

Transcatheter Aortic Valve Replacement for Aortic Stenosis in Inoperable Patients

► Interventional cardiologists and cardiac surgeons at Penn Medicine are performing transcatheter aortic valve replacement (TAVR) surgery for patients with aortic stenosis who are not candidates for open-heart surgery. As original investigators in the PARTNER trial¹ that led to Food and Drug Administration approval for the first transcatheter aortic heart valve for aortic stenosis, cardiac specialists at Penn are among the most experienced in the country performing transcatheter aortic valve replacement.

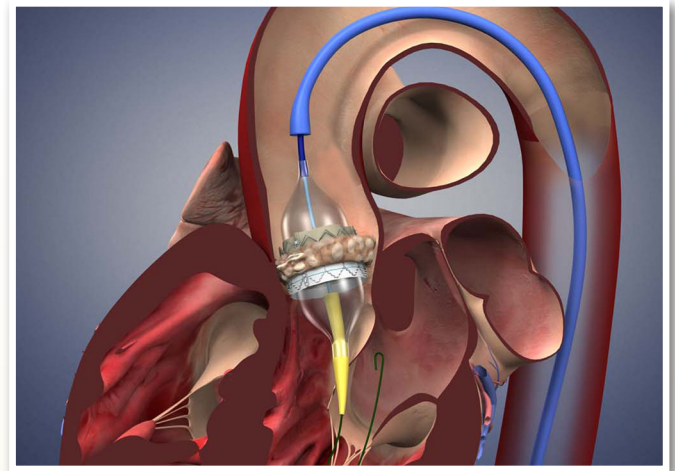
In adults, aortic stenosis is now primarily a condition caused by age-related calcium deposition at the valve, and degenerative calcific aortic stenosis is the primary indication for aortic valve replacement in symptomatic patients. Other, less common etiologies include congenital disease, rheumatic fever and stenosis arising from radiotherapy and other treatments.

Open-heart valve replacement surgery is the gold standard treatment for otherwise healthy patients with aortic stenosis. Because the physical demands of the procedure and other comorbidities may be prohibitive, however, many older patients are not candidates for open surgery.

A new approach called transcatheter aortic valve replacement (TAVR) utilizes a biological valve crimped onto a stent and folded inside a large bore catheter. The catheter is introduced at the groin and threaded up the aorta. Upon reaching the aortic valve, a balloon is inflated to deploy the stented valve directly over the calcified native valve, typically eliminating the need for surgical removal.

In the recently completed PARTNER trial, the transcatheter valve proved to be significantly superior to medical treatment in inoperable patients with severe symptomatic aortic stenosis. Penn researchers are now involved in the second phase of the trial, which is investigating a new and better valve design coupled with a smaller diameter delivery system that permits less invasive access at the groin.

1. Smith CR, Leon MB, Mack MJ, Miller DC, Moses JW, Svensson LG, Tuzcu EM, Webb JG, Fontana GP, Makkar RR, Williams M, Dewey T, Kapadia S, Babaliaros V, Thourani VH, Corso P, Pichard AD, Bavaria JE, Herrmann HC, Akin JJ, Anderson WN, Wang D, Pocock SJ, for the PARTNER Trial Investigators. Transcatheter versus Surgical Aortic-Valve Replacement in High-Risk Patients. *N Engl J Med*. 2011;364:2187-2198.



► **Figure 1:** During transcatheter aortic valve replacement surgery, an artificial valve mounted on a stent is deployed directly over the diseased native aortic valve.

Case Study

Mr. L, an 88-year-old man, was referred to Penn Interventional Cardiology by his community cardiologist after a decade of progressive heart failure (LVEF 30%) when an echocardiogram demonstrated a heavily calcified aortic valve. Mr. L had no signs of concomitant organ dysfunction and was in otherwise relatively good health. Because he was frail, however, he was felt to be inoperable.

At Penn, a physical examination revealed signs (a low-intensity carotid pulse and a pronounced heart murmur), indicative of aortic stenosis. After an angiogram demonstrated the patency of his iliac and coronary arteries and lung and kidney function were determined to be good, Mr. L was judged a good candidate for transcatheter aortic valve replacement surgery. After a consultation, he agreed to have the procedure.

The surgery proceeded without complications. Following anesthesia, the right femoral artery was dilated and a sheath introduced and advanced to the thoracic aorta. A guide wire was then threaded to the heart and the artificial valve advanced to the aortic valve. Mr. L's heart was then paced to halt ejection, and the artificial valve was inflated over the damaged native aortic valve. Mr. L remained in the hospital for five days, after which he went home to recuperate.

At his six-month follow-up evaluation, echocardiography showed near-normal left ventricular function, and Mr. L reported notably improved quality of life.

Faculty Team

Penn Interventional Cardiology is comprised of a team of nationally recognized interventional cardiologists working in close collaboration with cardiac surgeons and cardiologists to perform catheter-based procedures for a variety of cardiovascular disorders.

Performing TAVR Procedures at Penn Medicine

Co-Directors Transcatheter Aortic Valve Program

Joseph E. Bavaria, MD

Brooke Roberts - William Maul Measey Professor in Surgery

Howard C. Herrmann, MD

Professor of Medicine

Saif Anwaruddin, MD

Assistant Professor of Medicine

Nimesh D. Desai, MD, PhD

Assistant Professor of Surgery

Jay S Giri, MD

Assistant Professor of Medicine

Robert H. Li, MD

Clinical Associate of Medicine

Wilson Y. Szeto, MD

Associate Professor of Surgery

Prashanth Vallabhajosyula, MD

Assistant Professor of Surgery

Access

Penn Heart and Vascular Center

Perelman Center for Advanced Medicine

East Pavilion, 2nd Floor

3400 Civic Center Boulevard

Philadelphia, PA 19104

Penn Presbyterian Medical Center

Heart Institute Building, Suite 2A

51 N 39th Street

Philadelphia, PA 19104



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