

## CORRESPONDENCE

# Mild-to-moderate functional tricuspid regurgitation in patients undergoing valve replacement for rheumatic mitral disease: the influence of tricuspid valve repair on clinical and echocardiographic outcomes

**To the Editor:** We read with great interest the article by Kim and colleagues.<sup>1</sup> First, we would like to congratulate the authors for their study investigating relatively underestimated or neglected valvular disease; mild to moderate functional tricuspid regurgitation (FTR). Although the latest guidelines do not recommend any intervention to this patient population,<sup>2</sup> numerous long-term follow-up studies have revealed that mild to moderate FTR may progress following mitral valve replacement.<sup>3,4</sup> We would like to ask some questions to the authors and to share our experience on this subject. In our clinic, the general approach is to repair moderate to severe FTR. But our retrospective investigation has led us to consider individualised strategy in moderate even mild FTR in the last years. Our first question to the authors is: How was the pulmonary artery pressure change in patients with untreated mild FTR at their periodic echocardiographic assessment? In our experience, we observed persistent pulmonary hypertension in approximately half of the patients with untreated mild FTR following mitral valve replacement in the long term. And did preoperative pulmonary artery pressure affect their decision to repair FTR? The authors noted significant difference of Maze procedure rate between groups, but untreated atrial fibrillation may affect progression of FTR. We believe that there is a need to compare patient groups which have similar rates of atrial fibrillation. Although tricuspid regurgitation in patients with mitral valve disease may be attributable to rheumatic involvement of the valve or to FTR, we observed higher moderate to severe FTR incidence in patients with rheumatic disease in our experience. Finally, we thank the authors for this study, and we support their results suggesting correction of mild to moderate FTR at the time of mitral valve replacement if enlarged left atrium and/or enlarged right ventricle and/or atrial fibrillation is associated.

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**The Authors' reply:** We thank Gursoy and Hatemi for their interest in our article<sup>1</sup> and appreciate the editor for the opportunity to reply. Following the surgical correction of left-side heart valve diseases, persistent pulmonary hypertension predisposes to aggravation of tricuspid valve (TV) function; however, whether preoperative pulmonary hypertension is associated with postoperative TV dysfunction is controversial.<sup>2,3</sup> In our practice, preoperative level of pulmonary artery pressure (PAP) might not have affected the decision to repair functional tricuspid regurgitation (TR) since preoperative PAP level was not different according to the performance of TV repair ( $p=0.20$ ). With regard to changes in PAP in patients with untreated mild TR, preoperative estimated systolic PAP was  $40.3 \pm 14.3$  mm Hg and it decreased to  $30.4 \pm 6.0$  mm Hg on last follow-up ( $p=0.013$ ). Similarly, prevalence of pulmonary hypertension (systolic PAP  $>45$  mm Hg) decreased from 24.8% to 4.3%. This observation indicates that persistent pulmonary hypertension is not common in mild TR patients undergoing mitral valve (MV) replacement, and that preoperative level of PAP may not be an important determinant of late TV function. In our study, preoperative pulmonary hypertension was inversely related to late TR on univari-

able analysis, which was not relevant in multivariable models.

Several retrospective studies indicate that postoperative atrial fibrillation negatively affects TV function and the Maze procedure is protective against worsening of TR.<sup>4</sup> In our study, however, the Maze procedure has not emerged as an independent predictor of TV function. This may be attributable to the relatively small number of postoperative TR cases ( $n=34$ ) to include sufficient variables in multivariable models, although we used a stepwise elimination technique. Meanwhile, 'concomitant Maze procedure' was included in the propensity score model as one of baseline variables; therefore, the positive effects of TV repair on various clinical outcomes might not have been affected by postoperative rhythm status in our study.

Finally, in agreement with Gursoy, I believe the prevalence of functional TR is higher with rheumatic MV disease than with degenerative causes. This is perhaps related with the longstanding nature of rheumatic disease. Similarly, atrial fibrillation was combined in 87.7% (207/236) of patients in our study, which was much higher than the reported prevalence of 40–60% in patients undergoing MV surgery in general.

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## Important cost categories not included: transcatheter aortic valve implantation probably less cost-effective

Patients eligible for the transcatheter aortic valve implantation (TAVI) intervention are old (>75 years), face a high risk of mortality, and generally have multiple comorbidities.<sup>1</sup> Healthcare consumption of this group of patients can, therefore, be expected to be high.<sup>2,3</sup> As a consequence, life extension in this group would probably result in additional healthcare consumption in so-called life years gained. Healthcare consumption in life years gained could be due to treatment of a large variety of diseases related to old age and/or consumption of long-term care due to disabilities.

In the article by Watt *et al*,<sup>4</sup> only a limited set of cost categories is included, which results in too favourable estimates of the cost effectiveness of TAVI. Current NICE guidelines do not advocate the inclusion of medical costs in life years gained of diseases not directly related to the intervention under study.<sup>5</sup> Ignoring costs that are relevant for the NHS is difficult to defend using scientific arguments.<sup>6–8</sup> It also results in favouring interventions that primarily increase length of life over interventions that mainly improve quality of life.<sup>9</sup> Broadening the perspective beyond the NHS, as Watts *et al* suggest, would probably result in even less favourable cost-effective estimates, as the target group of TAVI does not participate in the labour market anymore and, therefore, consumes more than they produce.<sup>9</sup> While there may be uncomfortable implications of including more cost categories that warrant discussion, this can never be a reason to exclude foreseeable costs.

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**The Authors’ reply:** Van Baal argues that we have under-estimated the cost associated with transcatheter aortic valve implantation (TAVI) and as a result, we have generated an overly-optimistic picture of its cost effectiveness.<sup>1</sup> This view is based on the fact that we have not allowed for the cost of managing the range of diseases (other than aortic stenosis) that can be experienced during the additional years of life that we estimate will result from the use of TAVI rather than medical management. For example, van Baal implies that we should have included the cost associated with the chance of lung cancer being diagnosed during the additional years of life that have been generated by TAVI. The authors are correct in referring to arguments which have been made in favour of the inclusion of these ‘unrelated’ costs in economic evaluation. However, only a few of the health systems around the world, which use formal economic evaluation to support decisions about the use of new medical technologies, advocate the inclusion of these costs. Given that our analysis adopted the perspective of the UK NHS and the methodological guidelines published by National Institute for Health and Clinical Excellence,<sup>2</sup> which do not support the inclusion of ‘unrelated costs’, we did not include these into our model. Furthermore, if we had incorporated these costs, the interpretation of the resulting cost effectiveness ratio would be unclear. This is because the routine inclusion of such costs

would also need to be considered for all other interventions provided by the National Health Service which would then impact on the cost effectiveness threshold against which the TAVI cost effectiveness ratio is compared.

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## CORRECTION

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