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The Pathway Towards the Success of a New TAVR Device – A Surgeons' Adventure

Amedeo ANSELMi, MD PhD, Jean-Philippe VERHOYE, MD PhD

Division of Thoracic and Cardiovascular Surgery, Pontchaillou University
Hospital, Rennes, France

Corresponding author:

Amedeo ANSELMi, MD PhD

Division of Thoracic and Cardiovascular Surgery, Pontchaillou University Hospital

2, rue Henri Le Guilloux

35 033 Rennes, France

Tel: (0033) 06 37 06 03 79; Fax: (0033) 02 99 28 24 96

Email: amedeo.anselmi@alice.it

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Central Message

A novel TAVR device needs to take the next steps towards success: enhanced image guidance and demonstration of reproducibility.

List of abbreviations

TAVR: Transcatheter Aortic Valve Replacement.

3D: Three Dimensional

TEE: Transesophageal Echocardiography

Text

Implanted for the first time in a human patient in 2014, the J-Valve transcatheter aortic valve replacement (TAVR) concept has scored significant advancements. In perspective, it can be an attractive option for TAVR in aortic regurgitation, with a good deal of potential for success. The current paper [1] represents the first report of early and follow-up outcomes in a significant number of patients treated with this device. Unquestionably, this experience remains limited in terms of number of implants and amount of patient-years of follow-up. Yet, some prominent aspects deserve to be underlined.

First, this technology has been developed through the contribution of cardiac surgeons, who also currently are its only users, testifying once again the vitality and the propensity towards evolution of our discipline. Second, the separation of locators and valve – and their consequent deployment in differed times – represents a typical feature and, potentially, an effective mean to improve immediate results (perivalvular leakage, anatomically coherent positioning) especially in aortic regurgitation cases. Nonetheless, the rate of perivalvular leakage reported herein remains important and, not surprisingly, greater in aortic stenosis cases. It appears that the effectiveness of this TAVR concept relies on optimal landing of the locators at the nadir of each native aortic cusp: irregular calcifications in aortic stenosis reasonably represent an anatomical obstacle in several cases. Missed positioning of the locators – as acknowledged by the Authors – is at the root of many instances of paravalvular leakage in both regurgitation and stenosis cases. To such respect, bicuspid valve anatomy can be considered as a foe for the success of this TAVR system, including in the aortic regurgitation cases for which it was originally intended. As it is a crucial issue, the landing of the locators at the cusps' nadirs cannot be based on tactile

feedback alone, but requires effective image-based guidance. Real-time three-dimensional transesophageal echocardiography (3D TEE) may prove to be the best suited modality – and even essential - to such scope.

3D TEE has demonstrated far greater accuracy and fineness than fluoroscopy and angiography in the intraprocedural evaluation of the mechanism of aortic regurgitation after deployment of a TAVR device. Real-time 3D TEE provides information about the degree of elliptical expansion of the valve device, about the anatomical relationship between the prosthetic and native commissures (anti-anatomical expansion) [2]. All of these information can be discriminating in intraprocedural decision-making. Also, TEE has been already proposed as the primary imaging modality to guide the deployment of a TAVR device [3].

In transcatheter valve therapy, success is achieved through effectiveness and reproducibility. The pathway towards success of this promising TAVR concept will probably demand not only technological advancements (miniaturization of the 27-Fr introducer, availability for retrograde delivery routes) but also full exploitation of intraprocedural 3D TEE capabilities, and – most importantly – proof of reproducibility in larger international trials. Cooperation with allied heart team professionals (anesthesiologist, sonographer cardiologist) will be therefore essential.

In the end, this pathway further stimulates us to take advantage of the surgical knowledge of cardiac anatomy, physiology and pathology, in order to continue being the cutting edge in the innovation for valve therapy.

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Central Picture Legend

Authors' photo. Dr Anselmi (left) and Prof. Verhoye (right).

