CONGENITAL HEART DISEASES

Suspicion:

History:
- ⇨ age < 5 4.
- ⇨ No hx of Rh fever.

General ex:
- ⇨ systemic hypertension.
- ⇨ Central cyanosis.

Local ex:
- ⇨ dextrocardia é central trachea.
- ⇨ Basal or parasternal thrill in young.
- ⇨ Pure AS.
- ⇨ Bicuspid aortic valve.

Classification:

Abbott classification		
Cyanotic	**A Cyanotic**	**Potential cyanotic**
$F_3 - F_4 - F_5$ Eisenmenger syndrome T_A - T_{GA} Tricuspid atresia	PS AS Coarcitation of aorta Dextrocardia	ASD VSD PDA

Clinical classification	
Cyanotic	**A Cyanotic**
As in "Abbott"	As a Cyanotic + potential cyanotic in "Abbott"

According to chamber enlarged		
Point	**A Cyanotic**	**A Cyanotic**
No	F_4	Dextrocardia – small VSD
RVH	F_3 (PS) - Eisenmenger syndrome (pulm. HTN)	PS – ASD
LVH	Tricuspid atresia	AS – PDA - Coarcitation of aorta
Bi. VH	Persistent TA – TGA	Big VSD.

[A] ACYANOTIC GROUP

Point	① **PS**	② **ASD**	③ **VSD**
Types	Subvalvular Valvular Supravlvular	osteum primum (low) osteum secondum (at foramen ovale) Sinus venosus (high)	Small muscular type Big membranous type Gerbode type () RA K LV
Heamo – dynamic	LOCP Pulm. Art.Pr.& blood↓ Lung oligaemia RVH (pressure overload)	LOCP Pulm. Art.Pr.& blood↑ Lung plethora RVH (pressure overload)	LOCP Pulm. Art.Pr.& blood↑ Lung plethora Bi. VH (excess blood)
Complic-ation	If sever PS + patent F.O → reversible of shunt →cyanosis (F_3)	Functional VC of PA →organic narrowing → pulm. HTN→ reversible of shunt → Eisenmenger s	As ASD → reversible of shunt → cyanosis Eisenmenger syndrome

CONGENITAL HEART DISEASES

Point	① PS	② ASD	③ VSD
Symptoms	Mild case (asympt) LOCP $ $ of complication	Mild case (asympt) LOCP $ (dyspnea – haemoptysis) excess blood $ of complication	Mild case (asympt) LOCP $ Dyspnea Haemoptysis $ of complication
General Signs	Mild case → no signs LOCP Sings Giant S wave → contract ≠ resistance	Same Same No, except in pulm. HTN	Same Same No, except in pulm. HTN
Inspection Palpation Auscultation	RV apex Thrill on pulm. Ẃ may extend up & down Dullness in Lt 2nd pace → d.t position dilatation No pulsation	RV apex No thrill (low gradient) Dullness & pulsation on pulm. Area → d.t pulm. HTN	Bi.V apex Thrill (high gradient) at 3rd , 4th , spaces (parasternal) Dullness & pulsation
Auscultation Over pulmonary Area	Weak S_2 Wide splitting Ẃ ↑ by inspiration سكة ضيقة (inspiration →↑ VR → ↑ overload Ejectron click (organic PS) Ejectron harsh systolic murmur radiate up & down	Accentuated S_2 Wide splitting Ẃ is fixed (RBBB 80%)+ دم كثير Inspiration →stop shunt by ↑ VR Ejectron click (relative PS) Ejectron soft systolic murmur é no propagation	Accentuated S_2 Wide splitting Ẃ ↑by Inspiration دم كثير Ejectron click (relative PS) Ejectron soft systolic murmur é no propagation

Point		① PS	② ASD	③ VSD
Auscultation	Pulm. area	S_4 (↑ pressure)	S_3 (augmented RV filling) Mid diastolic murmur (soft) d.t relative T.S by ↑ bl. From RA → RV	----------
	Mitral area			
Complication		RVF IE (at pulm. Valve or pulm. Artery) TB (oligaemia) T_3	RVF No IE (low gradient) Haemoptysis Recurrent chest inf. Eisenmenger syndrome	bI VF IE (at RV) Haemoptysis Recurrent chest inf. Eisenmenger syndrome

Point		① PS	② ASD	③ VSD
Investigation	x-ray	Oligeamia (lung) ~~RVH (heart)~~ Post stenotic dil (heart)	(Lung plethora -Lung ~~hilar dance~~) → vigorous pulsation at ihilum of lung RVH (heart) Dilated pulm. Art. (heart)	Lung plethora ~~Lung hilar dance~~ BHV (heart) Dilated pulm. Art. (heart)
	ECG	RVH	RVH Rt BBB Lt axis deviation (associated MR) AF	Bi.V.H
	ECHO	Diagnostic	Diagnostic	Diagnostic
	Angio.	D type of PS	Show shunt of dye across I defect	Show shunt of dye across I defect
Treatment	Med.	Prophylactic	……	Prophylactic ≠ IE
	Surg.	Supra valvular →graft Valvular →commisurot → replacement Sub valvular → myomectomy	Closure of defect but wart till → $ exaggerated → school age → Pulm. Flow becomes at least twice systemic flow.	Immediate closure of defect once discovered

(4) COARCITATION OF AORTA (ADULT TYPE)

Def.: Narrowing of segment of aorta distal to subclavian artery.

Haemodynamics:

⇨ Mechanical obstruction by coarcitation: ↓blood pressure in lower 1/2 of body.
↑Blood pressure in upper 1/2 of body.

⇨ Collaterals foimed ( ) Lt Subclavian or its branches & descending aorta.

CP: symptoms:

⇨ ↑bl. Pr. in upper 1/2 (headache – epistaxis)
⇨ ↓bl. Pr. in lower 1/2 (cloudication of LL, Coldness, pallor).
⇨ Collaterals → pressure on nerves → shoulder pain.

Signs:

1. General signs:
   ⇨ Upper limb → forcible pulse, HTN.
   ⇨ Lower limb → weak pulse, low BP.
   ⇨ Collaterals → Suzmann sign (when pt. lean forward é upper arm hanging down → kinking of subclavian shift of blood to the collaterals → "worm-like" vessels & pulsation in i inter scapular area.

Why HTN UL?
↑ Blood in upper 1/2
↓bl. Pr. in lower 1/2 →renal ischemia →↑rennin →→→angiotensin II → general VC Ẃ↑ BP mainly in upper 1/2 as lower 1/2 contain empty VS.

2. Cardiac signs:
   - ⇨ LV apex: (shifted out & down – localized – pulging – heaving).
   - ⇨ Over aortic area:
     - o Accentuated S_2 – ejection click.
     - o Ejection systolic murmur due to: relative AS – dilated aorta by ↑Pr.
     - o Early diastolic murmur due to: (ass. Bicuspid aorta – dilatation of thering [2ry to HTN]) AR.
   - ⇨ Over Coarcitation:
     - o Systolic murmur Ẃ may extend to diastolic, radiate to inter scapular area & heared over infracalviculare area.
   - ⇨ Collaterals:
     - o Continuous murmur in inter scapular area.
     - o The murmur disappears by pressure over the feeding vessel.

Investigation:

- X-ray: LVH – double aortic knuckle (dilated aortic ring) in 1st space – notched lower border of posterior ribs due to collaterals (rosier sign).
- ECG: LVH (HTN).
- ECHO: diagnostic.
- Catheter: pr. Proximal to Coarcitation > pr. Distal to it (gradient inside A)
- Angiography: diagnostic – blood is seen shift to collaterals.

Complication:

- LVF.
- IE: at coarcitation – at valve in bicuspid aortic valve.
- Rupture aorta.
- Rupture of aneurysm of circle of Willis → subarachnoid Hgc → death.

Treatment:

- Medial: 5 نقاط.
- Surgical: small→ resection & anastomosis.
  Large→ resection & graft.
  V. large → bypass operation

Common association é coarcitation:

- Bicuspid aortic valve → AR → most important as it nullify deference of blood pr. % pulse volume () VL & LL so I most important sign is carotid femoral delay in D of Coarcitation.
- Aneurysm of circle of Willis, PDA, Turnings syndrome, VSD.

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(5) PDA

Def.: persistence of ductus arteriosus, A&B distal to Lt subclavian artery.

Haemodynamics:

⇨ Pr. In A&B: bl. Shunt from A&B in both systole & diastole, so both systolic & diastolic Pr&bl↓.

⇨ Shunt of blood → lung plethora → ↑LV blood → ↑ systolic pr. , so systolic ↓ is compensated while that of diastolic is not, so ↑ S, ↓ D (big pulse pressure)

- ⇨ Enlarged pulm. Artery & its branches & LAH & LVH.
- ⇨ Compensatory V.C of pulm. Vessels → pulm. HTN Ẃ progress till pressure in P>A → reversed shunt → Eisenmenger syndrome.

Clinical picture:

Symptoms:

- ⇨ Mild case → no signs.
- ⇨ Throbbing headache, palpitation, cough, dyspean.
- ⇨ Recurrent chest infection, $ of complication.

Signs:

1. General signs:
   - ⇨ Differential cyanosis in lower limb not upper limb.
   - ⇨ Peripheral phenomena as AR.
2. Cardiac signs:
   - ⇨ LV apex (hypertension).
   - ⇨ Continuous murmur at Lt 1st space machinery murmur Ẃ radiate up (neck) & down (apex) & heard over infracalviculare area.
   - ⇨ Continuous thrill at Lt 1st space:
     - o At P: accentuated S_2 – ejection systolic murmur (relative PS) d.t excess blood → dilate artery é normal ring.
     - o At A: ejection systolic murmur (relative AS) d.t excess blood through i valve.
     - o At M: mild diastolic murmur (relative MS) – S_3.

Complication:

- LVF – IE.
- Aneurysmal dil. Of shunt – rupture of the shunt – reversal of the shunt → Eisenmenger syndrome → deferential cyanosis.
- Recurrent chest infection – haemoptysis.

Investigation:

- X-ray: LAH – LVH – pulm. Artery dilatation – lung plethora (3/3).
- ECG: LAH – LVH.
- ECHO: diagnostic.
- Catheter: pr. Arterialization of pulm. Art. Blood $PAO_2 > RVO_2$.
- Angiography: show the shunt.

Treatment: once diagnosed must be surgically corrected (resection) as operative mortality is lower than I.E (complication).

DD: Coarcitation of aorta & PDA (by femoral pulse → weaker than radial in coarcitation.

N.B: Once pulm. HTN develop in case of PDA:

Eisenmenger syndrome → differentiated cyanosis in LL.

Giant A wave.

Pulsation & dullness over P area.

DEXTROCARDIA

Type I: situs inversus totalis – mirror-like malposition of the heart & other viscera
N.B: kartagener's syndrome: (situs inversus totalis – immotile cilia syndrome [bronchiectasis, sinusitis])

Type II: isolated dextrocardia – mirror-like malposition of the heart may be associated with other cardiac anomalies.

Type III: Dextrovarsion: the heart is just displaced to the right side and may be associated with other cardiac anomalies.

Type IV: Dextropostion or acquired dextrocardia: the heart is displaced to the right side by pulmonary, pleural, or diaphragmatic disease.

Differentiation between congenital & acquired dextrocardia:

Items	Congenital	Acquired
1. chest cause	Absent	Present
2. trachea	Central	Shifted to R
3. apex	Localized (LV)	Diffuse
4. situs inversus totalis	May be present	Absent
5. other cardiac anomalies	May be present	Absent

(B) Cyanotic group

Point	1- F_4	2- F_3	3- Eisenmenger sy.
Components	PS (Subvalvular) VSD – mild RVH Over riding aorta	PS (valvular) "sever" ASD Marked RVH	Pulm. HTN é reversal of shunt Ẃ occurs. Late → ASD Early → VSD – PDA
Haemo – dynamics	PS → lung Oligeamia Bl. Shift across defect to LV → LVH as pressure in RV is high Cyanosis is directly proportional é degree PS	PS → marked RVH Reversal of the shunt → cyanosis	Reversal of shunt d.t ↑bl. To lung → pulmonary HTN →↑ RV Pr. → cyanosis.
Symptoms	Central cyanosis LCOP (Stenosis – qualitative) Dysnea on exertion (arterial hypoxemia) Squatting & cyanotic spills.	Central cyanosis LCOP (Stenosis – qualitative) Dysnea on exertion (arterial hypoxemia)	Central cyanosis LCOP (hypertensive – qualitative) Dysnea on exertion (arterial hypoxemia)
Signs	Central cyanosis (since birth) Blue clubbing No giant A wave (blue pass via VSD)	Central cyanosis (since birth) Blue clubbing giant A wave (sever stenosis)	Central cyanosis (since birth) Blue clubbing giant A wave (HTN)

Point		1- F_4	2- F_3	3- Eisenmenger sy.
		Inspection & palpation		
		Mild RVH Thrill over 3rd & 4th spaces (Subvalvular)	Marked RVH Thrill over 3rd spaces (valvular)	Marked RVH According to origin of shunt: PDA→thrill(infra.Clav) VSD→thrill(parasternal) ASD→nothrill(low gradient) Pulsation & diastolic shock on pulmonary
		Percussion		
		---------	---------	Dullness in 2nd Lt space
		Auscultation		
		S_2 → single accentuate No ejection click Ejection systolic m over 3rd space d.t P.S	S_2 → weak wide split Ejection click Ejection systolic m over pulm. Area d.t P.S. Early diastolic m?? **why**	S_2→accent. Wide splitted Ejection click (may) Ejection Systolic m over pulm. Area d.t P.S. Early diastolic m "Graham steel" Due to dilated valve → 2ry PR "surest sigh"
Complication		RVF (rare d.t mild RVF) IE (rare d.t ↓bl) Polycythemia Thrombosis Paradoxical emboli (through shunt) TB (Oligeamia) Cyanotic spills No dysnea No haemoptysis	RVF IE same same same TB (Oligeamia) No Cyanotic spills No dysnea No haemoptysis	RVF IE same same same TB (Oligeamia) No Cyanotic spills No dysnea No haemoptysis
Investigation	X ray	Oligaemia Wooden boot shape Heart Coeur in shape (RVH-enlarged aorta – exagg. Waist)	Oligaemia Marked RVH Post-stenotic dil.	Plethora Marked RVH Dilated main pulm. Artery and its branches
	ECG	Mild RVH	Marked RVH	Marked RVH
	ECHO	Diagnostic	Diagnostic	Diagnostic
	catheter	↓Pulm. Artery pr. ↑RVF=aortic pr.	↓Pulm. Artery pr. RVF>aortic pr.	↑Pulm. Artery pr. RVF>aortic pr.
	Angio.	Show defect	Show defect	Show defect

Point	1- F_4	2- F_3	3- Eisenmenger sy.
Treatment	Rare...cyanotic spills Squatting – inderal – morphine.	Prophylaxis ≠ IE	Prophylaxis ≠ IE
	Complete surgery correction "broeck op" Shunt op. till suitable age: ▪ Blalock op. ▪ waterson op.	Complete surgery correction: ▪ Commisurotomy for PS. ▪ Closure of ASO	No role of surgery. Recently: heart-lung transplantation

RHEUMATIC FEVER

Def: connective tissue disease characterized by (vasculitis – fibrinoid degeneration – immune disturbance)

AE: group A-beta hemolytic streptococci – infection after period (4Ẇ)

Pathogenesis:

1. Cross reactive immunity (shared antigen): protein of streptococci is similar to cardiac ms protein immunology so body form antibodies against streptococci which cross react with cardiac protein.
2. Autoimmunity: streptococci damage CT → proteins which is already altered so act as antigen → stimulate AB ≠ it.
3. Hapten (incomplete).

Evidence:

- Epidemiology: as in army camps.
- Immunology: all cases of RH fever are ass é gp A-B- haemolytic strain.
- Prophylactic: prevention of store throat by penicillin → prevention of Rh. Fever.

Predisposing factors:

- Age: 5-15 y common, > 15 arthritis – recurrent attack.
- Sex: equal in both but chorea > in ♀.
- Race: white races.
- Familial: heridotifamilial.
- Season: autumn & winter.
- Area: temperate zone.
- Recurrent streptococcal infection (overcrowding &bad hygienic condition)

Pathology:

1. **Reaction:**
   - Exudative reaction: exudative formation – affect serous membranous (synovial – pleural – pericardium – peritoneum) – resolve completely.
   - Preoperative reaction (Ashoff's nodule): paravasculare nodules that heal by fibrosis consist of (from in to out): fibrinoid degeneration (center) – lymphocytes – plasma cues – Ashoff giant cells – fibroblasts – layer of fibrosis.

2. Site:

- General:
  - non-specific: inflammatory edema – inflammatory cell infiltration – vascular phenomena –
  - Specific: Ashoff's nodule.
- Extra cardiac:
  - Pleurisy – meningo encephalitis – pneumonia – vasculitis.
- Cardiac: pancarditis in all layers as follow:
  - Pericarditis: dry pericarditis: i 2 layers attached by fibrinous adhesion.
    Wet pericarditis: with adhesion.
  - Myocarditis.
  - Endocarditis:
    - Mural endocardium: necrosis of posterior wall of Lt Atrium → fibrosis (mac-callum patch) → predispose to thrombus formation.
    - Valvular endocardium: mild attack → edema (long course) → Stenosis, sever attack → regurge at once.

NB: frequency of valve affection: M > A > T > P due to closing pressure W is (120, 80, 30, 10).

Clinical picture:

A- Major:

[I] Arthritis: most common " sp in adult " :

- Polyarthritis – affect big joints as knee elbow – joints is hot, red, painful, swollen, tender, é limited movement – migratory.
- Leave joint free.
- Respond dramatically to asprine (salycilates).

[II] Carditis: most serious " sp in children"

- Pericarditis: dry (pericardial rub – chest pain), wet (dullness outside i apex).
- Myocarditis: tachycardia out of proportion to fever (N: $1C^{o}$ = 10beat /min.)
  Tick tack rhythm (S_1=S_2) due to loss of i muscular component of S_1 – dilating heart (continous) – HF – summation gallop
  ↑(P-R) interval – (A – V) incompetence (TR_1 MR) due dilated ring.
- Endocarditis: early (edema – Stenosis).
  Late (damage → short period → regurge),
  (Fibrosis → long time → Stenosis)
  - For mitral valve: mid diastolic murmur (carry comb murmur) due to edema
    Pan systolic murmur due to MR.
  - For aortic valve: ejection systolic murmur due to edema of valve or fever
    Early diastolic murmur due to AR.

[III] **Erythema marginatum:** on trunk proximal parts of limbs – occur on crops → coalesce → patch → clear center & red margin – evanescent.

[IV] **S.C nodules:** accumulation of Ashoff's nodules:
- Round or oval – symmetrical – from few mm to few cm.
- On pressure area & extensol surfaces – not tender.
- Not attached to overlaying skin but attached to underlying tendon.
- Firm in consistency – indicate sever Carditis.

[V] **Chorea:** common in ♀
- Involuntary movement (shoulder, face, tongue, extremities)
- Marked hypotonia – emotional instability.

ß- minor:

[1] Clinical:
- Arthralagia – acute abdomen vasculitis – pleurisy – peritonitis – pallor
- Pneumonia – epistaxis – Erythema nodosum.
- Fever – sweating – weatness – loss of weight – tachycardia.

[2] Lab.: ↑acute phase reactants (ESR, CRP) & leucoytosis – prolonged P – R interval - ↑ ASO titre.

Investigation:

[1] Cardiac:
- X-ray chest: to evaluate the heart.
- ECG: Myocarditis (long > 0.22 sec. = 1st degree HB), evidence of pericarditis.
- ECHO: to evaluate the heart.

[2] Laboratory:
- ESR: ↑ ed > 100 / 1st h (for follow up).
- CRP: +ve (recent infection), – ve in (pure chorea – isolated EM).
  - Abnormal ptn that agglutinate muco polysaccharide of pneumococci.
  - Non-specific: present in other disease.
- Leucocytosis: é esenophillia, if é esenophillia →septic arthritis.
- ASO (250 Todd's unit) +ve if recent infection.

Diagnosis: revised Joune's criteria

- ① Major + ② Minors (clinical + INV)
- Or ② Majors.
- Evidence of recent strept. Infection.
- HX of Rh disease or presence of Rh valve disease.
- but take i following precautions into consolidation:
  - Arthritis, fever, Leucocytosis, (not specific).
  - If arthritis is taken as major not to take arthralagia as minor.
  - If Carditis is taken as major not to take (tachycardia – long P-R) as minor.

DD: (Causes of arthritis) (causes of fever in cardiac pt) (PUO)
(Causes of chorea) (Causes of pericarditis)
(Causes of acute abdomen) (Leukemia & hemolytic anemia).

Treatment:

[1] Prophylactic:

a. **Eradication of infection:**

Treatment of sore throat by P:

Old protocol (Procaine P 600.000 U/day for 10 days IM).

Recent protocol (ampicillin 500 mg / 8h / day for 10 days).

Removal of septic foci: tonsillectomy of huge infected tonsils.

b. **Avoid activity (if recurrent)**

Long acting penicillin (benzathine) 1200.000 U IM:

(12w in summer – 14w in winter) for (fever – 54 from last attack – till age of 25 y) Ẃ is longer.

If sensitive to P → sulphadiazine 1 gm oral/day.

c. **Guard against infective endocarditis.**

[2] Curative: (in active stage):

1. Rest till ESR drop to normal value, ↓ signs of inflammation.
2. diet (light & nutritious)
3. Treatment of infection (crystalline P 1 million U / 6h for 10 days.
4. for arthritis: salycilates :

   Dose: (6 gm /day) Or (100 mg / kg/ day till clinical response → ↓ dose to 2/3 till laboratory response appear → gradual é drawal to avoid rebound.

   Action: analgesic – antipyretic – anti-inflammatory – St. Steroid secretion.
5. Carditis: prednisone 60 gm /day ↑gradually till response occur → then continue effective dose for 4W → then ↓ to 40 mg / day for 4W → then gradual withdrawal by 2.5 g/day to avoid addisonian crises.
6. Carditis + arthritis:

   Prednisone 60 mg /day for 1 W then stop & give Salycilates 60 mg / kg/day for 1 W.

   Recently steroids not superior to Salycilates & both not prevent cardiac damage.
7. Chorea: reserpine, its SIE is hypertension so used in ttt of chorea.
8. heart failure: steroids + anti failure measure :
   - Steroids in cardiomegally – HF.
   - Salycilates in mild Carditis.
   - 50% pt. gives no history of Rt fever.
   - Steroids not prevent chronic Valvular affection.
   - But in ↓ inflammatory signs (↓ fatality in a cute stage).

MITRAL STENOSIS

⇨ Degree (Grads) of MS :-

- ☞ ≥ 2.5 cm^2 → Asymptomatic .
- ☞ 1.6 - 2.5 cm^2 → Mild
- ☞ 1 - 1.5 cm^2 → Moderate
- ☞ < 1 cm^2 ⇨ tight (critical & need surgery)

⇨ Aetiology of MS :-

A) Organic :-

- ✯ Rheumatic endocarditis :- commonest , More in female & occur years after acute stage
- ✯ Congenital :- Lutenabacher's syndrome (MS + ASD) & Parachute mitral valve .
- ✯ Obstruction of mitral orifice by → Tumour (Lt atrial myxoma) , Thrombus & Nodules (fused libman sac nodules of SLE)
- ✯ Infective endocarditis .

B) Functional :-

- ✯ Conditions of ↑ blood flow through the valve :- MR , PDA , VSD & Hyperdynamic circulation
- ✯ Conditions of dilated LV with intact M.valve (relative stenosis) → AR & HTN
- ✯ Carry Comb's murmur :- It occurs in acute stage of Rh.fever due to edema of the cusps → relative narrowing of mitral valve → mid diastolic low pitched murmur .

⇨ Haemodynamics:- [Long course]

- ☞ Gradual progressive narrowing of MV → ↑ Lt.A pressure → Lt A dilation to overcome the resistance of M.valve → No symptoms occur .
- ☞ With more narrowing → LA can't push all the blood through MV → blood stagnates in pulmonary veins & capillaries → ↑ pulmonary venous pressure (pulmonary congestion)
- ☞ to protect against ↑ in pulmonary capillary pressure → V.C. of pulmonary arterioles (functional narrowing) → later organic narrowing due to intimal proliferation → thrombosis of the vessels may occur .
- ☞ The above mentioned events → ↑ pulmonary arterial pressure → pulmonary HTN → Rt.V. hypertrophy → right ventricular failure later on .

⇨ ***Stages of MS :-*** There are 4 stages ;

1- Stage of Complete compensation (Asymptomatic stage) :-

★ There is ↑ in Lt.Atrial pressure due to blood stagnation .

2- Stage of Pulmonary congestion (Congestive MS) :-

★ There is ↑ in pulmonary venous pressure .

3- Stage of Pulmonary arterial hypertension (hypertensive MS) :-

★ there is ↑ in pulmonary arterial pressure & Rt. ventricular hypertrophy → LCOP .

4- Stage of RVF (MS with RVF) :- It shows systemic congestion .

⇨ ***Mechanism of pulmonary HTN in MS :-***

1- Passive pulmonary HTN :- ↑ arterial pressure → ↑ pulmonary V. pressure & to maintain passage of blood from arteries to veins , there must be equal ↑ in pulmonary venous pressure (constant AV gradient) .

2- Constriction pulmonary HTN :- Lung congestion → reflex protective V.C. (functional) of pulmonary arterioles → pulmonary hypertension .

3- Obliterative pulmonary HTN :- Prolonged VC → irreversible organic narrowing of arterioles .

4- Acute obstructive pulmonary HTN :- Prolonged recumbency → may cause venous thrombosis → massive pulmonary embolism & acute pulmonary hypertension .

⇨ ***Clinical picture :-***

A) SYMPTOMS

★ Stage 1 :- No or mild symptoms .

★ Stage 2 :- Symptoms of lung congestion (pulmonary edema not common) .

★ Stage 3 :- Symptoms of low COP with gradual relief of lung congestive symptoms .

★ Stage 4 :- Symptoms of systemic congestion (heart failure) .

★ Symptoms of complications :- It may be the first presentation .

B) SIGNS

I] General signs :- It varies with the stage ;

★ Stage I :- no or mild signs .

★ Stage II :- Bilateral fine basal crepitation .

★ Stage III :- ⇨ Signs of Low COP :- weak pulse , Low Bp , Pallor , Peripheral cyanosis , Cold extremities & Malar flush (cyanotic flush over cheeks) .

⇨ Giant (a) wave due to pulmonary hypertension .

★ Stage IV :- peripheral signs of RSHF (systemic congestion)

★ Signs of complications maybe present .

II] Local signs on Cardiac examination :-

➲ Stage I & II :-

☞ Apex :- normal site , slapping , diastolic thrill & palpable S_1 .

☞ Auscultation :- There are 3 main findings ;

☆ Accentuated S_1 , due to :-

→ Closure of rigid mitral cusps .

→ Opening of mitral cusps as wide as possible in diastole at high atrial pressure followed by violent closure of cusps .

→ Sudden tension of pliable part of MV by tension of chordae tendinae .

→ Low position of mitral cusps in LV at end of diastolic due to small amount of blood as result of stenosis .

☆ Opening snap :- (heard [ ] Lt. sternal border & cardiac apex)

→ It is a sharp snapping sound due to opening of rigid stenotic mitral cusps (organic stenosis) .

→ It occurs after S2 (separated from it by isometric relaxation phase) & just before the murmur .

→ ↑ degree of MS → ↓ diastolic between opening snap & S_2 .

→ **Value :-** [TRP] ⇨ T :- tight MS , R :- Rheumatic , P :- Pure (no MR) , Pliable (no calcification) .

☆ Murmur :- (↑ Degree of MS → ↓ murmur) .

→ *Site* :- at or inside the apex .
→ *Timing* :- Early ⇨ pre-systolic , Late ⇨ mid-diastolic with pre-systolic accentuation .
→ *Character* :- Rumbling , low pitched .
→ *Intensity* :- Loud with pre-systolic accentuation (due to atrial contraction) .
→ *Propagation* :- localized .
→ *Position of patient* :- Lt. lateral position .
→ *Respiration* :- ↑ with expiration (-ve Carvallo's sign) .
→ *Method* :- best heard by cone .

(N .B) ⊗ S_2 is followed by Isometric relaxation phase → opening of MV , blood pass either by gravity (70 %) causing " mid-diastolic murmur " or by atrial contraction (30 %) producing " pre-systolic accentuation " , So ; in AF with MS , NO pre-systolic accentuation as there is NO atrial contraction .

Stage III :- (Stage of pulmonary HTN) ; there are 2 groups of signs :-

Signs of pulmonary hypertension :-

- Inspection :- pulsation in the Lt. 2nd space .
- Palpation :- pulsation in the Lt. 2nd space & diastolic shock (palpable S_2) .
- Percussion :- Dullness in the Lt. 2nd space .
- Auscultation :- as stage I & II ; plus ;

→ At pulmonary area :-

- Accentuated S_2 :- early ⇨ close splitting & late ⇨ wide splitting .
- Ejection systolic murmur (relative PS) .
- Early diastolic murmur (Graham steel) ⇨ surest sign of pulmonary HTN .
- Ejection click maybe heard .

→ At tricuspid area :-

- S_4 ; duo to strong Rt. atrial contraction as a result of pulmonary HTN (pressure over load) .

Signs of Rt. ventricular hypertrophy :-

- At apex :- shifted outwards , diffuse , retracting & heaving .
- Pulsation :- 3rd , 4th parasternal & epigastric pulsations .
- Dullness :- broad bare area & dullness at lower end of the sternum .

Stage IV :- It shows each of the following :-

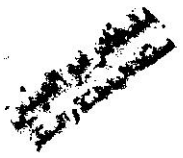
- Pulmonary hypertension & Marked RV hypertrophy (as stage III) .
- Proto-diastolic gallop (S_3) of heart failure on tricuspid area .
- Functional TR due to Rt.V. dilatation → Systolic thrill & pansystolic murmur .

⇨ Investigations :- MOST of diseases in cardiology , should be investigated by ;

1- X-ray
2- Electrocardiogram (ECG) .
3- Echocardiography .
4- Cardiac catheterization .
5- Angiography .
6- Certain specific investigation , according to the disease to be investigated .

1- X-ray :- (Comment on heart , blood vessel & both lung fields)

➲ **Stage I :-** Normal & may show mild Lt.Atrial dilatation .



➲ **Stage II :-** There are 2 views ;

☆ ***Postero-anterior view :-*** It shows 3 +ve data ;

➢ Left atrial dilatation :- It is detected by

- Obliteration of cardiac waist (Mitralization) .
- Prominent left atrial appendage .
- Double contour of right border of heart (it means huge Lt. atrium) .
- Wide carina of trachea .

➢ Pulmonary venous congestion :- It is detected by these signs ;

- Cephalization of upper lobe vessels (filled with blood) ⇨ Mostash sign .
- Hilar opacity (if associated with pulmonary oedema ⇨ bat wing appearance) .
- Kerley's B lines ; due to interstitial edema in base of lung .
- Pulmonary haemosiderosis ; due to rupture capillaries .
- Reticulosis → It means interstitial oedema & fibrosis .
- Fluffy cotton exudates → pulmonary oedema .

➢ Calcified mitral valve may appear .

N.B. :- Kerley's (A) lines means interstitial oedema NOT at the base of lung .

☆ ***Lateral view with barium :-*** Enlarged LA displaces the esophagus posteriorly .

➲ **Stage III & IV :-** It shows the following ;

☆ ↓ Pulmonary congestion .

☆ Radiological signs of pulmonary HTN :- (Dumbbell appearance)

- Dilatation of Pulmonary artery & its Left branch .
- Peripheral lung oligaemia ⇨ Pruned lung appearance .

☆ Right ventricular (RV) enlargement .

☆ Right atrium (RA) & SVC enlargement .

N.B. :- Dumbbell appearance occur in ASD , Pulmonary HTN & bilharzial cor pulmonale .

Complication:

A. Local:

- Pancreatic phlegmon: local mass due to digestion of the pancreas.
- Pancreatic ascites, pancreatic cyst.
- Pancreatic abscess.

B. General :

- ARDS, RF.
- Pleural effusion, pericardial effusion.

Investigation:

1. Serum amylase is elevated.
2. US & CT.

Treatment:

1. Nothing per mouth.
2. IV fluids.
3. Aspiration of gastric contents.
4. Peritoneal lavage in sever cases.
5. Analgesics for pain.

Chronic pancreatitis

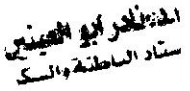
Aetiology: sever attack of acute pancreatitis.

Clinical picture: pain – Malabsorption – DM.

Investigation: as acute pancreatitis.

Treatment:

1. As acute pancreatitis.
2. Treatment of malabsorption & DM.
3. Pancreatic enzymes orally.



2- ECG :-

- **Stage I :-** no abnormality .
- **Stage II :-** broad & bifid P wave (P-Mitral) due to Lt.Atrial enlargement .
- **Stage III & IV :-** RVH , tall & peaked P wave (P-pulmonale) due to RAH & Pulmonary HTN .

3- Echocardiography :- (It is diagnostic) ; It has a general scheme ;

- ✯ Anatomical diagnosis of MS & any associated lesions..
- ✯ Functional measurement of ejection fraction & COP .
- ✯ Chamber enlargement ; either Rt or Lt .
- ✯ Complications :- calcification , pliability & LA thrombosis .
- ✯ Preoperative assessment :- to select MV valve prosthesis " depend on size of LV out flow tract"
- ✯ Postoperative follow up & diagnosis of re-stenosis & para-prosthetic mitral leak .

4- Catheterization :- (Assess pressure , degree & function)

- ✯ Wedge pressure & pulmonary artery pressure are elevated (in MS & LSHF) .
- ✯ Presence of diastolic gradient across MV (when it is opened → surest sign) due to ↑ LA pressure (normally there is NO pressure gradient) .
- ✯ ↑ RV end diastolic volume in RV Failure (RVF) .
- ✯ Assessment of degree of stenosis ; via MS index = COP / LA pressure which is normally = 5/5 ⇨ 100 % but ; in MS → there is ↓ COP & ↑ LAP → < 100 % (<1) .
- ✯ Preoperative assessment → it is the main indication .
- ✯ Diagnosis of other valve lesion & assessment of myocardial function .

5- Angiography .

⇨ Complications of MS :-

- ☞ ***Valvular :-*** Fibrosis , Calcification , Rheumatic activity & IE (more in AR) .
- ☞ ***Pulmonary :-*** Haemoptysis , Chest infection , Pulmonary HTN , Pulmonary infarction , Pulmonary edema & cardiac asthma .
- ☞ ***Right ventricular :-*** TR , RVF , RV enlargement .

☞ ***Left atrial :-***

★ Thrombosis , Embolization & aneurysmal dilatation .

★ Pressure manifestations ; on

⇨ Lt bronchus → cough , dyspnea , ...

⇨ Lt recurrent laryngeal nerve → horsiness of voice .

⇨ Oesophagus → dysphagia (Ortner's syndrome)

★ Dysarrhysthmia → AF & Extrasystole .

☞ ***Operative complication :-*** see treatment of MS (therapeutic complications) .

⇨ *Differntial diagnosis of MS :-*

☞ *On clinical level ; MS is differentiated from ;*

★ Other lesions causing similar murmur (Diastolic murmur → Mention from clinical)

★ Other causes of lung congestion .

★ Other causes of hart failure (mention by name) .

☞ *DD of aetiology of MS :-* differentiate [ ] organic & functional causes .

☞ *DD of MS from similar conditions :-*

★ Other causes of left sided hypertrophy (lung congestion) .

★ Other causes of obstruction of blood flow from LA to LV , as ; LA myxoma , ball & valve thrombus , veno-occlusive pulmonary diseases & cor triatriatum .

☞ *Silent MS :-* MS without murmur ; due to ↓ blood flow across MV , causes are ;

★ ↓ LA pressure → ↓ blood flow as in ; Pulmonary embolism , Sever pulmonary HTN , associated PS , RVF , TR & sever tachycardia .

★ ↑ LV pressure as in ; LVF , AS & systemic HTN .

★ Associated ASD as in Lutembacher syndrome .

☞ *DD of MS from MR .*

☞ *DD of MS from tricuspid valve lesions .*

⇨ Treatment of MS :-

A) Medical treatment :- (General scheme for all valvular heart diseases)

☆ Prophylaxis against Rheumatic fever ⇨ Long acting penicillin .

☆ Prophylaxis against Infective endocarditis (IE) .

☆ Symptomatic treatment ⇨ Diuretic (for lung congestion symptoms) , Digitalis (for AF) , Antibiotic (for chest infections) & Anti coagulants (for thrombo-embolization) .

☆ Treatment of complications ⇨ HF , AF , infection , embolism .

☆ Moderation of life ⇨ No smoking , No excess effort & Good hygenic habits .

B) Surgical treatment :-

☆ *Indications :-* [best age 20- 25 y]

- Tight MS (valve area < 1 cm^2 & pressure > 20 mmHg) .
- Serious diagnosis as haemoptysis .
- Embolism with NO capacitation → Paralysis .
- Progressive intolerable symptoms due to mechanical narrowing of MV .

☆ *Contraindications :-*

- Rheumatic activity .
- I.E .
- H.F.
- Associated significance aortic lesion ; unless surgically corrected .

N.B. :- In pregnant females → postpone the op. after delivery except in tight MS .

☆ *Types of operations :-* (Valvotomy , Valvoplasty & Valve replacement)

➢ *Closed operation :-*

- ✓ In cases without significant MR (pure MS) , much fibrosis & cusp calcification .
- ✓ Methods :- transatrial & transventricular commissurotomy .

➢ *Open operation :-*

- ✓ It is done in cases not suitable for closed surgery .
- ✓ Methods :- open commissurotomy , valve replacement & valvoplasty .

☆ ***Post operative compositions :-***

- Embolism .
- Dysarrhysthmias (due to sudden relieve of obstruction) .
- Tearing of mitral cusps → MR .
- Post commissurotomy syndrome :- (fever + 3 P)
  - ✓*It is post commissurotomy autoimmune pericarditis .*
  - ✓*It is due to allergic reaction to injured pericardium .*
  - ✓*C/P :- fever , pleural & pericardial rub occurring 2- 6 weeks after operation .*
  - ✓*Treatment :- Corticosteroids .*
- Re-stenosis of mitral valve .
- Complications of valve replacement (artificial valve) :-
  - ✓*Thrombo-embolism in case of Infective Endocarditis .*
  - ✓*Haemlytic anaemia ; in HF (technique fault)*
  - ✓*Fatty infiltration of the ball of the valve .*
  - ✓*Calcification of tissue valves .*

C) Ballon Dilatation :- It can replace surgery in patients indicated for valvotomy .

*Certain **IMPORTANT** N.B.s :-*

Results of association [ ] MS & AF :-

- *Loss of pre-systolic accentuation .*
- *↑ incidence of LA thrombosis .*
- *No (a) wave in neck veins .*
- *Paroxysmal AF → precipitate pulmonary oedema .*
- *Variable S_1 .*
- *No opening snap .*
- *No S_4 .*

Assessment of MV mobility & pliability :-

- *It is very important as , mitral valvotomy is only possible if valve is pliable & non calcified ; other wise DO → valve replacement .*
- *Methods of assessment :-*
  - *Auscultation ⇨ S_1 is not accentuated & no O.S in non pliable valve .*
  - *X-ray ⇨ may show calcification .*
  - *ECHO ⇨ It is the most reliable method .*

Value of measurement of capillary wedge pressure :- It either ↑ or ↓ ;

- *If ↑ ⇨ it means post capillary obstruction → LSHF & MS .*
- *If ↓ ⇨ it means pre-capillary obstruction → Cor-pulmonale & embolism*

Causes of Haemolysis in MS :-

- *Bronchitis .*
- *Pulmonary congestion .*
- *Pulmonary edema & PND .*
- *Pulmonary infraction :- MS → RVF → DVT → Pulmonary embolism → P.infarction .*
- *Pulmonary apoplexy :- due to rupture of dilated collaterals [ ] bronchial & pulmonary veins .*

مع سيشكو هذا المريض في الإستقبال ؟؟

Emergencies in MS :-

- Fever of Carditis (Rh.fever or IE) .
- Palpitation (AF) .
- Thrombo-embolic complications ⇨ blindness , deafness , hemiplegia & sudden death .
- Cardiac asthma .
- Pulmonary oedema .
- Haemoptysis :- due to pulmonary apoplexy .
- Death :- sudden death due to thrombosis → closed MV .

Criteria of Tight MS :-

- Congestive MS with dyspnea > grade II .
- Hypertensive MS (pulmonary HTN) .
- MS with RVF .
- Mitral valve area < 1cm2 .
- LA pressure > 20 mmHg .
- O.S. very near to S2 ; i.e. , < 0.06 second , heard by phonocardiogram .
- ↑ length of murmur unless pulmonary HTN develops .
- MS index < 20 % .

Criteria of Cortriatriatum :-

- It is a congenital anomaly of the heart in which there is accessory chamber which receive blood from pulmonary veins & connected to LA by an orifice <1cm in diameter (this orifice plays the role of Mitral valve after stenosis) .
- It results in ⇨ Pulmonary congestion & HTN .
- It is differentiated from MS by ; NO characteristic murmur & NO left atrial enlargement by X-ray & ECG .

Types & Criteria of Artificial valve :-

A) Tissue valves (Bio-prosthesis) :-

- Subtypes ⇨ Cadaveric or Xenograft (from animals)
- Advantages ⇨ No heamolysis , No anticoagulants & No thrombosis .
- Disadvantages ⇨ less durable .

B) Mechanical valves :-

- Types ⇨ Ball & socket , Tilting disc & Starr Edward valve .
- Advantages ⇨ Durable .
- Disadvantages ⇨ Heamolysis , Anticoagulant , Thrombosis & NOT suitable for old & pregnants .

LSHF is a failure of symptoms (i.e. show many symptoms & less signs) .

RSHF is a failure of signs (i.e. show many signs & less symptoms) .

Mesocardium means ⇨ Persistnt mediastinal heart .

Causes of haemolysis in cardiac patient :-

- the same 5 causes of haemolysis in MS +
- Sever HTN .
- Rupture aortic aneurysm in a bronchus .,
- Associated T.B. .

LEFT ATRIAL MYXOMA

⇨ ***Definition :-*** It is a rare benign tumour of LA usually arising from inter-atrial septum .

⇨ ***Clinical picture :-*** (3F , 3H , 3 NO & 3 sentences)

☆ Familial , Females > Males & Forty years old .

☆ High temperature (Fever) , High ESR & Hypergammaglobulinaemia .

☆ NO past history of Rh.fever , NO opening snap & Normal first heart sound .

☆ Intermittent murmur of MS (Postural) .

☆ Syncobal attack related to position (Postural) .

☆ Embolization with out AF incase of MS (friable) .

⇨ ***Investigations :-***

☆ *Angiocardiography :-* reveals filling defect .

☆ *Echocardiograhys :-* Tumour Plob ⇨ Diagnostic .

⇨ ***Treatment :-*** Excision .

MITRAL INCOMPTENCE

⇨ ***Aetiology of Mitral regurgitation (MR) :-***

A) Organic MR :-

☆ Rheumatic MR ⇨ (the commonest)

☆ Congenital :- It is associated with ASD .

☆ Infective endocarditis .

☆ Post commissurotomy & Atherosclerosis .

☆ Mitral valve prolapse & Myocardial diseases

☆ Papillary muscle dysfunction due to ; Myocardial ischaemia , Hypertrophic obstructive cardiomyopathy , associated with LV dilatation & Infiltration by sarcoidosis & haemochromatosis .

B)Functional MR :- due to Dilatation of mitral valve secondary to LV Dilatation as in ;

☆ Systemic hypertension , and ;

☆ Aortic valve lesion (AS) .

⇨ *Haemodynamics :-*

A) Acute MR (low compliance MR) :- It occurs in the following cases :-

☆ Infective endocarditis

☆ Acute Rheumatic fever .

☆ Post commissurotomy .

☆ Papillary Muscle rupture (acute MI) especially that of anterior wall .

N.B. ; In acute MR ; LA has no time to dilate and accommodate the regurgitant blood → Great ↑ in its mean pressure → pulmonary congestion & acute pulmonary oedema ⇨ medical emergency that need treatment of pulmonary edema , valve replacement & vasodilators

B) Chronic MR (high compliance MR) :-

☆ It occurs in other gradual causes .

☆ During systole ⇨ part of the blood in LV regurge in LA → ↓ COP & LA enlargement

☆ During diastole ⇨ larger amount of blood reach LV → LVH → LVF → lung congestion

☆ Finally ; LA accomedate excess blood → so , mean LA pressure & pulmonary venous pressure are normal .

☆ Because of all these data ⇨ Pulmonary HTN not occur or mildly present .

⇨ *Clinical picture :-*

A) SYMPTOMS

☆ Asymptomatic ; in mild cases

☆ Symptoms of low cardiac out put .

☆ Symptoms of lung congestion .

☆ Palpitation .

☆ Symptoms of complication .

B) SIGNS

1) General signs :- either ;

☆ No signs

☆ Signs of Low COP .

☆ Signs of lung congestion due to LVF .

2) Local signs (cardiac signs) :- It involves ;

I) Inspection & Palpation .

II) percussion .

III) Auscultation .

I) Inspection & Palpation :-

☆ LV apex :- Localized , Pulging , Shifted downword & outword & hyperdynamic .

☆ Systolic thrill over apex .

II) Percussion :- Signs of pulmonary HTN (may occur late) .

III) Auscultation :- either ;

☆ *Heart sounds :-*

✓ S_1 → weak & muffled (due to weak closure of mitral valve) .

✓ S_2 → within normal .

✓ S_3 → due to rapid rush of blood from LA → LV during rapid filling phase with vibration of the ventricular wall (more in functional MR) .

☆ *Murmur :-* There are 2 types ;

➲ ***Murmur due to MR :-***

- Site :- maximum over apex .
- Timing :- pansystolic murmur (start with S_1)
- Character :- harsh in organic murmur & soft in functional one .
- Propagation :- propagated to axilla except in posterior leaflet regurge which radiate to base of the heart .
- Position :- ↑ by left lateral position .
- Respiration :- ↑ with expiration .

➲ ***Murmur due to MS :-*** Mid diastolic murmur due to excess blood flow across MV

☆ *Added Sounds :-* No added sounds .

⇨ ***Investigations :-***

1) X- ray :- Enlarged LA & LV , Pulmonary congestion (LVF) & Calcified MV .

2) ECG :- Enlarged L.A (P-mitral) & enlarged L.V. .

3) Echocardiography :- MR , mitral valve prolapse & chamber enlargement .

4) Angiocardiography :- A dye injected in LV → regurgitate to LA (diagnostic) .

5) Cardiac catheterization :- It will show ; ↑ LA pressure & MR .

⇨ *Complications of MR :-* MS except ;

- ☞ LVF .
- ☞ Rheumatic activity (more common)
- ☞ Infective endocarditis (more common) .

⇨ *Differential diagnosis of MR :-*

- ☞ **Differntial diagnosis from similar conditions :-**
  - ☆ Other causes of systolic murmur over the apex .
  - ☆ In Acute MR :- from other causes of acute pulmonary edema (see sheet) .
- ☞ **Differntial diagnosis of aetiology :-** i.e. from ;
  - ☆ Mitral valve prolapse .
  - ☆ Papillary MS dysfunction :- its murmur is ;
    - Mid-systolic or late systolic (crescendo-decreascendo) as ⇨ AS
    - Propagated to base of the heart .

⇨ *Treatment :-*

A) Medical treatment :-

- ☞ *General schema for any valvular heart disease (5) .*
- ☞ *Vasodilators* :- (they are given with combined AR & MR)
  - They will ↑ blood flow to the aorta → ↓ blood pass to atrium , because blood is shifter to the dilated aorta .
- ☞ *Treatment of complication* :- as ; H.F , infection ,.... etc .

B) Surgical treatment :-

- ☞ Valvoplasty .
- ☞ Valve replacement :- by ;
  - ☆ Prosthesis .
  - ☆ Homograft :- in ;
    - OId people > 65 years .
    - Female in fertile period to avoid risk of anti-coagulant if she gets pregnant .

N.B. :- ***MS is better than MR*** *; because*

☒ *MS has ⇨ long period of free symptoms (late pulmonary oedema) , rare IE (due to fibrosis) & 2 types of operations can be done .*

☒ *MR has ⇨ progressive course (it parpiturate it self) .*

MITRAL VALVE PROLAPSE

(BARLOW'S SYNDROME)

⇨ ***Other name :-*** Click murmur syndrome .

⇨ ***Definition :-*** It is myxomatous degeneration of the posterior cusp of MV & chorda tendinae → redundant cusp → bulge in the LA during systole

⇨ ***Incidence :-*** More common in young female , Familial tendency & Maybe considered as normal variant .

⇨ ***Aetiology :-*** Un know but ;

- ☞ It maybe associated with hereditary syndromes , as ; Marfan , Ehler danlos syndrome & Pseudo myxoma elasticum .
- ☞ It maybe associated with congenital anomalies ⇨ PDA .
- ☞ It maybe idiopathic .

⇨ ***Pathophysiology :-***

- ☞ During ventricular systole , posterior leaflet (common) of MV , prolapse into LA , leading to ; Abnormal ventricular contraction , Papillary muscle strain & Some degree of MR .

⇨ ***Clinical presentation :-***

A) SYMPTOMS

- ☆ Asymptomatic :- in most cases .
- ☆ Chest pain :- due to stretch of chordae tendinae , stabbing pain in left infra-mammary .
- ☆ Palpitation :- due to abnormal ventricular contraction & associated Dysarrhysthmia .
- ☆ Sudden death due to :- associated Dysarrhysthmia .

B) SIGNS

☆ *Murmur :-* Mid or late systolic murmur due to some regurgitation , which ↑ with standing & it radiate to the base of the heart .

☆ *Added sound :-* Mid systolic click due to tension of chordae tendinae & sudden prolapse of the valve .

⇨ ***Investigations :-***

1) X –ray :- Normal ; except if associated with marked MR .

2) ECG :- Slight depression of ST segment .

3) Echocardiography :- shows posterior movement of MV cusps into LA during systole

⇨ ***Treatment :-***

A) Medical treatment :-

- ☆ Prophylaxis against IE .
- ☆ Avoid heavy exercise .
- ☆ β-blockers (Indral) for treatment of chest pain , palpitation & psychological treatment .
- ☆ Anti-coagulants :- to prevent thrombo-embolism if marked MR with AF is present .

B) Surgical treatment :- Valvoplasty (if sever MR is present) or Valve replacement .

AORTIC VALVE

AORTIC STENOSIS

⇨ *Aetiology :-* [Normal Aortic valve area = 3 cm^2]

A) Organic AS :-

☆ *Congenital heart diseases :-* they are either ;

- Valvular heart diseases .
- Supra-valvular heart diseases :- Hourglass narrowing above AV , e.g. William's syndrome ;
  - ✓ Low seated ear , Protruded upper jaw .
  - ✓ Hypertelorism , Collagen defect .
  - ✓ Congenital hyperparathyroidism → Infantile hypercalcaemia .
- Sub-valvular heart diseases :- Obstruction in LV out flow tract which may be ;
  - ✓ Idiopathic hypertrophic sub-aortic stenosis → Dynamic obstruction .
  - ✓ Idiopathic membranous sub aortic stenosis → fixed obstruction .

☆ *Rheumatic heart diseases :-* shows ;

- History of Rheumatic fever .
- Double aortic lesion .
- Presence of atrial fibrillation (AF) .

☆ *Calcification :-* It is either ;

- Primary :- In old people & associated with coronary atherosclerosis .
- Secondary :- to other aortic lesion as Rheumatic , congenital , ...

☆ *Infective endocarditis .*

B) Functional AS :- due to ;

☆ ↑ blood flow across the valve as in AR & hyperdynamic circulation .

☆ Dilatation of aorta but without dilatation of aortic ring as in ; systemic HTN , Aortic aneurysm & atherosclerosis .

⇨ *Haemodynamics :-* [In this case Aortic valve area = 0.8 cm^2]

☞ In Systole ; there is obstruction of LV out flow results in ;

☆ ↓ LV stroke volume → ↓ COP → ↓ peripheral & coronary blood flow .

☆ ↑ Pressure load on LV→ LVH → LVF & pulmonary congestive symptoms .

⇨ *Clinical Picture :-*

A) SYMPTOMS

☞ Mild cases :- Asymptomatic .

☞ Symptoms of Low COP .

☞ Symptoms of LVF → lung congestion .

☞ Symptoms of complications .

☞ Angina pectoris due to :-

- Low COP → ↓ coronary blood flow .
- LVH → ↑ O_2 demand .
- Shortening of diastole (due to long systolic with AS) → impaired coronary filling .
- Concomitant coronary atherosclerosis .
- ↑ tension inside the cardiac MS → squeezing of coronaries .

☞ Syncopal attacks :- they are of 2 types ;

- Exertional :- due to Low COP .
- At rest :- (rare) ; occur in calcific AS , due to extension of calcification to AV bundle → Adam's stock attacks & / or Complete heart block .

B) SIGNS

1) General signs :-

☆ Signs of Low COP .

☆ Signs of LVF (lung congestion) .

☆ Pulse :- either ;

✓ Plateau pulse [pulsus tardus et parvus] ⇨ Isolated pulse .

✓ Pulsus bisferance [bifid pulse , systolic double peak] ⇨ combined AS & AR .

☆ Blood pressure :- ↓ Systolic BP & ↓ pulse pressure .

☆ Systolic thrill over carotid vessels .

2) Cardiac signs :-

☆ LV apex :- Shifted out & down , localized , Pulging & Heaving (pressure over load) .

☆ Systolic thrill over A_1 → propagated to neck & apex .

☆ *Auscultation :-*

I] Over aortic area :-

➢ S_1 :- weak (dt ↓ aortic pressure) & delayed (paradoxical splitting) .

➢ Systolic ejection click :- due to opening of rigid Aortic cusps .

➢ Murmur :-

→ *Site :-* maximum over A_1 .

→ *Timing :-* Mid (ejection) systolic .

→ *Character :-* harsh (organic) or soft (functional) .

→ *Position :-* ↑ by leaning forward .

→ *Respiration :-* ↑ by expiration .

→ *Propagation :-* selective propagation to neck arteries & apex .

II] Over Mitral area :-

➢ Ejection systolic murmur (propagated) , due to AS .

➢ Pan-systolic murmur :- due to secondary MR .

➢ Pre-systolic gallop (S_4) :- In sever cases (AS → ↑ LV pressure → ↑ LA contraction) .

⇨ *complications of AS :-*

☆ *Sudden death :-* due to ;

➢ Ventricular fibrillation , with continuous contraction .

➢ Cardiac stand still (cardiac arrest) .

➢ Myocardial infarction .

➢ Formation of thrombus over the stenotic orifice .

☆ *Infective endocarditis .*

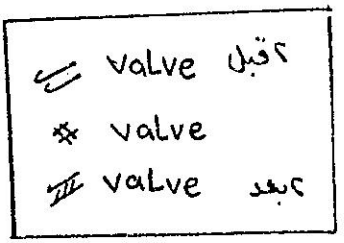
☆ *LVF .*

☆ *Rheumatic activity .*

⇨ *Investigations :-*

1) X- ray :- It will show ;

- LV enlargement .
- Pulmonary congestion (if there is LVF)
- Calcific Aortic valve .
- Small aortic knuckle .
- Post-stenotic dilatation .



2) ECG :- LV enlargement .

3) Echocardiography :- for ;

- Diagnosis & localization of AS .
- Diagnosis of IHSS .

4) Cardiac Catheterization :- It shows systolic gradient across site of obstruction ;

➲ ***In Valvular type :-***

- ≤ 50 mmHg → mild AS
- 50-100 mmHg → Moderate AS .
- > 100 mmHg → Sever AS .

➲ ***Sub-Valvular type :-*** Gradient difference in LV cavity .

➲ ***Supra-valvular type :-*** Gradient difference in ascending aorta .

5) Angiography :- It shows type of stenosis ;

➲ ***Sub-valvular :-*** Slit like LV cavity .

➲ ***Valvular :-*** ↓ mobility of aortic valve .

➲ ***Supra-valvular :-*** Hour glass narrowing of ascending aorta .

⇨ *Assessment of severity of AS :-*

☞ History taking (Symptoms) .

☞ Clinical examination (Signs) .

☞ Investigations .