Response to Letter Regarding Article, “Implications of Early Aortic Stiffening in Patients With Transposition of the Great Arteries After Arterial Switch Operation”

We thank Drs Kharabish and Fratz for their comment on and question about whether the observed difference in aortic distensibility truly reflects a difference in bioelastic properties rather than being confounded by the larger lumen area near the aortic root. We would like to point out several aspects that run counter to such a line of thought:

1. The suggestion that distensibility generally decreases with increasing cross-sectional area when stroke volume and bioelastic properties remain unchanged is incorrect. The physical quantity that causes the area change for a vessel with given bioelastic properties is the pulse amplitude. Vessel distensibility is commonly defined as the maximum change in cross-sectional area, \( \Delta A = A_{\text{max}} - A_{\text{min}} \), relative to the pulse amplitude, \( \Delta P = P_{\text{max}} - P_{\text{min}} \), normalized by the minimal area \( A_{\text{min}} \). Our analysis used this definition.\(^1\)

2. We found that the distensibility at the aortic root remains significantly different between patients with transposition of the great arteries (TGA) and volunteers, if adjusted by the cross-sectional area (\( P=0.18 \)) or the body height–adjusted cross-sectional area (\( P=0.8 \)) in a multivariate linear regression model. These findings are not altered if we also include stroke volume as a predictor in the model for aortic distensibility. Although the aortic distensibility correlates significantly and negatively with the cross-sectional area at the aortic root, this reflects that both aortic dilation and impaired bioelastic properties are abnormal in patients with transposition of the great arteries.

3. Of note, aortic cross-sectional area and distensibility were assessed from cine MRIs at 3 different locations of the thoracic aorta.\(^2\) A significant difference of the aortic areas was measured only at the aortic root, whereas the distensibility was also significantly different at the level of the ascending aorta and at the level of the aortic isthmus (Table 2), underscoring the intrinsic impairment of the aortic bioelastic wall properties. These results were presented in the article.\(^2\)

4. We also note that pulse wave velocity, a measure of the elastic properties of the aorta, that is determined without any reference to any cross-sectional area of the aorta was significantly higher in adults with repaired transposition of the great arteries compared with normal, age-matched control subjects, as mentioned in the article. This can also be taken as an independent confirmation of adversely altered bioelastic properties in patients with transposition of the great arteries.

In conclusion, based on the above-stated reasons, aortic dilation is not a confounding factor.

Disclosures

None.

References


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