

**The myopathic patient with
significant valvular regurge**

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Definition

“Cardiomyopathy is a primary disorder of the heart muscle that causes abnormal myocardial performance and is not the result of disease or dysfunction of other cardiac structures ... myocardial infarction, systemic hypertension, valvular stenosis or regurgitation”



Classification

- Etiology
- Gross anatomy
- Histology
- Genetics
- Biochemistry
- Immunology
- Hemodynamics
- **Functional**
- Prognosis
- Treatment

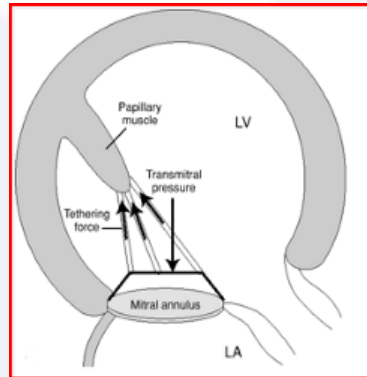
Functional Classification

- Dilated (congestive, DCM, IDC)
 - ventricular enlargement and systolic dysfunction
- Hypertrophic (IHSS, HCM, HOCM)
 - inappropriate myocardial hypertrophy in the absence of HTN or aortic stenosis
- Restrictive (infiltrative)
 - abnormal filling and diastolic function

Cardiomyopathy



Valvular pathology in secondary mitral regurgitation

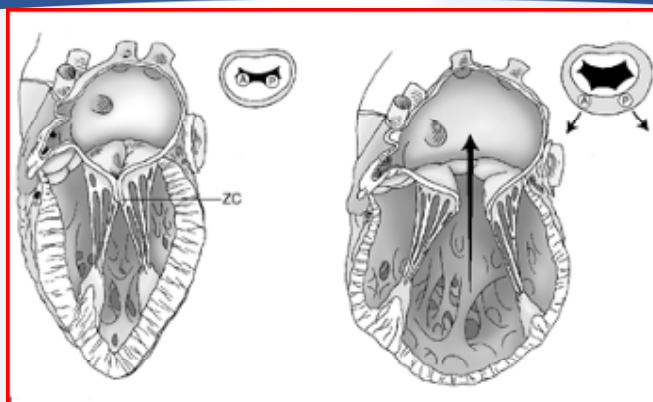


* Left ventricular dilation alters the alignment of the papillary muscles and contributes to the development of valve incompetence. In secondary mitral regurgitation, the transmitral pressure exceeds the tethering forces of the papillary muscles.

Mitral valve regurge in Cardiomyopathy

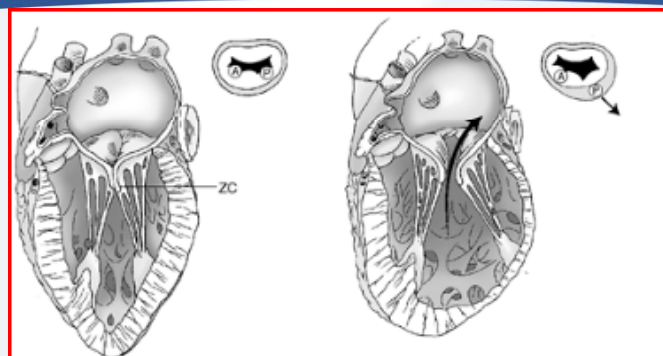
- Secondary mitral regurgitation (MR) is a complication of end-stage cardiomyopathy and may affect up to 60% of all heart failure patients as a preterminal or terminal event.
- Secondary MR is observed in patients with either idiopathic or ischemic cardiomyopathy and can be caused by many factors.

Idiopathic cardiomyopathy



* Geometric changes of the left ventricle producing central **MR** (Non-ischemic dilated cardiomyopathy).

Ischemic cardiomyopathy



* Asymmetric geometric ventricular changes secondary to myocardial infarction (Ischemic dilated cardiomyopathy).

Pathophysiology



- MR leads to a cycle of continuing volume overload of the already dilated ventricle, progression of annular dilation, increased LV wall tension, increasing degrees of MR, and worsening CHF.
- Patients with MR refractory to medical therapy have a poor long-term survival.
- In a study of 28 patients with cardiomyopathy and an ejection fraction of <25%, the 1-year survival without transplantation was 46%.

Management




- The mainstay of **medical management** of patients with cardiomyopathy and secondary MR is the treatment of the underlying CHF with the use of diuretics and afterload-reduction agents.
- Reducing the aortic ejection impedance reduces the regurgitant volume into the left atrium and relieves pulmonary congestion.
- This strategy reduces LV volume and increases forward stroke volume, which results in a smaller regurgitant orifice area.

Surgical Treatment Options



- Treatment options in end-stage dilated cardiomyopathy remain limited.
- More widespread use of heart transplantation is restricted by the small number of donor hearts and by its inapplicability in elderly patients or in patients with comorbid medical conditions.
- In order to solve this problem, alternative surgical strategies for endstage dilated cardiomyopathy have been proposed.

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- Left ventricular myoreduction surgery (Batista procedure) and also (Dor procedure) have met with varying degrees of success and limited survival.
 - In patients with dilated cardiomyopathy, **mitral valve repair** with an undersized **annuloplasty ring** was indeed reported to result in significant symptomatic and hemodynamic improvement and in actuarial survival rates comparable to orthotopic heart transplantation.

Mitral valve repair in Cardiomyopathy



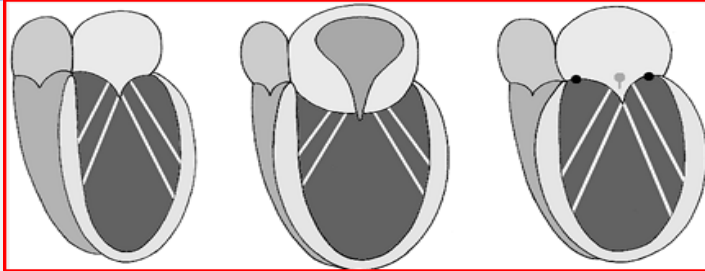
- Historically, the **surgical approach** to patients with cardiomyopathy and **MR was mitral valve replacement**, and little was understood of the adverse consequences that interruption of the annulus-papillary muscle continuity had on LV systolic function.
- This procedure was associated with high mortality rates.

Surgical management (cont.)



- It has been demonstrated in a number of studies that **preservation** of the annulus-papillary muscle continuity is of paramount importance to preservation of LV function.
- It was the excision and disruption of the subvalvar apparatus that accounted for the significant loss of systolic function due to the destruction of the LV that led to the poor outcome in the earlier patients who underwent valve replacement.

Rationale for annuloplasty in secondary mitral regurgitation



- As the left ventricle dilates, there is an increase in the regurgitant orifice area and the mitral annulus dilates.
- An undersized annuloplasty ring facilitates the return of the zone of coaptation to a more normal dimension to correct for the regurgitation.

Surgical management (cont.)

- Preservation of the mitral apparatus and LV in mitral valve repair has been demonstrated to enhance and maintain LV function and geometry with an associated decrease in wall stress.
- This procedure has been shown to be safe with good long-term outcomes.

Surgical management (cont.)

- At the University of Michigan, from 1993 to 2003, 215 patients with end-stage DCM and refractory MR underwent mitral valve repair with an undersized annuloplasty ring.
- The range in **age** was 30 to 87 years (64 ± 12 years). **Ejection fraction** was 6% to 30% ($20.8\% \pm 6\%$). Preoperative (**NYHA**) class was 3.1 ± 0.9 .

Surgical management (cont.)

- Thirty-day mortality was 4.7% (10 of 215) for all mitral repairs.
- The 1- and 2-year actuarial survival rates were 80% and 70%, respectively.

Surgical management (cont.)



- More recently Calafiore and associates published a series of 49 patients.
- In their study, LVEF improved from 27% to 30% and NYHA functional class improved from 3.5 to 2.2. Survival was 90%, 87%, 78%, and 73% at 1, 3, 5, and 10 years, respectively.

Surgical management (cont.)



- Interestingly, in this report actuarial survival was 83% for mitral valve repair versus 70% for mitral valve replacement and improvement of NYHA class at 5 years was 76% in MV repair and 65% in MV replacement.

Surgical management (cont.)



- Although all of these series have had failures associated with return of MR, **new techniques** such as new three-dimensional shaped rings, plication of the papillary muscles, attachment of the posterior papillary muscle to the annulus, and jacketing the heart all are aimed at reducing failure rates by changing LV geometry.

Surgical management (cont.)



- The successful results of mitral valve repair in patients with dilated cardiomyopathy have been observed in a well-defined subset of patients.
- All patients had longstanding dilated cardiomyopathy, large left ventricular enddiastolic volumes (>300 mL), low left ventricular ejection fractions ($-18\pm 5\%$), and severe mitral regurgitation (grade 4+).

Conclusion



- Secondary MR is a significant complication of end-stage cardiomyopathy. The MR is thought to occur due to progressive dilation of the annular-ventricular apparatus, altered ventricular geometry, loss of leaflet coaptation, and LV wall/papillary muscle dysfunction.

Conclusion



- Mitral reconstruction via an annuloplasty ring effectively corrects MR in cardiomyopathy patients, a safe procedure in a high-risk population, and has an acceptable operative mortality rate.

Conclusion

- Although surgical correction of secondary MR is controversial, in part because the prognosis is thought to be related primarily to the underlying cardiomyopathy, physicians **should** consider offering mitral valve surgery to medically optimized yet symptomatic patients with severe MR and end-stage heart failure.

Thank you for your attention

