difference is the major contribution of RAI.

To elucidate further on the differences in outcome, we would like to mention the following observations: as shown in the Results section, 5 of 7 patients with a RAI of at least 14 were dead at follow-up. The mortality among patients with PAR was lower (7/11). A closer look at the dead patients revealed that all patients with both RAI of at least 14 and PAR of at least 2+ were dead, whereas mortality was higher among patients with RAI of at least 14 and no significant PAR than among patients with PAR of at least 2+ and normal RAI. It seems to us that RAI can discriminate between prognostically relevant PAR independent of the severity of the regurgitation. Moreover, there are still some patients without significant PAR but with a “pathologic” RAI, suggesting that other factors influencing hemodynamics may play a role in mortality after transcatheter valve implantation. This supported by the fact that 3 of 5 patients with RAI of at least 14 who died had no PAR. As stated in the Discussion section, severe atherosclerosis with increased arterial stiffness and subsequent low diastolic and mean arterial pressures may lead to end-organ hypoperfusion and failure in these patients.

Addressing the question on the correlation between RAI and degree of PAR, we could not calculate a correlation coefficient because the degree of PAR cannot be used as a continuous variable. With respect to the variables included for the risk factor analysis, in our opinion it would not be correct to add anatomic or radiologic covariates that are proven risk factors for PAR in the univariate analysis for 30-day mortality. The addition of these factors in the analysis would have increased confounder bias and for this reason was omitted. Furthermore, the possible association of RAI with perioperative complications, including renal and respiratory failure as well as myocardial infarction and stroke, are summarized in the original article’s Table 1.

Dr Poulis correctly addresses the topic of respiratory failure in patients undergoing transcatheter valve implantation. In our hands, the vast majority of postoperative respiratory failure cases were associated with pneumonia and infectious complications and not with preexisting pulmonary disease. This finding is not new and was expected in this high-risk and old group of patients.

We agree that RAI could also be dependent on blood pressure (BP) management and use of inotropic agents, as well as cardiac and rhythm instability. We tried to increase calculation precision by adopting a uniform protocol of standardized measurements. As stated in the text, preimplantation BP measurements were the average of 3 different time points between skin incision and balloon valvuloplasty under stable hemodynamic and rhythm conditions. Similarly, postimplantation data were averaged by considering 3 different measurements between valve implantation and skin suturing. To minimize the risk of error, we performed additional calculations of the RAI index from noninvasive measurements. Those results were also based on preoperative measurements at admission and the average of 5 postoperative measurements after extubation. Both the invasive and noninvasive measurements yielded equivalent results, with sensitivity and specificity of 71.4% and 95.1%, respectively, which we consider to represent a positive proof of concept for the proposed index.

With regard to the formula with which the index was calculated, we disagree with the use of the mere diastolic BP (DBP) and systolic BP (SBP) without taking into consideration the BP amplitude (pulse pressure). A closer look at the original article’s Figure E2, which shows that DBP alone does not correlate with relevant PAR, confirms this assumption. Because we intended to calculate the influence of BP amplitude before and after valve implantation, both the SBP and the DBP were noted at those different time points (1 and 3 in equation). To yield reproducible results independently of the existing BP situation of the individual patient, a ratio of amplitude (1 and 3 in equation) divided by the current SBP (2 in equation) was calculated. Because many patients have a preexisting difference between SBP and DBP (high BP amplitude), the preimplantation ratio (subtrahend) was subtracted from the post implantation ratio (minuend), and the result (difference) was multiplied by 100% to get a common index.

\[
\text{RAI} = \left( \frac{\text{Post-TAVI BP Amplitude} (1)}{\text{Post-TAVI SBP} (2)} \right) \times 100\% 
\]

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SIMPLE INTERRUPTED SUTURING FOR AORTIC VALVE REPLACEMENT IN A SMALL AORTIC ANNULUS

To the Editor:

We read with great interest the article by Tabata and colleagues1 on simple interrupted suturing (SIS) for increasing valve performance after aortic valve replacement (AVR) in a small aortic annulus. We congratulate them on simplifying AVR without rolling subvalvular tissue by revival of the use of the SIS technique. Although the article looks simple, it provides much information. Supra-annular prostheses have been used for AVR to overcome patient-prosthesis mismatch, but the advantages could be offset by subvalvular rolling of annular tissue or pledgets.1 The annular circumference can be reduced when the pledgeted mattress sutures (ventricular pledgeted or everting pledgeted) are placed, but this does not occur with SIS. Recently, we have used SIS frequently because of its advantages.

Tabata and colleagues1 did not describe the SIS technique in detail, however, which may be more important for prevention of paravalvular leaks and placement of a larger prosthesis. Each stitch has to be deep and centrifugally far from below the leaflet attachment, because the strong annular tissue is not found in the leaflet attachments of the aortic valve. In the leaflet nadirs, the stitches have to be passed from the ventricular muscle or aortic-mitral fibrous continuity from 2 to 2.5 mm below the leaflet attachment to the transition of the connective tissue and smooth muscle in the aortic sinus (Figure 1, A). We call this an en bloc stitch.2 The leaflet attachment, which is the subvalvular rolling tissue in ventricular pledgeted mattress suturing, is buried in the sutures. The outer margin of the sewing ring is located at the transition of the muscular tissue and the connective tissue in the sinus wall, and we can place as large a prosthesis as necessary. The sewing ring is attached to the lower border of the sinus wall above the nadirs and to the interleaflet triangle below the commissures (Figure 1, B). As a result, both the native leaflet attachments and the sewing ring maintain their structural configuration. This can only be achieved with SIS or continuous suturing. Another surgical point is the number of stitches. Most AVR prostheses have narrow sewing rings. The stitch number must be at least double the number of traditional mattress sutures. An interval of 2 to 2.5 mm between stitches can eradicate all gaps between the aortic root base and prosthesis. From 26 to 32 2-0 polyester sutures are thus required, and the tying time is not extended because of smooth tension tying with no pledget. Tabata and colleagues1 could prevent even their small reported number of postoperative paravalvular leaks by using more stitches with the en bloc suturing technique.

Tabata and colleagues1 changed their suturing technique, cautiously observing the short-term outcomes of SIS. We congratulate them on clarifying the advantages of SIS for AVR in a small aortic annulus and suggest that the en bloc stitch technique and more stitches could make AVR more reliable with a mechanical valve or bioprosthesis.

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FIGURE 1. A, En bloc stitch in simple interrupted suturing for aortic valve replacement. B, Arrangement of the prosthetic sewing ring (black arrow) and the interrupted suture line (arrowhead) along the leaflet attachment. LVM, Left ventricular muscle.

Notice of Correction


In the above-mentioned article, National Institutes of Health funding was inadvertently listed in the disclosure line. The corrected disclosure statement is printed below.

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