Left ventricular reverse remodeling after annular-mitral valve repair in end-stage heart failure of dilated cardiomyopathy: a case report

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Title :

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ABSTRACT

Functional mitral regurgitation is a frequent complication of dilated cardiomyopathies. This is a 38-year-old women presented with recurrent symptoms of congestive heart failure. Transthoracic echocardiography revealed global severe left ventricular dysfunction with severe functional mitral valve regurgitation. She underwent a mitral valve restrictive annuloplasty. The follow-up showed an improved of left ventricle dimensions and function.

RESUME

L'insuffisance mitrale fonctionnelle est une complication fréquente des cardiomyopathies dilatées.

Il s'agit d'une patiente de 38 ans présentant des symptômes récurrents d'insuffisance cardiaque congestive.

L'échocardiographie transthoracique a révélé une dysfonction ventriculaire droite et gauche sévère globale avec régurgitation valvulaire mitrale fonctionnelle sévère. Elle a subi une annuloplastie restrictive de la valve mitrale.

Le suivi a montré une amélioration des dimensions et de la fonction du ventricule gauche.

Key-words

Left ventricle, dilated cardiomyopathies, mitral regurgitation, remodeling, mitral repair

Mors clefs

Ventricule gauche, cardiomyopathies dilatees, insuffisance mitrale, remodelage, reparation mirale.

INTRODUCTION :

Functional mitral regurgitation is a frequent complication of dilated cardiomyopathies and can seriously alter the vital prognosis of patients with heart failure.

The better understanding of the pathophysiological mechanisms of mitral regurgitation; a consequence of ventricular remodeling, and the new surgical treatments resulting from it allow excellent correction of mitral

insufficiency as well as primary ventricular remodeling by plasty of the base of the left ventricle, and secondary by the reduction of the parietal tension

OBJECTIVE

The purpose of this paper is to review the structural and functional alterations in patients with ischemic and non-ischemic cardiomyopathy associated with mitral regurgitation throw the study of a case. We also, report the benefit of mitral valve repair in increasing the left ventricular function

CLINICAL PRESENTATION

38-year-old women presented with recurrent symptoms of congestive heart failure, including dyspnea, lower-extremity edema, and ascites due to idiopathic dilated cardiomyopathy diagnosed two years ago, complicated with functional mitral and tricuspid regurgitation. Both coronary angiography and cardiac magnetic resonance were performed at the time with no significant abnormality.

Her past medical history revealed permanent atrial fibrillation.

In view of her worsening heart failure symptoms with recurrent hospitalizations despite optimal heart failure treatment, the decision of surgical management of her biventricular dilated cardiomyopathy was taken and the patient was admitted in our department for a mitral and tricuspid valve repair surgery.

On admission, initial physical exam reveals temperature 37 °C, heart rate 87 bpm, blood pressure 101/70 mmHg, Cardiac physical examination revealed irregularity of heart sounds S1 and S2, holosystolic murmur (grade 4/6) radiating to the axilla and holosystolic murmur (grade 3/6) at the left lower sternal border. Other physical checks were within normal limits.

Electrocardiography (ECG) examination revealed atrial fibrillation, and chest X-rays showed cardiomegaly.

Transthoracic echocardiography revealed global severe left ventricular dysfunction, ejection fraction (EF) of 25%, severe left ventricular dilatation with left ventricular end diastolic diameter (LVEDD) 68 mm, severe functional mitral valve regurgitation (MR) with central jet (effective regurgitation orifice 0.30 cm2, regurgitation volume 63 ml), and concomitant systolic dysfunction of dilated right ventricle (low TAPSE of 15 mm) with severe tricuspid valve regurgitation grade (TR). Bi-atrial enlargement was also noted (figure 1).

Results of complete blood count, inflammatory markers (C-reactive protein), electrolytes, serum creatinine, liver enzymes, and thyroid hormones were in normal ranges. Heart failure therapy was optimal.

She underwent a mitral valve restrictive annuloplasty with a Carpentier ring N°28 (figure 3)in addition to annuloplasty ring N° 30 mm.

The patient was discharged from the hospital on day 14 after an uneventful post operative course.

At the 6-month postoperative follow-up, the patient showed continuous improvement of her symptoms, besides, repeat transthoracic echocardiography also showed an improved of left ventricle dimensions and function with left ventricle EF increased to 40% (figure 2).

DISCUSSION:

Congestive heart failure (CHF) is the commonest heart problem in the world and is currently one of the leading causes of death and hospitalization in the older age group [1].

Left ventricular remodeling involves two mechanisms: restriction of valve movements and disappearance of cooptation. Then, The vicious circle: ventricular remodeling-mitral insufficiency. Functional mitral regurgitation occurs in the absence of structural mitral valve disease.

Given the better understood mechanisms of mitral regurgitation in dilated cardiomyopathies, the purpose of mitral plastic is therefore to restore a cooptation surface between the valve sheets by reducing the native ring by an undersized circumferential prosthetic ring to obtain valvular continence.

Indeed, the plane of computation of the two valve sheets, due to the hypertraction of the ropes, is moved towards the apex of the ventricle and moves away from the plane of the ring, resulting in a "tent" effect, increasing the covering surface necessary of the two mitral sheets to obtain the closure of the mitral orifice, and this to the detriment of the coaptation surface [2].

It is well established that secondary mitral regurgitation worsens both symptoms and prognosis in patients with left ventricular dysfunction of ischemic and non-ischemic etiology.

Cardiac transplantation has been the standard treatment for patients with severe CHF associated with end-stage heart disease. However, this therapeutic modality has limited applicability.

Alternate surgical strategies to manage patients with severe end stage heart disease have been applied over the last decade or more, including resynchronization therapy, electrical therapy, coronary artery revascularization, cardiomyoplasty, left ventricular myoreduction surgery and mitral valve repair.

Bolling et al. were the first to report the early outcome of remodeling mitral annuloplasty with a flexible posterior ring in 16 patients with severe CHF and mitral regurgitation in 1995[3].

Szalay et al. reported a similar experience among 121 patients with mitral regurgitation and cardiomyopathy having a left ventricular ejection fraction less than 30% [4].

Bolling has emphasized also in many presentations the importance of the undersizing of the flexible ring in reestablishing the ellipsoid shape and somewhat normal geometry of the left ventricular base [5].

Early and intermediate results with implantation of an undersized flexible ring in the posterior mitral annulus suggests that correction of functional regurgitation results in partial reversal of left ventricular remodeling and in symptomatic improvement. Intermediate results are superior to medical treatment alone and comparable to cardiac transplantation [6].

CONCLUSION :

The optimal treatment of functional mitral regurgitation in heart failure patients is still controversial.

Apart from guideline-directed optimal medical therapy, cardiac resynchronization therapy, a durable mitral valve repair has the potential to improve cardiac reverse remodeling and prognosis.

ABREVIATION

Electrocardiography: ECG

Left ventricular end diastolic diameter: LVEDD

Mitral valve regurgitation: MR

Tricuspid valve regurgitation grade: TR

Congestive heart failure: CHF

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