

Aortic Valve Replacement in Elderly Patients: Need of Multidisciplinary Complementary Procedures

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Until the decade of 1980-1990 cardiac surgery was considered an exceptional option in octogenarian patients. This conservative attitude for elderly subjects, considered to be at high risk for frequent associated extracardiac pathologies, was progressively modified thanks to the progress observed in different medical and paramedical specialties. Objectively, there was a positive evolution of cardiovascular diagnostic procedures, anesthetic, surgical and intensive care techniques, including biomarkers and new drugs. Concomitantly, the extracorporeal circulation material was perfected and new methods of circulatory assistance and myocardial protection were created. Finally, knowledge of valve prosthesis long term results led to a change in the attitude of the medical community towards cardiac surgery in octogenarian patients. (1, 2)

Valve diseases in elderly patients are mainly represented by severe calcified aortic valve stenosis. Mitral valve diseases, usually degenerative mitral insufficiency, are rarer. The prognosis of the spontaneous evolution of severe aortic stenosis is death in the short term since onset of symptoms as heart failure, angina, syncope and acute pulmonary edema. Surgery is indicated in the face of this spontaneous evolution.

A bioprosthesis is recommended after 70 years of age to reduce the frequency of thromboembolic or hemorrhagic complications, and according to its theoretical durability it may not surpass the patient's lifetime. The problem of a reintervention due to tissue deterioration is always a possibility, but of less magnitude in elderly patients.

As shown by the work by Pipkin et al. (3) at the Hospital Universitario Fundación Favaloro, the evolution of surgical techniques and postoperative care currently enables aortic valve replacement surgery in an important part of the population represented by octogenarian patients who suffer from an invalidating cardiomyopathy with bad prognosis despite medical treatment. Surgical risk is not negligible, so there should be great precision in the careful selection of surgical candidates, with the help of the geriatrician. Patients not presenting associated pathologies susceptible of considerably increasing surgical risk and post-

operative recovery can be oriented to surgery. Age per se cannot be considered as a contraindication for surgery; it is clinical and paraclinical criteria that should lead to the decision of surgically treating aortic valve disease.

Certain factors have good prognosis, as for example plain and severe valve stenosis associated with preserved left ventricular function, absence of coronary artery disease or revascularizable coronary lesions in patients with good general condition.

Prevention of complications is essential, by carefully assessing respiratory and renal functions, neuropsychological and nutritional status, and the patient's will to live and future projects. Long-term survival rates observed in different series and post-operative functional improvement justify resorting to surgery when necessary.

The elective replacement of the calcified stenotic aortic valve is normally performed with bioprostheses, whose durability has been improved thanks to progress in design (4, 5) and in the physicochemical fixation of biological material (new aldehydes and detergents, combined with chemical treatment). (6, 7) In its origin, this intervention used homografts or biological handcrafted stentless valves (without mechanical frame). (8) This tendency was renewed in the 90's with the Freestyle, Toronto, Prima and Shelhigh stentless valves, which were unable to show benefits with respect to bioprosthesis with stents, as their difficult surgical implant needs prolonged aortic flow interruption (aortic clamp) and prolonged extracorporeal circulation. (9, 10)

Bioprosthesis manufactured with decellularized animal valves by chemical procedures, which are then cellularized with cells from the recipient patient have also been investigated. This process uses detergents and other chemical products which considerably render more fragile the viscoelastic properties of the valve matrix, with important risk of dysfunction in the face of the hemodynamic characteristics of the human cardiovascular system. There are interesting perspectives using cellular engineering techniques to create valves containing autologous cells. (11)

During the last decade transcatheter aortic valve implantation (TAVI) procedures have been investigated and developed. These techniques are indicated in patients at elevated risk and with surgical contraindications. (12) There is an important tendency to expand the indications, and progress in these bioprosthesis is constant. The Lotus bioprosthesis has now been added to the primitive models (Sapiens®, Corevalve®), enabling the precise control of its position with respect to the native aortic annulus and its repositioning if necessary. (13)

The anatomical evaluation of the implantation site and access to be used (femoral, subclavian, LV apical and ascending aorta) are extremely important. The best results are observed in institutions with hybrid intervention units (radio-surgical) where multidisciplinary teams formed by interventional cardiologists, cardiac and vascular surgeons, anesthesiologists, radiologists, clinical cardiologists and geriatricians work together.

The TAVI procedure needs prior dilation of the stenosed and calcified aortic valve. Classic percutaneous balloons for valve dilation often significantly and sometimes unnecessarily dilate the calcified aortic annulus, with deficient results on the three leaflets. For this reason, new valvuloplasty catheters are investigated that could be used for isolated treatment or prior to the TAVI bioprosthesis implant. The V8 catheter (Intervale Inc.) is worth mentioning, presenting a distal intraventricular fixation conical balloon and a second large intra-aortic spherical balloon for valve dilation. (14)

The growth of treatments with TAVI procedures has led to the recent development of sutureless surgical bioprostheses, using mini-invasive incisions to implant them (high mini sternotomy or right anterolateral mini-thoracotomy). Current models (Enable, Intuity, Perceval) use fixation techniques by deployment on the aortic annulus, comparable to TAVI valves, completed with some sutures. The advantages of this procedure would be a brief aortic clamp and reduced extracorporeal circulation time. Patients with indication of aortic surgery and high risk multiple coronary bypass surgery would thus reduce their operative time. (15-17)

Aortic valve replacement in elderly patients, for the moment octogenarians, but that could be extended to nonagenarians or centenarians, comprises several multidisciplinary techniques that should be complementary and not competitive. The possibility of surgically implanting a valve in valve or valve in annuloplasty ring confirms this complementary approach. There are technical and economical restrictions in different geographical areas that will improve with the progress in the investigation and production

of materials used. The challenge for the future treatment of valvulopathies is important, and the international medical community should assume it with responsibility, optimism and solidarity.

Conflicts of interest

None declared

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