



Don't fix what's not broken: tricuspid valve repair in the mitral patient

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Keywords: Tricuspid valve repair; mitral valve repair; tricuspid annulus dilatation



Submitted Jun 24, 2025. Accepted for publication Aug 11, 2025. Published online Dec 16, 2025.

doi: 10.21037/acs-2025-tvd-0123

View this article at: <https://dx.doi.org/10.21037/acs-2025-tvd-0123>

How should surgeons manage the tricuspid valve in patients undergoing mitral valve surgery? The question is simply stated. The available data provide clear answers. However, clinical practice—often shaped more by surgeons' beliefs than by data—still varies widely. Rates of concomitant tricuspid valve repair in mitral valve patients vary from 5% to more than 60% across centers of excellence (1). This variation in practice is surprising, particularly given multiple recent publications that point in the same direction (1-5). Far from being a “data-free zone”, integration and analysis of the information that we have available lead to the well-known aphorism: don't fix what's not broken.

When the tricuspid valve is broken, it should be fixed. Patients with moderately severe or severe tricuspid regurgitation (TR) who are undergoing mitral valve surgery should have a concomitant tricuspid valve repair (6). Although surgeons may argue over the repair technique—ring *vs.* band, flexible *vs.* semi-flexible *vs.* rigid—virtually all agree that substantial TR requires management. The procedure itself is quite simple if one follows the “10 stitches in 10 minutes” approach, beginning at 10 o'clock and extending to 6 o'clock on the tricuspid valve (7). This is easier than sewing a delicate left internal mammary artery (LIMA) to a fragile left anterior descending (LAD) artery. Every cardiac surgeon can perform tricuspid valve surgery well.

The management of patients with tricuspid annular dilatation but without TR has remained controversial for three decades (1). Early observational work suggested that annular dilatation alone is frequently a precursor for the

development of clinically important TR over time (8). In fact, this does not occur often. Tricuspid annular dilatation is certainly a structural change that can result from severe mitral valve dysfunction. However, if the tricuspid valve is competent, whether the annulus is dilated or not, the valve is not broken. Therefore, it should not be fixed. We might add one caveat to this. It may be prudent to place a tricuspid annuloplasty in patients with tricuspid annular dilatation and severe pulmonary hypertension and/or right ventricular dysfunction; however, there is little evidence to support this assertion.

But why not “fix” it while you are there? Ten stitches, ten minutes, and you will have a valve that did not leak before and does not leak now, but that has a reduced circumference. This addition of a tricuspid valve procedure is not associated with an increase in operative mortality (9). However, the addition of a tricuspid valve annuloplasty to a mitral valve operation increases the likelihood of a patient requiring a permanent pacemaker before hospital discharge (5). Whether the risk of permanent pacemaker implantation increases two-fold or five-fold can be debated; however, it is certain that this risk increases with the addition of a tricuspid procedure. Permanent pacemakers in nonsurgical patients with *de novo* heart block or symptomatic bradycardia save lives and improve quality of life. The calculus, however, is different in cardiac surgery patients: the need for a permanent pacemaker after cardiac surgery is associated with reduced life expectancy (10). No cardiac surgical procedure is “free”. Adding a tricuspid valve annuloplasty and engendering the need for a permanent

pacemaker in a mitral valve patient with no pre-existing TR is an unfavorable result.

Patients with mitral valve disease and annular dilatation who also have more than mild TR constitute the most interesting group. There appears to be no benefit to performing an annuloplasty in those with only mild TR (5). However, when the TR is greater than mild (i.e., moderate or between mild and moderate), an annuloplasty does reduce progression of TR (5). In this setting, annuloplasty appears to be beneficial. If moderate TR is left untreated, it progresses in more than one-third of patients (3). Patients with progressive TR also incur a survival penalty (3,4). Of course, we recognize that TR does not always progress, and, in fact, may regress in up to two-thirds of mitral patients with moderate TR, but we cannot currently distinguish those who will have progressive TR from those who will not. Therefore, we can state that among those with more than mild TR, the valve is broken in many. This presents an opportunity for the surgeon to improve outcomes. A thoughtfully placed annuloplasty that avoids damage to the conduction system serves these patients well.

It is worth noting, however, that with new technology progressive TR can be managed percutaneously, improving quality of life and potentially reducing the need for reoperation in selected patients (11). Still, the most favorable course remains surgical repair of the tricuspid valve in patients with more than mild TR at the time of the index mitral valve operation.

We have the data to answer the questions concerning management of the tricuspid valve at the time of mitral valve surgery. Pure tricuspid annular dilatation without TR should not be treated. Moderately severe or severe TR should be treated. More than mild TR with annular dilatation also warrants treatment. Following these principles will enable the surgeon to achieve the greatest good for the greatest number of patients.

Acknowledgments

None.

Footnote

Funding: None.

Conflicts of Interest: M.G. reports consulting relationships with Edwards Lifesciences, Medtronic, Abbott, Artivion, ClearFlow, Johnson and Johnson, Baxter, AtriCure and

Corcym. T.M. has received honoraria from LifeNet. P.W. has served as a consultant to Edwards Lifesciences. The other author has no conflicts of interest to declare.

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Cite this article as: Gillinov M, Malas T, Wierup P, Svensson LG. Don't fix what's not broken: tricuspid valve repair in the mitral patient. *Ann Cardiothorac Surg* 2026;15(2):24. doi: 10.21037/acs-2025-tvd-0123