

Concomitant Transapical Transcatheter Valve Implantations: Edwards Sapien Valve for Severe Mitral Regurgitation in a Patient with Failing Mitral Bioprostheses and JenaValve for the Treatment of Pure Aortic Regurgitation

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ABSTRACT

Transcatheter valve implantation is a novel interventional technique, which was developed as an alternative therapy for surgical aortic valve replacement in inoperable patients with severe aortic stenosis. Despite limited experience in using transcatheter valve implantation for mitral and aortic regurgitation, transapical transcatheter aortic valve implantation and valve-in-valve implantation for degenerated mitral valve bioprosthesis can be performed in high-risk patients who are not candidates for conventional replacement surgery. In this case, we present the simultaneous transcatheter valve implantation via transapical approach for both degenerated bioprosthetic mitral valve with severe regurgitation and pure severe aortic regurgitation.

CASE REPORT

A 82-year-old man with severe aortic regurgitation and a failing bioprosthetic mitral valve was admitted with NYHA class III/IV dyspnea, which was not responding to full medical treatment. The patient had a history of hypertension, severe chronic obstructive pulmonary disease (FEV1 <0.6 L), and patent coronary artery bypass grafting. Transthoracic echocardiographic examination revealed a severe pure aortic regurgitation, and severe mitral regurgitation out of a degenerated failing bioprosthetic mitral valve (29 mm St Jude Medical Epic heart valve). Also, the left ventricular ejection fraction was 45%. Redo surgery was predicted as high risk for the patient because of multiple risk factors. However, surgical risk evaluation was made; the logistic EuroSCORE was 37.08 and the STS score was 14.3. Therefore, there was consensus from the heart team to perform interventional valve implantation through transapical access with anterolateral minithoracotomy. After the aortic valve was implanted successfully, then the mitral valve was deployed. A 27 mm JenaValve prosthesis was successfully implanted percutaneously through the transapical route

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(Figure 1). Afterward, following balloon predilatation, a 29 mm Edwards Sapien XT valve was implanted successfully inside the bioprosthetic mitral valve level during rapid ventricular pacing (Figure 2). Post-procedural echocardiographic and angiographic assessments revealed a well-functioning prosthesis valve with minimal aortic and mitral paravalvular leak (Figure 1, D; Figure 2, D). The patient was discharged on postoperative day 7 without any complication or hemodynamic impairment. The patient had a better functional status (NYHA class I/II) and hemodynamic stabilization one month following the procedure and is currently alive.

DISCUSSION

Transcatheter valve implantation offers a new treatment modality for those patients who have many comorbidities that



Figure 1. Procedural angiographic and echocardiographic images during transapical transcatheter aortic valve implantation (JenaValve). A, the advance of the valve via transapical approach; B, positioning of the valve on the aortic level; C, implantation of the valve on the aortic level; D, fluoroscopic aspect of the valve after deployment.

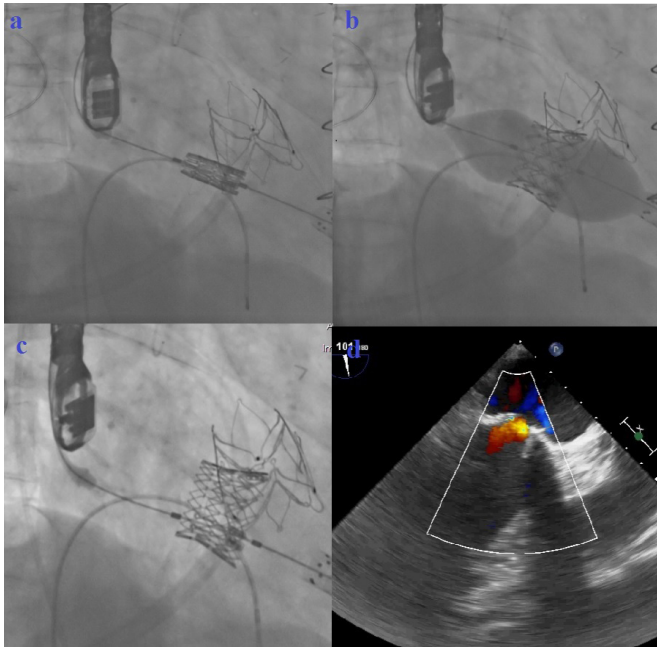


Figure 2. Procedural angiographic and echocardiographic images during transcatheter valve-in-valve mitral implantation (Edwards Sapien). A, the advance of the valve via transapical approach to mitral level; B, the opening of the balloon expandable valve; C, after the opening of the valve on the mitral level; D, echocardiographic images of the valve after deployment.

make conventional surgery high risk or prohibitive [Gul 2014; Grube 2007]. In an aging population, a growing number of patients are requiring redo surgery. Redo valve surgery may bring excessive risks in certain patients, as redo candidates tend to be older and sicker than first surgery candidates. Previous reports of in-hospital mortality rates for double-valve surgery range from 1.75% to 14% [Hellgren 2002; Astor 2000]. The mitral and aortic valve replacement, even in patients with few comorbidities, is a procedure with a mortality rate that may reach 15.5%, as stated by a recent paper from the Northern New England Cardiovascular Disease Study Group—and the risk is increased for redo surgery [Leavitt 2009]. While transcatheter aortic valve implantation (TAVI) is now established as the standard of care for high-risk elderly patients with severe aortic stenosis, there are limited data on the use of transcatheter technology for mitral valve replacement. A second transcatheter valve procedure (THV-in-THV) might be required in TAVI procedures because of high paravalvular leak or valve malposition. A transcatheter mitral valve-in-ring procedure for a patient with mitral dysfunction who had undergone a mitral ring replacement operation long ago has been reported, as has a mitral valve-in-valve procedure for a patient with valve dysfunction who had undergone a mitral bioprosthetic valve replacement operation [Neves 2014; de Weger 2011; Salizzoni 2014]. Experience with TAVI for severe aortic regurgitation is limited due to the risk of insufficient anchoring of the valve stent within the noncalcified aortic annulus [Schlingloff 2014]. Two second-generation valves, such as the Engager

(Medtronic, Minneapolis, USA) and the JenaValve (JenaValve Technology, Munich, Germany), have been designed with a different anchoring mechanism that does not need calcification in the native valve. The JenaValve comprises a self-expanding nitinol stent with a native porcine aortic valve. Aortic annulus size of 25–27 mm JenaValve prosthesis (Delivery System + prosthesis) was preferred for our patient whose aortic annulus was 25.2 mm. The Edwards Sapien Valve (Edwards Lifesciences, Irvine, California, USA) is being used commonly and safely with bovine pericardial tissue and cobalt-chromium frame. Edwards Sapien XT, at the size of 29 mm (Ascendra+ Delivery System), which has been developed for transapical access systems, was used for our patient. The pacemaker implantation rate is lower in patients with aortic regurgitation compared with patients with Aortic Stenosis, because there are usually no calcified plaques pushed into the annulus and onto conductive tissues by the valve [Eksik 2013]. In the present case, both severe mitral and aortic regurgitation were treated via transapical approach and the patient did not require a pacemaker.

Conclusion

The transapical route not only facilitates intervention to the aortic valve, but also to the mitral valve; this differs from the transfemoral route, which facilitates intervention only to the aortic valve. The possibility for intervention to multiple valves at the same time with transcatheter techniques will bring about increased indications for the transapical approach in the future. Transcatheter replacement of malfunctioning bioprosthetic valves in the mitral position using valved stents is an attractive alternative to repeat surgery in high risk or multi-operated patients. Also, second-generation valves for aortic regurgitation are now successfully being implemented. Thus, transcatheter multiple valve implantation is an efficient method for patients with multiple valve disease, though surgery should be the first technique for patient who can tolerate surgery. Further, in experienced cardiac centers, the transcatheter technique should be performed on high-risk patients who cannot tolerate surgery.

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