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## Commentary: Annular reduction of the tricuspid valve—maybe less, maybe a little more?

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Moderate-to-severe secondary tricuspid regurgitation (TR) is associated with an 2-fold increase of all-cause mortality typically attributed to progressive right ventricular (RV) failure.<sup>1</sup> Despite accumulating evidence that underscores the adverse clinical prognosis of relevant TR, there are still major uncertainties with respect to the optimal timing of surgery and best operative technique.<sup>2</sup> A recent report from the Society of Thoracic Surgeons database summarizing more than 50,000 patients undergoing surgery of the tricuspid valve demonstrates that annuloplasty is the primary surgical strategy and that 80% of tricuspid valve repairs are performed at the time of left-sided surgery.<sup>3</sup> Although these data are in compliance with the recommendations of the European Society of Cardiology/European Association for Cardio-Thoracic Surgery and American Heart Association/American College of Cardiology, surgical correction of relevant TR is currently discouraged in both in the presence of severe biventricular dysfunction or pulmonary hypertension due to its poor prognosis.<sup>4,5</sup>

In this issue of the *Journal*, Jazwiec and colleagues<sup>6</sup> present functional data on the hemodynamic effects of gradual tricuspid annular reduction for the treatment of secondary TR in an ovine tachycardia-induced cardiomyopathy model. In this meticulously instrumented experimental study, biventricular failure with tricuspid annular dilatation and relevant TR occurred after a 2-week pacing period. In a second step, the investigators analyzed the impact of a gradual reduction of the tricuspid annular area from 18% to 76% by a flexible De Vega annuloplasty on tricuspid valve competence, RV function, and strain. Two important aspects can be derived

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### CENTRAL MESSAGE

This experimental study demonstrates that moderate tricuspid annular reduction optimally balances reduction of tricuspid regurgitation while preserving right ventricular function.

from this study. First, “overzealous” annular reduction of the tricuspid valve area beyond 56% from baseline effectively abolished TR but resulted in a progressive impairment of RV and left ventricular function. Second, a mild reduction of the tricuspid valve area to normal (18%-38% reduction) was insufficient to resolve TR, probably due to the pre-existing alteration of RV function and geometry.

The authors can be congratulated for a hypothesis-generating study that certainly reflects the clinical dilemma for many surgeons dealing with functional TR. It is true that annular treatment of relevant TR fails to address the diseased RV and its altered subvalvular geometry. Consequently, reshaping of the RV at the time of surgery by reducing leaflet tethering through resuspension of the diseased subvalvular apparatus has been proposed by some surgeons, but robust clinical data supporting this approach are still lacking.<sup>7</sup> On the other side, the clinical benefits of tricuspid annuloplasty for relevant functional TR are well documented, showing improved mid- and long-term survival, especially in patients with concomitant surgery for left-sided valve disease.<sup>5,6,8</sup>

The latter aspect indicates an important clinical limitation of the presented experimental work.<sup>6</sup> The authors primarily focused on RV functional parameters, thereby potentially neglecting concomitant left ventricular disease and mitral regurgitation in the presence of biventricular cardiomyopathy. Thus, not addressing a relevant mitral regurgitation at the time of tricuspid annuloplasty, as recommended by current guidelines and also usually done in the routine surgical practice, weakens the clinical

relevance of the present work beyond its acute hemodynamic setup. Nonetheless, Jazwiec and colleagues<sup>6</sup> can be congratulated for their efforts in highlighting an important and emerging area of cardiac surgery.

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## Commentary: Addressing tricuspid annular dilation: Cinch it down but not too tight

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Reaching consensus today on the optimal management of functional tricuspid regurgitation (FTR) is an unlikely endeavor. The tricuspid valve, no longer forgotten, still remains understudied, with surgical technique, patient selection, and indications still debated. Often the result of left-sided heart disease, FTR is a complex pathophysiology that occurs in the setting of varying degrees of pulmonary artery hypertension, right ventricular (RV) dysfunction, annular dilation, and leaflet tethering associated with left ventricular dysfunction.<sup>1</sup>

### CENTRAL MESSAGE

In a large-animal model, moderate (~50%) rather than aggressive annular reduction was optimal correction for functional tricuspid regurgitation while preserving right ventricular function.

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Jazwiec and colleagues<sup>2</sup> should be commended for investigating the complex interaction between tricuspid annular dilation and RV dilation with varying degrees of tricuspid annular reduction. Using a large-animal ovine model of tachycardia-induced cardiomyopathy, the authors identified moderate annular reduction (~50%) as the optimal correction for FTR that improves valvular function while not compromising RV function. This study is a follow-up to their previous work in healthy sheep, where they identified