Editorial

The Era of Transcatheter Valve Therapy. Where Are We?

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The arrival of transcatheter therapies for aortic stenosis and mitral insufficiency eight years ago, their continuing and thorough substantiation, and their inclusion in the relevant therapeutic algorithms[1,2] provide an example of rapid transformation of clinical practice rarely encountered by physicians in their working life. The aim of this supplementary issue of the Hellenic Journal of Cardiology is to update current knowledge in this rapidly developing field.

Percutaneous replacement of the stenosed aortic valve in patients at prohibitive surgical risk (i.e. "inoperable") is a therapy that clearly improves symptoms and quality of life and prolongs survival.[3] The challenge in the selection of patients belonging to this category is their careful and appropriate assessment, so as to avoid futile interventions that will not affect the clinical condition and prognosis of patients who lack reserves.

Two large randomized trials using two distinct transcatheter devices (PARTNER-A and CoreValve US Pivotal Trial-High Risk) concluded that transfemoral valve implantation is superior to conventional surgical replacement in patients with high-risk aortic stenosis.[4,5] The first randomized 492 patients (Logistic EuroSCORE I 29% and STS score 11.7%) and the second 795 patients (Logistic EuroSCORE I 18% and STS score 7.5%) to either transfemoral implantation of the SAPIEN valve (Edwards Lifesciences) and CoreValve (Medtronic), respectively, or surgical replacement. The relative reduction in mortality at 30 days by the transfemoral method was 47% and 27%, and at one year 16% and 26%, respectively—despite the very low operative 30-day mortality achieved in both studies (6.2% and 4.5%, respectively). It is not surprising, therefore, that a cost-effectiveness study taking into account all recent clinical studies calculated the cost of the transfemoral method as €15,000 per quality-adjusted life year (QALY) for inoperable patients and as an impressive -€25,000 (profit) per QALY for patients at high surgical risk, while the calculated cost for those at moderate surgical risk was €13,500 per QALY.[6] The expansion of the method to moderate risk patients (STS score 2-8%) will depend on the results of two large randomized trials (PARTNER-II, SURTAVI), which are expected shortly.

Technically, the currently available percutaneous aortic valves fall into two categories: balloon-expandable and self-expandable. The spectacular technological improvements already achieved in both categories have been translated into direct clinical benefits, and more innovations are in the pipeline. The latest generation balloon-expandable valves (SAPIEN XT and 3, Edwards Lifesciences) have the inherent disadvantage that they cannot be repositioned or withdrawn in

case of implantation in an non-desired position (high or low implantation site, coronary orifice occlusion), they can cause injury and disruption of the aortic annulus in case of excessive hyperinflation, and their implantation depends on successful rapid ventricular pacing. However, they have clear advantages, such as the lower risk of conduction abnormalities and need for a permanent pacemaker, less residual paravalvular regurgitation, and more predictable placement (with the possible exception of cases with large subaortic ventricular septal hypertrophy).[7-9] The latest generation self-expandable valves (CoreValve Evolut R, Medtronic; Lotus, Boston Scientific; Portico, St. Jude Medical) have dramatically reduced the risk and the consequences of valve displacement, having an almost unlimited capacity for withdrawal and redeployment. The more frequent conduction abnormalities and need for a permanent pacemaker, and the higher incidence and degree of residual paravalvular regurgitation (with the exception of Lotus, Boston Scientific) remain their major disadvantages.[7-9] The quest for the ideal transcatheter aortic valve that will be suitable for use in younger patients, who often have bicuspid anatomy, is still ongoing.

No durability issues in relation to transcatheter aortic valves have been raised so far, and this becomes more important as we approach the critical time of 10 years.

The percutaneous treatment of mitral valve insufficiency is much more complex and demanding, as dictated by its intricate anatomy and its wide substrate. The transcatheter edge-to-edge repair technique with MitraClip (Abbott Vascular) has been in clinical use for more than 8 years and, while undergoing appropriate evolution, has shown remarkable progress. EVEREST II was a bold randomized clinical trial that compared the MitraClip procedure with surgical treatment, without restrictions on the surgical risk or on the etiology of the valve insufficiency of the 279 patients included.[10] The results vindicated this design and substantiated the principle of the method. However, the widespread use of a new method cannot rely on a single successful study, even one that was so inclusive. Thus, at present the method is proposed to patients who are at prohibitive or high surgical risk and when it is technically feasible.[1,2,11]

The widely disparate etiology, anatomy and prognosis of patients with significant mitral valve insufficiency have imposed major challenges on the design and execution of further clinical studies, which are finally underway (RESHAPE, COAPT). It will certainly be a great challenge to prove a survival benefit from Mitraclip treatment in patients with severe functional mitral regurgitation. These patients are also characterized by great heterogeneity and suffer from different forms and severities of heart failure, require multiple simultaneous pharmacological and non-pharmacological treatments, and eventually also have a heterogeneous and often poor prognosis, dictated chiefly by the underlying disease. The timely elimination of mitral regurgitation seems to cause favorable ventricular remodeling and to improve the symptoms.

It appears that the quest for transcatheter mitral valve replacement will take several years more and it will hardly be an all-inclusive solution.

Disclosure

Dr. Spargias is a Proctor for Edwards Lifesciences, Medtronic, St. Jude Medical and Abbott Vascular.

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