

פרופסור אברהם כספי
מכון הלב
בי"ח קפלן



MITRAL VALVE DISEASE

מבנה של מסתם מטרלי תקין

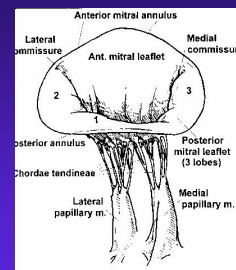
- עלי המסתם המטרלי
- Chordae tendineae
- שרירים פפילריים
- שריר הלב סביב השריר הפפילרי
- Mitral annulus

Mitral insufficiency

אי ספיקת המסתם המטרלי

פאתולוגיה של העלים

- Myxomatous degeneration
- Infective endocarditis
- Acute rheumatic fever
- Rheumatic heart disease
- Trauma



פאתולוגיה של השרירים פפילרים

- Coronary artery disease
- Global LV dysfunction
- Infiltrative disease

Chordae tendineae disease

- Myxomatous degeneration
- Rheumatic heart disease
- Infective endocarditis

Myxomatous degeneration



Mitral annulus

- Global LV dysfunction
- Endocarditis (abscess)

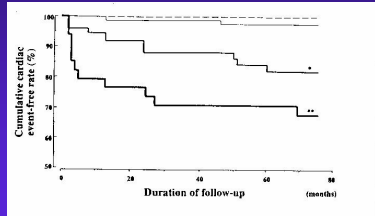
MYXOMATOUS VALVE DISEASE PROGRESSION

- Slow - due to gradually worsening of leaflets prolaps.
- Abrupt - due to ruptured chordae that results in flail segment and significant MR.

WIDE SPECTRUM OF MYXOMATOUS MV DISEASE

- from young women with MVP and mild MR
- to middle age men with severe leaflet prolaps or flail leaflet and severe MR

Relation between cardiac events and initial severity in 229 patients with MVP (From Kim S Am Heart J 1996)



Predictors of clinical outcome in MVP patients

- Gender- cumulative risk for complications 5-10% for men, vs 2-5% for women.
- Age - older patients have a higher rate of events.
- MV morphology- thicker and more redundant leaflets are associated with higher likelihood of severe MR.
- The strongest predictor are severity of MR and LV dilatation.

Rheumatic Mitral insufficiency



אי ספיקה מטרלית חריפה

- אנדוקרדיטיס
- קרע של כורדה במסתם מקסומטוטי
- קרע של שריר פאפילרי באוטם חריף
- טראומה

RHEUMATIC MV REGURGITATION ONLY 15 % OF ALL PATIENTS WITH MR IN EUROPEAN SERIES

- Acute rheumatic fever produce LV dilatation and restriction of leaflet motion.
- Chronically scarring of leaflets leads to combined MS and MR
- Natural history depends on severity of combined valvular lesions

MR OF CHRONIC CAD

- Normal MV leaflets.
- Regional wall motion abnormalities (most often inferior wall) with preserved global LV function
- Affected medial PM.

קרע של שריר פפילרי (אוטם)



MR physical examination

- Left atrial lift
- Pansystolic murmur
- Mitral systolic click
- S3
- Mitral mid diastolic murmur (MDM)

Mechanism of chronic ischemic MR

- Restrictive posterior leaflet motion.
- Apical displacement of PM.
- Dilated mitral annulus.

א.ק.ג.

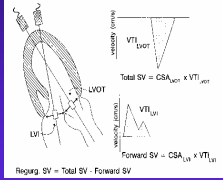
- Left atrial enlargement
- Atrial fibrillation
- Left ventricular Hypertrophy/enlargement

צילום חזה



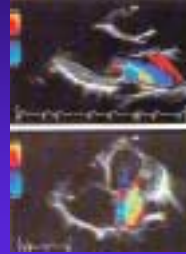
- הגדלה של עליה שמאל
- הגדלה של חדר שמאל
- גודש ראתי

MITRAL VALVE REGURGITANT FRACTION



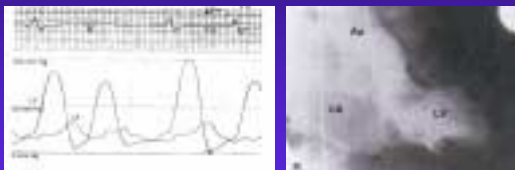
- $RF = \frac{SV_{mv} - SV_{av}}{SV_{mv}}$
- TRIVIAL MR < 20%
- MILD MR 20-30%
- MOD MR 30-50%
- SEVERE MR >50%

Echocardiography

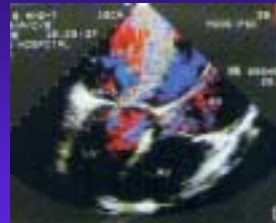


- מבנה המסתם
- מימדי חדר שמאל ותפקודו
- גודל עליה
- לחץ דם ראתי
- חומרת האי ספיקה

צנתור



Transoesophageal Echocardiography



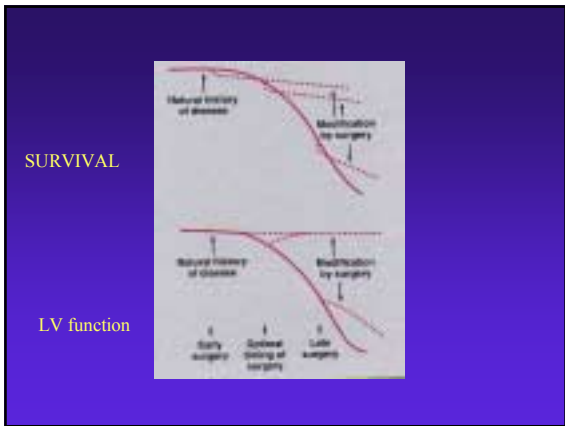
- מבנה המסתם
- חומרת הדליפה
- הערכה לגבי אפשרויות ניתוחיות

טיפול תרופתי

- דיורטיקה
- חוסמי ACE
- דגוקסין
- ניטרטים

טיפול

- תרופתי (SBE prophylaxis+)
- ניתוח



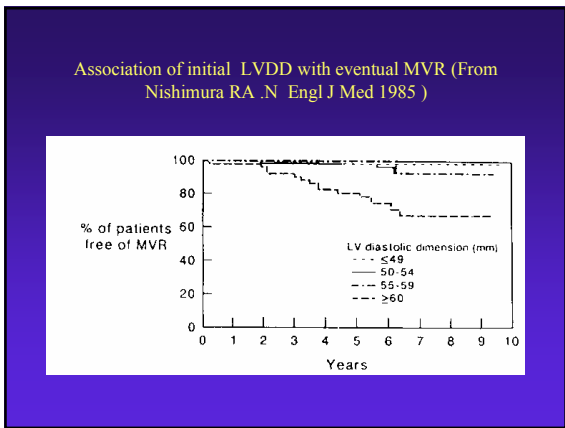
אינדיקציות לניתוח

• האינדיקציה תלויה באתיולוגיה ובהסתמנות

Class I	Class IIa	Class IIb	Class III
<p>1. Patients with acute symptomatic MR in whom repair is likely</p> <p>2. Patients with asymptomatic Class II, III, or IV symptoms with normal LV function, without an aortic aneurysm - 40% and 60% systolic dimension < 45 mm</p> <p>3. Asymptomatic patients with normal LV function, without an aortic aneurysm, and aortic diameter < 45 mm</p> <p>4. Asymptomatic patients with normal LV function, without an aortic aneurysm, and aortic diameter < 45 mm</p>	<p>1. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p> <p>2. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p> <p>3. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p> <p>4. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p>	<p>1. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p> <p>2. Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p>	<p>Asymptomatic patients with preserved LV function and aortic diameter < 45 mm</p>



- אפשרויות ניתוח**
- תיקון
 - טבעת
 - החלפה
 - טיפול במחלה הכללית

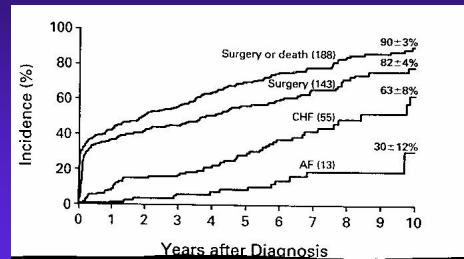


- Myxomatous valve surgery**
- Symptomatic patients with significant MR are candidates for surgery
 - Asymptomatic patients- decision depends on echo assessment of LV size and function
 - The choice of surgery:
 - 5- 10 y .survival rate after MV repair 80-90% vs 40-50% after MVR
 - In cases when repair is not feasible-MVR with chordal preservation is indicated.

Rheumatic valve surgery

Mitral valve replacement
Mitral valve repair in selected cases (unusual)

Clinical outcome in 229 patients with MR due to a flail leaflet (From Ling LH N Engl J Med 1996)



MITRAL VALVE SURGERY IN DCM

IN PATIENTS WITH END-STAGE CHF AND MR MORTALITY IS DIRECTLY RELATED :

- # SEVERITY OF LV SYSTOLIC DYSFUNCTION
- # INCREASED CHAMBER SPHERICITY
- # SEVERITY OF MR

SURGERY IN PATIENT WITH ISCHEMIC MR

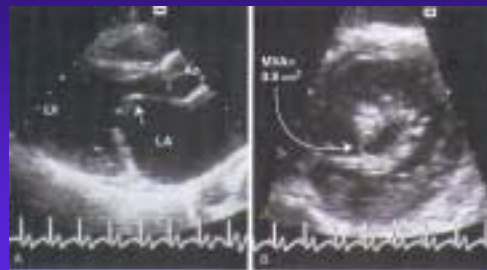
- Patients with severe MR, CHF and LV dysfunction- benefit from combined coronary-valvular surgery.
- Asymptomatic patients with milder MR and preserved LV function- CABG alone may be adequate.
- For patients with moderate MR the best solution is unclear. TTE and TEE before operation are helpful for correct decision. In cases with pure functional moderate MR- intraoperative preload challenge under TEE guiding is indicated.

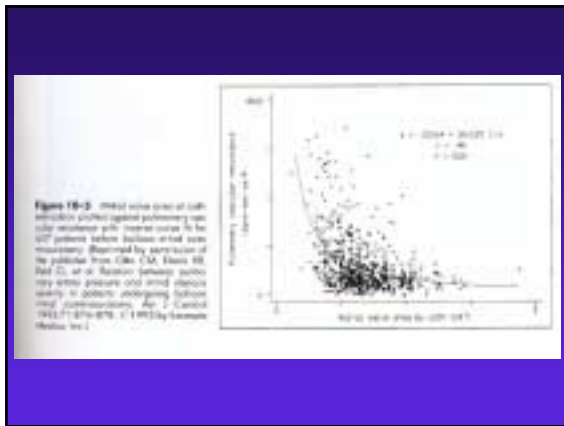
Anatomic Findings

- Rheumatic Mitral Stenosis
 - fusion of commissures
 - fusion of MV chordae
 - fibrosis of valve leaflets

Severe Mitral Annulus Calcification

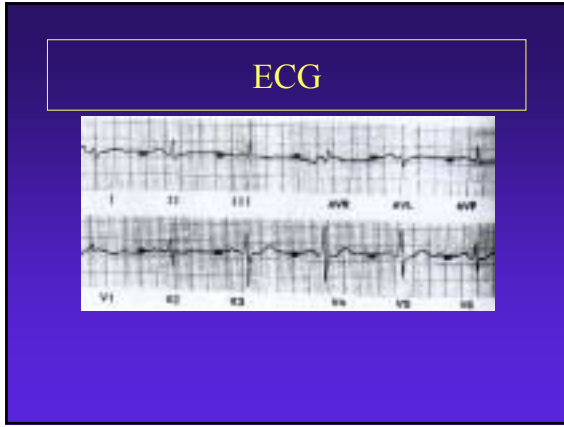
MITRAL STENOSIS





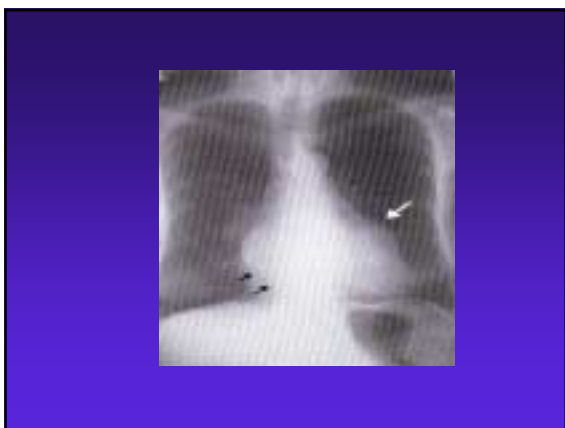
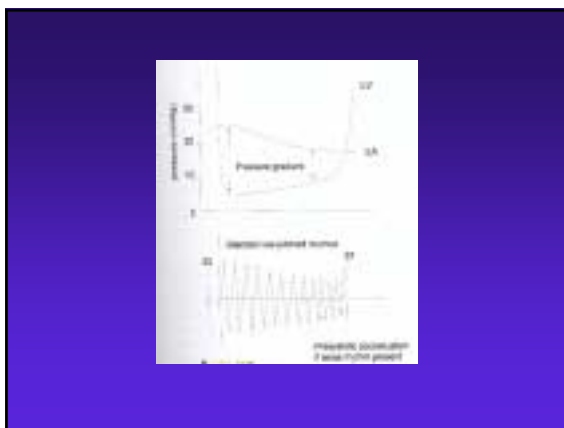
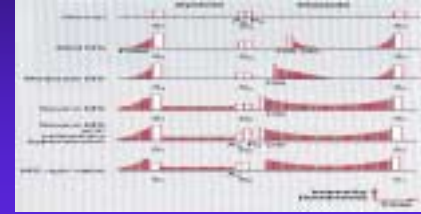
Pathophysiologic Abnormalities

- Mechanical obstruction
- Effect of elevated transmitral gradient on left atrium and pulmonary vasculature



Physical Examination

- Auscultatory findings
- Signs of pulmonary hypertension



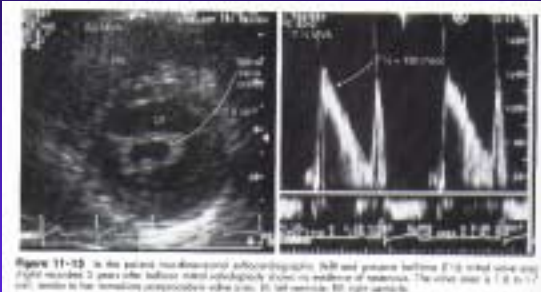


Figure 11-15 In the parasternal short-axis echocardiographic (left) and parasternal long-axis (right) views 2 years after balloon mitral valvuloplasty, there is evidence of mitral regurgitation. The color scale is 1.0 to 1.7 m/s, sensitive for mitral regurgitation color scale. RV, right ventricle; LA, left atrium; LV, left ventricle.

TABLE 10-1 ECHOCARDIOGRAPHIC EVALUATION OF THE PATIENT WITH MITRAL STENOSIS

- Mitral regurgitation severity
 - Mitral pressure gradient
 - Transcatheter pressure gradient
 - Pressure half-time valve area
 - Continuity equation valve area if needed
- Mitral valve morphology
 - Presence and severity of coexisting mitral regurgitation
- Left atrial size and function
 - Evaluation for left atrial thrombus before balloon valvuloplasty (parasternal transthoracic echocardiography)
 - Diastolic mitral regurgitation
 - Left ventricular size and function
 - Right ventricular size and function
 - Evaluation for rheumatic involvement of aortic or tricuspid valves

TABLE 11-7 APPROACHES TO MEDICAL TREATMENT OF MITRAL STENOSIS

Approach	Indications	Contraindications
Class I (strongly recommended)	<ul style="list-style-type: none"> Weight gain Worsening dyspnea Cardiothoracic ratio > 0.5 Reduced exercise tolerance Third-degree atrial fibrillation 	<ul style="list-style-type: none"> Medical contraindications to diuretics Concomitant aortic regurgitation Concomitant mitral regurgitation
Class IIa (recommended)	<ul style="list-style-type: none"> Development of pulmonary hypertension Development of atrial fibrillation Development of pulmonary regurgitation 	<ul style="list-style-type: none"> None
Class IIb (reasonable)	<ul style="list-style-type: none"> Presence of pulmonary hypertension Presence of atrial fibrillation Presence of pulmonary regurgitation 	<ul style="list-style-type: none"> None
Class III (not recommended)	<ul style="list-style-type: none"> Diagnosis of mitral stenosis Diagnosis of mitral regurgitation Diagnosis of aortic regurgitation Diagnosis of pulmonary regurgitation 	<ul style="list-style-type: none"> None

TABLE 10-4 MEDICAL THERAPY FOR MITRAL STENOSIS

- Noninvasive follow-up
 - Symptoms and functional status
 - Echocardiography at baseline and then as clinically indicated
 - Exercise echocardiography if clinically indicated
 - Prevention of endocarditis
 - Prevention of recurrent rheumatic fever
 - Prevention of embolic events
 - Treatment of pulmonary congestive symptoms
 - Counseling about pregnancy and contraception



TABLE 11-4 NEWER EVIDENCE IN THE CHOICE OF INTERVENTION FOR BEST OF MITRAL STENOSIS

Procedure	AF Rhythm Control	Severity of MR	Other Valve Lesions	Pulmonary Hypertension
Mitral regurgitation	Class I (strongly recommended)	Class I (strongly recommended)	No other valve lesions	Prevention of pulmonary hypertension
Mitral regurgitation	Class IIa (recommended)	Class IIa (recommended)	No other valve lesions	Prevention of pulmonary hypertension
Mitral regurgitation	Class IIb (reasonable)	Class IIb (reasonable)	No other valve lesions	Prevention of pulmonary hypertension

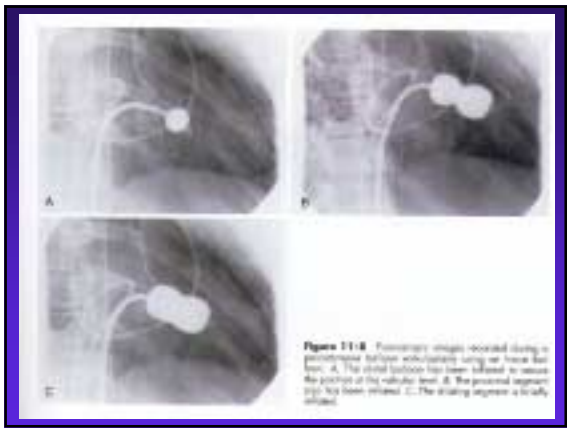
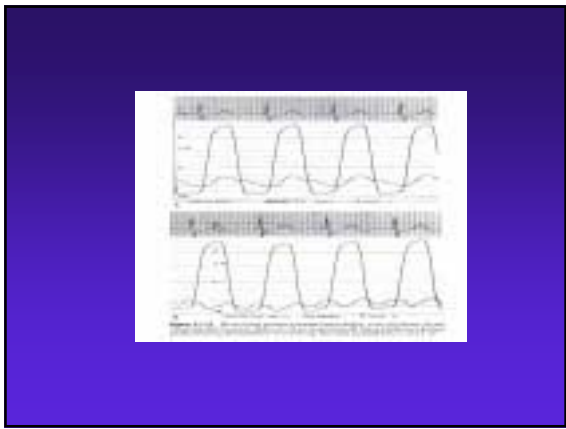


Figure 11-8 Fluoroscopic images recorded during a percutaneous balloon ablation using an atrial catheter. A, The distal balloon has been inflated to correct the position of the catheter head. B, The proximal segment of the catheter has been inflated. C, The distal segment is fully inflated.

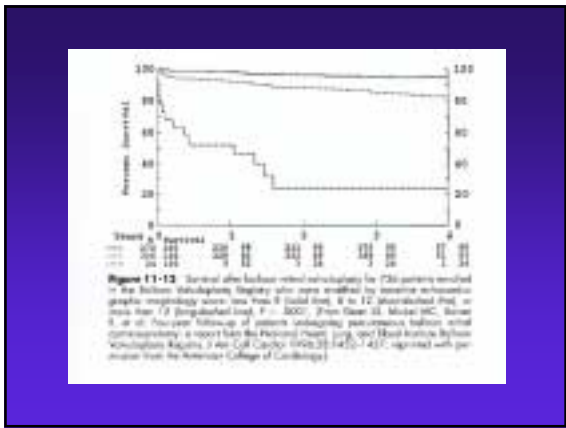


Figure 11-10 Survival after balloon-atrial ablation for AF in patients enrolled in the British Atrial Fibrillation Registry who were stratified by baseline echocardiographic measurements into two risk groups. The solid line is the 12-month survival rate in those with a left atrial diameter ≤ 40 mm ($P < .0001$). From Green et al. *Medical Clinics North America*. Follow-up of patients undergoing percutaneous balloon atrial ablation: a report from the National Heart Lung and Blood Institute Atrial Fibrillation Registry. *J Am Coll Cardiol* 2006;38(14):2114-2121. Reprinted with permission from the American College of Cardiology.



Figure 11-12 Short-axis, real-time echocardiography, fluoroscopic catheter ablation using an atrial catheter. The catheter is positioned at the annulus of the aortic valve and measured from 1.2 to 1.4 cm in the size.

