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PROXIMAL AORTIC ARCH RE-DILATATION AFTER EXTERNAL

AORTIC WRAPPING

To the Editor:

We read with interest the article by Kim and colleagues,¹ who report that the use of aortic wrapping in a moderately dilated ascending aorta in patients who underwent aortic valve replacement shows acceptable long-term outcomes. However, this procedure was accompanied with a higher risk of re-dilatation at the proximal arch than after an ascending aortic replacement.

The fact that this article was accepted for publication—the second original research article during a short period of time regarding aortic wrapping—demonstrates the increased interest in ascending aortic wrapping.^{1,2} We would like to add several discussion points.

- As mentioned in our previous publication, Sanger Heart and Vascular Institute has a long-term experience with aortic wrapping.³ In our initial surgical procedures described by Robicsek and colleagues,⁴ we found proximal arch diameter increase over time in patients undergoing wrapping, and to a lesser extent after aortic replacement. We do not completely agree with the authors that aortic arch dilatation after wrapping was connected to degeneration of the wrapped portion of aortic wall, and showed an increase in peak systolic shear stress. We saw degeneration of the aortic wall only in patients with connective tissue disorders. Wrapping only the ascending aorta leads to downstream turbulence in the transition zone at the proximal arch. The loss of pulsatility in the graft and preserved pulsatility in the wall of the native proximal arch contributes to turbulence and potential aneurysmal dilatation. That's why, to prevent proximal aortic arch dilatation, our technique includes extended aortic wrap secured at the aortic annulus and going all the way beyond the innominate and secured at the proximal to the left common carotid artery.³
- In the presented study, 204 patients underwent aortic valve replacement with an ascending aortic procedure, for ascending aortic dilatation of 40 to 55 mm. How

did the authors decide on the aortic procedure? According to current guidelines, “regardless of etiology, surgery should be performed in patients who have a maximal aortic diameter of at least 55 mm or if the rate of growth is > 1 cm/year.”⁵ Also, guidelines advocate preventative aortic replacement at diameters of 4.5 to 5.5 cm, dependent on risk factors, valvular function, concomitant procedures, and surgeon experience, to mitigate the threat of aortic dissection or rupture associated with progressive aneurysmal dilatation. Thus, each cardiac surgeon should decide individually what is best for his or her patient.

- We believe that external aortic wrapping is a safe and less-invasive technique, performed without cardiopulmonary bypass. This is a good alternative to replacement especially in elderly patients. However, current grafts, including polyethylene terephthalate and polytetrafluoroethylene used to control aortic dilatation have not been designed for this purpose. They tend to get stiff and the compliance mismatch causes turbulence, increased shear stress throughout the cardiac cycle, and strong fibrotic reaction. The repaired aorta is thus transformed into a passive, noncompliant conduit that leads to changes in flow dynamics at the proximal and distal end of the neo-aorta. New grafts such as expanded polytetrafluoroethylene are more suitable to comply with dilatation tendency. Alternative for the aortic wrapping with synthetic materials could be scaffold-based tissue-engineered vascular graft, with adequate biological, mechanical, and handling properties. Bioengineered wrapping devices might benefit high-risk surgery candidates and potentially patients with connective tissue disorders. This is a new concept that we have a particular interest in and it deserves to be further investigated.

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