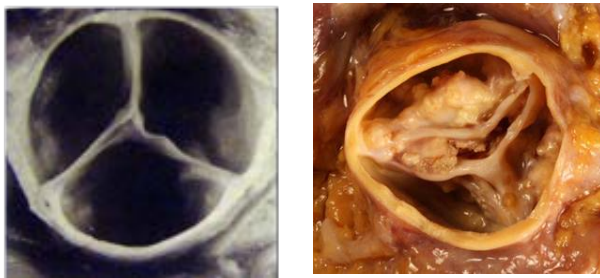


Media Backgrounder: Aortic valve disease

Dysfunction of the aortic valve with life-threatening consequences

- The aortic valve is a one-way valve, which ensures that oxygenated blood out of the left ventricle is carried into the aorta. Aortic valve disease is defined as an inadequate closing or opening of this valve, resulting in its **dysfunction**.¹
- Aortic valve stenosis is the process of **thickening and stiffening in the valve**, which can result in an abnormal narrowing of the aortic valve opening and reduction in blood flow. As a consequence, the heart needs to work harder to pump the sufficient amount of blood past the narrowed valve and throughout the body.²



*Caption: Aortic valve stenosis represents a significant narrowing of the valve opening, usually due to stiffening and calcification of the valve leaflets. The image on the left shows a healthy aortic valve. The image on the right shows a bi-leaflet, tri-commissural and severely calcified aortic valve.
Source: Boston Scientific data on file.*

- Principal **symptoms** associated with aortic stenosis include shortness of breath upon exertion (dyspnea), chest pain or tightness (angina), and dizziness/fainting episodes (syncope).³
- Left untreated, severe aortic stenosis can eventually lead to **heart failure, severe infection and even sudden death**.⁴ From the onset of aortic stenosis symptoms, the average **survival rate** is 50 percent at two years⁵ and 20 percent at five years.⁶
- Aortic valve stenosis is a progressive, fatal, and expensive condition affecting approximately three percent of the population over age 65⁷ and five percent of people older than 75.⁸
- In Europe and North America, aortic stenosis is considered the **most common valvular lesion**.⁹ It can be caused by a congenital abnormality or by infections such as rheumatic fever or endocarditis.¹⁰ The most common cause of aortic stenosis in Europe, however, is **calcific degenerative disease**, a build-up of calcium on the valve cups that occurs with

increasing age.¹¹ **There are approximately 1.2 million patients with severe, symptomatic aortic stenosis in Europe.**^{a,12,13}

Replacement of the diseased valve in patients with severe aortic stenosis

- Treatment of aortic valve disease remains a significant and **growing unmet clinical need**, among others, due to its increasing occurrence with age and an ageing population.
- Today, the mainstay of treatment for severe symptomatic aortic stenosis is replacement of the native diseased valve with an artificial valve, normally during open-heart surgery using cardiopulmonary bypass.
- Nevertheless, not all patients are eligible for this treatment, and some are assessed to be a high risk patient for cardiac surgery. Approximately up to one third of patients with severe aortic stenosis do not undergo open surgery due to factors such as advanced age, advanced left ventricular dysfunction or multiple medical comorbidities.¹⁴
- For patients who are considered inoperable or at high risk for cardiac surgery, **minimally invasive** aortic valve replacement technologies such as Transcatheter Aortic Valve Implantation (TAVI)^b may be the only viable treatment option.^{15,16} A recent meta-analysis of aortic stenosis in elderly patients in North America and Europe showed that under the current indications, approximately 290,000 elderly patients with severe aortic stenosis are TAVI candidates. This population stands to grow as approximately 27,000 new patients become eligible for the procedure each year.¹⁷

TAVI – an alternative treatment for patients who are considered inoperable or assessed to be high risk patients for cardiac surgery

- TAVI (Transcatheter Aortic Valve Implantation) is designed to reduce the risks and morbidity associated with open surgical valve replacement and allows for reduced recovery times and fewer postoperative complications.
- During TAVI, which is performed on the beating heart without the need for cardiopulmonary bypass, a replacement valve is introduced.
- Multiple avenues for the delivery of the TAVI device are possible.¹⁸ In most cases, the valve is implanted through the femoral artery (trans-femoral approach) via a small incision in the thigh.¹⁹
- The prosthetic valve is pre-mounted on a catheter that is gently inserted and threaded across the native aortic valve. The prosthetic valve is then deployed and displaces the native aortic valve leaflets out of the way.
- Several studies demonstrated **potential benefits** of the TAVI procedure. For example, data from the PARTNER (Placement of Aortic Transcatheter Valves) trial population of 358

^a Based on extrapolated figures from Bordonni et al. 2013 and Lung et al. 2007. See reference section.

^b Also referred to as TAVR = Transcatheter Aortic Valve Replacement.

people with severe aortic stenosis who were not eligible for surgery show that all-cause death rates at one year (measured by Kaplan-Meier analysis) were 30.7 percent with TAVI as compared with 50.7 percent with standard therapy.²⁰ Nevertheless, **limitations** associated with the first generation of TAVI devices included stroke, bleeding and vascular complications, challenges with the precise positioning of the device as well as paravalvular leak, which has proven to be a strong predictor of post-procedural mortality.^{21,22,23,24}

Media contacts

Simonetta Balbi
Media Relations and Corporate
Communications Europe
Boston Scientific Corporation
+39 338 79 36 422 (mobile)
balbis@bsci.com

Nathalie Verin
Health Economics & Public Affairs
Manager
Boston Scientific
+44 (0) 7785 510429 (mobile)
VerinN@bsci.com

Sandra Wagner
Weber Shandwick
+49 151 61 33 64 11 (mobile)
swagner@webershandwick.com

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