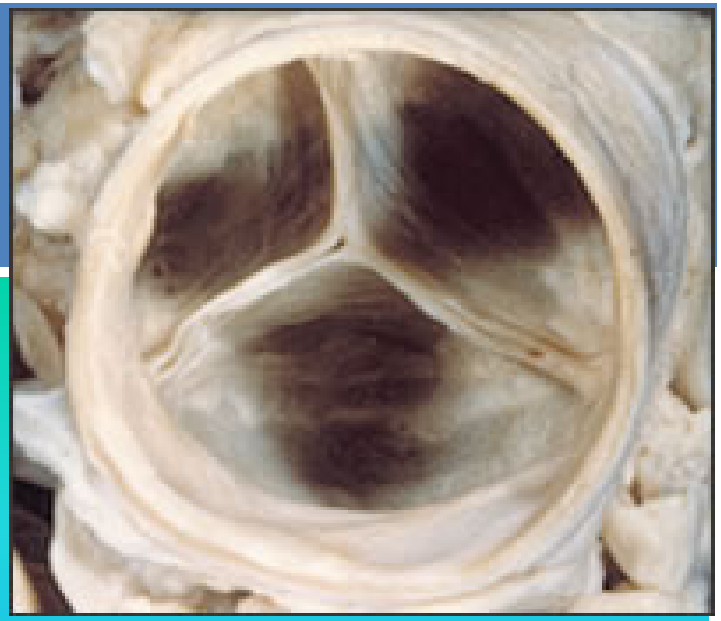
Aortic valve disease



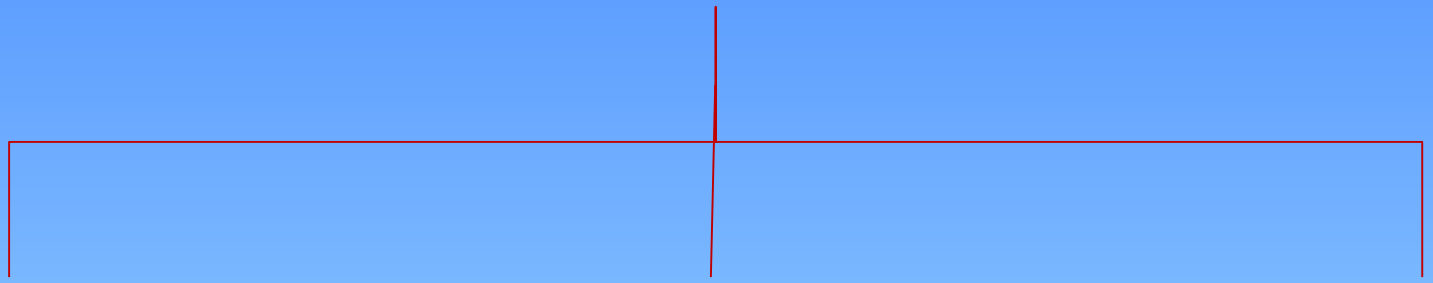
- Aortic stenosis .
- Aortic regurgitation .

DR YAHYA KIWAN
Consultant cardiologist
& interventionist (DH)

Aortic stenosis

- **The normal aortic area is 3-4 cm^2, in severe valvular AS (< 1cm^2)**
- Normally ,little or no pressure difference across the aortic valve
- **In sgnificant aortic stenosis LV pressure may exceed that of the aorta by >50 mmHg** .
- AS causes progressive obstruction of LV out flow tract resulting in pressure hypertrophy of LV .
- **Untreated, As is assoc with significant morbidity & mortality .**

Types Aortic stenosis



valvular

Subvalvular

Congenital condition

fibromuscular membrane

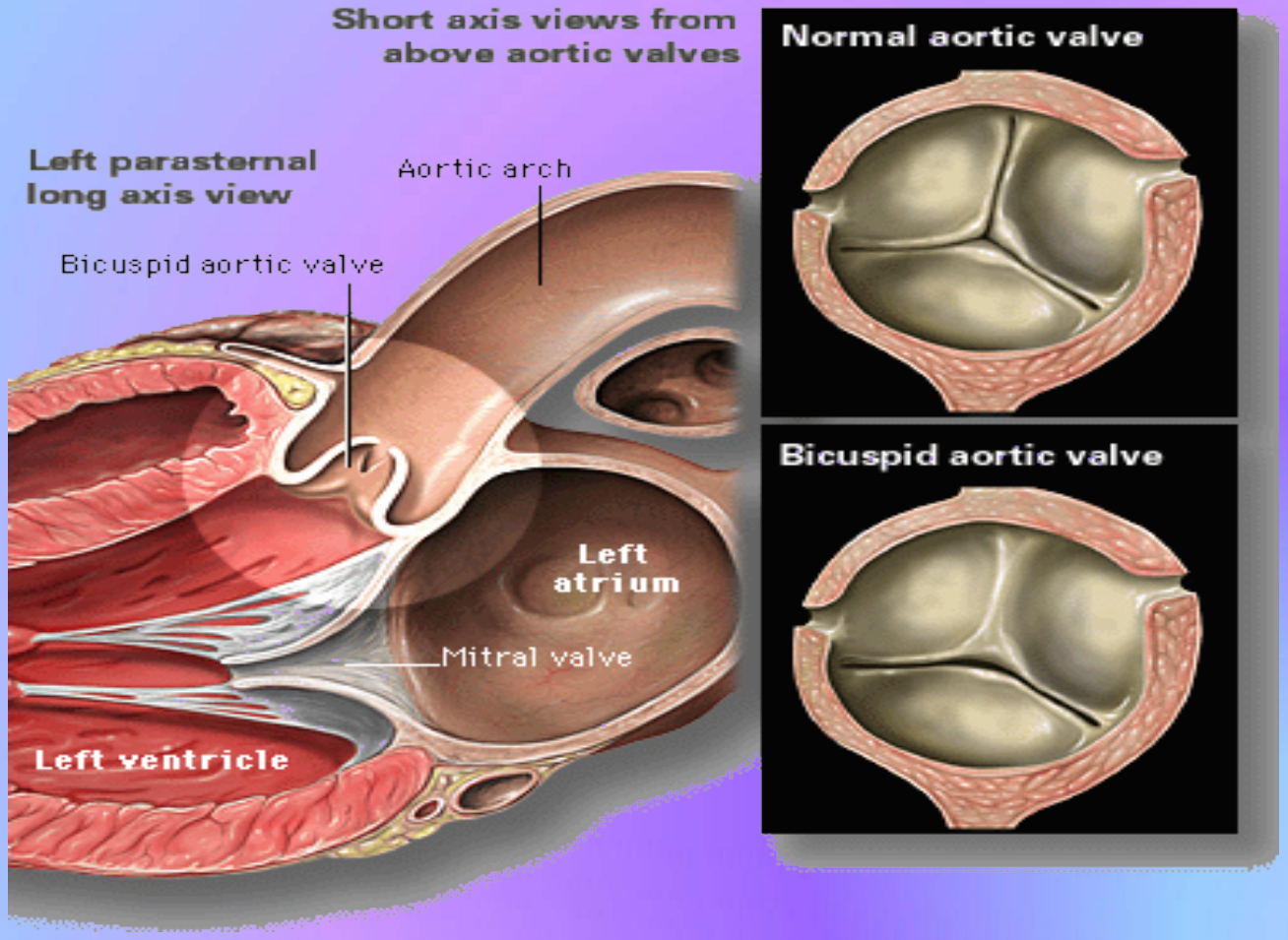
in the LVOT below AV

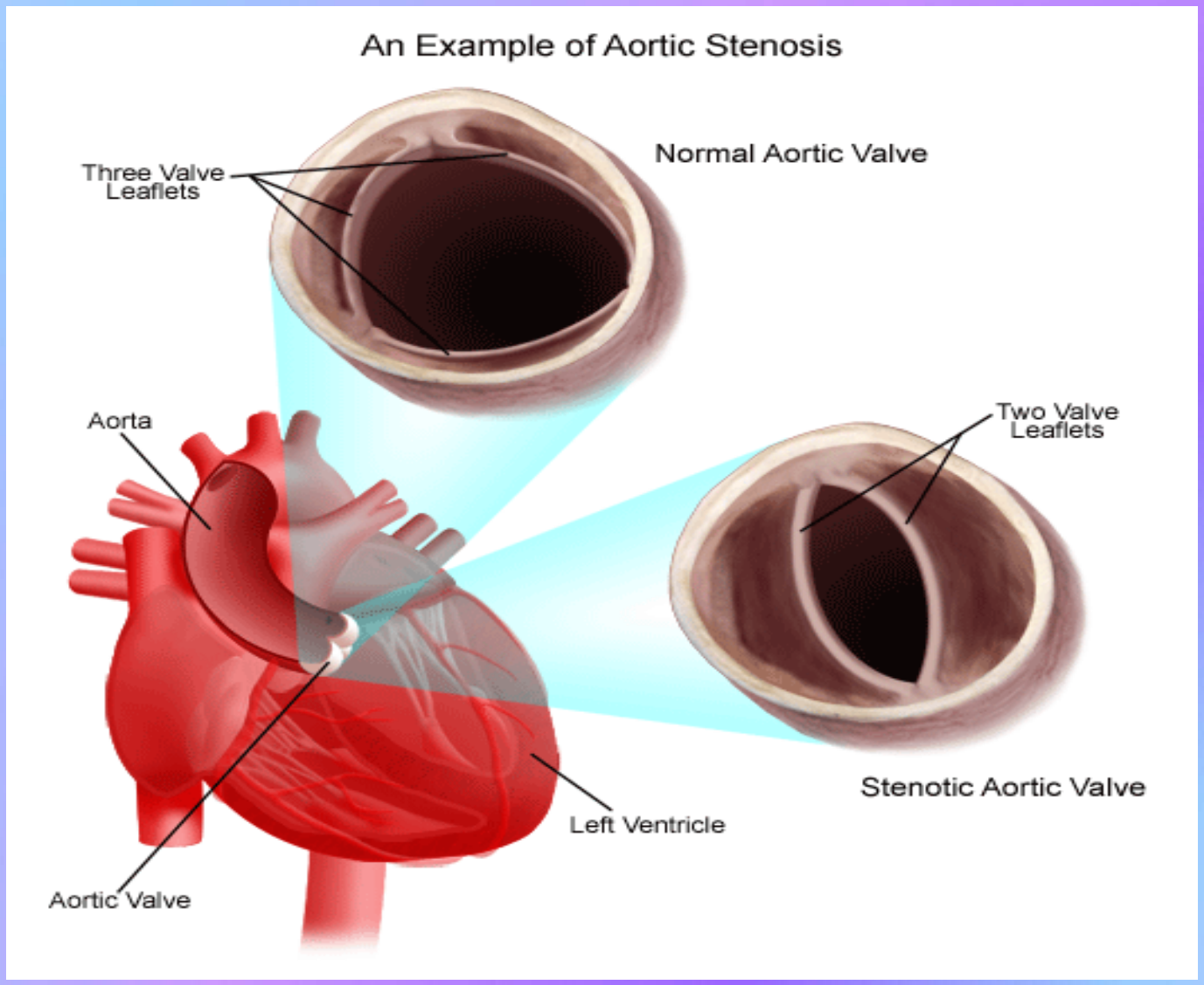
Supravalvular

(uncommon)

Etiology of Valvular AS

- **Congenital**
- **Rheumatic (often coexist with AR & MVD)**
- **Bicuspid (1-2%,predominate in males ,in 9% of 1rst degree,may be stenotic or regurgitant**
- **Age-related calcific degeneration**


Short axis views from above aortic valves
Normal aortic valve
Left parasternal long axis view
Aortic arch
Bicuspid aortic valve
Bicuspid aortic valve
Left atrium
Mitral valve
Left ventricle


An Example of Aortic Stenosis
Normal Aortic Valve
Three Valve Leaflets
Aorta
Two Valve Leaflets
Stenotic Aortic Valve
Left Ventricle
Aortic Valve

Symptom of AS

- **Angina** (↓ myocardial perfusion,associated CAD (occurs in 40-80% of pts with angina & 25% in pts with out angina)
- **Syncope**
- **Heart failure**
- **Sudden death** (hypotension, arrhythmia due to ischaemia, LVH or impaired LVF)

Physical finding in AS

- Arterial examination:-

  Diminished & delayed carotid upstroke (pulsus parvus et tardus)

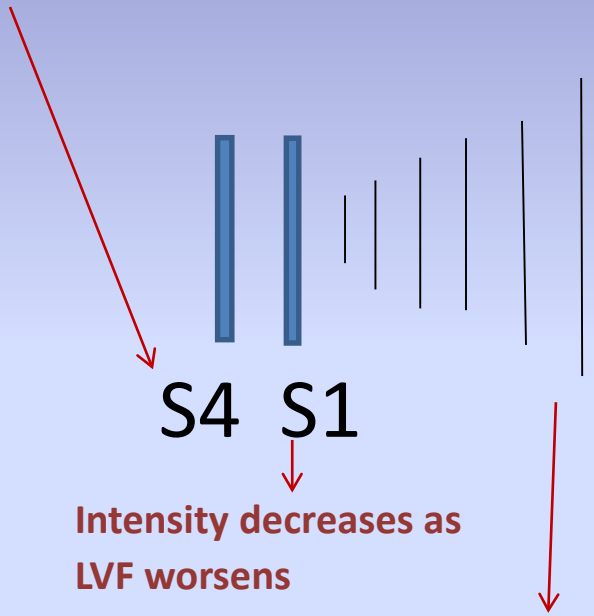
- Palpation :-

  None displaced ,diffuse, sustained apical impulse , double apical impulse (palpable a wave or S4 caused by noncompliant LV .

  systolic thrill in the 2^{ND} Rt ICS .

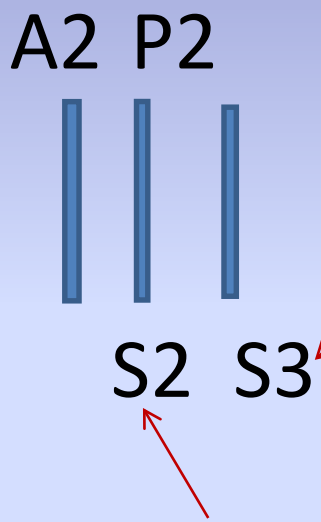
Ausculatory finding in AS

Often present due to LVH & poor LV compliance



Intensity decreases as LVF worsens

Intensity decreases as AS progresses



S3 may be present late in the course

Murmur is systolic ,harsh best at Rt upper sternal border radiadtes to carotids peaks in early to mid systole until late in the course when it peaks later & is more intense

S2 becoms soft as A2 decreses in intensity. may paradoxically split as severity increases may become soft & single late in the course.

Diagnostic testing of AS

- ECG (LA abnormality ,LVH)
- CXR (boot shape,cardiomegally,calcification)
- Echocardiography (T TE,TEE)
- Cardiac catheterization.

Therapy of AS

- Medical

  - Antibiotic prophylaxis

  - Asymptomatic :- (1ry prevention of CAD maintenance of SR , blood pressure control,

  - symptomatic :-treatment of heart failure

- Percutaneous aortic balloon valvuloplasty (PABV)paediatric congintal,noncalcific,Rh AS)

- Surgical AVR (main stay in severe AS)

Indication of PABV in adults with AS

- Bridge to surgical aoric valve replacement in haemodynamically unstable patient .
- Palliative therapy for nonoperative candidate
- (high surgical risk due to multiple comorbidities or pt refuses surgery)
- Pts with critical AS who require urgent noncardiac surgery

Recommendation of AVR

- **Symptomatic Pts with severe aortic AS**
- **Pts with severe AS undergoing CABG .**
- **Pts with severe AS undergoing aortic or other valve surgery .**

Possibly indicated :-

- Pts with moderate AS who require CABG or aortic or other valve surgery .
- A symptomatic Pts with severe AS & :-

- impaired LV F (EF < 50%)
- symptoms,hypotension or ventricular arrhythmias **during exercise .**

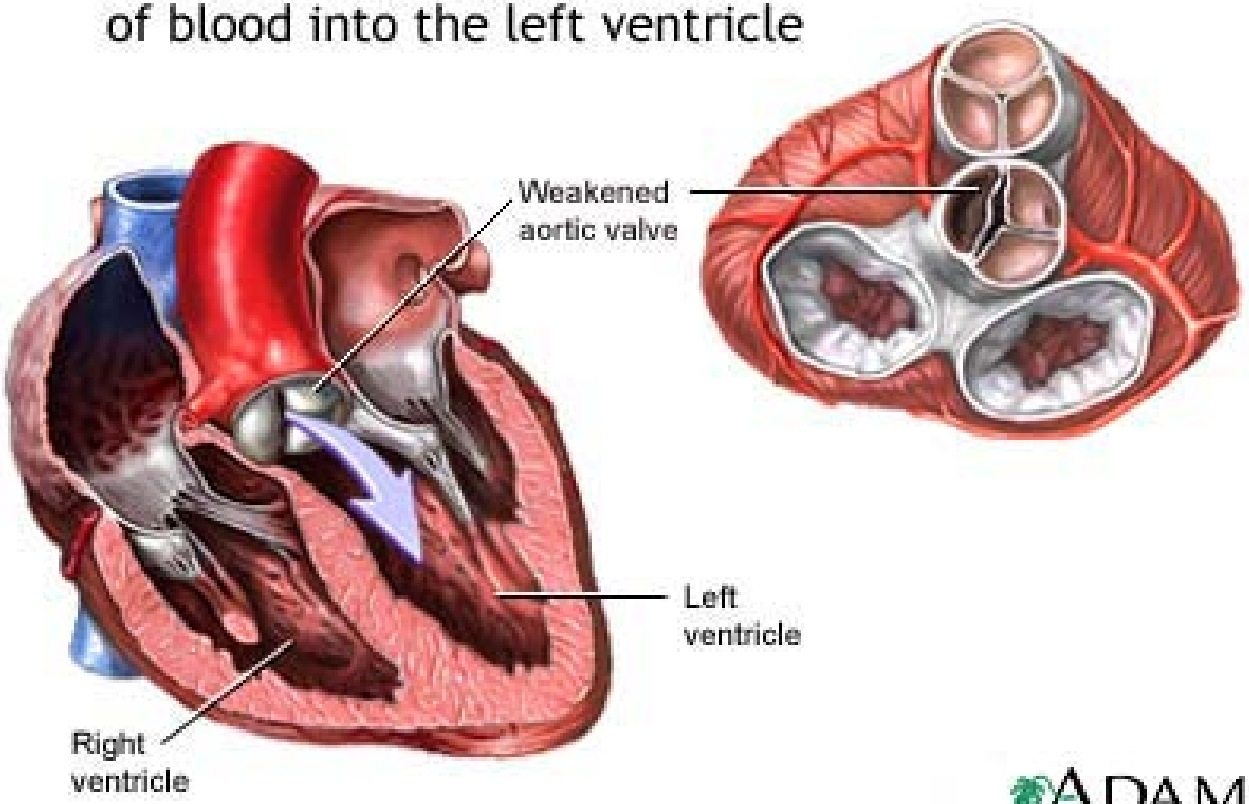
Aortic regurgitation

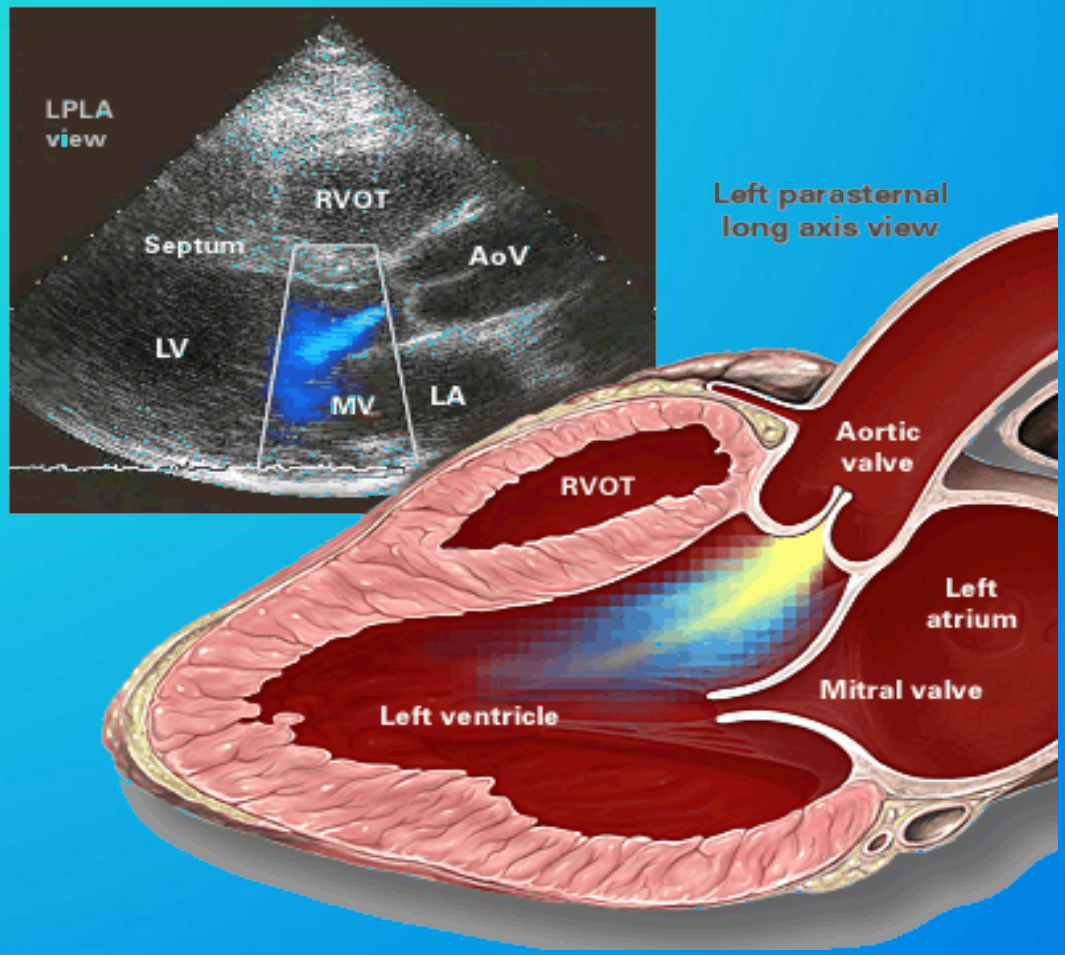
- Can develop from

  - 1ry disease of the valve leaflets
  - Abnormality of aortic root or ascending aorta.

- Can be acute or chronic

Failure of the aortic valve to close tightly causes back flow of blood into the left ventricle




LPLA
view
RVOT
Septum
AoV
LV
MV
LA
Left parasternal
long axis view
Aortic
valve
RVOT
Left
atrium
Mitral valve
Left ventricle

Major causes of chronic AR

Leaflet abnormalities	Aortic root or Ascending Aort a Abnormalities
Rheumatic fever	Age related aortic dilatation
Infective endocarditis	Annuloaortic ectasia
Trauma	Cystic medial necrosis of aorta (isolated or marfan syndrome)
Bicuspid aortic valve	Systemic hypertension
Myxomatous degeneration	Aortitis (syphilis ,giant cell arteritis)
Congenital aortic regurgitation	Reiter's syndrome
SLE	Ankylosing spondylitis
Rheumatoid arthritis	Behçet syndrome
Ankylosing spondylitis	Psoriatic arthritis
Takayasu's arteritis	Osteogenesis imperfecta
Crohn's disease	Relapsing polychondritis
Drug induce valvulopathy	Ehlers –Danlos syndrome

Major cause of acute AR

Leaflet abnormalities	Aortic rot or ascending aorta abnormalities
Traumatic rupture	Acute aortic dissection
Acute infective endocarditis	Perivalvular leak or dehiscence of prosthetic valves
Acute prosthetic valve dysfunction	
Poor aortic balloon valvuloplasty	

Symptoms of AR

Chronic AR	Acute AR
Usually asymptomatic for along time .	Sudden haemodynamic deterioration hypotension, tachycardia,pallor,cyanosis, Diaphoresis, cool extremities,pulm onary congestion
After LV dysfunction – symptoms of pulmonary congestion - dyspnea ,PND	Weakness,altered mental status ,SOB syncope .
Chest discomfort (due to LV enlargement exaggerated after pvcs &in supine position	If severe chest pain is present aortic dissection should be suspected .
Angina (uncommon,due to latent CAD, reduced diastolic coronary perfusion,nocturnal bradycardia , LVH,subendocard ischaemia	

Physical findings in chronic AR

- characteristic peripheral pulses, cardiac auscultatory findings.
- Pts with chronic AR should be examined for:-
  - Peripheral manifestation of infective endocarditis
  - Signs of Marfan syndrome .
  - Evidence of chronic aortic dissection
  - Signs for collagen vascular disorder .

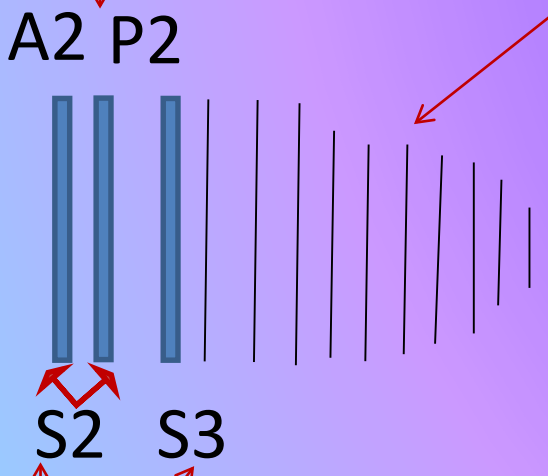
Physical signs associated with hyperdynamic pulse in chronic AR

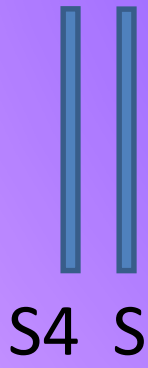
Physical sign	Description
Water hammer or corrigan's pulse	Rapid upstroke followed by quick collapse
De Musset's sign	Head bob with each heart beat
Traube's sign	Pistol shot sounds heard over the femoral arteries in both systole &diastole
Müller's sign	Systolic pulsation of the uvula
Duroziez's sign	Systolic murmur over the femoral artery when compressed proximally & diastolic murmur when compressed distally or systolic-diastolic murmur with increasing compression over femoral artery
Quincke's sign	Capillary pulsations visible in the lunula of the nail bed
Hill's sign	Popliteal cuff systolic pressure >brachial cuff systolic pressure by >60mmHg
Becker's sign	Arterial pulsations visible in the retinal arteries & pupils

Auscultatory finding in AR

A2may be soft due to poor coaptation
P2 may be obscured by the murmur

Murmur is diastoli c, blowing , Decrescendo best hearedat the Lt upper S B severity correlates more with duration than intensity





Note :- Austin flint murmur mid - late diastolic rumble (vibration of AML) may be audible

Intensity decreases as LVF worsens

S3 may be present late in the course

May be narrowly split or paradoxically split due to prolonged systolic ejection time

Often present due to LVH &poor LV compliance

Physical examination maneuver in AR

Increase murmur	**Decrease murmur**
Isometric exercise (e.g.,hand grip)	Standing from squatting position
squatting	Strain of Valsalva maneuver
Inotrope infusion	Inhalation of amyl nitrite

Physical findings in acute AR

- Signs of hyperdynamic circulation characterize chronic AR often absent .
- Pulse pressure normal or slightly wide
- Heart size normal (undisplaced apex)
- S1 may be diminished due to preclosure of MV P2 may be loud,S3(if cardiac decompensation)
- Murmur is shorter &lower in pitch ,if severe may not be audible
- systolic flow murmur may be audible .
- Austin flint, if present ,is shorter

Diagnostic testing of AR

- **ECG :-** LVH,LAD,Lt atrial abnormality ,in acute AR non specific ST-T changes.
- **CXR :-** cardiomegaly (acute AR may be normal) pulmonary congestion .
- **Echo:-** TTE(2D M mode,Doppler color flow),TEE}.
- **Cardiac catheterization** :- coronary angiography to exclude CAD.

Medical Therapy of AR

Chronic AR :-

- Antibiotic prophylaxis .
- Drugs: (vasodilator (hydralazine ,ACEI,CCB) to slow progression of LV dysfunction &LV dilatation,B blocker in in aortic root dilatation

Acute AR :-

- IV vasodilators &inotropic agents in pt with cardiogenic shock .
- Antibiotic if assoc with infective endocarditis
- management of acute AR Usually surgical according to the cause .

Surgical therapy of AR

Indications of aortic valve replacement in AR
Class 1
NYHA class 111or 1V or CHA class 11to 1V symptoms(withor without CAD) with normal LVF (EF ≥50%)
NYHA class 11 & preserved LV systolic function (EF ≥50%) with progressive LV dilatation or declining EF at rest or declining exercise tolerance .
A symptomatic or symptomatic pts with mild to moderate LV dysfunction at rest (EF 25 -49%)
Pts undergoing CABG or surgery in the aorta or other heart valves.
Class 11a
NYHA class 11& preserved LVSF with stable LVSF,size&exercise tolerance
A symptomatic pts with normal LV F but with severe LV dilatation EDD>75 or ESD>55

Surgical therapy of AR

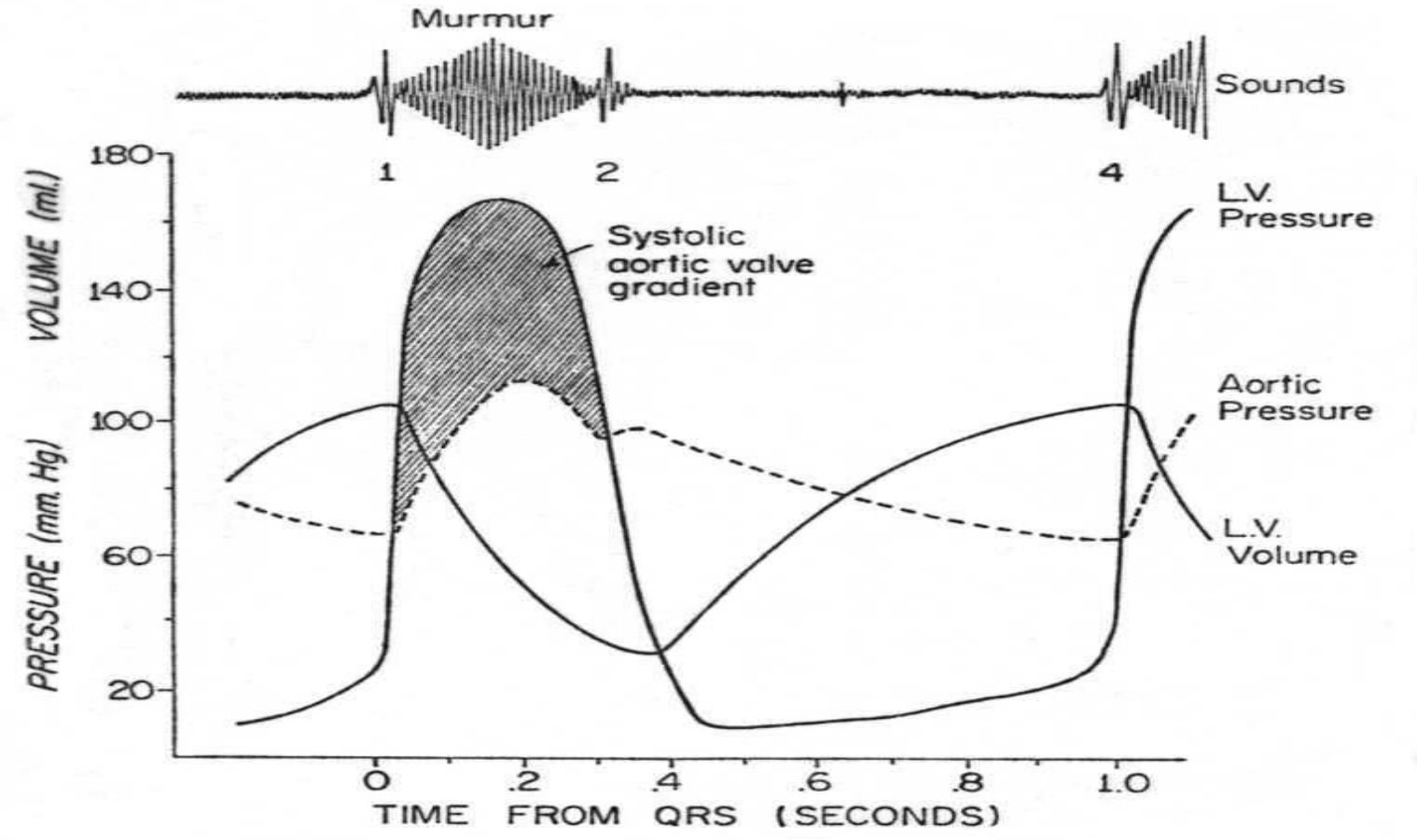
Indications of aortic valve replacement in AR(continued)
Class 11b
Pts with severe LV dysfunction (EF < 25%)
Asymptomatic pts with normal LVSF at rest & progressive LV dilatation which is moderately severe (EDD70-75,ESD 50-55% mm)
Asymptomatic pts with normal LVSF at rest but with decline in EF during(stress echo or exercise radionuclide angiography)
Asymptomatic pts with normal LVSF at rest &LV dilatation which is not severe (EDD <70 mm,DSD < 50 mm)

Pt with chronic AR should be obsereved closely for the development of LV systolic dysfunction.

Follow up evaluation typically is conducted with serial echocardiography .

If signs o of LV systolic dysfunction develop surgical therapy should be considered .

THANKS


Murmur
Sounds
1
2
4
180
140
100
60
20
PRESSURE (mm. Hg)
VOLUME (ml.)
Systolic
aortic valve
gradient
L.V.
Pressure
Aortic
Pressure
L.V.
Volume
0
.2
.4
.6
.8
1.0
TIME FROM QRS (SECONDS)