might be a satisfactory solution in selected patients with type A aortic dissection pathologies.

Jeko M. Madjarov, MD^a

Michael G. Katz, MD, PhD^b

Shahood Fazal, BS^b

Dan T. Simionescu, PhD^c

^aSanger Heart and Vascular Institute
Charlotte, NC

^bDepartment of Cardiology
Icahn School of Medicine at Mount Sinai
New York, NY

^cDepartment of Bioengineering
Clemson University
Clemson, SC

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REPLY: THE CONCEPT OF AORTIC WRAPPING—HOW DID IT ALL BEGIN?

Reply to the Editor:

The article by Suematsu and colleagues¹ presenting their version of stepwise aortic wrapping as a good alternative to aortic graft replacement in type A intramural hematoma stimulated a wide discussion, including Madjarov and colleagues,² about this alternative technique for high-risk patients. The dilemma is certainly the fact that experience is excellent in their center but randomized data or large compulsory registries to document long-term success are not available and will probably never be available in the future.³ Moreover, the principle concept is not new, although it never really reached a broad audience.⁴ One of the pioneers was certainly Francis Robicsek, who introduced, alongside with the concept of reduction aortoplasty (where an oval segment of the aortic aneurysm was excised of the maximal convexity of the ascending aorta), some

external support by additional wrapping as reinforcement using a customized Dacron vascular prosthesis placed around the reduced ascending aorta.⁵ This Dacron wrap is tailored snug but not constricting and closed by suturing from the annulus to the innominate artery. Francis Robicsek and his group concluded that external reinforcement as they called it might extend the scope of indications for aortoplasty of the ascending aorta regardless of aortic regurgitation to patients with primary structural aortic disease and Marfan syndrome.⁶ Nevertheless, they were aware that lifetime monitoring of the ascending aortic size was still essential even after successful surgery because of sporadic reports of under-the-wrap aortic wall atrophy, rupture, and other late events. Thus, the technique never really reached widespread popularity.

A Polish group around Tomas Plonek and colleagues⁷ have refined the wrapping technique to restore competence of the aortic valve in ascending aortic aneurysm and have provided supportive biomedical information of the technology and coded it a *corset* of the ascending aorta. Wrapping according to Plonek refers to the use of an off-the-shelf corrugated vascular graft, opened along its long axis and wrapped around the ascending aorta, essentially a refinement of the Robicsek approach. Radiologic follow-up studies, however, illustrated the shortcomings of using low porosity relatively rigid graft material to wrap around the aorta; such a graft does not conform well to the anatomy and allowed accumulation of fluid between the aorta and the corset support.⁸ Several variations of these initial wrapping techniques have been published but all miss some standardized and randomized scientific comparison or the scrutiny of prospective studies.⁹⁻¹¹

The personalized external aortic root support (PEARS) is the latest variation of the initial wrapping concept.¹² With PEARS a pliant porous mesh is wrapped around the ascending aorta in early stages of an aneurysmal evolution as a preventive measure, which becomes incorporated into the aortic wall. This avoids the risk of migration and impingement on other structures such as the coronaries. Moreover, no spaces are left between the porous mesh and the adventitia covering the aorta ideally from the annulus to the brachiocephalic artery. The operation itself is usually done on the beating heart as a pre-emptive measure to avoid further dilation and prevent dissection. Limitations to the PEARS procedure are certainly the fact that it is not suitable for unplanned use or an intraoperative change of plan. It requires a personalized imaging protocol, a computer-aided design, 3-dimensional printing, and the production of a customized sleeve suitable for a given anatomical structure.¹³ Although no randomized data exist to prove the benefit of PEARS, more than 400 patients have now been subjected to this protective or preventive surgical approach, in particular and for the most part, in patients with hereditary connective tissue disorder such as Marfan syndrome.

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The PEARS operation has undergone British Health Technology Appraisal under the auspices of the National Institute of Care and Excellence and successfully obtained approval for selected patients. Long-term follow-up in the early cases revealed that PEARS is capable of preventing the expansion of slightly dilated aortic root and ascending aorta and obviously avoiding type A aortic dissection. Although intuitively promising and successful, randomized studies and comparison with other surgical techniques are unlikely to materialize and probably not ethically viable.³ Nevertheless, we suggest meticulous compulsory registries for PEARS or any new surgical technique and a structured follow-up protocol. An external body should be appointed to supervise such compulsory registry and monitor any participating center. The respective societies should organize the collection of at least observational evidence over time to recommend or discourage any new surgical technique that is unlikely to be subject to any scrutinised controlled trial. This will probably be the only way to document both feasibility and quality of an innovative new approach, and eventually help gain widespread acceptance among colleagues.

Christoph A. Nienaber, MD, PhD^{a,b}

Xun Yuan, MBBS, MMED^{a,b}

Andreas Hoschtitzky, MD^c

^aCardiology and Aortic Centre

^cDepartment of Cardiac Surgery

Royal Brompton & Harefield NHS Foundation Trust

London, United Kingdom

^bFaculty of Medicine

National Heart and Lung Institute

Imperial College London

London, United Kingdom

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REPLY: FIRST STEPS NEEDED

Reply to the Editor:

As colleagues of Dr Francis Robicsek, who pioneered the concept of aortic wrapping, Madjarov and colleagues¹ are qualified to lend some unique perspectives on this seldom-used technique. Their center's

extensive experience to which their letter alludes—more than 400 cases over half a century to treat various aortic pathologies—suggest that they have found this to be a safe and effective approach in the short term. Interestingly, Madjarov and colleagues¹ report a tendency “not to use CPB [cardiopulmonary bypass],” whereas Suematsu and colleagues² reported 2 cases of great vessel injury (aortic rupture, pulmonary artery injury) for which cardiopulmonary bypass was key in avoiding intraoperative death.

Our understanding of aortic surgical treatments is expanding. Technologies such as 4-dimensional magnetic resonance imaging and computational modeling allow modeling of hemodynamic and biomechanical effects, but they still lack clinical validation. The work in animals done by Madjarov and colleagues is an important complement. However, the basic first step would be to establish clinical evidence affirming their anecdotal experience. This is even more important, given the expanded population for whom they propose this technique, and their extension of wrapping involve the root. While most would agree that aortic wrapping could be considered for high-risk candidates undergoing urgent or emergent surgery, data on mid- and long-term outcomes are needed for the lower-risk groups they propose. A 2014 meta-analysis of 722