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Authors’ reply regarding “A general three dimensional parametric geometry of the native aortic valve and root for biomechanical modeling”

We appreciate the comments of Fabius et al. (2013) regarding our general parametric geometric model of native aortic valves (AVs) (Haj-Ali et al., 2012). In their letter, concerns were raised that the use of our geometric model of tricuspid aortic valves (TAVs) might not be suitable when applied for bicuspid valves (BAVs) since it may predict a stenotic configuration. We are glad that Fabius et al. (2013) note that our geometric model is a “good representation” of non-pathologic TAVs, as was the original aim of our proposed mathematical equations. However, the BAV geometry with the fused cusps (Marom et al., 2013), the main concern of the above letter, was actually calculated from a finite element analysis rather than from our TAV geometric model. In the BAV biomechanical analysis of Marom et al. (2013), two of the “TAV” cusps were fused together by moving them into each other to generate the BAV geometry. Fabius et al. (2013) correctly mentioned that in our recent BAV study there is no redundant cusp tissue. Therefore, the motion of the cusp may have been restricted. This representation of BAV geometry is indeed different from our general parametric geometry of TAVs, but it is similar to other previous numerical models (Conti et al., 2010; Jermihov et al., 2011). That is why our calculated opening areas for BAVs were comparable with these previous BAV studies.

In summary, our parametric TAV geometry was validated only against three dimensional transesophageal echocardiogram of non-pathologic TAV. We agree with Fabius et al. (2013) suggestion for the need to model BAV specific representation and capture its non-stenotic behavior. Our TAV geometric representation can be extended to include the redundant cusps’ tissue in BAVs and thus generate biomechanical models that can be validated against scans of non-stenotic BAVs.

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Conflict of interest statement

None declared.

References


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