Surgical Treatment of Patients with Heart Failure Through Myocardial Revascularization, Ventricular Reconstruction, and Mitral Valve Surgery

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Heart failure, a final outcome of different cardiomyopathies is currently the most serious problem in the field of cardiology and public health.

Despite the extraordinary progress made over the last two decades regarding the understanding of the deeper mechanisms of ventricular failure as an endocrine-metabolic syndrome, it is the major cause of death in the adult population.

This justifies the use of polypharmacy with five or more active principles with a view to neutralizing different stages of the adrenergic stimulation cascade.

The clinical application of these active principles fascinates professionals, leading them to attach great importance to the heart failure syndrome, so much so that they sometimes accept the etiology of the disease without further questioning and, beyond that, fail to identify causes of heart failure that could be removed.

The identification of the causal mechanism of the disease and its removal or neutralization translates into a significant impact on the progression of the disease. This is the case of ischemic myocardiopathies, tachymyopathies, deposit and metabolic diseases and others.

With the emergence of important and recent concepts on ventricular dynamics under the light of the double helix helicoidal mechanism and the acknowledgement of the harmful effects of ventricular sphericity, it is necessary to approach heart failure from a mechanicist point of view that is not opposed to the endocrine-metabolic concepts, but allows the expectation of a better management of this syndrome.

Among the possibilities of surgical intervention in these situations, we will briefly discuss the revascularization of ischemic myocardium, ventricular reconstruction and the repair of secondary mitral insufficiency.

Myocardial revascularization

Myocardial ischemic dysfunction can be reversed by surgical treatment, in sharp contrast with clinical management alone, as demonstrated by several studies; it constitutes a major criterion for surgery indication[1-5].

More recently, the Ephesus and Valiant studies, with cut-off values for ejection fraction between 0.35 and 0.40 have proved the advantages of surgical revascularization over clinical management in the medium to long term.

It is worthy of notice that with the assessment of ischemia using scintigraphy, stress-echo test and more recently nuclear magnetic resonance imaging, the results are predictable to a high degree, whereas the statement of absence of ischemia, even if a pet scan is conducted, is subject to an error risk of approximately 20%.

It is therefore difficult to deny the indication of revascularization in patients with poor ventricular performance when there are approachable distal coronary beds.

There are doubts as to the benefit of revascularization when ventricular volumes are increased, and the results are not as satisfactory as revascularization in patients without an enlarged left ventricle[6-8].

These observations constitute the basis for the proposal of associating some type of ventricular reconstruction with myocardial revascularization, and the clinical application of current concepts that state that ventricular contraction is due to a single muscle that curls over itself is very promising.

Ventricular reconstruction

The impact of the resection of dyskinetic areas of the left ventricle on the progression of ischemic cardiomyopathy[9,10] has long been known. More recently the SAVER[11] and RESTORE[12,13] studies pointed to the need for resection of fibrotic areas, even those that are akinetic, thus justifying the design of the recently completed STICH study.

The concept of "helical heart" originally described by Torrent Guasp embodies the basis for understanding how ventricular reconstruction can be performed with greater efficiency so as to restore the heart's elliptical form[14,15].

At present, the possibility of improving ventricular performance by excluding transmural fibrosis areas in association with myocardial revascularization is a field of extraordinary interest and shows a possibility of progress.

Well conducted experimental studies support the idea of preventing, through surgery, the expansion of infarcted areas which show an impairment of the function of the remaining myocardium[16].

It is advisable, in view of this clinical and experimental evidence, that when indicating and planning the surgical treatment of patients with ischemic cardiomyopathy and

Key words

Cardiac output, low; myocardial revascularization; heart ventricles/surgery; mitral valve/surgery.

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Article received August 31, 2006; accepted September 14, 2006.

lowered ejection fraction, the presence of areas with fibrosis should be studied, preferably by cardiac magnetic resonance and the tagging of regional motility.

The results of the STICH study are expected with great interest: one of its arms is isolated revascularization and the other is revascularization with associated ventricular plasties.

Mitral valve surgery

The secondary mitral insufficiency that appears in the initial stages of heart failure is a factor with considerable negative impact on the prognosis[17].

This regurgitation is based on the left ventricle sphericity, which will determine the distancing of the papillaries, the dilation of the ring and additional loss of contractile function with an increase in wall tension and energy consumption.

The proposal for repairing this regurgitation using mitral repair was first put forward by Chen et al[18] and later publicized by Bolling et al[19].

This technique aims at repairing an additional overload of the left ventricle, eliminating the regurgitant flow and increasing the systolic volume without having the improvement of the ejection fraction as a primary objective.

We proposed a more comprehensive technique. Through the implant of prosthesis in A-V position, the mitral insufficiency is repaired, the mitral ring is remodeled and the parallelism of the papillary muscles is restored[20]. This technique has been modified and applied by others[21,22].

The selection of patients for this type of procedure requires special care. The etiology of myocardiopathy is not a relevant factor for its indication. It is fundamental to identify moderate or severe mitral insufficiency using transesophageal echocardiography. It is worth highlighting that the detection of insufficiency in these situations through physical examination, radiology tests and ventriculography often underestimates its importance.

On the other hand, it is known that the degree of mitral insufficiency is not static, and may vary according to the patient's degree of compensation. In cases of non severe mitral insufficiency with ventricular desynchrony, the resynchronization may replace valve surgery.

Our recently published results for a consecutive series of 116 patients allowed us to observe a consistent improvement in functional class, a significant increase of the ejection volume, the elimination of a regurgitant fraction and a decrease in LV sphericity[23].

Although the hospital mortality was considerable (16.3%), life expectancy at the end of 5 years was in the region of 60% including the hospital stay, which is similar to the results obtained with heart transplant.

In conclusion, we believe that it is valid to propose the elimination of secondary mitral insufficiency and the modeling of the ventricular cavity with the implant of a valvular prosthesis in patients with advanced heart failure, in order to improve the patient's quality of life, delay or create conditions for a heart transplant and, in few cases of reversible myocardiopathies, as a transition path to cure.

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