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## SCIENTIFIC EDITORIAL

# Transcatheter aortic valve implantation in patients with severe aortic stenosis: Does lower-risk profile mean a young patient?



Morgane Michel<sup>a,b,c</sup>, Romain Didier<sup>d</sup>, Claire Bouleti<sup>e</sup>,  
Martine Gilard<sup>d,\*</sup>

<sup>a</sup> Robert Debré Hospital, AP–HP, 75019 Paris, France

<sup>b</sup> Université Paris Diderot, Sorbonne Paris Cité, ECEVE, UMR 1123, 75010 Paris, France

<sup>c</sup> Inserm, ECEVE, U1123, 75010 Paris, France

<sup>d</sup> University hospital of Brest, Department of cardiology, 29200 Brest, France

<sup>e</sup> Inserm U1148, Department of Cardiology, hôpital Bichat, AP–HP, 6, rue Henri-Huchard, 75018 Paris, France

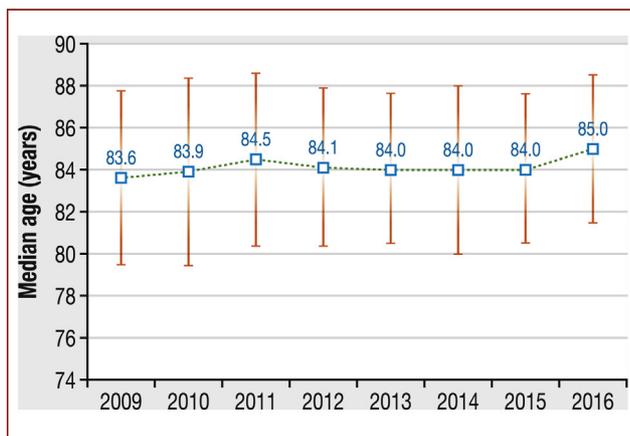
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Transcatheter aortic valve implantation (TAVI) is superior to medical therapy in inoperable patients with severe aortic stenosis [1,2]. Moreover, TAVI is non-inferior to surgical aortic valve replacement in patients at high and/or intermediate surgical risk [3–6]. On the basis of this evidence, TAVI is the standard of care, at least for patients with a high-risk profile, and is a reliable alternative to surgical aortic valve replacement in patients at intermediate risk.

Several risk scores are available to define the risk of a patient with severe aortic stenosis. The most widespread are the logistics EuroSCORE I and EuroSCORE II, and the Society of Thoracic Surgeon (STS) score. In everyday clinical practice, although their use is not mandatory, these scores can help guide decision-making by the Heart Team [7]. By extrapolation, albeit sometimes too simplistic, patients with a lower-risk profile for surgery are often considered to be younger than those with a higher-risk profile. However, age is only one component of the risk score calculation, and cannot explain a high score on its own. In fact, age remains one of the most important criteria for surgical denials and referral for TAVI, especially if femoral access is available. In contrast, younger patients referred for TAVI often have more coexisting medical conditions than older patients, and potentially have a higher risk score.

\* Corresponding author.

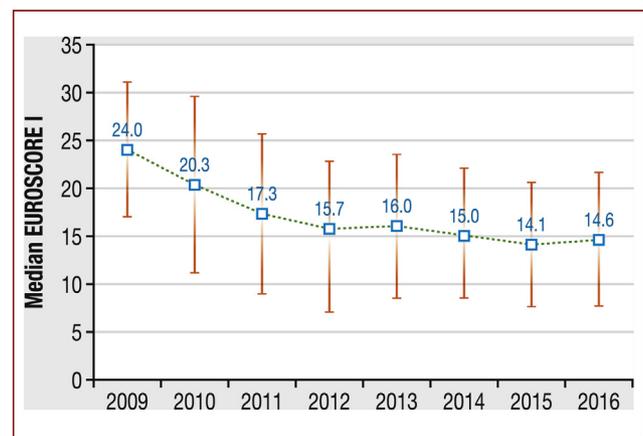
E-mail address: [martine.gilard@gmail.com](mailto:martine.gilard@gmail.com) (M. Gilard).



**Figure 1.** Change over time (2009 to 2016) in median age of patients undergoing TAVI. Vertical lines indicate interquartile range.

Nevertheless, aortic stenosis is a disease of the elderly. In one study, the prevalence was estimated as  $\leq 0.2\%$  before the age of 65 years, rising to 1.3% between 65 and 74 years, and to 2.8% after 75 years [8]. Another study reported a higher prevalence in the elderly population, at 3.9% between 70 and 79 years of age, and 9.8% between 80 and 89 years [9]. To highlight this point, we have investigated the evolution of age and risk score over time (from 2009 to 2016) in patients undergoing TAVI. All patients from the four main French registries, namely FRANCE (FRench Aortic National CoreValve and Edwards), FRANCE 2, FRANCE TAVI and RAC, were included in the present study. Briefly, FRANCE is a prospective multicentre registry that enrolled symptomatic patients between January and October 2009 who required TAVI due to degenerative severe aortic stenosis and were at very high risk for aortic valve replacement [10]. FRANCE2 was an exhaustive national TAVI registry for patients with similar inclusion criteria as those in FRANCE, enrolled between January 2010 and January 2012 [11]. FRANCE TAVI included all patients undergoing TAVI in the 50 French participating centres from 2013 to 2015 [12]. Finally, RAC (Rétrécissement Aortic Serré) was a prospective multicentre registry that included all patients aged  $> 75$  years referred for severe aortic stenosis between 1 September 2016 and 31 October 2016 in 28 French centres with on-site TAVI and surgical facilities (i.e. 56% of all French centres performing TAVI). Only patients for whom the therapeutic decision was TAVI were included in our study. To use a similar and reproducible score among the registries, only the logistic EuroSCORE I is presented in the present analysis.

The results of this analysis show that the median age of patients remained stable over time (Fig. 1), whereas the median Logistic EuroSCORE I decreased dramatically between 2009 and 2012, and plateaued between 2013 and 2016 (Fig. 2). Our findings are in concert with those of the pivotal studies. The evolution of risk score for patients in the PARTNER (placement of aortic transcatheter valves) trials decreased over time, moving from inoperable patients to intermediate-risk patients, whereas age remained relatively stable. In the inoperable cohort of the PARTNER trial, the STS score was 11.2% (logistic EuroSCORE = 26.4%),



**Figure 2.** Change over time (2009 to 2016) in median EuroSCORE I of patients undergoing TAVI. Vertical lines indicate interquartile range.

with a mean age of 83.1 years [1]. In the PARTNER 1 study (high-risk patients), the STS score was 11.8% (Logistic EuroSCORE = 29%), and the mean age 84.0 years [3]. In PARTNER 2 (intermediate-risk patients), the STS was 5.8%, and mean age 80.0 years [5]. Patients from the US CoreValve study, considered at high risk for surgery, had an STS score of 7.5%, and a mean age of 83.5 years [4]. Patients in the SURTAVI (Surgical Replacement and Transcatheter Aortic Valve Implantation) trial, considered to be at intermediate risk, had an STS score of 4.5%, and a mean age of 80.0 years [6]. The data regarding patients with a low-risk profile for surgery undergoing TAVI remain limited; however, in the NOTION (Nordic Aortic Valve Intervention) trial, the mean age was 79.0 years [13].

Regarding other data concerning TAVI from everyday clinical practice, we observed the same trend, with a decreasing risk profile of patients and a stable mean age close to 80 years. The STS/ACC TVT Registry reported a mean age of 82 years in 2012, with an STS score of 7.05%, versus 81 years in 2014 with a lower STS score, at 6.69% [14]. In the SAPIEN S3 observational study, conducted in intermediate-risk patients in 2014, the STS score was 5.2%, and the mean age 81.9 years [15]. In the German Aortic Valve Registry, conducted in patients with a low-risk profile, the STS score was 2.86% and the mean age 78.9 years [16]. However, only the UK registry of TAVI ( $n = 3980$  patients over 5 years) did not show a reduction in EuroSCORE over time ( $\approx 21.9\%$ ), but the age remained stable (82.1 years in 2008 versus 81.2 years in 2012) [17].

In conclusion, there is undeniably a shift in TAVI use towards patients at lower surgical risk. However, this change in the profile of patients is not necessarily associated with a transition to younger patients, as aortic stenosis remains a disease of the elderly.

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## Disclosure of interest

The authors declare that they have no competing interest.

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