

State-of-the-art TAVI - How Much Minimalism is Enough?

TAVI de vanguardia. ¿Cuánto minimalismo es suficiente?

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Since 2002, the treatment of severe aortic valve stenosis has been revolutionized by introducing transcatheter aortic valve implantation (TAVI) as a complementary technique to surgical aortic valve replacement (SAVR). During this time, TAVI has become the standard of care for elderly patients with severe aortic stenosis at low, intermediate, and high surgical risk when the femoral approach can be implemented safely. (1-4) 2016 was already a breakthrough for this technology, as this was the first time when overall in-hospital mortality after transvascular TAVI was numerically lower than after isolated SAVR in Germany. Despite the fact that the patient cohorts were completely different and SAVR patients were at a numerically lower surgical risk, as indicated by the German aortic valve score, similar in-hospital survival was only found in the low-risk group, whereas TAVI was superior in patients at intermediate, high, and very high risk. (1-4)

The development was made possible by the introduction of innovative transcatheter heart valves (THVs) and refinement of technical skills that have contributed to the decreased complication rates associated with TAVI. Increasing operator experience, smaller sheath diameters, standardized pre-procedural planning with the introduction of computed tomography as gold standard, and improved vascular closing techniques have resulted in significantly lower rates of vascular complications. (5) Therefore, it is not surprising that a so-called “event-free” TAVI procedure has the lowest post-procedural morbidity and mortality. (6)

The next step is a simplification of the procedure, which should contribute to a further decrease in complications by rendering the procedure less invasive, but also a reduction in procedural time and hospital stay, as well as staff workload and costs. Moving to conscious sedation without transesophageal echocardiography (TEE) guidance of the TAVI procedure, abandonment of balloon aortic valvuloplasty (BAV) for predilatation, avoidance of Foley and Swan-Ganz

catheters, and finally post-procedural transfer to intermediate care or even only telemetry units with early ambulation, instead of an intensive care unit, are options for achieving this ultimate refinement. (5)

In this issue of the Journal, Fava et al. assessed the impact of a simplification of the TAVI procedure [the so-called “minimalist approach” (MA)] on post-procedural patient outcome in a single-center experience. (7) To this end, the authors compared 229 consecutive patients who underwent a MA-TAVI with 74 standard approach (SA) patients. The authors concluded that their simplified TAVI approach proved to be feasible and safe, as it reduced procedure duration and in-hospital stay, with 30-day outcomes similar to those of the SA, and providing better comfort for the patient. Although the learning curve and increasing operator experience may explain at least in part the beneficial effect of the “minimalist approach”, (since the first patients in their center were treated with SA-TAVI and then the operators switched completely to the MA-TAVI approach) the authors can be congratulated for this important analysis.

They simplified their TAVI procedure over time by implementing the following strategies:

CONSCIOUS SEDATION IN COMBINATION WITH LOCAL ANESTHESIA

Although the first TAVI cases were initially performed under conscious sedation, the TAVI procedure was commonly carried out under general anesthesia due to the surgical shutdown that was necessary in the first trans-arterial procedures as a consequence of the large sheath diameters and for better control of the procedure itself. However, many issues are related to general anesthesia such as hemodynamic instability, greater need for inotropic drugs, higher risk of bleeding, increased risk of pulmonary infection, extubation difficulties or delay in patients with chronic pulmonary disease, longer procedural duration and hospital stay, and higher staff workload and global costs. (5) Taken together, the avoidance of general anesthesia

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was one of the most important steps to give the TAVI procedure a “PCI-like” character.

ROUTINE USE OF TRANSTHORACIC ECHOCARDIOGRAPHY (TTE)

To move from general anesthesia to conscious sedation, operators had to replace TEE guidance during the TAVI procedure for the assessment of paravalvular leakage and valve function by a multi-modal approach using aortic root angiography, hemodynamic parameters such as the aortic regurgitation index, and transthoracic echocardiography. (8, 9)

PERCUTANEOUS CLOSURE DEVICE

Percutaneous closure has been adopted in routine practice in most centers for transfemoral TAVI procedures. Although the surgical approach has been reported to be associated with a low rate of vascular complications and to provide a more direct control of hemostasis, percutaneous closure is a less invasive technique enabling conscious sedation instead of general anesthesia and even more importantly a shorter procedural time. Finally, this less invasive access strategy results in shorter hospital stay.

STANDARDIZED VASCULAR COMPLICATION MANAGEMENT

The implementation of a standardized vascular complication management using a specific percutaneous closure device with different escalation steps when hemostasis is not achieved immediately, is essential to limit access site complications, decrease morbidity and mortality of the procedure, and to allow early discharge of the patient. The common femoral artery puncture site should be carefully selected on the CT scan or angiography before the procedure to avoid puncture of the bifurcation and to allow as ultimate bailout maneuver that a polytetrafluoroethylene (PTFE)-covered stent can be placed to seal the access site.

ABANDONMENT OF FOLEY URINARY CATHETER AND SWAN-GANZ RIGHT HEART CATHETER

These measures also contribute to a less invasive character of the TAVI procedure and help to avoid infections or, in the case of Foley urinary catheters, post-procedural hematuria under dual anti-platelet therapy.

Taken together, this well written paper with its careful analysis adds another piece to the puzzle and nicely demonstrates that a simplification of the TAVI procedure itself decreases its invasiveness and results in an even lower rate of complications, shorter procedural time, improved patient comfort, as well as decreased costs and staff workload. Further simplification of the procedure itself and post-procedural care will play a pivotal role to give TAVI a “PCI-like” character in the future.

Conflicts of interest

Dr. Grube is proctor for Medtronic and Boston Scientific and has received speaker honoraria from Medtronic and Boston Scientific. Dr. Sinning is proctor for Medtronic and has received speaker honoraria and research grants from Medtronic, Edwards Lifesciences, and Boston Scientific.

(See authors' conflicts of interest forms on the website/ Supplementary material)

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