EuroIntervention 2018;14:e416-e417 published online March 2018 ■ published online e-edition July 2018

Acute performance of first- and second-generation transcatheter aortic valves: a quantitative videodensitometric assessment of aortic regurgitation

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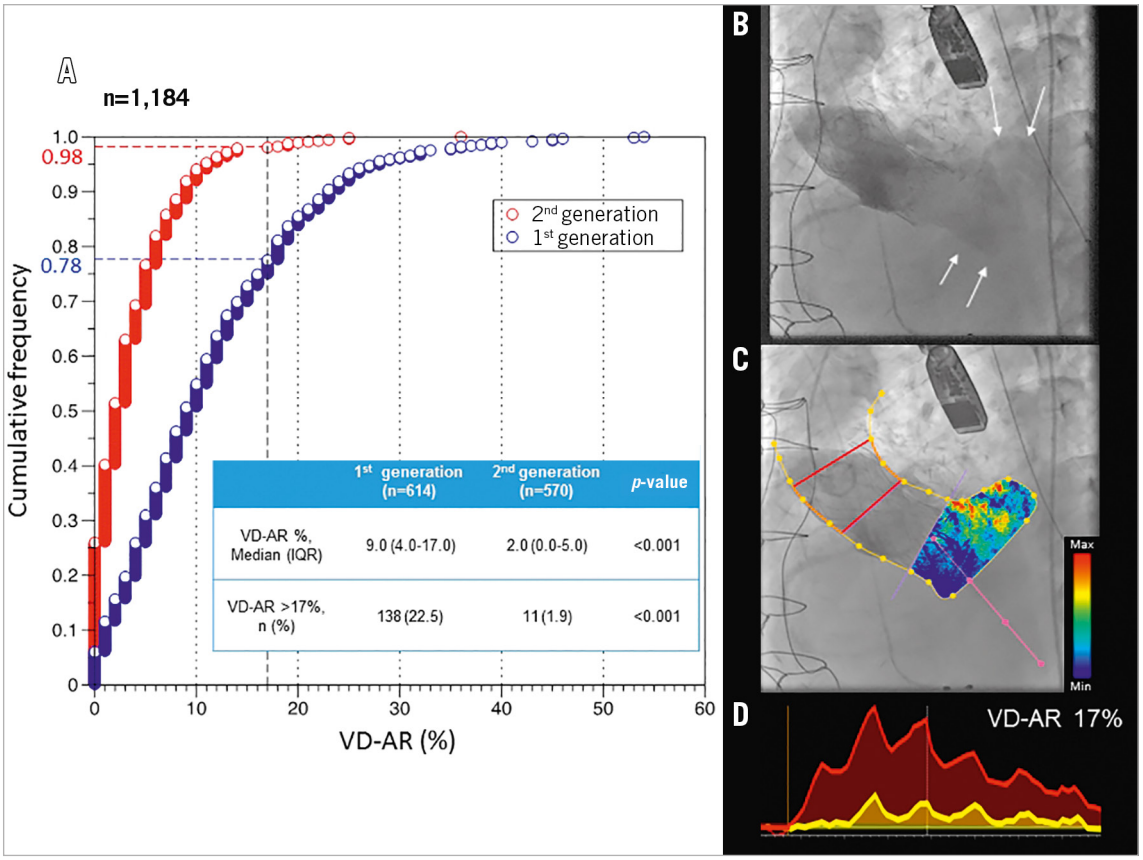
This paper also includes supplementary data published online at: http://www.pcronline.com/eurointervention/137th_issue/74



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SUBMITTED ON 19/02/2018 - REVISION RECEIVED ON 13/03/2018 - ACCEPTED ON 23/03/2018

DOI: 10.4244/EIJ-D-18-00196

Paravalvular regurgitation (PVR) post transcatheter aortic valve implantation (TAVI) is a feared complication and relates greatly to clinical outcomes – increased late mortality. The development of newer devices with improved technology (enhancement of paravalvular sealing and retrieval/repositioning mechanisms) has decreased the incidence of moderate/severe PVR according to echocardiographic assessment in multiple studies. However, the assessment of PVR with echocardiography using standardised criteria from the Valve Academic Research Consortium (VARC-2) takes into account a wide range of parameters without thorough validation[1]. PVR assessment during the procedure is challenging, especially in the era of the minimally invasive approach (without general anaesthesia). Videodensitometry assessment of aortic regurgitation (VD-AR) is an objective, quantitative, reproducible, well validated method, performed intraprocedurally with great correlation with magnetic resonance imaging[2-4]. Briefly, it is a software-guided technique in which the density over time is measured in both the aortic root and the left ventricle outflow tract (region with the regurgitated jet) **(Panel B, Panel C)**, and time-density curves are constructed **(Panel D)**. Areas under the curves are calculated and their ratio is the result of the VD-AR assessment, representing the aortic regurgitation severity **(Moving image 1)**. We conducted a retrospective *post hoc* analysis of post-TAVI aortograms from general clinical practice in an international, multicentre registry in Canada, the Netherlands, Brazil, USA, Germany and Japan. We have examined through an independent academic core laboratory 1,184 post-TAVI aortograms using the software CAAS A-valve 2.0.2 (Pie Medical Imaging BV, Maastricht, the Netherlands). Six different types of valve were implanted and divided into: (i) first-generation (CoreValve® [Medtronic, Minneapolis, MN, USA] and SAPIEN XT [Edwards Lifesciences, Irvine, CA, USA]), and (ii) second-generation (Evolut™ [Medtronic], SAPIEN 3 [Edwards Lifesciences], LOTUS™ [Boston Scientific, Marlborough, MA, USA] and CENTERA [Edwards Lifesciences]). Cumulative frequency curves for both generations were created **(Panel A)**, showing that the second generation has a lower median value of VD-AR (2.0% vs. 9.0%, p<0.001) and a lower incidence of moderate to severe aortic regurgitation (VD-AR >17%)[4] (1.9% vs. 22.5%, p<0.001) compared to the first. At first, this finding is easily explained by the device improvement over recent years. However, we also have to consider the growing experience of the operator, advancing on the "learning curve", and the patient selection, evolving from inoperable to high- and intermediate-risk patients. From these results it might be prematurely concluded that the PVR has been resolved; however, interventions in bicuspid stenotic valves and aortic regurgitation are increasing, thus impacting negatively on the procedure. In conclusion, the improvement of the valves, operators and patient selection play roles in diminishing AR post TAVI. Glimpsing into the near future, the new VD-AR technology has excellent reproducibility, and its online assessment will probably become a useful tool for interventional cardiologists in assessing AR intraprocedurally and in guiding TAVI.

Guest Editor

This paper was guest edited by Alec Vahanian, MD, PhD; Department of Cardiology, Hôpital Bichat-Claude Bernard, and University Paris VII, Paris, France.

Acknowledgement

We thank Jean-Paul Aben for his help and support for the conception of this Interventional Flashlight article.

Conflict of interest statement

The authors have no conflicts of interest to declare. The Guest Editor is a consultant for Edwards Lifesciences.

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Supplementary data

Moving image 1. Quantitative aortic regurgitation assessment with videodensitometry.

The supplementary data are published online at: http://www.pcronline.com/eurointervention/137th_issue/74