EDITORIAL

Mechanical Prostheses

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Since the advent of mechanical caged-ball valves developed by Harken and Starr in 1960s, design and composition progresses have resulted in significant improvement of clinical and hemodynamic outcome. (1, 2)

In 1988, standardized definitions were developed to assess the results of prosthetic valves, which made it possible to compare the results of each procedure with similar criteria and in various facilities. (3)

The events associated with prosthetic valves are the following:

- *Structural Damage:* It is any intrinsic impairment of the valve structure, such as calcification, breakdown, tear or disruption.
- *Non-structural Dysfunction:* It is defined as a prosthetic malfunction which is not associated with structural damage, including thromboembolism, pannus growth, perivalvular leaks, inappropriate residual gradient, or hemolysis.
- *Valve Thrombosis*: It is listed as a separate subcategory of thromboembolism.
- *Bleeding associated with the required anticoagulation level for the prosthesis being studied.*
- *Prosthetic Endocarditis*.

New prosthesis evaluation guides have recently been published, including events associated with valve replacement, such as the need for pacemaker and/or defibrillator. (4)

The use of mechanical prostheses in the aortic position has shown benefits in the durability and necessity of reoperation over other valve substitutes. (5, 6) However, these benefits do not entail late in-hospital mortality results, since patient clinical findings (ventricular function, functional class, age, and sex) have the greatest influence on these results. (7, 8) The presence of serious postoperative ventricular dysfunction, NYHA class III, IV with or without preoperative arrhythmia characterizes high-risk patients in this group. The influence of the effective valve orifice area is still unclear; some authors could associate the presence of prosthetic mismatch (< 0.65 cm2/m2) with greater mortality, especially in patients with ejection rates < 40%. (9) However, others papers could not demonstrate the impact of this variable on late in-hospital mortality. (10)

The main disadvantages of mechanical prostheses are thromboembolism and bleeding; (1-6) the incidence reported with the latest prosthetic models (mostly bivalve) is 0.7%/year (11) and 1.3%/year, (12) respectively. These data correlate with results presented by Marenchino et al. in his paper "Mid-Term Follow-Up of Patients Submitted to Aortic Valve Replacement with Mechanical Prosthesis". (13) The prevention of this complication basically depends on stability in clotting control, patient age, and, to a lesser extent, on its intensity. (14) In the RVAo with bivalve mechanical prostheses and in the Medtronic Hall single-leaflet model, the RIN should be 2.0-3.0 (class I, level B), but if the patient has any embolic risk factor, it should be 2.5-3.5. (15) Some authors have reported benefits in the stability and in the RIN objective with the daily patient self-monitoring through personal devices. (16) In patients with higher risk of thromboembolism (auricular fibrillation, ventricular dysfunction, large left atrium, hypercoagulability, etc.), the association with antiplatelet agents should be considered.

The presence of cognitive disturbances may also be a complication, which has recently been described and is probably associated with microembolism; (17) these findings reinforce the need to maximize clotting controls.

Regarding clinical criteria for mechanical prosthesis indication, in the socio-economic reality of our country, the possibility for the patient to have permanent access to anticoagulant agents and required monitoring should be considered as important as outcome variables which influence the selection of this type of prosthesis.

With the advent of new mechanical prosthesis models, the incidence of thrombosis or periprosthetic pannus has diminished; however, periodic echocardiographies are required, since sometimes patients become asymptomatic. This mainly occurs in those patients with RIN high variability, with a 2-4% incidence by year. (18)

Periprosthetic breakdown may or may not be inflammatory, and occurs with an approximate frequency of 1.5-3.0%. The early prosthetic endocarditis is the most common type among inflammatory conditions, and serious valve ring calcification among non-inflammatory conditions. (2)

In conclusion, mechanical prostheses in the aortic position are an excellent option for patients with low-risk bleeding and long life expectancy. In our environment, it is also extremely important to consider the patient socio-economic status with the aim of guaranteeing compliance and monitoring of the anticoagulant therapy.

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