

Valvular Heart Disease

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Introduction

- Four valves
- Purpose to let blood flow forward & prevent backward flow
- Disease: Congenital or Acquired
- Either narrowing (stenosis) or leaking (regurgitation)

Valvular Heart Diseases

- Mitral stenosis
- Mitral regurgitation
- Aortic stenosis
- Aortic regurgitation

Mitral Stenosis: Etiology

- Primarily a result of rheumatic fever
(~ 99% of MV's @ surgery show rheumatic damage)
- Scarring & fusion of valve apparatus
- Rarely congenital

Mitral Stenosis:

Pathophysiology

- Normal valve area: 4-6 cm²
- Mild mitral stenosis:
 - MVA 1.5-2.5 cm²
 - Minimal symptoms
- Mod mitral stenosis
 - MVA 1.0-1.5 cm² usually does not produce symptoms at rest
- Severe mitral stenosis
 - MVA < 1.0 cm²

Mitral Stenosis: Symptoms

- Fatigue
- Palpitations
- Cough
- SOB
- Left sided failure
 - Orthopnea
 - PND
- Palpitation
- Systemic embolism
- Pulmonary infection
- Hemoptysis
- Right sided failure

Recognizing Mitral Stenosis

Palpation:

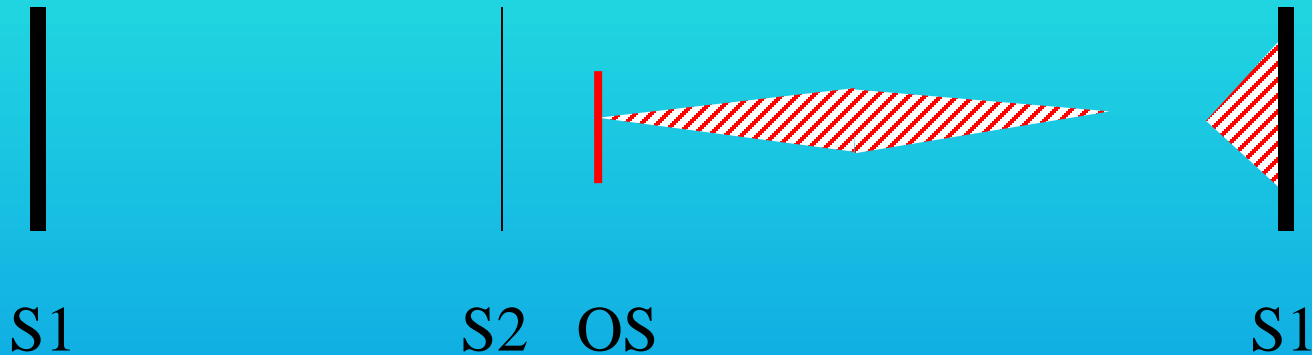
- Small volume pulse
- Tapping apex-palpable S1
- +/- palpable opening snap (OS)
- RV lift
- Palpable S2

ECG:

- LAE, AFIB, RVH, RAD



Mitral Stenosis: Physical Exam



- First heart sound (S1) is accentuated and snapping
- Opening snap (OS) after aortic valve closure
- Low pitch diastolic rumble at the apex
- Pre-systolic accentuation (esp. if in sinus rhythm)

Mitral Stenosis: Natural History

- Progressive, lifelong disease,
- Usually slow & stable in the early years.
- Progressive acceleration in the later years
- 20-40 year latency from rheumatic fever to symptom onset.
- Additional 10 years before disabling symptoms

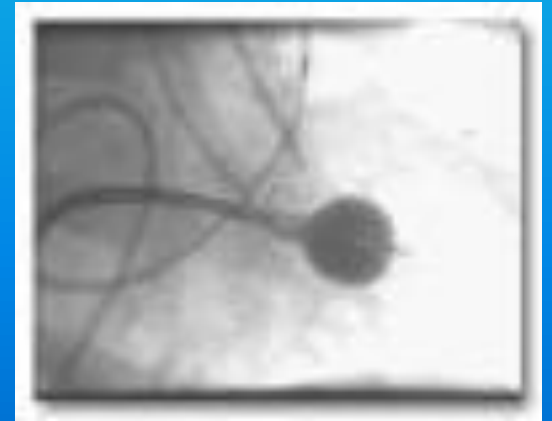
Mitral Stenosis: Complications

- Atrial dysrrhythmias (atrial fibrillation)
- Systemic embolization (10-25%)
 - Risk of embolization is related to, age, presence of atrial fibrillation, previous embolic events
- Congestive heart failure
- Pulmonary infarcts (result of severe CHF)
- Hemoptysis
 - Massive: 2^o to ruptured bronchial veins (pulm HTN)
 - Streaking/pink froth: pulmonary edema, or infection
- Endocarditis
- Pulmonary infections

Mitral Stenosis:Therapy

- Medical
 - Diuretics for heart failure
 - Digitalis/Beta blockers/CCB: Rate control in atrial fibrillation (A Fib)
 - Anticoagulation: In A Fib
 - Endocarditis prophylaxis
- Balloon valvuloplasty
 - Effective long term improvement

Mitral balloon valvuloplasty



Mitral Stenosis:Therapy

- Surgical
 - Mitral commissurotomy
 - Mitral Valve Replacement
 - Mechanical
 - Bioprosthetic

Mitral Regurgitation

MR aetiology: 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

Symptoms

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

Physical signs

- 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



Treatment

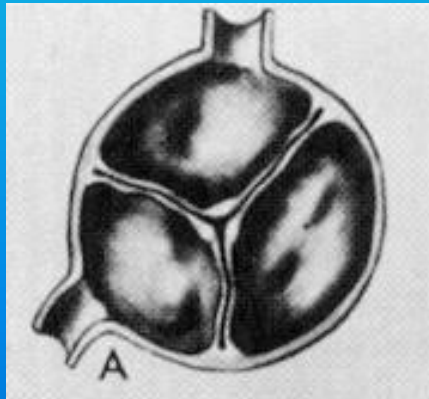
- Only effective treatment is valve repair/replacement
- Optimal timing determined:
 - Presence/absence of symptoms
 - Functional state of ventricle
 - Feasability of valve repair
 - Presence of Afib/PHTN
 - Preference/expectations of patient

Aortic stenosis

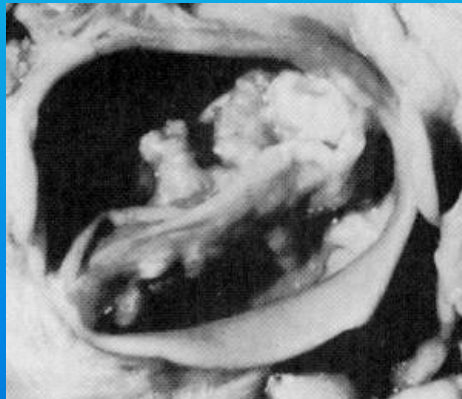
Aeitiology

- Young patient think congenital
 - Bicuspid
 - 2% population
 - 3:1 male:female distribution
 - Co-existing coarctation 6% of patients
- Rarely
 - Unicuspid valve
 - Sub-aortic stenosis
 - Discrete
 - Diffuse (Tunnel)
- Middle aged patient(4&5th decades) think bicuspid or rheumatic disease
- Old patient think degenerative (6,7,8th decades)

- Congenital bicuspid valve is the most common abnormality
- Rheumatic heart disease and degeneration with calcification are found as well



Normal



Bicuspid Ao V

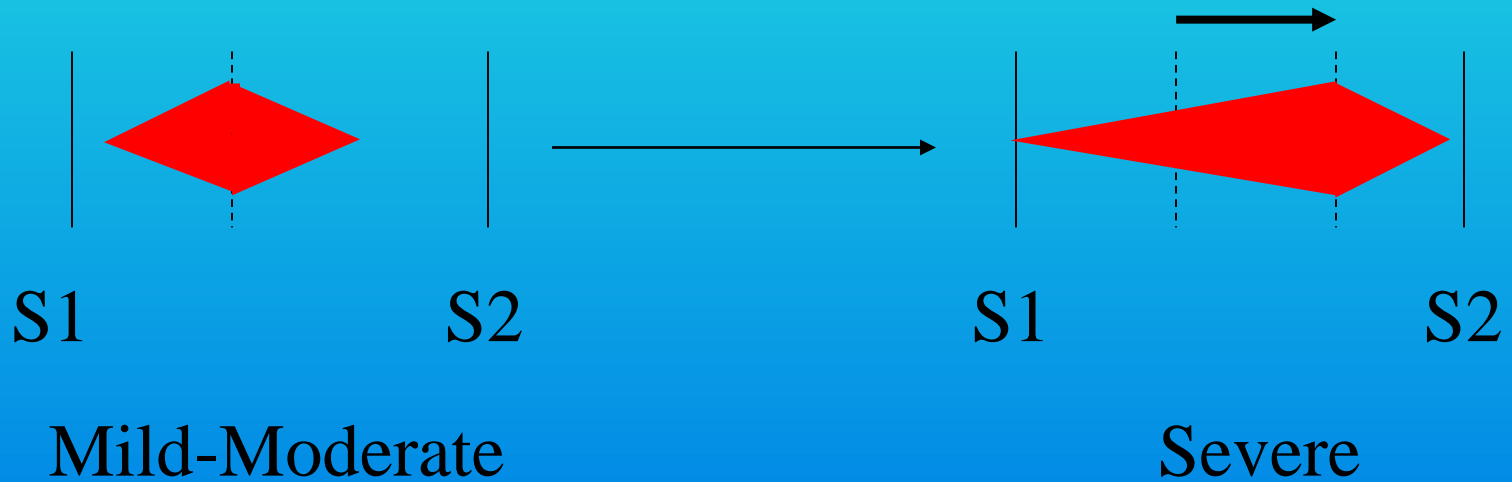


“Normal” geriatric
calcific valve

Symptoms

- Cardinal Symptoms
 - Chest pain (angina)
 - Reduced coronary flow reserve
 - Increased demand-high afterload
 - Syncope/Dizziness (exertional pre-syncope)
 - Fixed cardiac output
 - Vasodepressor response
 - Dyspnea on exertion & rest
 - Impaired exercise tolerance
- Other signs of LV failure
 - Diastolic & systolic dysfunction

Physical signs



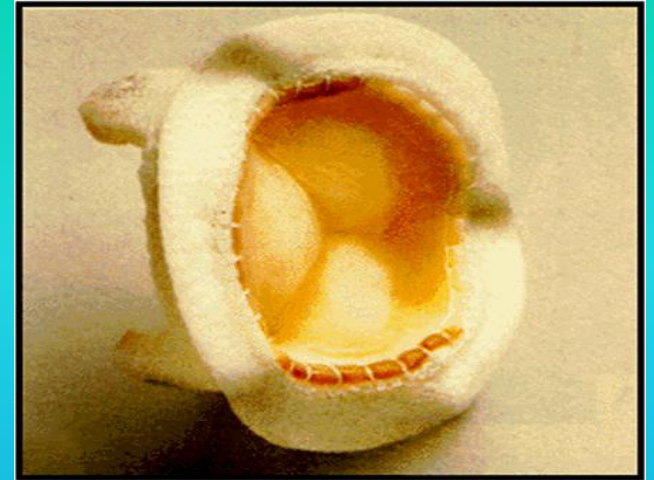
Physical signs

- Intensity DOES NOT predict severity
- Presence of thrill DOES NOT predict severity
- “Diamond” shaped, harsh, systolic crescendo-decrescendo
- Decreased, delay & prolongation of pulse amplitude
- Paradoxical S2
- S4 (with left ventricular hypertrophy)
- S3 (with left ventricular failure)

Prognosis & Treatment

Symptom/Sign	Live expectancy
Angina	5 years
Syncope	2-3 years
Congestive Heart Failure	1-2 years

Therapy: Valve replacement for severe aortic stenosis



Aortic Regurgitation

Aeitiology

- Any conditions resulting in incompetent aortic leaflets
- Congenital
 - Bicuspid valve
- Aortopathy
 - Collagen disorders (e.g. Marfan's)
 - Ehler-Danlos
 - Osteogenesis imperfecta
 - Pseudoxanthoma elasticum
- Acquired
 - Rheumatic heart disease
 - Dilated aorta (e.g. hypertension..)
 - Degenerative
 - Connective tissue disorders
 - E.g. ankylosing spondylitis, rheumatoid arthritis, Reiter's syndrome, Giant-cell arteritis)
 - Syphilis (chronic aortitis)
- Acute AI: aortic dissection, infective endocarditis, trauma

Symptoms

- Dyspnea, orthopnea, PND
- Chest pain.
 - Nocturnal angina >> exertional angina
 - (↓ diastolic aortic pressure and increased LVEDP thus ↓ coronary artery diastolic flow)
- With extreme reductions in diastolic pressures (e.g. < 40) may see angina

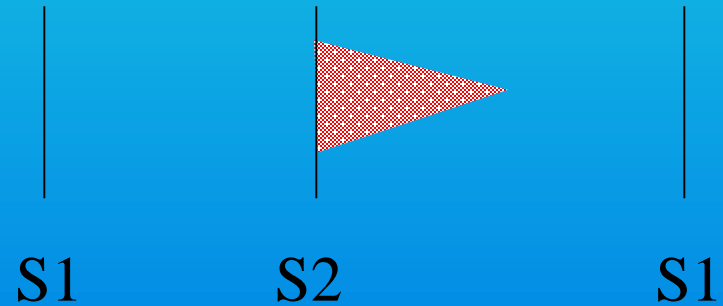
Physical signs

- **Quincke's sign**: capillary pulsation
- **Corrigan's sign**: water hammer pulse
- **Bisferiens pulse** (AS/AR > AR)
- **De Musset's sign**: systolic head bobbing
- **Mueller's sign**: systolic pulsation of uvula
- **Durosier's sign**: femoral retrograde bruits
- **Traube's sign**: pistol shot femorals
- **Hill's sign**: BP Lower extremity > BP Upper extremity by
 - > 20 mm Hg - mild AR
 - > 40 mm Hg – mod AR
 - > 60 mm Hg – severe AR



Physical signs

- Widened pulse pressure
 - Systolic – diastolic = pulse pressure
- High pitched, blowing, decrescendo diastolic murmur at LSB
- Best heard at end-expiration & leaning forward
- Hands & Knee position



Wave Sound

Natural History

Asymptomatic	%/Y
• Abnormal LV function	
– Progression to cardiac symptoms	25
• Normal LV function (~good prognosis)	
– Progression to symptoms or LV dysfunction	< 6
– Progression to asymptomatic LV dysfunction	< 3.5
– 75% 5-year survival	
– Sudden death	< 0.2
• Symptomatic (Poor prognosis)	
– Mortality	> 10
• <i>TX: Medical → Surgery BEFORE LV dysfunction</i>	