

Valve-in-Valve in the Tricuspid Position for a Stenosed Bioprosthesis

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ABSTRACT

The strategy of transcatheter valve-in-valve implantation into failing mitral and aortic bioprosthetic valves is a documented approach. It allows one to avoid performing a high-risk repeat cardiac surgery in elderly patients with multiple comorbidities. Tricuspid valve-in-valve implantation has been documented only a few times in the literature. We report the case of a 65-year-old woman with a failing bioprosthetic tricuspid valve who had undergone 3 prior open heart operations. We attempted a transatrial transcatheter approach and successfully deployed a 29-mm Edwards Sapien balloon-expandable bioprosthesis into a severely stenotic tricuspid bioprosthesis. This case demonstrates the technical feasibility and safety of this approach.

INTRODUCTION

Percutaneous replacement of the aortic valve has rapidly gained acceptance as an alternative to open valve surgery for patients with a high operative risk [Zajarias 2009]. This strategy avoids performing a high-risk repeat cardiac surgery in elderly patients with multiple comorbidities. Transcatheter heart valve implantation into a failed bioprosthesis or a previous valve repair with a ring, ie, a “valve-in-valve” procedure, may offer a less invasive alternative with lower morbidity and mortality rates, compared with the conventional redo surgery.

Percutaneous tricuspid valve replacement has scarcely been documented [Lauten 2010]. Webb et al [2010] reported 1 case of tricuspid valve replacement (valve-in-valve), in which a valve designed for percutaneous use was inserted through a thoracotomy with direct puncture of the right atrium. Rapid ventricular pacing was used during the deployment for successful positioning. Kenny et al [2011] reported a case of a transvenous (femoral) approach for

implantation of a 26-mm Edwards Sapien valve in a failed tricuspid bioprosthesis. Roberts et al [2010] described a case of a right transjugular approach for placing a Medtronic Melody valve (Medtronic, Minneapolis, MN, USA) into a failing tricuspid bioprosthesis.

We describe a transatrial approach without rapid pacing for tricuspid valve-in-valve replacement.

PATIENTS AND METHODS

The procedure was performed in 2011 as “compassionate treatment” for a 65-year-old woman who had multiple comorbidities and severe stenosis of a tricuspid bioprosthesis (Figure 1). Owing to the comorbidities and the requirement for a fourth redo surgery, the patient was offered a valve-in-valve solution for her tricuspid bioprosthesis stenosis.

The patient underwent a transcatheter valve-in-valve replacement of her tricuspid valve. The percutaneous transvenous approach was rejected because of the inherent risks associated with liver cirrhosis. The procedure was performed in the operating theater, with the patient under general anesthesia and the use of double-tube intubation. We planned to use fluoroscopy and transesophageal echocardiography for correctly positioning of the valve (Figure 2). A right intercostal surgical approach with direct right atrial puncture was used to facilitate coaxial positioning. Despite excessive cardiac motion, rapid ventricular pacing was not used. We performed a balloon valvuloplasty and then implanted a 29-mm balloon-expandable Cribier-Edwards Sapien XT transcatheter heart valve (Edwards Lifesciences, Irvine, CA, USA).

An intraprocedural transesophageal echocardiography evaluation demonstrated successful positioning and good function of the valve (mean pressure gradient, 3 mm Hg).

RESULTS

No postsurgical complications were documented. The patient improved clinically over a follow-up of 90 days, with the patient experiencing a dramatic improvement in New York Heart Association class, from III to II/I, a net weight loss of approximately 15 kg, and a near-disappearance of her lower-limb edema. The transvalvular gradient was reduced from 14 to 3 mm Hg.

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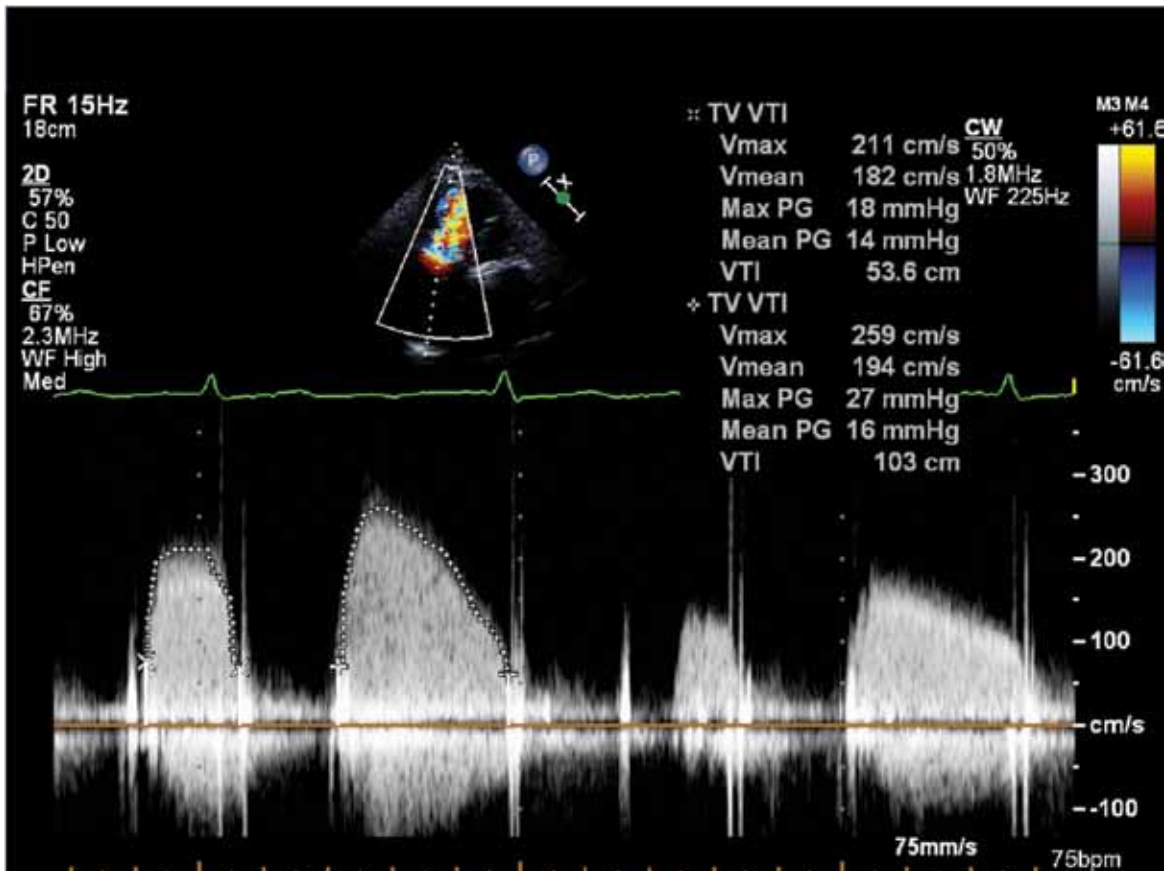


Figure 1. Color flow and pressure gradient across the stenosed tricuspid bioprosthesis.

DISCUSSION

Given that a structurally degenerated bioprosthetic tricuspid valve may cause symptoms related to right heart failure, treatment options include aggressive medical therapy, percutaneous balloon valvuloplasty, and repeat operation for tricuspid valve replacement. Percutaneous valvuloplasty may be an

effective treatment for native tricuspid valve stenosis; however, the clinical experience with valvuloplasty for stenosis of a tricuspid prosthesis has not been favorable because of the risk of inducing severe tricuspid regurgitation. Surgery for replacement of a failing tricuspid prosthesis carries a significant operative risk, especially in patients with severe symptoms of right heart failure.



Figure 2. Positioning and inflation of the expandable bioprosthesis.

The present report demonstrates the technical feasibility and procedural safety of transatrial, transcatheter treatment of a failing tricuspid bioprosthesis in a human patient. This approach was associated with prompt hemodynamic and short-term clinical improvement. After deployment, excellent valve function was documented. Paravalvular leakage and systolic flow reversal in the inferior vena cava and the hepatic veins were ruled out by Doppler interrogation during follow-up. Valve function remained unchanged during sequential assessment. During early follow-up, the patient experienced a reduction in clinical symptoms associated with venous congestion and an improvement in her physical capacity, as mentioned above.

In summary, the reported approach may provide an advantageous, viable alternative treatment option for carefully selected patients.

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