JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 8, NO. 11, 2015

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jcin.2015.04.025

Transapical Mitral Valve Implantation for the Treatment of Severe Native Mitral Valve Stenosis in a Prohibitive Surgical Risk Patient

Importance of Comprehensive Cardiac Computed Tomography Procedural Planning

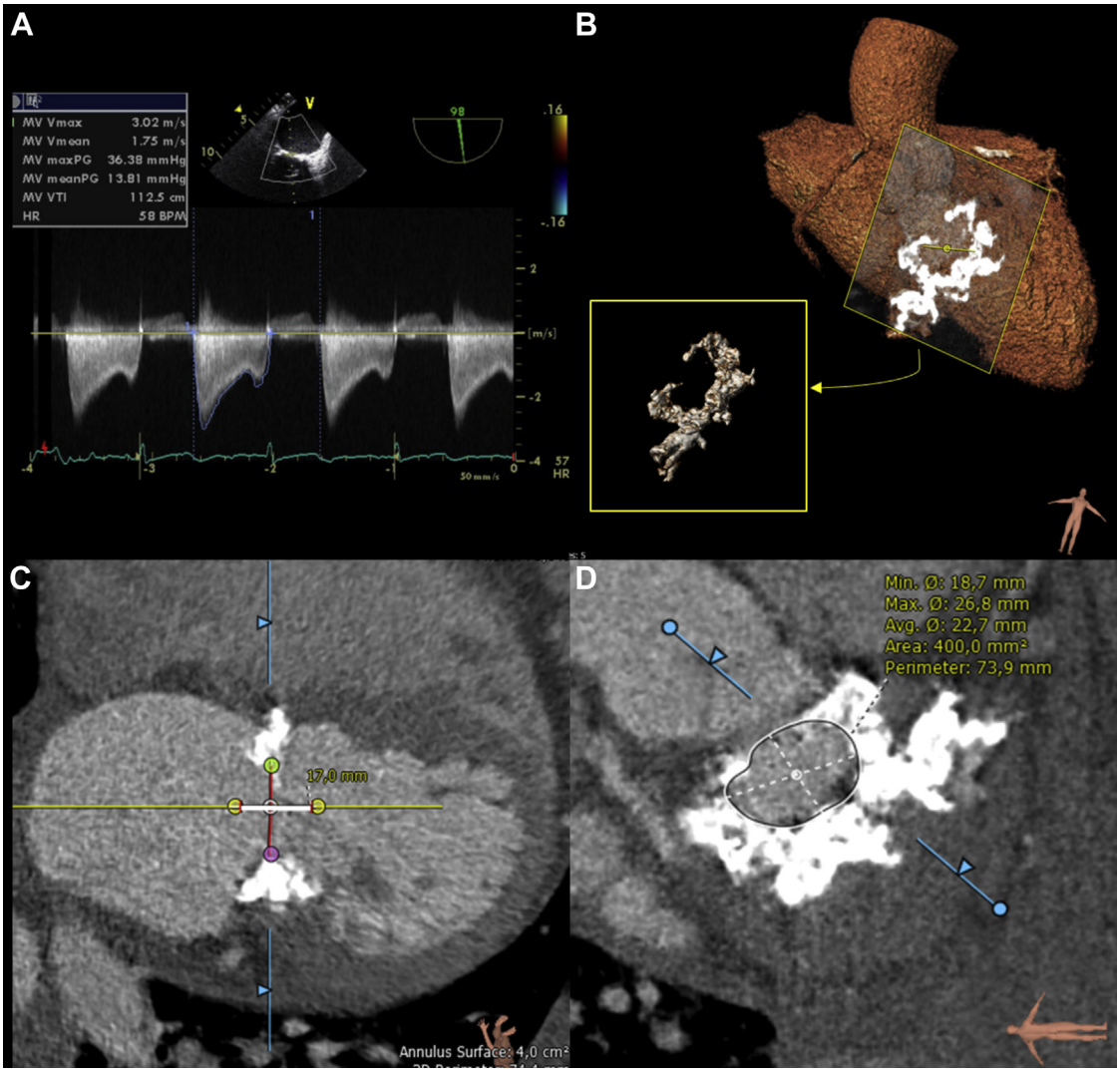
Guilherme F. Attizzani, MD, Anas Fares, MD, Chor Cheung Tam, MD, Bimal Padaliya, MD, Stacey Mazzurco, RN, Kehllee L. Popovich, NP, Angela C. Davis, RN, Elizabeth Staunton, NP, Hiram G. Bezerra, MD, PhD, Alan Markowitz, MD, Daniel I. Simon, MD, Marco A. Costa, MD, PhD, Basar Sareyyupoglu, MD

A 66-year-old woman with severe mitral stenosis (mean gradient, 13.81 mm Hg; valve area, 0.8 cm^2) and extensive mitral annular calcification (MAC) presented with New York Heart Association functional class IV congestive heart failure. Balloon mitral valvuloplasty was not considered due to the high Wilkins score (i.e., 12) Because of a Society of Thoracic Surgeons mortality score of 10.04% and cirrhosis (Child-Pugh B), the heart team deemed her at prohibitive surgical risk. We, therefore, decided to perform a transapical transcatheter mitral valve implantation using a SAPIEN XT valve (Edwards Lifesciences, Irvine, California). Cardiac computed tomography (CCT) performed as part of the procedural planning revealed heterogeneous C-shape MAC distribution that was greater in ventricular and posterior locations Across the 17-mm axial distribution, the maximal area perpendicular to the MAC centerline was 4.0 cm^2 (**Figure 1**). Across that area, a virtual valve was simulated in 3 different sizes, 23, 26, and 29 mm, using advanced post-processing software (3mensio Version 7.2, Pie Medical, Maastricht, the Netherlands) to help, along with the maximal area and calcium distribution, determine the optimal valve sizing and positioning (i.e., achieving the best sealing while minimizing the risk of valve embolization) (**Figure 2**). We, therefore, selected a 26-mm valve (~30% oversizing) aiming at positioning it 60% ventricular and 40% atrial (i.e., in line with the MAC distribution) (**Figures 2G and 2H**). Although severe MAC can be clearly visualized on fluoroscopy, using it as a single

From the Valve and Structural Heart Disease Intervention Center, Harrington Heart and Vascular Institute, University Hospitals Case Medical Center, Cleveland, Ohio. Dr. Attizzani is a consultant to Medtronic, Edwards Lifesciences, and St. Jude Medical; and a proctor for Medtronic and St. Jude Medical. Dr. Simon is a member of the advisory board for Medtronic. Dr. Costa has a relationship with Abbott. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose. Drs. Attizzani and Fares contributed equally to this paper.

Manuscript received April 15, 2015; accepted April 25, 2015.

FIGURE 1 **MAC Morphology and Functional Assessment**



(A) Pre-procedural transesophageal echocardiogram showing severe mitral stenosis. **(B)** Pre-procedural 3-dimensional volume-rendered cardiac computed tomography (CCT) demonstrating, in a double oblique plane, C-shaped MAC distributed more posteriorly (detailed in the **yellow square**). **(C)** A more ventricular axial distribution of MAC is revealed (17 mm, **white line between the 2 yellow dots**); the **red line** corresponds to the maximal area (4.0 cm^2) across the MAC, which is demonstrated as a cross section **(D)**. MAC = mitral annulus calcification.