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INVITED COMMENTARY

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The sutureless aortic valve: a story of continuing improvements

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In light of all evolutions in transcatheter treatment of aortic valve stenosis, also the world of surgical aortic valve replacement (AVR) has to keep evolving, with improvements in outcome for the patient as the most important objective. One of the possible ways to facilitate surgery and improve the overall result is to make the surgical procedure faster, easier and less invasive. Sutureless valve technology was introduced in surgical AVR to reach these goals [1]. The fact that we are able now to implant a tissue valve without any suture saves time and avoids unneeded manipulation in the aortic root. A quick implantation makes cross-clamp time, cardiopulmonary bypass time and overall procedure time significantly shorter. Some still argue whether this is relevant in a straightforward case of isolated valve replacement. But in many patients, like in more complex cases, more fragile patients, in minimal access surgery and in combined cases (CABG, multiple valves, etc.), taking off 20–30 min in cross-clamp and overall procedure time, can only be beneficial to the patient. It also opens doors to enhanced recovery and fast-track protocols. Next to the speed of implantation, the sutureless valve technology like Perceval also allows to position a valve with only minimal manipulation in the aorta. The absence of any need for stitching and knotting does not only provide an elegant bail-out scenario in complex cases but also—much more importantly—significantly facilitates minimal access surgery in single AVR. And still, the surgical field still needs a big push towards minimally invasive procedures for isolated AVR.

In this issue, Pollari *et al.* [2] report on their overall experience with Perceval from 2010 to 2020 in 547 consecutive patients. The authors are to be congratulated for their continuing work to stimulate and support an innovative tool such as the sutureless valve in aortic valve surgery and for their meticulous follow-up on valve durability. In a population with a mean age of 76 years, they demonstrate a safe and stable overall outcome, with an early mortality lower than what was predicted by EuroSCORE II, low rates of major postoperative complications and a long-term survival very comparable to what is reported in other tissue valves. Risk factors for worse survival are the usual suspects: age, EuroSCORE II and renal failure. Interesting to notice in their results is the high rate of minimal access surgery (>70%), which is still significantly higher then what is happening in real-world practice in many parts of the world [3]. With experience and confidence in using sutureless technology, adopting and maintaining a high rate of minimally invasive procedures is certainly easier. Related to these fast and minimal access procedures, is the observed low rate of new-onset atrial fibrillation (only 25%). Avoiding postoperative atrial fibrillation—and the concomitant thrombo-embolic risks—can only be beneficial to patients. A similar observation was made in the PERSIST trial, comparing outcomes of sutureless versus conventional tissue valves [4]. The speed and simplicity of the sutureless valve implantation has to be one of the causative factors in this low atrial fibrillation rate.

Looking back at 15 years of overall clinical experience with the Perceval sutureless valve, this valve had 2 important milestones. In 2017, both surgeons and the manufacturer realized that many users were actually oversizing the valve, and it was decided to change the sizing strategy [5, 6]. In 2019, a new version of the valve was introduced, named Perceval PLUS. The PLUS version introduced 2 major changes: (i) the leaflets carry a new tissue treatment combining phospholipid extraction, glutaraldehyde detoxification and an aldehyde-free storage [7] and (ii) the biggest size available (the XL) changed in design using a shorter inflow cuff to prevent conduction disorders after valve placement. These 2 milestones implicate that the entire clinical experience with Perceval is divided into 3 distinct eras: (i) the initial period with the old sizing strategy (2007–2017); (ii) the second period with the new sizing implemented (2017–2019); and (iii) the third era with the PLUS version of the prosthesis (since 2019).

The switch in sizing method (2017) certainly improved the overall results of the sutureless valve, both in the observed haemodynamics at discharge, as in the observed need for postoperative pacemaker implantation [5, 6]. Pollari *et al.* also report on their evolution in time, with a clear reduction in postoperative pacemaker need from 9% to 4% throughout the years, quite similar to other reports [2, 8].

The observed higher rate of structural valve degeneration (SVD) in younger patients is not new for a tissue valve. Every surgeon and cardiologist will agree that age is the most important

factor driving the potential calcification and degeneration of all the tissue valves that we are using [9]. Specifically for Perceval in this series, we have to take 2 important elements into account. First, the majority of the implants were done using the initial sizing strategy, meaning that many patients may have been oversized causing incomplete valve expansion, turbulent flow and high gradients already at discharge. The authors acknowledge that several of their patients who experienced SVD already had high mean gradients at discharge. It has been shown that this phenomenon has significantly improved by implementing the new sizing method [5, 6]. Second, all of the valves experiencing SVD in this series were the original Perceval carrying an older anticalcification technology on the leaflets and not the newer Perceval PLUS [6]. Perceval PLUS was also used in this series, but both the numbers and the actual duration of clinical follow-up are still too short to comment on any improvement on durability. The overall worldwide experience and follow-up with Perceval are increasing year by year [8].

As it is with all tissue valves, we have to continue stringent follow-up in all of our patients. This way, the future will reveal the added value of the new tissue treatments regarding valve durability and longevity. In the meantime, we believe that sutureless valve technology like Perceval offers a safe and stable outcome facilitates minimal access surgery and simplifies many combined and complex procedures. The valve offers good haemodynamics, low rates of paravalvular leakage and low rates of postoperative pacemaker implantation, which makes this technology in surgical AVR still highly competitive against TAVI for many patients, even in the elderly [8].

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