safe dissection. Use of specifically designed instruments facilitated posterior passage of the graft material, and graft pieces were tailored to account for size discrepancies in the various aortic segments.

The long-term aortic outcomes in this series may lend some insight into the question of the likelihood of an entry tear being associated with type A IMH. The immediate biomechanical effect of wrapping is reduction of wall stress in the wrapped segment. However, the compliance mismatch between native and wrapped aorta, due to differential elastic properties, results in increased wall stress in the native aortic segments closest to the wrapped portion. These effects have been demonstrated in computational models.⁵ Just as high wall stress correlates with intimal tear development, local greater wall stress in reaction to wrapping would likely tend to promote continued flow through an existing entry tear.⁶ No patient in the study by Suematsu and colleagues developed an acute dissection after wrapping, and aortic remodeling was 100% at 2 years. Thus, one could reasonably speculate that these excellent

short- and mid-term aortic outcomes suggest the absence of an intimal tear in this series. Nevertheless, just as Suematsu and colleagues acknowledge the need for high-quality data to reach persuasive evidence in the clinical realm, much greater computation and biomedical work are needed in the realm of IMH.

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Commentary: External wrapping in proximal intramural hematoma of the aorta: What's behind the magic?

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Wrapping (bottom) in medicine in the setting of IMH (top) and as PEARS in aortopathy (center).

CENTRAL MESSAGE

Stepwise external wrapping of the ascending aorta in IMH may prevent rupture and support remodeling in selected patients with prohibitively high risk for classic resection surgery.

The Department of Cardiovascular Surgery at Tsukuba Memorial Hospital, spearheaded by Dr Yoshihiro Suematsu,

has recently reported their experience with a stepwise external wrapping procedure in patients with intramural hematoma (IMH) at the level of the ascending aorta who are at prohibitively high risk for conventional surgery.¹ Stepwise surgical wrapping using graft tissue was applied to 49 patients with a mean age of 78 years over a time span of 4 years in one center, whereas 79 cases underwent conventional graft replacement in the same setting, as they were considered at low surgical risk. Patient outcomes after external wrapping were excellent, with zero cases of hospital mortality despite high risk, successful aorta remodeling, and no aorta-related deaths during 3 years of follow-up—very encouraging results and the revival of an old surgical concept in experienced hands.² The authors consider external wrapping of the aorta a feasible alternative to conventional graft-replacement surgery and are probably in favor of broadening the indications for this procedure. Is this too good to be true or indeed a real game changer?

Regarding their set of data, various issues, I believe, deserve a closer look. It is notable from recent observational studies and a reflection of ongoing debate that proximal IMH of the aorta may behave differently in patients in Asian countries such as Japan when compared with those in Western societies.³ In Japan, the 10-year survival of patients with proximal IMH seems to range from 83% to 89% under exclusively medical management in a total of 135 patients.^{4,5} Conversely, mortality of IMH in Western society is reportedly similar to the mortality of overt dissection, thereby requiring surgical treatment similar to dissection in a strategic fashion.⁶⁻⁸ One could argue and in fact challenge the need for stepwise external wrapping in light of a 10-year survival rate of 83% to 89% simply with proper medication and surveillance. The mystique around IMH in Asian societies may not be fully lifted and understood, but classic resection surgery there would rather increase the death toll than improve outcome as shown in Western societies.

External wrapping was applied by highly skilled surgeons to sick patients with a median European System for Cardiac Operative Risk Evaluation (Euroscore) II of $54\% \pm 23\%$ (all $\geq 20\%$), with some patients on home oxygen, with bleeding issues, or bedridden, whereas those patients with associated aortic regurgitation, connective tissue disorders, or coronary dissection were excluded from external wrapping. Although cardiopulmonary bypass with femoral artery cannulation was used in all cases of wrapping, neither hypothermia nor aortic clamping was necessary, leaving the careful separation of the aortic tissue the only critical part of the procedure. Such an approach is certainly less traumatic than strategic resection surgery and could in fact even be performed off pump on the beating heart.⁹ While resection surgery is considered to be a more definitive solution, external wrapping is designed to prevent rupture, which it obviously did¹; however, by design,

wrapping may not prevent pericardial effusion and deadly tamponade or retrograde dissection into the aortic arch and head vessels, complications that may still occur. Again, external wrapping may be a gentle alternative to classic surgery, but the reported follow-up is only around 3 years, and medical management of IMH has been reported to work magic in Japan, with fantastic survival rates.³⁻⁵ As a logical consequence, a multicenter trial comparing external wrapping with medication only in the setting of proximal IMH would be of great interest.

A trial, however, in particular a randomized clinical trial, infers other problems recently outlined in the context of PEARS (personalized external aortic root support), which implies pre-emptive wrapping of the ascending aorta in asymptomatic patients with aortopathy.¹⁰ Similar to stepwise external wrapping in IMH, PEARS is intuitively a good thing, but lacks any level 1 data so far; similar to external wrapping, PEARS is merely based on intuition and personal experience. In addition, similar to data on PEARS in aortopathy, central elements for randomization such as equipoise, blinding, and the need for long-term follow-up are either missing or not feasible for the concept of stepwise external wrapping. The context of external wrapping in IMH is the brainchild and product of the interaction between inference and preference, skills, and experience of the surgeon with little evidence so far as often encountered in the surgical world. We in the medical community have to truthfully deal with this dilemma and always keep the best interest of our patients in our minds.

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