment of the morphology and hemodynamic functions of the Bio-valsalva composite valve-conduit graft using cardiac magnetic resonance imaging and computational modelling technology

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Reviewer: Vanash Patel

Reviewer’s report:

I reviewed this original article by Kidher et al. which characterized the haemodynamics and blood flow at the aortic root following implantation of a composite biovalsalva graft. They did this utilizing MRI and computational modeling technology.

I found the article interesting to read as clearly future valve prosthesis will need such complex haemodynamic assessment and the authors have demonstrated this well for the first time in the biovalsalva composite graft. I hope that this article encourages clinicians and valve companies to invest more time in using computational analysis during the design phase. The images were particularly interesting.

I would recommend publication of this article provided the following minor revisions are addressed:

1. Page 2 – results paragraph ‘...due to relatively smaller effective orifice area, the EOA was comparable to other reported prosthesis. – this sentence is confusing and I would suggest you rewrite it.

2. I understand that it is a ‘proof of concept’ but examining just four patients and comparing them to two ‘age-matched normal controls’ and then reaching the conclusion that the biovalsalva is comparative to a native aortic root is probably not justifiable as a conclusion.

3. You mentioned a degree of ‘helical flow’ at the suture line. What do you think the significance of this is and can it be quantified? Clearly in patient number 4 this is likely to be more of an issue and may lead to upstream (heart) and downstream clinical consequences (descending aorta).

4. Why did you not consider obtaining haemodynamic measurements in other parts of the aorta, e.g. arch, peripheral abdominal aorta?

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests: no