Research Correspondence

Transcatheter Aortic Valve Implantation in Patients With Mitral Prosthesis

To the Editor: Transcatheter aortic valve implantation (TAVI) is an important therapeutic strategy for high-risk patients with severe aortic stenosis. Recently, this technique has proven to be as effective as surgery in reducing mortality at 2 years in this population (1). Historically, the presence of a mitral prosthesis has represented a special concern in the context of a TAVI procedure. Indeed, the rigid prosthetic mitral struts may reduce stability and increase the risk of prosthesis embolization during or after deployment (2). Furthermore, close interaction between the mitral prosthetic valve struts has the potential to prevent correct device expansion and, over time, valve durability. We report a multicenter experience of TAVI in patients with a mitral prosthesis.

Between February 2008 and March 2012, 40 (n = 40) patients affected by severe symptomatic aortic stenosis and with a mitral prosthesis underwent TAVI using both the self-expanding Medtronic CoreValve (CV; Minneapolis, Minnesota) and the balloon-expandable Edwards SAPIEN (ES) heart valve (Edwards Lifesciences, Irvine, California) at 9 Italian centers with a high volume of TAVIs. For each patient, contraindication to conventional surgical aortic valve replacement was established based on a consensus of a local multidisciplinary heart team before consideration for TAVI. Design features of the CV and ES prostheses and technical details of the procedures have been described previously (3). Multislice computed tomography was performed in all patients to assess carefully relationship between the aortic annulus and the mitral prosthetic ring and strut extending into the left ventricular outflow tract.

All procedures were performed under local anesthesia or general anesthesia and endotracheal intubation, under fluoroscopic guidance and transesophageal echocardiography, according to individual institutional practice. All outcomes were defined according to the Valve Academic Research Consortium (14).

The mean patient age was 76.3 ± 9.5 years (range: 30 to 88 years), and female gender was more represented (n = 29, 72.5%). The Logistic EuroScore I and Society of Thoracic Surgery scores were 26.3 ± 17.5% (range: 6.2% to 72.5%) and 13.4 ± 11.5% (range: 3.3% to 46.7%), respectively. Thirty patients (75%) had a mechanical and 10 patients (15%) had a biological mitral prosthesis. The mean interval between TAVI and the most recent operation was 15.1 ± 5.5 years (range: 8 to 26 years). The vast majority of patients were in permanent atrial fibrillation (n = 31, 77.5%) and were receiving oral anticoagulant therapy (n = 34, 85%). One patient had a degenerated aortic bioprosthesis. In 1 patient (2.5%) with severe left ventricular impairment, partial detachment of a 31-mm Carpentier-Edwards Perimount bioprosthesis (Edwards Lifesciences, Irvine, California) already was present at the moment of the TAVI screening phase. No other cases of mitral prosthesis dysfunction were documented before TAVI. Thirty patients (75%) had 2+ or more tricuspid regurgitation (mean systolic pulmonary arterial pressure (sPSP): 49.3 ± 15.2 mm Hg), and 18 (45%) had a moderate to severe right ventricle dysfunction investigated by tricuspid annular systolic velocity evaluation and tricuspid annular plane systolic excursion measurement.

A CV prosthesis was implanted in 28 cases (70%) using a transfemoral (n = 23, 57.5%), trans-subclavian (n = 3, 7.5%), or transaortic (n = 2, 5%) approach; otherwise, the ES valve was implanted in 12 cases (30%) using both transfemoral (n = 6, 15%) and transapical (n = 6, 15%) routes. In the immediate term, Valve Academic Research Consortium–defined device success was achieved in 97.5% of cases. In the patient previously mentioned with pre-existing mitral bioprosthesis dysfunction, device success was not obtained because of moderate or severe perivalvular leak after 29-mm CV implantation, which was maintained even after aggressive post-dilation. In 5 patients (12.5%), balloon shift during pre-dilation was documented, and in 3 patients (7.5%), (3 Carpentier-Edwards Perimount Bioprosthetic Valve recipients), prosthesis (ES device) shift during deployment also was noted; nonetheless, a satisfactory implant was accomplished. No evidence of prosthesis shift was noted in cases not documenting balloon shift during valvuloplasty. Evaluation of balloon and prosthesis behavior during the procedure was not achievable in 8 cases (12.5%). Overall, dilation after the procedure was performed uneventfully in 5 patients (12.5%), in 4 after CV implantation and in 1 after ES implantation. No deformation of the nitinol tubing of the CV device or the cobalt-chromium and steel stent of the ES device, nor distortion or malfunction of the mechanical valve in mitral position, occurred in any patients.

No cases of procedural death, stroke, myocardial infarction, or urgent cardiac surgery occurred. One case of transient ischemic attack after 29-mm CV implantation was reported. All patients were discharged after a mean hospitalization of 14 days on dual antiplatelet therapy for 3 months. All patients with a mechanical mitral prosthesis remained under oral anticoagulant therapy (target international normalized ratio: 3).

At a median follow-up of 560 days (range: 35 to 1,488 days), 5 patients died at 14 days (heart failure), 32 days (multiorgan failure), 168 days (heart failure), 776 days (heart failure), and 1,040 days (acute renal failure) after the procedure, thus imparting all-cause and cardiovascular mortality rates of 12.5% and 7.5%, respectively. Disabling bleeding, major bleeding, and strokes complicated 7.5% (n = 3), 20% (n = 8), and 2.5% (n = 1) of procedures, respectively; all of these complications occurred during hospitalization. In 5 patients (12.5%), 1 or more rehospitalization for cardiac reasons was needed. Reoperation was reported in 2 cases: a 60-year-old woman with severely impaired left ventricular function underwent cardiac transplantation and concomitant CV prosthesis removal, and a 30-year-old man with pre-existing mitral prosthesis dysfunction and residual moderate or severe perivalvular leak after TAVI underwent combined surgical aortic and mitral replacement with mechanical prostheses 2 months after TAVI, after the clinical and hemodynamic conditions improved, to allow a surgical approach.

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At follow-up, New York Heart Association functional class III or IV was present in 10% of the population. Mean transaortic gradients decreased from 44.3 ± 17.2 mm Hg (before TAVI) to 10.2 ± 5.2 mm Hg (after TAVI), and aortic valve area increased from 0.6 ± 0.2 cm^2 (before TAVI) to 1.9 ± 0.3 cm^2 (after TAVI; $p < 0.001$ for both comparisons). Perivalvular leak of 2+ or more was present in 15% of patients. No cases of intraprosthetic regurgitation were reported. Left ventricular ejection fraction also improved slightly from 46.6 ± 13.5% (before TAVI) to 50.5 ± 11.9% (after TAVI, $p = 0.045$). Finally, a minimum significant reduction in mean systolic pulmonary arterial pressure was reported (from 49.5 ± 15.6 mm Hg to 43.4 ± 10.2 mm Hg, $p = 0.032$).

In summary, this multicenter study demonstrated that TAVI with both available devices can be performed safely and effectively in patients with a pre-existing biological and mechanical mitral prosthesis. Further larger series and longer follow-up are warranted to determine better the safety, efficacy, and durability of TAVI in this particular population.

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REFERENCES

1. Kodali SK, Williams MR, Smith CR, et al. Two-year outcomes after transcatheter or surgical aortic-valve replacement. N Engl J Med 2012;366:1686–95.
2. Soon JL, Ye J, Lichtenstein SV, et al. Transapical transcatheter aortic valve implantation in the presence of a mitral prosthesis. J Am Coll Cardiol 2011;58:715–21.
3. Rodés-Cabau J. Transcatheter aortic valve implantation: current and future approaches. Nat Rev Cardiol 2011;9:15–29.

Letters to the Editor

Blood Oxygen Level-Dependent Magnetic Resonance Imaging in Patients With Coronary Artery Disease

Arnold et al. (1) should be commended for their recent study in which they evaluated the clinical usefulness of blood oxygen level-dependent (BOLD) magnetic resonance imaging. They used 3-Tesla cardiac magnetic resonance and steady-state free precession sequence to overcome technical limitations encountered in the previous studies and reported a high diagnostic accuracy of BOLD imaging to identify anatomical and functional significance of coronary artery disease. However, the following pertinent points require further clarification.

A significantly large percentage of acute coronary syndromes patients (as high as 58%) have high blood glucose levels at the time of admission, regardless of their diabetes status (2–4). Further, undiagnosed impaired glucose tolerance is very common in patients with acute coronary syndromes at presentation, and the preadmission status of glucose tolerance cannot be relied on solely (2–4). Hence, it would be important to know if the authors made an attempt to evaluate the diagnostic performance of BOLD imaging in the setting of various blood glucose levels.

Because BOLD imaging exploits the differences in the magnetic property of oxyhemoglobin and deoxyhemoglobin. It would be interesting to know the effect of conditions like anemia, which affect blood oxygenation, on the diagnostic performance of BOLD imaging. The same also applies to other factors that affect the oxygen dissociation curve.

In the present context, a high false positive rate, limited spatial coverage, and uncertainties over the clinical implications of additional information obtained through BOLD imaging raise the concern that its use would lead to an additional layering of a diagnostic test without any proven clinical benefit.