WHAT'S IN A WRAP? To the Editor:

We read with interest the report by Kim and colleagues¹ on this retrospective comparative series of 140 patients followed for a median of 7.1 years. At first sight, the application of a standard polyethylene terephthalate (Dacron) or polytetrafluoroethylene (Teflon) vascular graft to wrap the ascending aorta in patients undergoing aortic valve replacement with an ascending aortic diameter of 40 to 55 mm sounds simple and attractive. Unfortunately, we identify some concerns with the described technique.

In the wrapping group, there was a 14.3% incidence of dissection, with 11.4% suffering an arch dissection (all underwent a reoperation) and 2.9% sustaining a type B dissection. This compares with an 8.6% incidence of dissection (7.1% arch and 1.4% type B) in the replacement group, with 5.7% needing reoperation. It seems that for these patients undergoing aortic valve replacement, both options are unfavorable. Using a linear mixed-effects model, post-operative dilatation of the aortic arch (0.343 mm/year; $P = .006$) was observed in the wrapping group. The complications arising distal to the treated aorta may indicate that concomitant arch disease should be managed more aggressively in select patients. This becomes even more pertinent when considering that wall stress in the arch increases after wrapping or replacement, as pointed out by the authors.

The authors offer 3 insights into the cause of arch dilatation and dissection after wrapping. It was not acknowledged

that vascular grafts elicit limited cellular incorporation (Figure 1). By serving as a barrier, they may impair the nutrition of the tunica media, potentially leading to dilatation adjacent to the wrap.² Furthermore, vascular grafts can cause buckling at the transition zone, possibly leading to wall erosion.³

We have proposed an alternative approach to prevent aortic dissection and rupture by the use of personalized external aortic root support (PEARS). As opposed to vascular grafts, the mesh used has 0.7-mm pores, enabling incorporation at a cellular level, binding the sleeve to the aortic adventitia (Figure 1), and reducing wall stress.^{2,4} In an interim analysis in April 2020, there were no late dissections or ruptures over 16 years of follow-up in 321 patients undergoing PEARS.⁵

After PEARS, the circumferential wall stress at the interface between supported and unsupported aorta increases, and the area of greatest expansion is shifted distally.⁴ As a vascular graft is stiffer than the PEARS mesh, the stress increase is expected to be greater after wrapping. Because the PEARS mesh has a graded reduction in hoop strength from proximal to distal, the transition in stress between protected aorta and native arch will be less abrupt.

Although there was no significant arch dilatation after PEARS in 24 consecutive patients with Marfan syndrome (mean follow-up, 6.3 years), these patients had predominantly root dilatation with normal arch diameters.⁶ Furthermore, they did not undergo aortic valve surgery and thus had minimal hemodynamic changes compared with the patients

FIGURE 1. Cellular reaction to polymer fabrics surrounding the aorta (hematoxylin and eosin staining; original magnification 20×). (A) Low-porosity polyethylene terephthalate (PET) vascular graft. Limited tissue ingrowth and pronounced foreign body reaction (arrowheads). (B) Macroporous PET mesh used in personalized external aortic root support surgery. Extensive incorporation with fibroblasts, collagen, and neovessels (asterisk).²

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REPLY FROM AUTHORS: MAIN FACTOR IN DISTAL AORTA DILATATION AFTER WRAPPING: PROCEDURE RATHER THAN MATERIAL Reply to the Editor:

We thank Van Hoof and colleagues¹ for their interesting review and comments. We partially agree with the benefit of soft and macroporous material for late outcomes after wrapping. But we do not entirely agree that it is the difference in materials that makes the difference in outcomes for distal aorta complications. Van Hoof and colleagues¹ suggest that if procedures of wrapping and replacement are performed with rigid material, incidence of distal aorta dilatation should be similar. But our study showed that incidence of distal aorta dilatation in the wrapping group was significantly higher than that in the replacement group, although both groups used rigid material grafts.² Our results are consistent with those from Plonek and colleagues.^{3,4} They demonstrated that lesions of the proximal arch had more wall-stress than other lesions and wall-stress of the proximal arch was maintained after wrapping.^{3,4} We believe it is more reasonable that the complication of distal aorta dilatation might be associated with the procedure of wrapping rather than the materials used.

Furthermore, we agree with emphasizing importance of size matching the graft with the native aorta. The material used in personalised external aortic root support was carefully constructed with 3-dimensional printing to exactly match the size of the native aorta, whereas the graft material in the wrapped patients in our study had off-the-shelf grafts modified during surgery to approximate the size of the remaining aorta. Relative size discrepancy was inevitable.

Complications regarding distal aorta dilatation are associated with the mechanical limitations that are inevitable in the wrapping procedure, such as size discrepancy, flow turbulence, and residual diseased aorta, rather than the type of wrapping material.

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studied by Kim and colleagues. Finally, the moderately dilated aorta of a young patient with Marfan syndrome may react differently to a polymer material than the aneurysm of a patient undergoing valve replacement.

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