Commentary: The no longer neglected valve

Amedeo Anselmi, MD, PhD,^a and Alfonso Agnino, MD^b

From the ^aDivision of Thoracic and Cardiovascular Surgery, Pontchaillou University Hospital, Rennes, France; and ^bDivision of Minimally Invasive Cardiac Surgery, Cliniche HUMANITAS Gavazzeni, Bergamo, Italy.

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Address for reprints: Amedeo Anselmi, MD, PhD, Division of Thoracic and Cardiovascular Surgery, Pontchaillou University Hospital, 2 rue Henri le Guilloux, Rennes 35000, France (E-mail: amedeo.anselmi@chu-rennes.fr).

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Amedeo Anselmi, MD, PhD

Central Message

Detailed geometric analysis of the tricuspid annulus stimulates improvements in the design of annuloplasty devices and provides insights for the development of percutaneous tricuspid therapy.

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Recent years have been marked by increasing interest from the surgical community in the tricuspid valve. Knowledge of this no longer neglected valve has been advanced not only in the domain of its prognostic role but also from the physiologic point of view. The article in this issue of the *Journal* by Malinowski and associates¹ represents a step forward, with sonomicrometry-based fine analysis of the 3-dimensional behavior of the tricuspid annulus across the cardiac cycle being obtained for the first time in human hearts. Some limits exist in its experimental design (such as regarding the regulation of right ventricular afterload). Still, it suggests that the pathophysiologic mechanisms of tricuspid regurgitation may be a more complex process than annular dilatation or leaflet tethering, and that loss of the normal 3-dimensional behavior may accompany or even precede such events. Future research will need to make the link with the different steps of pathologic progression and translate the data into novel ring annuloplasty devices displaying coherent annular height, shape, and stiffness in their different segments. These devices in turn may contribute to further reduction in recurrent tricuspid regurgitation rates.

In-depth knowledge about the physiology of the interactions between the components of this complex system (tricuspid annulus, leaflets, subvalvular apparatus, and right ventricle) has never been so strategic, nor so expected to impact future practice. Such knowledge is important for the success of any transcatheter device aimed at restoring tricuspid valve function. Percutaneous edge-to-edge,² percutaneous annuloplasty devices (Cardioband system; Edwards Lifesciences, Irvine, Calif; and TriCinch system; 4TECH, Inc, Galway, Ireland), percutaneous tricuspid bi-cuspidization device (Trialign; Mitralign, Inc, Tewksbury, Mass), and percutaneous coaptation device (Edwards) are some examples. The number and variety of devices and concepts that are currently under investigation demonstrate the commitment to transcatheter tricuspid therapy but also express the magnitude of the challenge they take up. The

success of these innovative strategies will depend on their ability to address the complex pathophysiologic functioning of the tricuspid valve and of the valve-ventricle interdependence; the data of Malinowski and associates¹ advocate the importance of adequate management of the tricuspid annulus in such context. Still, the reference of durability and predictability of results in terms of correction of regurgitation must remain, once again, in the field of surgery. Such objectives can be pursued through physiology-based amelioration of tricuspid annuloplasty material, but also through further refinement of indications to surgical therapy, as testified by ongoing multicenter investigations.

The current article by Malinowski and associates¹ indicates, once again, that close cooperation and exchanges among surgeons and research units composed of biomedical engineers is vital lymph to our surgical departments. It also reminds us that our discipline is the best positioned to obtain reliable human data (as underlined by the design of this study), and that the reference knowledge accumulated by surgeons about heart valves is a patrimony that we must cultivate and grow if we are to remain protagonists during the coming years.

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