JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 8, NO. 7, 2015

ISSN 1936-8798/$36.00
PUBLISHED BY ELSEVIER INC.
http://dx.doi.org/10.1016/j.jcin.2015.01.036

IMAGES IN INTERVENTION

Transcatheter Mitral Valve Implantation With the FORTIS Device

Insights Into the Evaluation of Device Success

Omar Abdul-Jawad Altisent, MD, Eric Dumont, MD, François Dagenais, MD, Mario Sénéchal, MD, Mathieu Bernier, MD, Kim O'Connor, MD, Jean-Michel Paradis, MD, Sylvie Bilodeau, MD, Sergio Pasian, MD, Josep Rodés-Cabau, MD

A 66-year old man with severe functional mitral regurgitation (**Figure 1A**) secondary to chronic ischemic cardiomyopathy (previous myocardial infarction and coronary artery bypass grafting) and advanced heart failure (left ventricular ejection fraction: 25%; New York Heart Association [NYHA] functional class III) was considered to be at very high surgical risk and was finally accepted by the Heart Team for transcatheter mitral valve implantation (TMVI) with the FORTIS transcatheter valve (Edwards Lifesciences, Irvine, California) (**Figures 1B and 1C**).

The procedure was performed using previously described techniques (1). In brief, the valve was inserted in the left ventricular cavity using a 40-French delivery catheter through the left ventricular apex. The valve prosthesis paddles were unsheathed to capture the native mitral leaflets at the A2-P2 level (Online Video 1). After confirmation of native mitral leaflet capture, full deployment of the valve system was successfully performed (**Figure 1D**, Online Video 2).

After valve deployment, transesophageal echocardiography (TEE) images revealed the presence of a mild to moderate perivalvular leak at the level of the posteromedial commissure (**Figure 1E**, Online Video 3; **Figure 1F**, Online Video 4). However, cardiac magnetic resonance (CMR) showed the absence of any residual leak (**Figure 1G**, Online Video 5), and multislice computed tomography demonstrated the correct positioning and atrial anchoring of the valve system (**Figures 1H and 1I**, Online Video 6). The post-procedural period was uneventful, and the patient was discharged 5 days after the intervention. At 1-month follow-up, the patient was in NYHA functional class I, and TEE showed a minimal "pseudo leak" (Online Video 7) and a mean transvalvular gradient of 3 mm Hg.

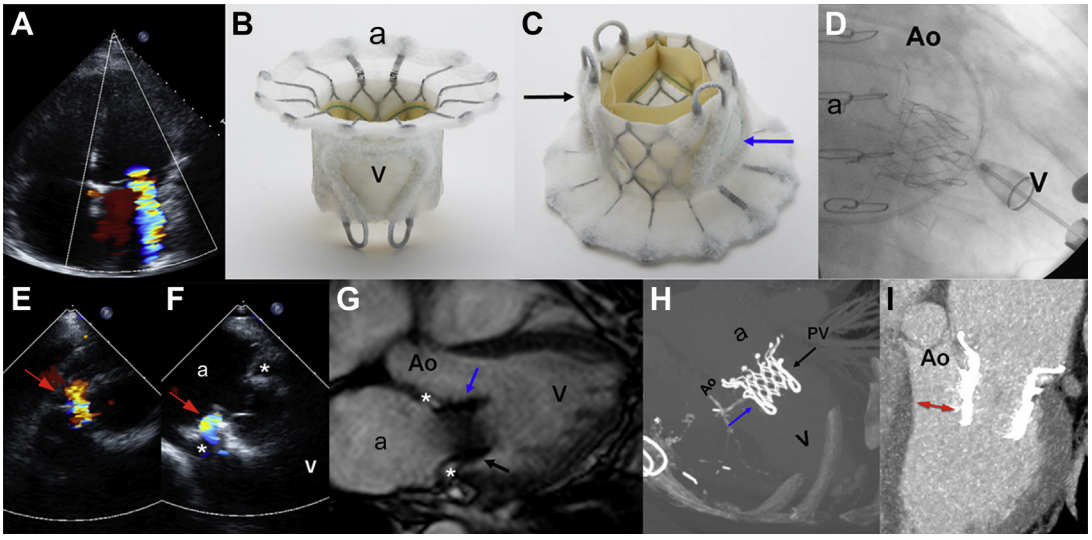
TMVI has recently emerged as a new option for the treatment of mitral regurgitation. An accurate evaluation of the presence of residual leaks remains of maximal importance for determining device performance and success. This report shows that the interpretation of residual leaks after TMVI may be challenging. We hypothesize that the relationship between the captured leaflets (A2-P2) and the free leaflets (A3-P3) generated an eccentric turbulent flow between the native leaflets and the valve prosthesis that resulted in an image suggestive of paravalvular leak. However, the eccentric jet did not extend into the atrium ("pseudo leak"), as further confirmed by CMR, and tended to disappear over time, probably due to new tissue growth covering the paddles of the valve prosthesis.

REPRINT REQUESTS AND CORRESPONDENCE: Dr. Josep Rodés-Cabau, Quebec Heart & Lung Institute, 2725 Chemin Ste-Foy, Quebec City, Quebec, Canada. E-mail: josep.rodes@criucpq.ulaval.ca.

From the Quebec Heart & Lung Institute, Quebec City, Quebec, Canada. Dr. Rodés-Cabau is consultant for and has received research grant from Edwards Lifesciences. Dr. Dumont is consultant for Edwards Lifesciences. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received November 5, 2014; revised manuscript received December 22, 2014, accepted January 15, 2015.

FIGURE 1 Transcatheter Mitral Valve Implantation With the FORTIS Device (Pre-Procedural, Procedural, and Post-Procedural Images)



(A) Four-chamber transthoracic echocardiogram view showing severe functional mitral regurgitation due to restriction of the posterior leaflet and tethering of subvalvular apparatus. **(B, C)** The FORTIS transcatheter heart valve system (Edwards Lifesciences) consists of a nitinol stent frame including 2 paddles **(black and blue arrows)** and a valve with 3 leaflets of bovine pericardial tissue sutured inside. **(D)** Fluoroscopic images (right anterior oblique projection) showing the FORTIS prosthesis deployed in the mitral annulus (Online Video 2). **(E)** Transesophageal echocardiography images (45° short-axis view) showing an eccentric turbulent jet in the posteromedial commissure between the prosthesis and the free portion of the native mitral leaflets **(red arrow)** (Online Video 3). **(F)** Transesophageal echocardiography images (0° long-axis view) showing a turbulent jet generated in the septal wall **(red arrow)** (Online Video 4). **(G)** Cardiac magnetic resonance in the end-systolic phase. No significant mitral regurgitation was found using both a direct quantification method (mitral regurgitant volume: 2 ml; mitral regurgitant fraction: 4%) and indirect quantification method (mitral regurgitant volume: 2 ml; mitral regurgitant fraction: 2%; left ventricular stroke volume: 89 ml; left ventricular ejection fraction: 28%; aortic antegrade volume: 87 ml; aortic regurgitant volume: 1 ml). We observed an optimal position of the prosthesis in the mitral annulus. The "pseudo leak" seems to be generated in the virtual space **(white star)** between the native leaflets captured by the paddles **(arrows)** and the atrial part of the prosthesis (Online Video 5). **(H)** Left superior view of 3-dimensional multislice computed tomography showing the FORTIS valve system correctly positioned in the mitral annulus (Online Video 6). **(I)** Multislice computed tomography images showing an optimal clearance in the left ventricular outflow tract **(red double-headed arrow)**. a = left atrial side; V = left ventricular side; Ao = aorta; PV = pulmonary vein. The **black arrow** indicates posterior paddle; the **blue arrow** indicates anterior paddle; the **red arrow** indicates pseudo perivalvular leak; the **white star** indicates virtual space between the native leaflets captured by the paddles and the atrial side of the prosthesis; the **red double-headed arrow** indicates left ventricular outflow tract clearance. See also Online Videos 1 and 7.

REFERENCE

1. Bapat V, Buellesfeld L, Peterson MD, et al. Transcatheter mitral valve implantation (TMVI) using the Edwards FORTIS device. EuroIntervention 2014;10 Suppl U:U120–8.

KEY WORDS mitral regurgitation, transcatheter mitral valve implantation

APPENDIX For accompanying videos, please see the online version of this article.