The role of synergy between cardiology and cardiac surgery in the choice of the treatment of dilated cardiomyopathy

Gabriele Di Giammarco, Antonio Maria Calafiore

Department of Cardiology and Cardiac Surgery, University "G. d'Annunzio", Chieti, Italy

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Address:

Dr. Gabriele Di Giammarco

Cattedra di Cardiochirurgia Università degli Studi "G. d'Annunzio" c/o Ospedale San Camillo de Lellis Via Forlanini, 50 66100 Chieti

At the beginning of the new century the hopes in the treatment of dilated cardiomyopathy (DCM) are fundamentally based on cardiac transplantation (HTX).

This is due either to the point of view of the observation of the disease or to the fact that the patients' selection could not take advantage from sophisticated diagnostic tools. The final result was sometimes discouraging.

The purpose of this paper was to discuss the different options to be considered as alternative to HTX as well as the role of the preoperative diagnostics to find the appropriate candidates to surgical or interventional procedures.

Epidemiological impact of congestive heart failure

Many reports in the literature have emphasized the incidence of this phenomenon. The most significant data are reported by the American Heart Association that estimates 400 000 new cases of heart failure per year with 10 cases/1000 people over the age of 65. Furthermore, among those people affected by acute myocardial infarction, 20% will develop congestive heart failure within 6 months of the acute episode.

If on one hand it is evident that not all the patients affected by this syndrome are potential candidates to HTX for different reasons, on the other hand, the enrolment of patients to HTX usually has to follow very strict criteria.

Furthermore, the lack of donors heavily influences the chances to be treated for those supposed to be the optimal candidates; in fact the mortality rate in the waiting list can reach 40%/year.

These data represent a sufficient reason to try to find alternative options not only for those who cannot benefit from HTX but also for the optimal candidates to organ replacement.

Looking at the surrounding causes in the group of patients who are candidates to HTX there is another striking evidence. The Columbia University Transplantation team published in 2001 the data concerning their 22-year experience in 1086 HTXs; almost 37% of patients underwent transplantation for postischemic DCM; among these, no information is reported concerning the type of dysfunction leading to HTX[1].

Furthermore, the results observed in this subgroup of patients affected by ischemic DCM were the worst ones, the 5-year survival rate averaging 64%.

Unfortunately, a similar database is not available in Italy so that it is not possible to figure out the incidence of this cause in our country in transplanted patients.

Alternative surgery

The attempt to restore the lost contractility was the goal of the first alternative choices to HTX.

One of the most investigated techniques is the latissimus dorsi dynamic cardiomyoplasty[2,3]; there is up to now a reported number of almost 700 patients treated with this technique with a 40% cumulative survival rate, the best result being obtained is NYHA functional class II or III. Furthermore, this option needs a couple of months of latissimus dorsi preconditioning before

being used to wrap the ventricle. The overall 5-year survival reported from the Brasilian group in San Paulo ranges from 39 to 54%. These results are even better than those in the NYHA class IV patients suggesting that the procedure finds the appropriate indication in an earlier phase of the clinical course if compared to HTX[4].

Another surgical choice is represented by the extreme myocardial revascularization; it is feasible in case the viable amount of the myocardium exceeds 20% of the total muscle, as assessed after pharmacological test using dobutamine[5].

Transmyocardial laser revascularization is an additional tool proposed in the last few years. Besides its unclear mechanism of action, the major advantage, even if under investigation, is the chance to stimulate angiogenesis[6].

The volume reduction surgery

An important achievement in the knowledge of the surgical pathophysiology of DCM is the concept of the need of volume reduction as a pivotal step of the treatment.

By considering that the pivotal finding in DCM is the ventricular volume increase, Batista et al.[7] in 1997 proposed the direct reduction of it, cutting out a piece of the left ventricular lateral wall with the aim of restoring the heart function. After the initial experience, swinging through enthusiasm and reproof, this choice was blamed as a technique to be abandoned. By the way, many surgical teams continued to investigate about that and recently Angelini[8] reported on a meta-analysis performed on Internet concerning the published results obtained using this surgical option. The analysis showed some interesting points that we are going to discuss about.

Among 520 patients (mainly males with a mean age of 50.2 ± 5.2) collected from this meta-analysis, the preoperative mean NYHA functional class was close to 4, with a very high incidence of moderate-to-severe mitral regurgitation (72.7%).

The overall operative mortality rate was 16.3%. Following the volume reduction, as documented by the left ventricular end-diastolic diameter which decreased from 7.7 ± 0.4 cm preoperatively to 6.0 ± 0.5 cm postoperatively, the NYHA functional class showed a gain by 2 classes, beyond the evidence of the left ventricular ejection fraction that, even if increased from 18.9 ± 3.9 to 28.1 ± 6.3%, could not represent an index as optimal as the stroke volume increase.

Going deeply into the analysis we observed that the early results with this technique ranged widely in different teams, the 12-month survival rate varying from 82 to 40%.

Looking at the experience of some authors[9] who submitted to the Batista operation a group of patients affected by idiopathic DCM this could be explained from the histomorphological feature found at biopsy specimens at the moment of surgery, without any correlation with the preoperative clinical status. These data suggest that a preoperative myocardial biopsy may be helpful in choosing the proper surgical option.

Postischemic dilated cardiomyopathy

The possibility of utilizing the Batista technique in ischemic DCM is obviously related to the ventricular septum function; the resection of a good functioning left ventricular lateral wall in the presence of an impaired septal function will lead to dreadful results.

In case of postnecrotic DCM due to septal and/or apical involvement, the surgical choice is oriented to different techniques, already described by Dor[10], Guilmet et al.[11], and Calafiore et al.[12].

Functional mitral regurgitation

The most interesting and frequently observed finding in this group of patients is functional mitral regurgitation, which represents the final step towards the fatal outcome[13,14]. That is why it could be considered like a real complication in the course of the disease, not only just a diagnostic finding.

Either in the course of the idiopathic or the postischemic DCM, it is related to the change in the geometry of the left ventricular chamber that usually affects the dynamics of the whole mitral apparatus[15,16].

The change from the ellipsoidal to the spherical shape of the left ventricle acts as the cause of the change in the spatial relationships between the papillary muscles, the chordae tendineae and the mitral valve, leading to different degrees of lack of leaflet coaptation[17].

Furthermore, the importance of this complication is not well documented by left ventricular angiography that usually shows a low grade of regurgitation due to the poor ventricular function observed in these patients[18].

On the basis of these considerations, in the flow chart of the preoperative evaluation echography represents the pivotal tool either to depict this situation or to choose the optimal surgical strategy[12]. This is particularly true when looking for the proper surgical technique that could be mitral annuloplasty[19,20] for mitral valve replacement preserving the subvalvular apparatus[21].

In conclusion, the increasing incidence of congestive heart failure represents one of the emerging problems in cardiology even from the social point of view. The choice of the optimal treatment for this huge cohort of patients is fundamentally related to the attitude of sharing information between cardiology and cardiac surgery.

The pathophysiology of this syndrome is subject to changes in the course of the natural history of the disease following any kind of treatment available, either medical or interventional or surgical.

On the other hand, there are many surgical options that could be adopted in addition to organ replacement and these solutions can provide, if optimally used, quite good results.

It is to be considered that the single patient affected by this syndrome can swing over medical or surgical field according to the course of the disease. Therefore, the optimal choice of treatment can only be found if an integrated approach is considered following a close cooperation between the cardiologist and the cardiac surgeon.

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