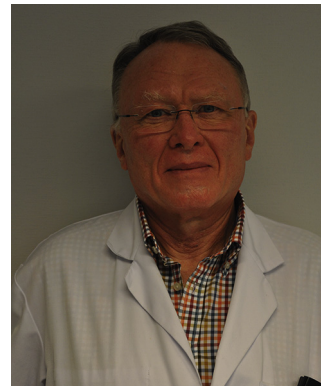


Is the air in Toronto, Rochester, and Cleveland different from that in London, Monaco, Leiden, Genk, Milan, and New York?

Robert A. Dion, MD

ABSTRACT

The tricuspid valve has been recently referred to as the “forgotten valve,” because one now realizes that tricuspid regurgitation is bad for the patient and that reoperation for progressive tricuspid regurgitation after a left-sided valvular correction still carries a high mortality risk. However, the indication for concomitant tricuspid valve repair during a mitral valve repair procedure is still controversial, as illustrated by the reaction of Dr T. David to the presentation of Dr Chikwe and colleagues at the 2015 American Association for Thoracic Surgery meeting. One of the explanations for these divergent opinions could be that tricuspid regurgitation grading is largely unreliable because of the dependence of the right ventricle on the preload and of the discrepancy between clinical and hemodynamic data. Therefore, we need a parameter that does not depend on preload. An annular dilation of 40 mm or 21 mm/m² has been proposed and validated by many authors. The preoperative functional class also plays a major role. Tricuspid regurgitation is a progressive disease, but the presence of a concomitant mitral valve disease may aggravate annular dilation; therefore, the earlier we operate on the mitral valve, the less frequently patients will require concomitant tricuspid valve repair. (*J Thorac Cardiovasc Surg* 2015;150:1040-3)



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Central Message

Concomitant functional TR: Repair before irreversible annular dilatation (≥ 40 mm or 21 mm/m²). This is also a plea for early mitral surgery.

Perspective

The indication of concomitant TVr, based on annular dilation rather than on TR grading, during an MV procedure is supported by an increasing number of authors but still challenged by others. The earlier the MV procedure, the less frequent concomitant TVr. In any case, there is a definite agreement to avoid reoperation on the TV after an MV procedure.

See Editorial Commentaries page 1043 and 1045.

At the 2015 American Association for Thoracic Surgery Annual Meeting in Seattle, Chikwe and colleagues¹ presented the comparative outcomes of an aggressive strategy of tricuspid valve repair (TVr) concomitant to mitral valve (MV) repair in degenerative disease whenever moderate tricuspid regurgitation (TR) or tricuspid annular

dilatation (TAD) (≥ 40 mm) was present. This led to a concomitant TVr in approximately two thirds of the patients.

The strategy was validated because there was no significant difference in mortality, morbidity, or permanent pacemaker requirement; it durably cured TR, prevented progression of TR at the 7-year follow-up, induced right ventricle (RV) recovery, and reduced pulmonary hypertension (PHT).

In his discussion of the article, Dr Tirone David called this strategy “an overkill.” In his 30-year experience with MV repair, he has not seen a significant progression of TR in patients, even in the presence of an advanced myxomatous degeneration, noting “less than 10% of the patients developed significant TR at 25 years.” In his opinion, the use of a rigid ring in MV repair is the cause of TR development. He also commented that “the 40 mm diameter threshold

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Abbreviations and Acronyms

TVr	=	tricuspid valve repair
MV	=	mitral valve
TR	=	tricuspid regurgitation
TAD	=	tricuspid annular dilatation
RV	=	right ventricle
PHT	=	pulmonary hypertension
LV	=	left ventricle
TA	=	tricuspid annulus
AL	=	anterior leaflet
SL	=	septal leaflet
PL	=	posterior leaflet

has not been validated in patients with degenerative mitral valve disease.”

I will address his 2 last assertions about rigid rings in the mitral position and the 40-mm diameter threshold. There is no evidence linking the rigidity of the mitral ring and the development or progression of TR. Dr David had to admit that pliable rings were becoming more and more rigid with time, and as early as 6 months because of the formation of scar tissue. In addition, a pliable ring is not dilating in diastole.

Progressive tricuspid annular dilation in the setting of mitral regurgitation was alluded to as early as 1974 by Carpentier and colleagues² (3 fingers) and later by Sagie and colleagues,³ Fukuda and colleagues,⁴ Tager and colleagues,⁵ Colombo and colleagues,⁶ Sugimoto and colleagues,⁷ and Kim and colleagues.⁸ Most of them were already proposing 40 mm as the threshold to perform a concomitant TVr, and many of their patients had no rheumatic valve disease.

The rationale behind considering annular dilation rather than TR grading rests on 3 points: (1) TR grading is largely unreliable because the RV is eminently dependent on preload, and annular dilation is not; (2) there is a discrepancy between clinical and hemodynamic data^{9,10}; and (3) TR is bad for the patient.¹¹

In fact, the 7 cm intraoperatively measured by Dreyfus and colleagues¹² between the commissures anterior leaflet (AL)/septal leaflet (SM), and AL/posterior leaflet (PL) also correspond to the 4 cm (mid AL–mid SL) measured by echocardiography; most of the patients in the study by Dreyfus and colleagues¹² had degenerative disease. Therefore, I proposed the 40-mm threshold, and it was adopted while I was a member of the European Guidelines Taskforce in 2006.¹³ This was taken over in the American Guidelines.¹⁴ The 40-mm threshold has been further validated by De Bonis and colleagues,¹⁵ Goldstone and colleagues,¹⁶ and Benedetto and colleagues.¹⁷ During my stay in Leiden, Van de Veire and colleagues¹⁸ found the same protective effect of an aggressive strategy on TR

progression, RV function, and PHT, and again in Genk.¹⁹ The same conclusions were recently reached by Desai and colleagues²⁰ and Kilic and colleagues.²¹ The Society of Thoracic Surgeons database even indicates a lower risk if TR valve surgery is added to MV surgery.

Similar to David’s approach, Yilmaz and colleagues²² at the Mayo Clinic reported a conservative approach to concomitant TVr, but 30% of their patients had at least moderate TR after 5 years despite the preoperative exclusion of patients with PHT, RV dysfunction, or failure.

At the present time, concomitant tricuspid repair is performed in 7% to 10% of patients at the Mayo Clinic and in Toronto (T. David); in 25% of patients in Leipzig (F. Mohr); in 40% to 45% of patients in Monaco (G. Dreyfus), Leiden, and Genk (R. Dion); and in 65% of patients in New York (D. Adams).

Gillinov, the invited discussant of the Chikwe article at the American Association for Thoracic Surgery, would only repair TV if the TR is “moderate,” but what does “moderate” mean?

What could be the reasons for such divergent opinions regarding the importance of concomitant TVr at the time of MV repair?

First, the preoperative functional class certainly plays a major role. On one side of the spectrum, as noted by Dr Adams in the discussion of the article, patients in New York Heart Association class III and IV (as in presumably many patients of the historical cohort of Dr David) who did not develop at least moderate TR at the time of the mitral procedure will likely not do so after MV repair. On the other side of the spectrum, asymptomatic patients with normal left ventricle (LV) and no or mild TR (as in presumably the majority of the current patients of Dr David) are less likely to develop severe TAD. In an ongoing prospective study, De Bonis and colleagues¹⁵ (San Raffaele, Milano) found a 40 mm or greater TAD in only 5.3% of the patients undergoing early MV repair with TR 2 or less. The earlier we operate on the MV, the less frequently patients will require TVr.

Second, measurement of the TV diameter is not really standardized. In view of the triangular shape of the tricuspid valve, it should be measured precisely between the midpoints of the anterior and septal annular segments. By using 2-dimensional echocardiography, according to Berrebi,²³ Carpentier’s echocardiographer, it should be measured in diastole on a 4-chamber view with the echocardiography beam cutting the MV through A3-P3. Of course, the measure is easier if one uses 3-dimensional echocardiography or magnetic resonance imaging. A large circular but still competent TV is probably prone to develop TR in the future, because the leaflets are made for a triangular-shaped annulus.

Third, the type of approach to the MV probably makes a difference, that is, a transeptal approach automatically exposes the tricuspid valve.

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