model may be a useful tool for developing novel adjunctive repair techniques that focus on the subvalvular apparatus.

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See Article page 76.

Commentary: Tricuspid regurgitation: When a repair is not just a repair

Peter J. Altshuler, MD, and Pavan Atluri, MD

The management of functional tricuspid regurgitation (FTR) is evolving as we add to our understanding of the disease. With the prevalence of moderate-to-severe FTR approaching 3 million people in the United States,^{1,2} improvements in treatment have the potential to affect morbidity and mortality on a large scale. Current practice is dictated largely by valve repair intended to restore valve competence through a spectrum of annuloplasty techniques; unfortunately, while largely successful in improving valve geometry and mechanics, residual TR is common.³⁻⁵

In this issue of the *Journal*, Amedi and colleagues set out to help answer the question of how to better surgically repair severe FTR.⁶ Using an ex vivo porcine model of isolated TR, the authors were able to provide a unique and detailed insight into the structure and function of the tricuspid valve and right ventricle (RV) after either ring or

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CENTRAL MESSAGE

Better understanding of tricuspid valve and right ventricular mechanics after tricuspid valve repair provide clarity into optimal surgical management.

focal-cinching Hetzer suture annuloplasty. Overall, while both techniques were able to reduce FTR, neither was able to completely restore valve competence. Through detailed echocardiographic assessment of the valve apparatus and RV, residual regurgitation was found to be a result of ongoing RV wall displacement. Without addressing this displacement, papillary muscles inserting on the RV free wall caused persistent valve tethering. This finding provides further insight into an important shortcoming in current management of severe FTR: without addressing associated subvalvular pathology, residual TR is likely irrespective of repair technique.

The findings demonstrated in this study provide valuable insight into how current surgical therapy alters the already

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complex nature of the tricuspid valve, subvalvular apparatus and RV. Even by the authors' own admission, however, this experimental model presents a simplified version of FTR pathology. An ex vivo model is not meant to serve as an in vivo surrogate, but rather functions to remove external variables to isolate the area of interest. The true value in this study, then, is in its validation of previous in vivo analyses suggesting a need to correct subvalvular pathology along with the valve itself.^{7,8}

Ultimately, the true nature of severe FTR is one that necessitates careful consideration not only of the status of the right heart but the entire cardiovascular system and overall patient health. Indeed, while ideal surgical management of FTR may very well involve addressing both the valve and subvalvular apparatus, the Hippocratic dictum of *primum non nocere* may prevail and instead warrant a safe, if not optimal, valve-only approach. Overall, Amedi and colleagues are to be commended for their experimental ingenuity as well as their meaningful contribution to the understanding of the tricuspid valve and associated repair techniques. Through their findings, further proof is given to the assertion that addressing

subvalvular pathology is necessary in finding a true gold standard repair for FTR.

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See Article page 76.

Commentary: One ring to rule them all?

Asvin M. Ganapathi, MD, and
Nahush A. Mokadam, MD

J. R. R. Tolkien's *Lord of the Rings* trilogy has as its centerpiece the character of Gollum and his obsession with the One Ring to Rule Them All. The tale, which is epic and has spawned numerous literary and philosophical debates,

Asvin M. Ganapathi, MD (left), and Nahush A. Mokadam, MD, FACS, FACC (right)

CENTRAL MESSAGE

Tricuspid valve ring annuloplasty might not be the best intervention for functional tricuspid valve regurgitation. Understanding mechanisms of failure may lead to more durable repairs.

centers on the single ring that is all-powerful and designed to help Sauron gain control of Middle Earth. While there are numerous memorable characters and plots, Gollum calling

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