Peer Review File

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Reviewer A

This is an interesting topic we have to discuss in the era of sutureless valve. The technical details are described with tips. One comment is below. Did you put valve into the infected Perceval valve? Please clarify this situation and its outcome as you had cases of endocarditis.

Reply: We thank the reviewer for his/her valuable comment. We fully agree with the reviewer that ViV procedures should never be performed in active endocarditis. However, the incidence rate of 0.46% per patient rate we mention in our manuscript refers to endocarditis in our Perceval series, but these patients were not selected for the ViV procedure but treated with antibiotics or redo surgery. We understand our phrasing may have been a little confusing and have therefore slightly modified wording in the following sentence (line 181): "Of these 15 patients with pure SVD, only 9 were scheduled for and underwent successful ViV TAVR."

Reviewer B

Dubois et al. detail an interesting outline of the technical considerations involved in VIV TAVI for the Perceval prosthesis. The article is well written, and the illustrations and videos are excellent.

Reply: We thank the reviewer for these positive comments.

Given this article discusses Perceval deterioration, it should be mentioned that redo cardiac surgery for this valve can be extremely challenging, with a risk of annular injury and the need for root replacement. This is particularly relevant when use is considered in young patients, who may require multiple future valve-in-valve procedures.

Reply: We thank the reviewer for this relevant remark. We have incorporated these thoughts in the section "Perceval™ as a receptor for a transcatheter heart valve (THV)" adding the following sentences: However, in case of SVD of the Perceval™ SV, redo cardiac surgery can be extremely challenging, with a risk of annular injury and the need for root replacement. This is particularly relevant when use is considered in young patients, who may require multiple future procedures. (lines 106-109).

The nitinol frame of the Perceval allows for overexpansion, in which case the VTC distances would be expected to reduce. This should be highlighted, and it would still be important to perform CT assessment prior to aggressive balloon expansion.

Reply: We agree with the reviewer that Perceval allows for some overexpansion. In our practice, however, we tend to avoid aggressive if any predilation of the Perceval (as the reviewer rightfully suggests below), and rely on measurements of the diameters to select the TAVR valve, together with the suggestions in the ViV app. The predefined space between the leaflets of the Perceval and

the aortic cusp/coronary ostium (which follows the sinusoidal struts of the Perceval) is large enough (5-6.5mm) and is expected to compensate for slight overexpansion and reduction of VTC, unless gross oversizing of the THV is done. We have incorporated this aspect in the revised text as follows in line 127:
In case of ViV TAVR in Perceval™, the VTC corresponds to the space between the sinusoidal struts and the open leaflets, a distance that varies between 5mm for the Perceval™ S to 6.5mm for Perceval™ XL and is not influenced by the THV frame (Figure 2A), except in case of gross oversizing of the THV.

We fully agree with the reviewer that CT analysis and simulation are key to predict valve behaviour and predict coronary occlusion or future access problems. While the role of CT was already mentioned in our first submission, we have specifically added the importance of CT-based simulation of the implant as follows (lines 135-137): Ideally, a CT-based computer simulation of the implant should be performed to assess the interaction of the THV with the SV and with the surrounding anatomy.

The nitinol frame cannot be fractured and can exhibit some recoil following overexpansion. This may be of more relevance with use of self-expanding TAVI devices. Do the authors have any experience of haemodynamic dysfunction resistant to post-dilation due to this?

Reply: This is indeed a valuable observation and is one of the reasons why we tend to prefer balloon expandable THV's in Perceval as compared with self-expandable THV's. We had 1 case of Evolut in Perceval (the case in video 1) where the Evolut valve was not well expanded and where postdilation improved expansion. This postdilation did not impact on the external diameter of the Perceval, but mainly allowed better expansion of Evolut inside the Perceval. In another Evolut in Perceval case we performed postdilation because of high residual peak-to-peak transprosthetic gradient. This additional information has been included in the revised paper (see also the last remark of the reviewer) (Lines 186-189).

I would suggest that predilation should only be performed with the TAVI prepared and ready to go for salvage of catastrophic acute AR.

Reply: We have added this valuable comment as follows: In such cases, the THV should be prepared beforehand and ready to go for salvage of catastrophic acute AR. (lines 162-164)

I recommend the authors specifically describe that the deployment of the evolut system should be with the aim of maximal expansion of the upper segment to improve haemodynamic outcome.

Reply: We have added this remark in the revised version in lines 141-143: Similarly, the larger and longer frame at the outflow side other self-expanding THV's requires sufficient space to allow for maximal valve expansion of this upper segment, to improve hemodynamic outcome.

The short-term feasability and safety of VIV TAVI within a Perceval has been published in multiple case studies/series. While the immediate results from a larger cohort are described here, this manuscript would benefit from inclusion of the additional details below.
- How often was pre or postdilation used and what was the haemodynamic response? Did

haemodynamic improvements after post-dilation vary between the S3 and evolut?
- Post VIV gradients remain relatively high (although acceptable), even in large and extra large Percevals. Do you have data from the followup of these patients regarding clinical status and echo gradients?

Reply: We thank the reviewer for this valuable suggestion, adding practical knowledge to the manuscript. We have added the following sentences to the revised paper, in the section reflecting our case experience (lines 185-193):
None of the patients underwent predilation of the degenerated Perceval™. Postdilation was performed in patients receiving Evolut™ only, due to visible underexpansion in one, and high invasive peak-to-peak transprosthetic gradient in the other (45mmHg). In these patients, postdilation resulted in residual invasive peak-to-peak transprosthetic gradients of 2 and 20 mmHg, respectively. The patients in Table 1 are currently undergoing serial clinical and echocardiographic follow-up at 1 and 6 months, and yearly after THV-in-SV, and all patients present transprosthetic gradients similar to the immediate postprocedural result and absent or trivial aortic regurgitation. The longest available follow-up to date is 3 years after the ViV procedure.