

Valvular Heart Disease

Mitral Regurgitation

Mitral Regurgitation

- Etiology
- Symptoms
- Physical Exam
- Severity
- Natural history
- Timing of Surgery

An 80 year old woman with increasing dyspnea

- Longstanding heart murmur
- Increasing dyspnea & fatigue
- Recent ER visit Dx CHF



Mitral Regurgitation: Etiology

■ Valvular-leaflets

- Myxomatous MV Disease
- Rheumatic
- Endocarditis
- Congenital-clefts

■ Chordae

- Fused/inflammatory
- Torn/trauma
- Degenerative
- IE

■ Annulus

- Calcification, IE (abcess)

■ Papillary Muscles

- CAD (Ischemia, Infarction, Rupture)
- HCM
- Infiltrative disorders

■ LV dilatation & functional regurgitation

■ Trauma

MR Etiology: Surgical series

- MVP(20-70%)
- Ischemia (13-40%)
- RHD (3-40%)
- Infectious endocarditis(10-12%)

MR Pathophysiology

- Chronic LV volume overload -» compensatory LVE initially maintaining cardiac output
- Decompensation (increased LV wall tension) -»CHF
- LVE – » annulus dilation – » increased MR
- Backflow – » LAE, Afib, Pulmonary HTN

MR Symptoms

- Similar to MS
- Dyspnea, Orthopnea, PND
- Fatigue
- Pulmonary HTN, right sided failure
- Hemoptysis
- Systemic embolization in A Fib

Recognizing Chronic Mitral Regurgitation

- Pulse:
 - brisk, low volume
- Apex:
 - hyperdynamic
 - laterally displaced
 - palpable S3 +/- thrill
 - late parasternal lift 2° to LA filling
- S 1 soft or normal
- S 2 wide split (early A2) unless LBBB
- Murmur-Fixed MR:
 - pansystolic
 - loudest apex to axilla
 - no post extra-systolic accentuation
- Murmur-Dynamic MR(MVP)
 - mid systolic
 - +/- click
 - ↑ upright
- S 3 / flow rumble if severe



Recognizing Acute Severe Mitral Regurgitation

- Acute severe dyspnea, CHF & hypotension
- LV size normal
- LV may/may not be hyperdynamic
- Loud S1
- Systolic murmur may/may not be pan-systolic
- Inflow/rumble
- S3 present-may be only abnormality
- RV lift
- TTE/TEE for diagnosis
 - Chordal or papillary muscle rupture/tear
 - Infarction with papillary muscle ischaemia or tear
 - Infectious endocarditis with leaflet perforation or disruption or chordal tear
 - Flail MV segment

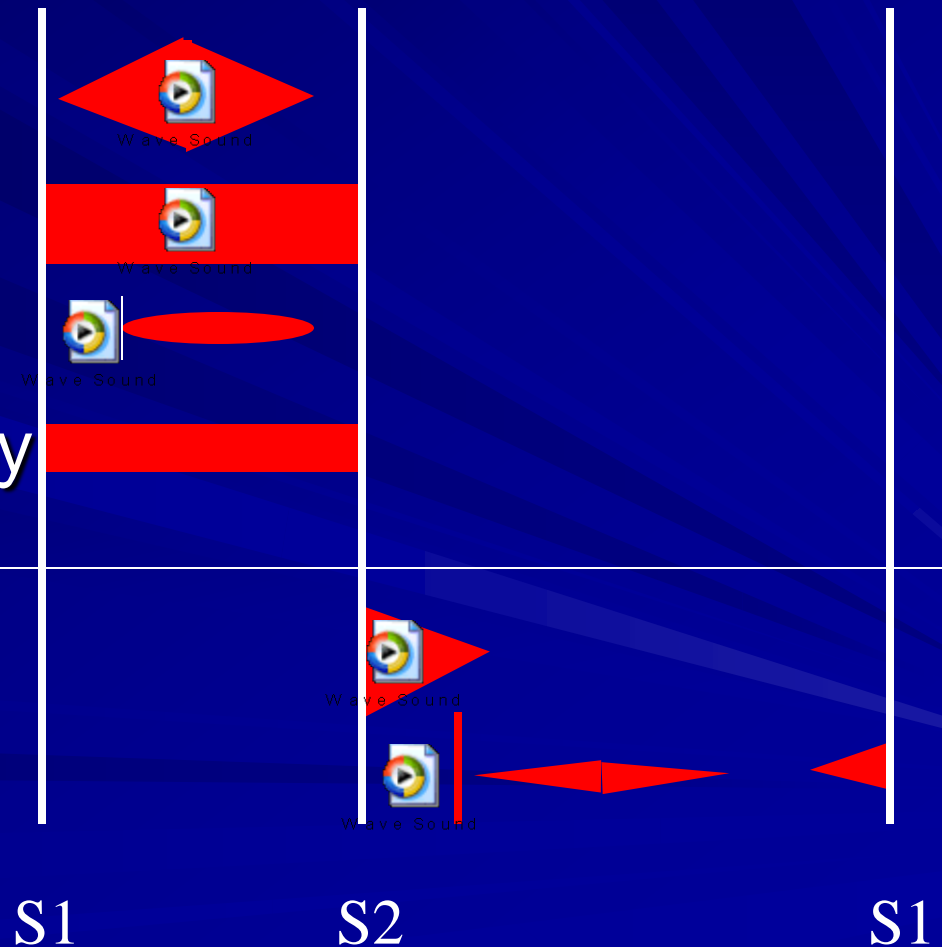
Comparing AS and MR

Systolic Murmurs

- Aortic stenosis
- Mitral insufficiency
- Mitral valve prolapse
- Tricuspid insufficiency

Diastolic Murmurs

- Aortic insufficiency
- Mitral stenosis



Assessing Severity of Chronic Mitral Regurgitation

Measure the Impact on the LV:

- Apical displacement and size
- Palpable S3
- Longer/louder MR murmur (chronic MR)
- S3 intensity/ length of diastolic flow rumble
- Wider split S2 (earlier A2) unless HPT narrows the split

Recognizing Mitral Regurgitation

■ ECG:

- LA enlargement
- Afib
- LVH (50% pts. With severe MR)
- RVH (15%)
- Combined hypertrophy (5%)

■ CXR:

- ↑ LV
- ↑↑ LA
- ↑ pulmonary vascularity
- CHF
- Ca++ MV/MAC

MR Echocardiography

- Baseline evaluation to identify etiology, quantify severity of MR
- Assess and quantify LV function and dimensions
- Annual or semi-annual surveillance of LV function, estimated EF and LVESD in asymptomatic severe MR
- To establish cardiac status after change in symptoms
- Baseline study post MVR or repair

MR Echocardiography

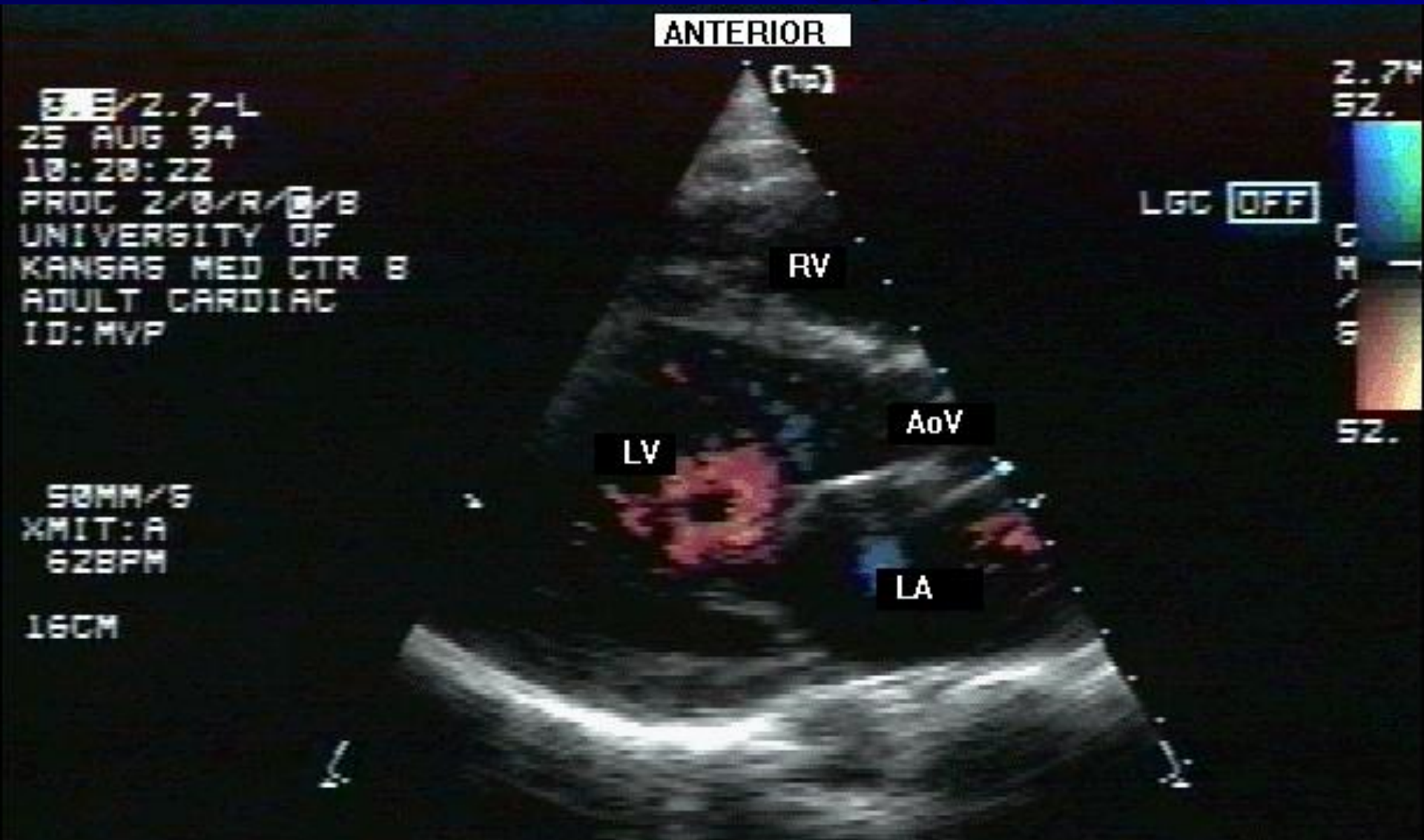
■ Etiology:

- flail leaflets (chord/pap rupture)
- thick (RHD)
- post mvt of leaflets (MVP)
- vegetations(IE)

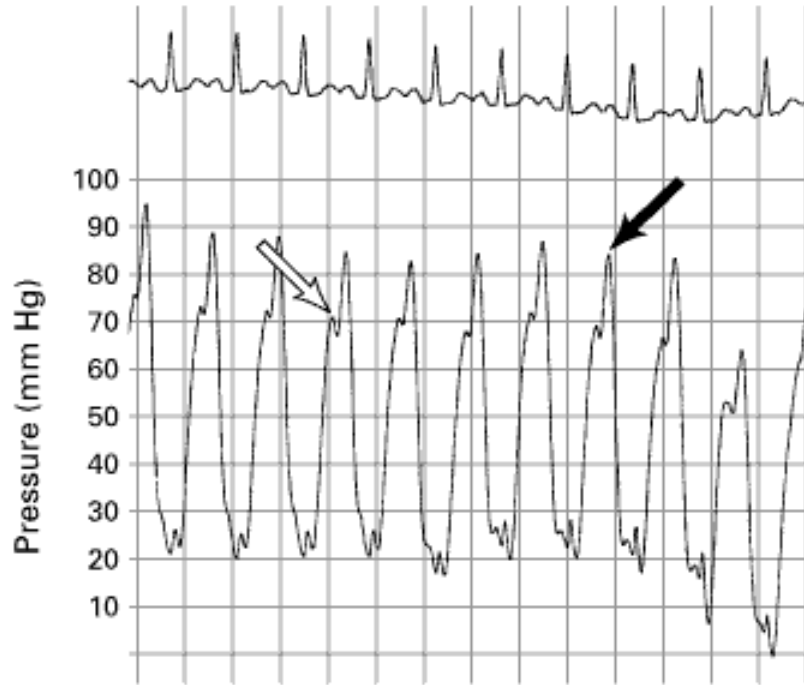
■ Severity:

- regurgitant volume/fraction/orifice area
- LV systolic function
- increased LV/LA size, EF

MR Echo/Doppler

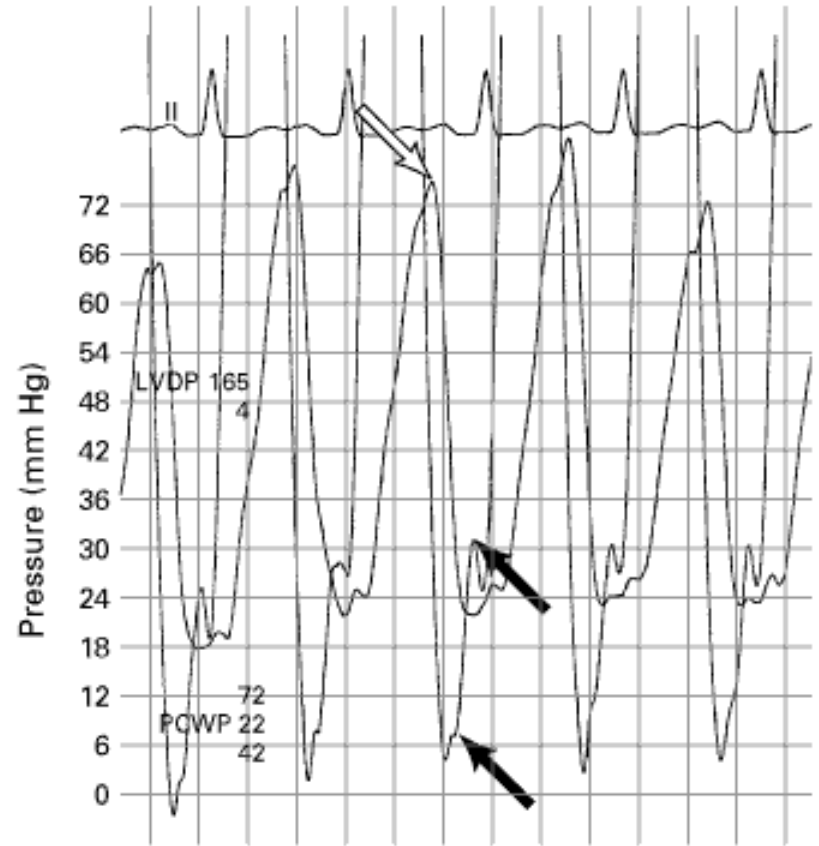


MR Pressure Tracing



RR interval, 556 msec
Timing, 0.04 sec
Paper speed, 50 mm/sec

A



RR interval, 560 msec
Timing, 0.04 sec
Paper speed, 50 mm/sec

B

MR Stages

LV size and function defined by echo

■ Stage 1-compensated:

- End-diastolic dimension less 63mm, ESD less 42mm
- EF more than 60

■ Stage 2-transitional

- EDD 65-68mm, ESD 44-45mm, EF 53-57

■ Stage 3-decompensated

- EDD more than 70mm, ESD more than 45mm, EF less than 50

Echo Indicators for Valve Replacement in Asymptomatic Aortic & Mitral Regurgitation

Type of Regurgitation	LVESD mm	EF %	FS
Aortic	> 55	< 55	<0.27
Mitral	> 45	< 60	< 0.32

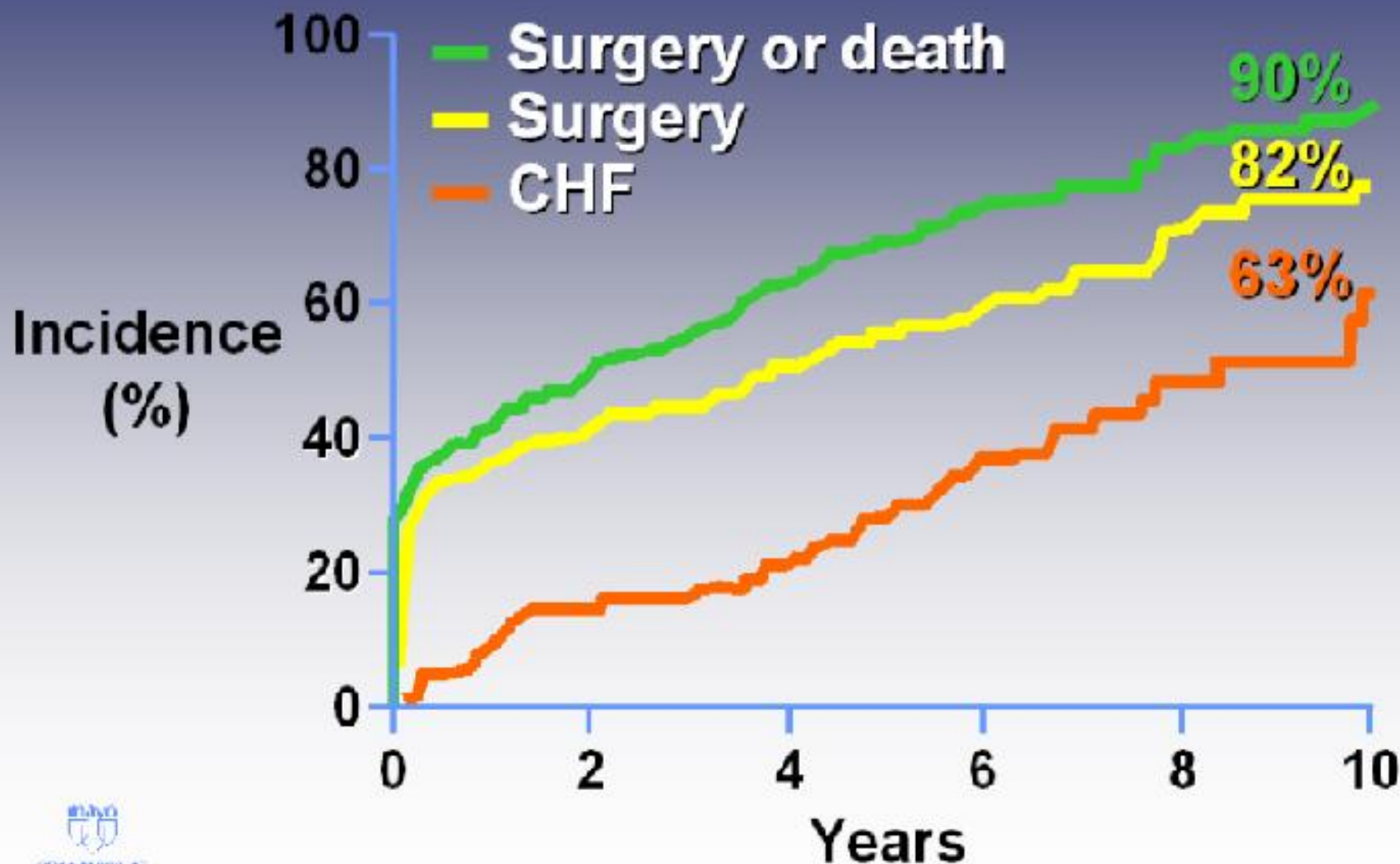
RECOMMENDED FREQUENCY OF ECHOCARDIOGRAPHY IN PATIENTS WITH CHRONIC MITRAL REGURGITATION AND PRIMARY MITRAL-VALVE DISEASE.

SEVERITY OF MITRAL REGURGITATION	LEFT VENTRICULAR FUNCTION*	FREQUENCY OF ECHOCARDIOGRAPHIC FOLLOW-UP
Mild	Normal ESD and EF	Every 5 yr
Moderate	Normal ESD and EF	Every 1 –2 yr
Moderate	ESD >40 mm or EF <0.65	Annually
Severe	Normal ESD and EF	Annually
Severe	ESD >40 mm or EF <0.65	Every 6 mo

*ESD denotes end-systolic dimension and EF, ejection fraction.

Mitral Regurgitation

Natural History: **High Morbidity**



Mitral Valve Surgery

- Only effective treatment is valve repair/replacement
- Optimal timing determined:
 - Presence/absence of symptoms
 - Functional state of ventricle
 - Feasibility of valve repair
 - Presence of Afib/PHTN
 - Preference/expectations of patient

Surgical Therapy - Timing

- Surgery reduces morbidity and mortality from severe MR but exposes patient to risk of surgery and prosthetic valve
- Surgery should be performed before onset of severe symptoms or development of LV contractile dysfunction

Symptoms

- Class III or IV symptoms (even if transient) always indicate need for surgery
- Class II symptoms indicate need for surgery in patients with repairable valves
- ETT may reveal concealed symptoms

Ejection Fraction (LVEF)

- Strongest predictor of outcome following surgery
- Should be assessed quantitatively
 - MUGA or Echo
- Surgery indicated if LVEF is below normal (60%)
- If EF normal, follow every 6 to 12 months
- If EF <30%, medical management (valve repair experimental in this setting)

Load-Independent Measures of LV Function

- Complex measurements:
 - LV dP/dT
 - End-systolic stress-strain
 - Myocardial Elastance
 - Peak systolic pressure/end-systolic volume
- End-systolic diameter
 - LVIDs >45 predicts poor outcome
- End-systolic volume index
 - ESVI >50cc/m² predicts poor outcome

Other Indications

- Flail mitral leaflet
- Left atrial dimension >45mm
- Paroxysmal atrial fibrillation
- Pulmonary hypertension

Mitral Regurgitation

ACC/AHA recommendations

Surgery Recommended in patients who are

- Symptomatic
- Asymptomatic with
 - Any LV dysfunction
 - Atrial fibrillation
 - Pulmonary hypertension
 - Repairable valves
 - Recurrent VT

Indications for Surgery Isolated, Severe Chronic MR

■ Definite (major criteria):

- NYHA Class III or IV heart failure (any duration)
- EF <60%
- EF >60% but decreasing on serial measurements
- LVIDs >45mm
- ESVI >50cc/m²

Indications for Surgery Isolated, Severe Chronic MR

- Emerging (minor criteria):
 - Any symptoms of heart failure or sub optimal exercise tolerance test
 - Flail mitral leaflet
 - Left atrial diameter >45mm
 - Paroxysmal atrial fibrillation
 - Abnormal exercise end-systolic volume index or ejection fraction

MV Repair vs. Replacement

- Lower operative mortality
- Better late outcome
- Curative
- Avoids anticoagulation unless atrial fibrillation
- Open Afib ablation

MV Repair vs. Replacement (2)

- Valve replacement:
 - Mortality 2-7%
 - Anti-coagulation
 - Decreased LVEF
- Tissue prosthetic valve degeneration
- Mechanical prosthetic valve dysfunction/thrombosis
- Valve repair
 - Mortality 2-3%
 - No anticoagulation (unless Afib)
 - Preservation of LVEF
- Valve repair always preferable
 - Feasible in 70-90% of patients

Mitral Valve Replacement

Other Issues

- Mechanical valve – thromboembolism, bleed from anticoagulation
- Bioprosthetic valve– limited durability (degeneration)
- Chordal/subvalvular apparatus preservation
 - EF preop/postop 60% to 36% VS 63% to 61% in a comparative study

Acknowledgment

- Some slides adapted from Cardiology Rounds presentation by Stephane Moffett – R1 Anesthesia