

### Keep, Preserve, Replace

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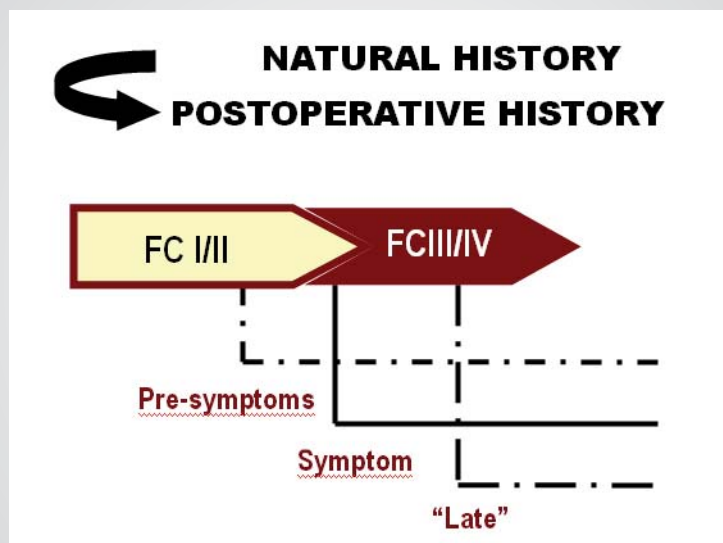
Keep the heart working with a severely damaged valve in compliance with certain clinical criteria; preserve the damaged valve by employing surgical skills to repair morphological peculiarities; replace the damaged valve with a prosthesis, which is seen as the ultimate benefit for the anatomic-functional circumstance. This “management of patients with valvular heart disease” trilogy is in tune with propaedeutic audiovisual expertise that emphasizes words of complaint regarding quality of life (sounds with classic semiotic value), virtual images of supplementary examinations, and actual images of the operative field.

Reference markers gleaned from the habitually long natural history of patients with valvular heart disease gauge the usefulness of bioethical rituals, propaedeutic strategies, therapeutic solutions and prognostic analyses in accordance with the progression of cardiac-valve morphology, pathophysiologic cardiac and non-cardiac adaptation, and more or less “by the book” clinical manifestations. There are subjective markers, based on symptoms, and there are objective markers. Outstanding

among the objective markers are valve lesion severity, left ventricular function, presence of co-morbidity, and level of pulmonary hypertension<sup>1</sup>.

The various markers lend support to good standards of practice in the management of patients with valvular heart disease, aimed to establish a conciliatory position – a balance, as it were – between maintaining/restoring quality of life to patients with valvular heart disease, and lengthening the survival of such patients. In our environment, within this proposed balance that favors beneficence/nonharmfulness, the rheumatic ethiopathogenic substrate still predominates.

In the management of patients with valvular heart disease, no recognition should be conceded to beneficial/nonharmful credits attributed to admissible orientations, to precipitous communication of a solution (due to premature release of postoperative reports), or to late communication of a solution due to overlong maintenance of the patient’s natural history (Figure 1). It is well to point out that precipitance often stems from the medical team’s reflections and concepts – reflections and concepts that



**Fig. 1** – Concept regarding moments of interruption in the natural history of valvular heart disease and the unfolding of postoperative history. It is our understanding that the ideal indication of beneficence/nonharmfulness must coincide with progression from functional class I/II to functional class III/IV; the pre-symptom indication is premature in relation to reflections on risk-cost-benefit, and the “late” indication takes for granted a too far advanced natural history, often associated to degrees of left ventricular function depression, not constituting a counter indication, although implying restrictions to full postoperative beneficence/nonharmfulness.

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feature scant participation of the patient's own free will – while patient behavior constitutes a significant portion of non-precipitated communication.

Three reflections on conduct set forth in the Management of Patients with Valvular Heart Disease express our conviction regarding the legitimacy and representivity of the good use of scientific knowledge and technical skills to control valvular heart disease. Reproducibility requires flexibility in dealing with the sociocultural reality of the circumstance, since any analysis of validity must take into consideration the peculiarities of the patient being assessed, always unique in terms of expression and comprehension of his/her clinical morbidity.

### **KEEP THE DAMAGED VALVE AS THE PRELIMINARY CLINICAL OPTION**

Peri- and postoperative risks and cost, over and above any postoperative benefits, tend to be present for a long period of time after the cardiac valve has acquired the status expressed in the “severe damage” criterion<sup>2</sup>.

This reflection is supposedly consistent with the natural process of adaptation to valvular heart disease and respects the efficiency of neuro-humoral adjustments. It discourages clinical initiatives that overvalue allopathic appeals for hemodynamically appropriate prostheses in patients with severe asymptomatic valvular heart disease.

The issue here is that, in itself, the intensity of ventricular remodeling, proportional to the valve damage, fails to constitute sufficient justification for an intervention aimed at interrupting the natural history of the heart valve disease. Cutting lines, with numbers representing diameters, volumes, indexes, and serum markers<sup>3,4</sup> made it impossible to achieve revelation of imminence of the limit of adaptive capacity, and failed to acquire unanimity regarding the status of excellence for projections regarding postoperative beneficence/nonharmfulness.

For example, severe and symptomatic rheumatic aortic regurgitation, operated with systolic and diastolic diameter values above those proposed as “preoperative critical”<sup>5,6</sup>, and in the absence of depressed left ventricular function, is accompanied by a high postoperative degree of involution of values<sup>3</sup>, to beyond the alleged limits of benefit constraints. In other words, hemodynamic correction of this valve disease upon onset of functional class III symptoms in the presence of advanced preoperative levels of eccentric hypertrophy and – habitually – similar day-after levels, allow efficient reverse ventricular remodeling.

This concept is analogous to that which deems that there are too many initiatives aimed to medicalize life, and therefore concerns itself with containing the spectrum of applications poorly supported by research evidence or bedside experience. The subdivision of recommendations into classes I, IIa, IIb, and III summarizes the position that the availability of a conceptually useful and effective therapy does not oblige said therapy to be useful and effective in all circumstances.

In any diagnosis of valvular heart disease, the objective information that leads to unanimity among Cardiology Services when deciding for interventional cardiology, even in the happenstance of lack of functional class III/IV, is depressed left ventricular function<sup>7</sup>, universalized in guidelines<sup>5,8</sup>. Such conformity of opinions represents an example of the synergy between clinical practice and imaging in the course of the natural evolution of patients with valvular heart disease, which might be termed as sovereign clinical practice, powerful echocardiography<sup>9</sup>.

The immortal anamnesis continues unbeatable as the propaedeutic method of greatest impact for drawing the dividing line between clinical and surgical treatment: the more interaction in an ethically healthy physician-patient relationship, the clearer the result. Meetings held in the surgical amphitheater, for example, can only adequately represent a “second opinion of the in-house team” when the arbiters are attuned to and perfectly knowledgeable of the subjectivities of the patient in question.

“Keeping the damaged valve as the preliminary clinical option” coexists with certain intercurrent events, when the “one symptom says yes, another symptom says no” duality as a reference for “yes to intervention, no to intervention” must be adapted to details of the manifestation. Overcoming the intercurrent event often makes the clinical situation revert to the pre-event routine. At other times, “keeping the damaged valve as the preliminary clinical option” must be discarded because the changes prove to be nontransitory.

Rheumatic activity, thromboembolic phenomena, and/or pregnancy can trigger symptoms in patients with valvular heart disease who had been asymptomatic up to that time, and whatever causes the symptoms does not necessarily have to contradict the strategy adopted in regard to the damaged valve based on the “disquieting symptom-interventional conduct” concept. Manifestations specific to these events, or possible transitory hemodynamic influences, rarely cause treatment to be transferred from the bedside to the operating table. This is what occurs in the case of paroxysmal atrial fibrillation, which can cause a radical change in functional class, but which, once reverted to sinus rhythm, brings about involution of the manifestation of hemodynamic worsening.

Solidarity between tricuspid regurgitation and the mitral valve lesion, which causes it to function as a safety valve<sup>10</sup>, as well as the inverse Bernheim effect that interferes in the left ventricular diastolic function due to ventricular interdependence, are interpreted, singly, as non-triggering adaptive processes of interruption of the natural history of the valvular heart disease.

In its turn, infective endocarditis is an intercurrent event with potential to go counter to the option, upheld until that time, of “keeping the damaged valve as the preliminary clinical option” even though antibiotic treatment results in an expressive percentage of success. This occurs due to valvular destruction, impossibilities of response to antibiotics such as abscess formation, or etiopathogenic

aspects such as fungemia. In these cases – at times disturbing, such as dehiscence or reinfection – theorizing about the risks inherent to implanting a prosthesis in an unfavorable microenvironment must not supplant the practical urgency of intervention, highly beneficial in view of the prognosis.

Experiences with pharmacological deceleration of adaptive ventricular remodeling have not yet acquired the “routine” status, as is usually the case with conclusions that although academically correct, are insignificant in terms of clinical enthusiasm. This is the case of the use of vasodilators for patients with mitral valve regurgitation<sup>11,12</sup>. The influence of the use of statin on the intended morphological progression in aortic stenosis, based on etiopathogenic similarities to arteriosclerosis, failed to fulfill irrefutable criteria to admit its classification as useful and effective. This subject, which involves uncertainties regarding conflicts of interest, shows how essential time is as a factor in strengthening or weakening opinions, a test of its transitory or lasting nature, pencil and eraser taking turns in the modeling of scientific progress. The cardiologic community witnessed how, with a difference of no more than one year, the same author, a respected researcher of statin in aortic stenosis, first made his readers aware that the agent exerted significant influence on the progression of aortic stenosis – behavior that he deemed independent of cholesterol levels (2004)<sup>13</sup> – and then, that the use of statin is not justified in this valvular heart disease unless there is some additional indication (2005)<sup>14</sup>.

There are times when “keeping the damaged valve as the preliminary clinical option” faces competition from some other surgical indication that exposes the damaged valve during surgery. One must admit that the extent of the valve damage is an essential factor for the premise of taking advantage of the approach to the heart and performing the intervention that could have waited if it were the sole diagnosis. This is the case of the extemporaneous evolution of rheumatic valvular aggressions, resulting in concomitance of one moderate and one severe valve lesion (this latter being the real reason for recommending surgery). It is also the case of aortic regurgitation stemming from the loss of support by aortic dissection referred to surgical treatment, and of aortic stenosis in patients submitted to myocardial revascularization in which combined surgical intervention is justified when the valvular disease is at least moderate, but unjustified in mild cases<sup>15</sup>.

The beneficial/nonharmful criterion as applied to “keeping the damaged valve as the preliminary clinical option” finds support in the figure of the overflowing glass, a metaphoric structure that richly supports the categorization of perception and comprehension. Each cardiology service defines the height of the glass that it considers sufficient to provide the required beneficial/nonharmful balance by means of the heteronomy of feedback guidelines and the autonomy of bedside individualization. In the “tall glass”, the overflow of the content, as expressed upon intervention, would represent

manifestation of the symptoms. In the “short glass” then, the overflow would constitute pre-symptoms when some supplementary examination marker level is reached. Once the “point of overflow” is determined – symptoms or pre-symptoms – “keeping the damaged valve as the preliminary clinical option” continues to be valid so long as the adaptive process is a single drop in the bottom of the glass or is still missing one drop before reaching the rim. The desired sedimentation of knowledge gleaned from bedside feedback leads to conviction regarding the height of the glass that will provide the beneficial/nonharmful balance between the heteronomy of guidelines and the autonomy of individualization in patients with valvular heart disease.

It is important to point out that pharmacological measures that influence the content and continent halt the overflow that occurs in functional class III, but the pharmacological benefit does not alter the reflection that ruled out the clinical option to keep the damaged valve. The sole aim of medication is to comfort the patient and ease surgical preparations.

## **INTRAOPERATIVE ATTEMPTS AT MORPHOLOGICAL PRESERVATION**

In these times when interest in stem cells runs high, the prospect of valvuloplasty is equivalent to the aspired reconstruction for the overall progress of medicine. Nothing is more pluripotential in terms of prognostics than returning the damaged heart valve to morphological characteristics as close as possible to the original.

The “keep the damaged valve” option has shown a tendency to increase over the last few years as compared to “replace with a prosthesis”. However, in our opinion, the intention to perform valvuloplasty is an insufficient argument for pre-symptom precipitation (one of the forms of “short glass”), since keeping the valve is multifactorial and the whole is only completed in the intraoperative stage. Regardless of the fact that preoperative images can anticipate the surgeon’s in loco vision – and in the near future perfected to three-dimensional images – the influence of a biological and/or technical imponderable still remains. Prerequisites for keeping the valve are based on postoperative actuarial curves drawn up in relation to the variable morphological aspects<sup>16-18</sup>. Requisites include the surgeon’s skill and intraoperative monitoring in which echocardiography plays a major role.

Unsuccessful valvuloplasties superpose the postoperative condition on that which constituted the preoperative need for hemodynamic correction. As the results were the opposite of what was intended, and because they caused the patient additional adversities, they become the antithesis of beneficence/nonharmfulness.

There are conditions in which one cannot discard the option for valvuloplasty and conditions in which precious surgical time cannot be wasted in hoping for the impossible. Valvuloplasty in cases of mitral valve regurgitation with myxomatous degeneration (Barlow’s

disease) tends to be successful, while valvuloplasty in cases of severe calcific aortic stenosis has no rhyme or reason. The availability of human and technical infrastructure for advancement of the learning curve in valvular preservation is an indispensable condition in qualifying a Cardiac Surgery Service.

Here we would highlight preservation of the tricuspid valve, a landmark in cardiac surgery. In the last nearly twenty years, valve replacement is a rare option in cases of tricuspid regurgitation due to the fact that there is rarely any significant aggression to the valve tissue. This is the extreme pro-valvuloplasty morphology. Other situations of so-called organic compromise of the valvular structure are the modern challenge to cardiovascular surgeons who see this operation as that which most clearly overrides the bioethical rules of beneficence/nonharmfulness.

Heart valve preservation takes precedence not only in the history of cardiac surgery, but is also preferable to certain techniques that have undergone scant change over the years and have become true classics, such as the so-called mitral commissurotomy, quadrangular resection, and De Vega's annuloplasty. The availability of a constrictive ring – Carpentier and other variants – reinforces the concept that admits beneficence in valve preservation and that the intent of its precedence is a nonharmful attitude in view of prosthetic heart valve morbidity.

## ESTABLISHING PROSTHESIS-DEPENDENCE

No cardiac valve prosthesis can fulfill the criteria of ideality proposed approximately fifty years ago by the pioneer surgeon Dwight Harken (1910-1993)<sup>19</sup>. This is the basis for reflection on the beneficence/nonharmfulness of prosthesis-dependence. Given the superimposable actuarial curves, selection of the type of prosthesis demands socioeconomic analyses which, in Brazil, prioritize regional heterogeneities over the risk-cost-benefit of oral anticoagulation.

In daily bedside routines we find that the mechanical prosthesis - bioprosthesis duality shows two different faces: that of the quality of life restoring hemodynamic benefit, and that of the disturbing open-and-close of a device subject to abnormalities intrinsic to the implant, or acquired in the postoperative course. Routines reduce chances of infectious colonization and thrombus formation, but they do little to contribute to the preservation of structural aspects. These must be worked by means of optimistic outlooks in research labs which, in relation to bioprostheses, currently include improvement of the annulus (stentless or less-stented)<sup>20-</sup>

<sup>22</sup> to favor hemodynamics, and technologies that cause decellularization to favor tissue preservation by preventing inflammatory reactions<sup>23,24</sup>.

Comparisons obtained over a long period of observation suggest that priority would be given to mechanical prostheses in the mitral position in cases of reoperation and prosthesis-dependent mortality, especially for over-70 age brackets, but not for prosthesis-dependent morbidity, neurological deficits being equal<sup>25</sup>. The availability of these data is useful in that it motivates periodic exercises of reflections on “quality control” in regard to routines, on an equivalency scale greater or smaller than that analyzed, in each experienced Service.

“This is the way we do it here” is a slogan inspired by bioethics that helps in communication regarding the dynamics of the decision-making process of each team in view of the need for a valve-prosthesis implant. It stimulates the definition of an identity of conduct by the Service, an institutional guideline that lends transparency to its standards, portraying similarities and dissimilarities as compared to what is practiced elsewhere.

For example, the “Here we do it like this” at InCor features a 35-year tradition of preference for bioprosthesis implants, the zero point of which coincides with the making of dura-mater bioprostheses<sup>26</sup>. The subsequent steps were reinforced by convictions nourished by the medical-social realities of its population and users. The ongoing routine is sustained by the reasonability of the degree of beneficence/nonharmfulness observed in analyses of morbidity and survival<sup>20-22</sup>, taking into account evidence of good quality of life in the period of time elapsing between the implant and reoperation – this latter being undoubtedly the Achilles heel of opting for a bioprosthesis.

The quintet of post-prosthetic valve replacement potentialities comprises prosthetic thromboembolism, anticoagulant-dependent hemorrhage, more severe prosthetic valve endocarditis, structural defects, and hemodynamic restrictions – both the early restrictions due to the characteristics of the implant, and tissue-dependent late restrictions. These arguments are more than sufficient foundation for the claim that postoperative history of valvular heart disease should be evoked only after reaching the absolute conviction that there is, in fact, no means of avoiding prosthesis-dependence.

### Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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