

IMAGES IN INTERVENTION

# First-in-Human Transcatheter Pulmonic Valve Implantation Through a Tricuspid Valve Bioprosthesis to Treat Native Pulmonary Valve Regurgitation Caused by Carcinoid Syndrome



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**T**rascatheter heart valve implantation is a well-established alternative to surgical valve replacement for specific types of valvular heart disease (1-4). We report the first case of implantation of an Edwards SAPIEN XT transcatheter heart valve (Edwards Lifesciences, Irvine, California) in the native pulmonary valve position through a tricuspid valve bioprosthesis to treat severe pulmonary valve regurgitation as a result of carcinoid heart disease.

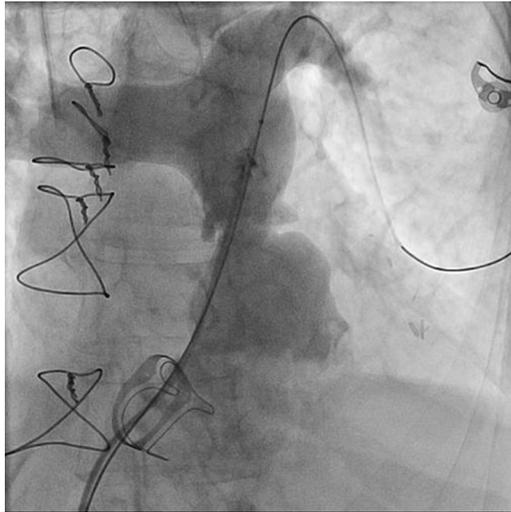
A 77-year-old woman with carcinoid syndrome that was due to grade 2 neuroendocrine tumor was referred to the cardiology clinic for further evaluation of severe lower extremity edema and heart murmur. Investigations revealed right heart failure as a result of carcinoid heart disease with severe tricuspid and moderate-to-severe pulmonary valve regurgitation. Coronary angiography also demonstrated an 80% proximal left anterior descending coronary artery stenosis. Therefore, the patient was referred to surgery for valve replacement of both the tricuspid and pulmonary valves with concomitant coronary artery bypass graft surgery. Surgical evaluation indicated that double-valve surgery with single-vessel coronary artery bypass graft surgery would be risk prohibitive, and tricuspid valve replacement alone may be

sufficient to treat right heart failure. After a multidisciplinary team discussion, the patient underwent end-to-side grafting of the left internal mammary artery onto the left anterior descending coronary artery and placement of a 25-mm Carpentier-Edwards bioprosthesis (Edwards Lifesciences) in the tricuspid position.

Because of persistent symptoms of right heart failure 1 month following surgery, percutaneous placement of an Edwards SAPIEN XT valve in the pulmonic position with transesophageal echocardiography guidance was pursued. Transfemoral venous access was obtained, and the tricuspid valve bioprosthesis was crossed with a balloon-tipped pulmonary artery catheter. The pulmonary valve was then traversed with the same catheter and positioned in a segmental branch of the left pulmonary artery, which was thereafter exchanged for a curved tip Lunderquist extra-stiff wire (Cook Medical, Bloomington, Indiana). A pulmonary angiogram was performed (Figure 1, Online Video 1). The pulmonary valve annulus was sized with a 24-mm Amplatzer sizing balloon (St. Jude Medical, St. Paul, Minnesota) (Figure 2, Online Video 2). This was followed by direct implantation of a 26-mm Edwards SAPIEN XT valve in the pulmonic position, which resulted in an excellent angiographic

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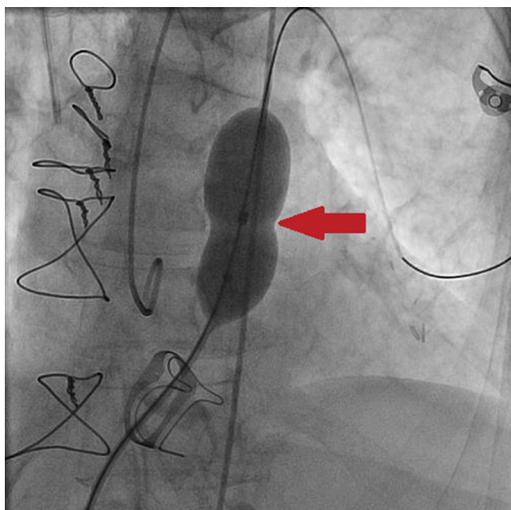
Manuscript received March 2, 2015; accepted March 12, 2015.

**FIGURE 1 Pulmonary Angiogram Confirming Severe Pulmonary Valve Regurgitation**

A Multi-Track angiography catheter (NuMed Inc., Hopkinton, New York) is positioned distal to the pulmonary valve over a curved tip Lunderquist extra-stiff wire (Cook Medical), which is placed distally in a segmental branch of the left pulmonary artery ([Online Video 1](#)). The 25-mm Carpentier-Edwards tricuspid valve bioprosthesis is also visualized.

**FIGURE 3 Pulmonary Angiogram After Implantation of the Edwards SAPIEN XT Valve**

Pulmonary angiogram following implantation of the Edwards SAPIEN XT valve in the pulmonic position, with trivial catheter-induced pulmonary regurgitation ([Online Video 3](#)).

**FIGURE 2 Amplatzer Sizing Balloon Across the Pulmonary Valve**

Inflated 24-mm Amplatzer sizing balloon across the pulmonary valve with residual waist, indicated by the **red arrow** ([Online Video 2](#)).

appearance with trivial catheter-induced pulmonary regurgitation and a well-functioning tricuspid valve bioprosthesis ([Figure 3 Online Video 3](#)). Two weeks later, the patient was discharged to a rehabilitation facility with much improved peripheral edema and stable renal function, after a brief period of continuous venovenous hemodialysis because of anuria.

In patients who are considered excessively high risk for surgical valve replacement, transcatheter heart valve implantation with an Edwards SAPIEN XT valve can be safely performed in the pulmonic position through an existing tricuspid valve bioprosthesis. In this particular instance, pre-stenting of the right ventricular outflow tract before transcatheter pulmonic valve implantation was not performed, because carcinoid accretion of the native pulmonary valve provided an adequate landing zone for deployment of the new valve bioprosthesis.

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**KEY WORDS** carcinoid, pulmonary regurgitation, transcatheter valve, tricuspid bioprosthesis

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