

First-In-Man Simultaneous Transcatheter Aortic and Mitral Valve Replacement to Treat Severe Native Aortic and Mitral Valve Stenoses



Adam Witkowski, MD,* Krzysztof Kuśmierski, MD,† Zbigniew Chmielak, MD,* Maciej Dąbrowski, MD,* Jan Jastrzębski, MD,* Ilona Michałowska, MD,‡ Tomasz Hryniewiecki, MD,§ Piotr Szymański, MD,§

A 39-year old man after chest radiotherapy was referred for heart failure. Transesophageal echocardiography revealed stenosed and severely calcified native aortic and mitral valves (mean gradients 46 and 14 mm Hg, respectively). Considering the high surgical risk and based on previous experience (1,2), the heart team decided to attempt simultaneous transapical aortic and mitral valve replacements.

In transesophageal echocardiography, aortic annulus diameter was 21 mm and mitral was 24 × 19 mm (Figures 1A and 2A). In multislice computed tomography, aortic annulus perimeter was 6.75 cm and mitral was 8.0 cm (Figures 1B and 2B).

A 23-mm Sapien XT (Edwards Lifesciences, Irvine, California) bioprosthesis was directly deployed within the aortic annulus, with mild paravalvular leak (Figures 1C and 1D, Online Videos 1 and 2). A 29-mm

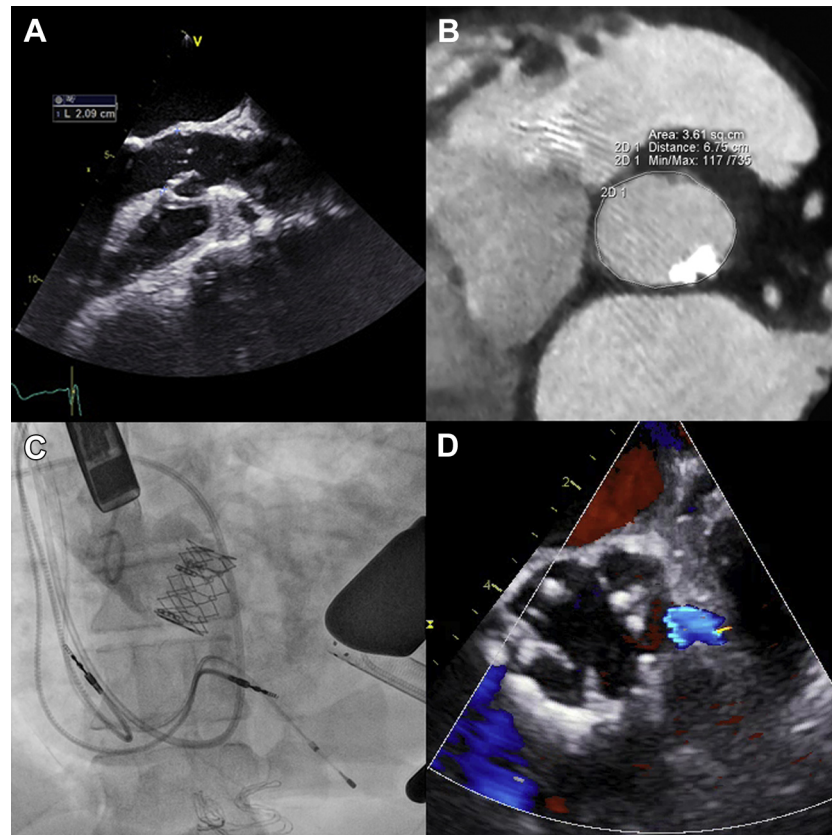
inverted Sapien XT valve was directly implanted within the mitral annulus (Figures 2C and 2D, Online Videos 3 and 4). Mean gradients were 18 mm Hg (aortic) and 6 mm Hg (mitral). In transesophageal echocardiography, aortic valve area increased from 0.76 cm² to 1.1 cm² and mitral valve area from 1.28 cm² to 2.8 cm². After 30 days, the patient improved from New York Heart Association functional class III to II.

Simultaneous transapical aortic and mitral valve replacements in native aortic and mitral annuli is feasible in patients with suitable anatomy and who are at high surgical risk.

REPRINT REQUESTS AND CORRESPONDENCE: Dr. Adam Witkowski, Interventional Cardiology and Angiology Department, Institute of Cardiology, 42 Alpejska Street, 04-628 Warsaw, Poland. E-mail: witkowski@hbz.pl.

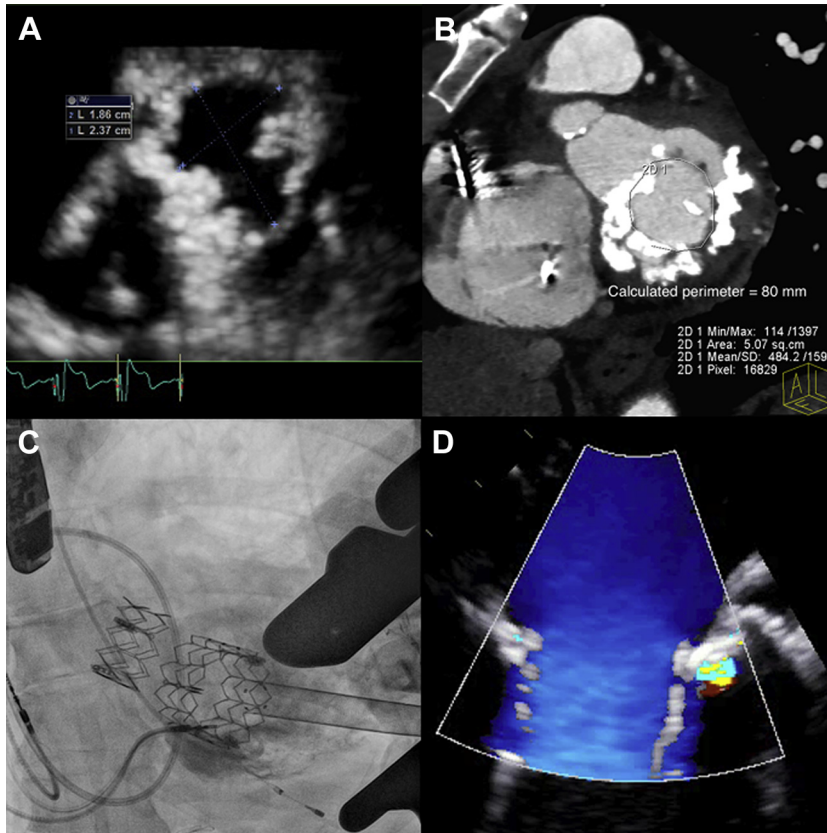
From the *Interventional Cardiology and Angiology Department, Institute of Cardiology, Warsaw, Poland; †Cardiosurgery and Transplantology Department, Institute of Cardiology, Warsaw, Poland; ‡Radiology Department, Institute of Cardiology, Warsaw, Poland; and the §Acquired Cardiac Defects Department, Institute of Cardiology, Warsaw, Poland. Dr. Witkowski is a proctor for Medtronic; and has received speaker's fees from Edwards Lifesciences. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received February 18, 2015; revised manuscript received March 10, 2015, accepted March 22, 2015.

FIGURE 1 Aortic Valve

(A) Transesophageal echocardiogram of the aortic annulus diameter. **(B)** Multislice computed tomographic image of the aortic annulus perimeter. **(C)** Angiogram after transcatheter aortic valve replacement ([Online Video 1](#)). **(D)** Transesophageal echocardiogram after transcatheter aortic valve replacement. There is a mild paravalvular leak at 3 o'clock ([Online Video 2](#)).

FIGURE 2 Mitral Valve



(A) Transesophageal echocardiogram of the mitral annulus diameters. **(B)** Multislice computed tomographic image of the mitral annulus perimeter. **(C)** Angiogram after transcatheter mitral valve replacement ([Online Video 3](#)). **(D)** Transesophageal echocardiogram after transcatheter mitral valve replacement ([Online Video 4](#)).

REFERENCES

1. Hasan R, Mahadevan VS, Schneider H, Clarke B. First in human transapical implantation of an inverted transcatheter aortic valve prosthesis to treat native mitral valve stenosis. *Circulation* 2013;128:e74-6.
2. Ladeiras-Lopes R, Vouga L, Braga P, et al. Simultaneous transapical implantation of an inverted transcatheter aortic valve-in-ring in the mitral position and transcatheter aortic valve replacement: first-in-human report. *J Am Coll Cardiol* 2014;63:e25.

KEY WORDS multi-slice computed tomography, transcatheter aortic valve replacement, transcatheter mitral valve replacement, transesophageal echocardiography

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