

☆ Treatment of Atrial flutter :-

1-Electric cardioversion :- (It is the treatment of choice)

- ◆ Sudden total depolarization & repolarization → give the chance for SAN to take the upper hand once again .

2- Medical Cardioversion :- by ;

A) Digitalis :- It ↓ ventricular rate , leading to one of the following ;

- ◆ Patients remain in atrial flutter state .
- ◆ Patient regain his sinus rhythm .
- ◆ Patient become AF → it may disappear if digitalis stop .

B) Quinidine :-

- ◆ It is vagolytic in action , so it leads to ;
 - ✓ ↑ Atrial refractory period → stop circus movement & SAN acts .
 - ✓ ↓ Automaticity → ↓ Ability to form impulses i.e. it inhibits ectopic focus .
- ◆ It must be used in caution :- because ;
 - ✓ It is vagolytic (↑ conduction) so , you must use digitalis before it .
 - ✓ We must use anti-coagulants with it to avoid embolization .
 - ✓ Dose :- 0.2 gm for sensitivity , give in the 2 tab. In first day , 3 tab. In third day & 4 tab. In forth day → each 2 hours up to 6 doses .

☆ Treatment of Atrial Fibrillation :-

1- Electric Cardioversion :-

- ◆ AS Atrial flutter .
- ◆ Contraindications of DC :-
 - ✓ History of thrombo-embolism .
 - ✓ Old AF .
 - ✓ Persistent Aetiology .
 - ✓ Loan AF .
 - ✓ Heart failure .

2- Medical Cardio-version :-

A) Digitalis :- It ↓ Ventricular rate (not to normal rhythm) as , it atrium contract by regular rhythm → destruction of thrombus in LA ↑ Embolization .

B) Quinidine .

C) Verapamil .

D) β-Blockers .

N.B. :-

☆ Medical Cardio-version is indicated in ;

- ✓ Recent AF .
- ✓ NO history of embolization .
- ✓ Corrected aetiology of AF .
- ✓ Normal size & function of the heart .

☆ Causes of slow AF :-

- ✓ Digitalis toxicity , β-Blockers .
- ✓ Heart block , Loan AF .
- ✓ Myxedematous degeneration .

☆ Causes of occasional Cannon S₁ :- as occasional Cannon (a) wave .

☆ Causes of prolonged Q-T interval :- Acute hypoglycaemia & Hypocalcaemia .

C) Heart Block

☆ **Definition :-** Slowing or interruption of spread of cardiac impulses at any part of conducting system .

☆ **Normal Physiology :-**

- SAN can produce impulses at rate of 120 b / m , but due to vagal control impulses are released at a rate of 70-80 b / m .
- Once impulse is released → activation of atrium → reach AVN (at which there is physiological delay) → Ventricles contract after atrial contraction .
- Course of impulses :- It start at AVN → bundle of Hiss → 2 bundles (under endocardium) → Lt. bundle divides into anterior & posterior fascicle → All right bundle & 2 Fascicles of Left bundle give → Purkinje Fibers for myocardium .
- All heart is supplied by vagus except ventricles (Vagal escape phenomenon) .

☆ **Types of heart block :-** According to the site of interruption ;

- ⊙ At SAN → Sino-Atrial block .
- ⊙ Inside Atrium → Intra-atrial block .
- ⊙ At AVN → AV nodal block (will be discussed) .
- ⊙ At bundle of Hiss → Infra-nodal block .
- ⊙ At Right bundle → Right bundle branch block (Rt. BBB)
- ⊙ At Left bundle → Left bundle branch block (Lt. BBB) .
- ⊙ At Anterior or posterior fascicle → Hemi-block .
- ⊙ At Perkinje fibers → Intra-ventricular block .

Atrio-Ventricular Block (AV Block)

☆ **Definition :-** Slowing or interruption of cardiac impulses at AVN .

☆ **Aetiology :-**

- ◆ Congenital heart diseases .
- ◆ Coronary heart diseases .
- ◆ Calcification & Fibrosis of conductive system .
- ◆ Cardiomyopathy & Myocarditis .
- ◆ Calcified AS .
- ◆ Drugs :- Verapamil , Indral , Digitalis toxicity .
- ◆ Physiological Heart block :- e.g. Athelets (High vagal tone) .



Mobitz type I



Mobitz type II

☆ **Degrees of heart block :-**

1- **First degree :-** delay conduction from atrium to ventricles .

2- **Second degree :-** It has 2 types :-

☆ **Mobitz type I (Wenkebach's phenomenon) :-**

- ◆ It shows progressive prolongation of AV conduction time until conduction fails completely → Block of atrial impulses at the level of AVN .

☆ **Mobitz type II :-**

- ◆ Intermittent failure of AV conduction (2 : 1 , 3 : 1) i.e. ; every 2 impulses activating atrium → only one activates the ventricle .

3- **Third degree (Complete heart block) :-**

- ◆ All atrial impulses are not conducted to the ventricles & so ventricles beat by Idio-ventricular rhythm (30 b / m) & Atria beta by SAN impulses at rate of 80 b / m .
- ◆ There is AV dissociation → Occasional cannon , i.e. It is similar to ventricular tachycardia but slower & with regular rhythm .

N.B. :-

High grade AV block means combination of 2 types of block :

- ♦ First degree AV block .
- ♦ Lt. BBB .

Causes of variable S₁ :-


- ♦ AF .
- ♦ All causes of occasional Cannon wave :- Complete HB & Ventricular tachycardia .

All causes of long PR interval → weak S₁ & vice versa .

In case of sinus Bradycardia → there is normal PR interval , but in the first degree HB , there is prolonged PR interval .



☆ Clinical Presentation & Investigations :-

Parameter	First degree	Second degree	Third degree
☆ Symptoms :-	♦ Asymptomatic .	♦ Asymptomatic . ♦ Low COP . ♦ Syncope .	♦ Asymptomatic (if pacemaker is in bundle of Hiss) . ♦ Low COP .
☆ Signs :- → Neck veins :- → Auscultation :-	♦ Normal a & cv wave ♦ Prolonged a-c interval . ♦ Weak S ₁ .	♦ Type I :- Gradual prolongation of a-c interval till one a wave is not followed by cv wave . ♦ Type II :- 2 or 3 a waves are followed by one cv wave . ♦ Variable S ₁ in some cycles .	♦ Number of a wave > pulse . ♦ Occasional cannon a wave . ♦ Variable S ₁ .
☆ Investigations :- → ECG :-	♦ Normal P & QRS . ♦ Long PR interval > 0.22 second . (Normal PR = 0.2 sec) . 	♦ Type I :- gradual ↑ in PR interval till P wave is not followed by QRS . ♦ Type II :- 2 or 3 P waves are followed by one QRS .	♦ Fixed P-P interval at rate of 80 b / m . ♦ Fixed R-R interval at rate 30 b / m . ♦ No relation [] P & QRS complex . ♦ Variable PR interval . ♦ Wide QRS complex .
☆ Rate :-	♦ Bradycardia .	♦ Bradycardia .	♦ Tachycardia .
☆ Rhythm :-	♦ Regular .	♦ Irregular .	♦ Regular .

☆ Treatment of heart block :-

- 1- Treatment of the cause .
- 2- Parasympatholytics :- to ↓ vagal tone → ↓ conduction , e.g. Atropine , 0.5-1 mg , S.C. .
- 3- Sympathomimetics :- as Isoprenaline .
- 4- Artificial pacemaker .

Cardiac Arrest

☆ Definition :- No blood come out from the heart .

☆ Types :-

- 1- Ventricular fibrillation :- Lack of effective pumping → fibrillation waves .
- 2- Asystole :- Cardiac standstill → Complete stoppage .
- 3- Electro-mechanical dissociation :- There is electrical activity but NO contraction or relaxation .

☆ Aetiology :-

A) Medical causes :-

- ♦ Drug anaphylaxis .
- ♦ Acute MI .
- ♦ Acute pulmonary embolism .
- ♦ Coronary HD .
- ♦ Cyanotic congenital HD .
- ♦ Electric Shock .
- ♦ Valvular HD :- specially AS .
- ♦ Drugs :- Digitalis , Procainamide , K & Sympathomimetics .

B) Surgical cause :-

- ♦ Anaphylaxis to anaesthesia .
- ♦ Hypoxia :- Acidosis during operation .
- ♦ Excessive manipulation of viscera → stimulate vagus .

☆ Clinical presentation :-

- ♦ Absent pulse , BP & HS .
- ♦ Cyanosis .
- ♦ Convulsions & coma .
- ♦ Death .

☆ Treatment :- (Cardio-pulmonary resuscitation)

- 1- Put patient on hard object .
- 2- Direct thumbing of sternum in case of VF .
- 3- Cardiac massage :- It is of 2 types ;
 - ♦ External :- 70 / m , for 15 minute (Cardiac massage : Breathing = 4 : 1) .
 - ♦ Internal (intra-operative) .
- 4- Artificial respiration :- either by ;
 - ♦ Mouth to mouth (16 b / m) .
 - ♦ Umbo bag as pump of air connected to oxygen tube .
 - ♦ Endo-tracheal tube + oxygen inhalation .
- 5- NaHCO_3 :- for acidosis during arrest .
- 6- Special line of treatment for each type :-
 - ♦ VF :- they are ;
 - ✓ Intra-cardiac adrenaline , 0.5-1 ml (1/1000) , in bare area .
 - ✓ Direct current cardio-version .
 - ✓ Defibrillation .
 - ♦ Asystole :- Artificial pacemaker . (Immediately)
 - ♦ Electro-mechanical Dissociation :- I.V. fluids for hypovolaemia & Atropine .

☆ Prognosis :-

- ♦ If arrest for short duration :- Recovery is the role .
- ♦ If for long period ; It may lead to :- Permanent damage & even Death .

N.B. :-

- ☞ In Cardio-pulmonary resuscitation , we must do 4 cardiac massages for each respiratory trial , i.e. Cardiac massage : Breathing = 4 : 1 .
- ☞ Conditions for resuscitation :-
 - ♦ Correction of brain oedema by Mannitol .
 - ♦ It should be continued till full recovery .
 - ♦ Correction of hypotension by I.V. fluids & Dopamine .
- ☞ In case of VF , if Adrenaline fails , give ;
 - ♦ Lidocaine :- 75 mg / IV / 5 min / 3 doses .
 - ♦ Phenytoin :- 100 mg / 5 min / 3 doses , I.V. .
 - ♦ After sinus rhythm is restored , Lidocaine is continued by I.V. infusion at a rate of 2-4 mg / min for at least 48-72 hour to prevent recurrence .

CORONARY HEART DISEASES

☆ Anatomy of coronary blood vessels :-

- ◆ There is anterior & posterior atrio-ventricular groove between atria & ventricles .
- ◆ There is anterior & posterior inter-ventricular groove between the 2 ventricles over septum .
- ◆ There are 3 cusps of aorta above each , there is dilatation called ⇒ " Sinus of Valsalva " .
- ◆ *Gross anatomy of Right coronary artery :-*

✓ Course :-

- ↳ It arises from right anterior sinus of valsalva .
- ↳ It passes on right side of pulmonary artery till reach AV groove & pass in side it → till right border of heart , then turn backwards in post AV groove crossing the septum .

✓ Branches :-

- ↳ Conus artery to pulmonary .
- ↳ Branches to → right atrium , right ventricle , SAN (55 %) & AVN (95 %) posteriorly .
- ↳ Marginal artery which runs along lower border of the heart to supply both surface of RV .
- ↳ Posterior descending artery → runs in posterior inter-ventricular groove supplying 1/3 of inter-ventricular septum .

◆ *Gross anatomy of Left coronary artery :-*

✓ Course :-

- ↳ It arises from left sinus of valsalva .
- ↳ It passes on left side of pulmonary artery till reach AV groove where it ends by dividing into 2 branches :-
 - ☞ Anterior descending branch :- which passes in anterior IV groove till apex then turn backwards in posterior IV groove to meet posterior descending artery .
 - ☞ Circumflex artery :- which passes to left side till margin of heart where it turn backwards in post AV groove to meet the right coronary .

✓ Branches :-

- ↳ Anterior descending artery :- gives conus artery to pulmonary artery , branches to SAN (45%) , RV , LV & anterior 2/3 of IV septum .
- ↳ Circumflex artery :- gives branches to LV & gives Marginal artery .

☆ Patterns of circulation :-

A) Balanced circulation :- in which ;

- ◆ Rt coronary supply \Rightarrow RA , RV & posterior 1/3 of IV septum .
- ◆ Lt coronary supply \Rightarrow LA , LV & anterior 2/3 of IV septum .

B) Right coronary predominance :-

- ◆ In which Rt coronary supply \Rightarrow its normal sites + posterior wall of RV .

C) Left coronary predominance :-

- ◆ In which left coronary supply \Rightarrow its normal sites + posterior wall of RV + posterior 1/3 of IV septum .

N.B :- Atherosclerosis affect left branch more therefore , it is commonly obstructed . So , in patient with Lt coronary predominance \rightarrow heart block occurs early as it supply whole septum .

☆ Collaterals of coronary arteries :-

⊗ Criteria of coronary collaterals :-

- ◆ Coronary arteries are not end arteries .
- ◆ They are potential collaterals \Rightarrow act on need .
- ◆ They open on gradual obstruction of coronaries .
- ◆ If obstruction occur suddenly \rightarrow infarction of part below .

⊗ Examples :-

- ◆ Branches [] branches of one coronary and those of the other
- ◆ Branches [] branches of one coronary & each other
- ◆ Branches [] branches of one coronary & direct cavity (atrium or ventricle) .
- ◆ Branches [] branches of one coronary & extra cardiac artery .

☆ General clinical presentation of coronary heart diseases :-

- ⊗ Silent :- coma , syncope , anaesthesia , & DM (dt diabetic neuropathy) , so in DM do ECG / 6 min .
- ⊗ Sudden death :- due to cardiac arrest .
- ⊗ Angina :- pain for minutes .
- ⊗ Infarction :- pain of hours .
- ⊗ Pre-infarction syndrome :- Prolonged pain (1-2 h) without infarction \rightarrow MI within weeks .
- ⊗ Arrhythmia
- ⊗ HB \rightarrow e.g. Left BBB .
- ⊗ Ischemic Cardiomyopathy .

☆ Aetiology of coronary heart diseases (CHD) :-

A) Causes :-

- ♦ Atherosclerosis (99 % of cases) .
- ♦ Syphilitic coronary ostial stenosis .
- ♦ Embolism & Thrombosis .
- ♦ Dissecting aortic aneurysm .
- ♦ Vasculitis (collagen disease) :- e.g. Kawasaki disease .
- ♦ Spasm in coronary → angina .
- ♦ Abnormal origin of Lt coronary from Lt pulmonary artery → infarction in young age .

B) Risk factors :-

☞ Un-Avoidable risk factors :-

- ♦ Positive family history .
- ♦ Age > 50 year (common) .
- ♦ Sex :- male > female (due to endogenous oestrogen & progesterone) then male = female (post menopausal) .

☞ Avoidable risk factors :-

- ♦ Syndrome X :- hyperlipidaemia, hyperglycaemia, HTN , Hyperuricaemia, Hyperinsulinaemia & NASH (Non Alcoholic Steato-Hepatitis) .
- ♦ smoking :- Carboxy Hb & Atherosclerosis .
- ♦ Sedentary life .
- ♦ Stress .

C) Contributing factors :-

- ♦ ↓ O₂ due to advanced lung disease .
- ♦ ↓ HB due to advanced anemia .
- ♦ Advanced aortic disease .
- ♦ Gall bladder disease & colonic disturbance → Reflex coronary spasm → chest pain (Cardiac link) .

D) Precipitating factors :-

سبب السبب راجع من التشنج

- ♦ Effort .
- ♦ Heavy meals .
- ♦ Exercise after meal .
- ♦ Emotions .
- ♦ Hypoglycemia (stress) .
- ♦ Cold path → ↑ catecholamines .

• تعب
• جعان
• اكل جاد
• التشنج
• دخل في الموضوع

N.B. :-

★ A driver complains of chest pain after driving in cold night , you should suspect coronary HD or myocarditis .

★ Causes of Hyperlipidaemia :-

- ✓ Primary :- Genetic & Familial .
- ✓ Secondary :- Hypothyroidism , DM , Nephrotic syndrome , Cushing's & Drugs (Corticosteroids , oral contraceptives) .

★ Fasting serum lipids :-

- ✓ No chylomicrons .
- ✓ ↑ VLDL → ↑ TGs .
- ✓ ↑ HDL → ↓ cholesterol (Protective) .
- ✓ ↑ LDL → ↑ cholesterol (Atherogenic) .

★ Discuss Atherosclerosis :-

- ✓ Mention risk factors .
- ✓ C / P :- Ischemic heart , Cerebral stroke , renal artery stenosis & PVD .
- ✓ Investigations :- Serum lipids (explain) .
- ✓ Treatment :- Diet control & Hypo-lipidaemic drugs .

☆ General Investigation for CHD :-**1- ECG :-**

★ In angina :-

- ♦ During attacks :- it shows ;
 - ✓ Straight flat depressed ST segment except in Prinzmetal angina (elevated ST segment) .
 - ✓ Flat or inverted T wave .
 - ✓ Dysrhythmia .
- ♦ In between attacks :- normal or show ischemic changes in sever cases .

★ In infarction :- It occurs only in leads representing the part in infarction

- ♦ First sign :- Raised convex (coved) ST segment .
- ♦ Late pattern (evolving) :- inverted T wave is added .
- ♦ Then ; Appearance of Q-wave .
- ♦ On recovery :- all changes disappear except Q-wave persists (stigmata of infarction) .

N.B. :- In Pericarditis , there is Concave upwards (raised) ST segment) & It appears in all leads (all heart surfaces) .

2- Stress ECG :- It is done by ergometer or treadmill ; Ask about chest pain ???

★ Take care of HR , BP , ECG changes in this patient .

★ Results :-

In angina :-

- ◆ Done [] attacks to precipitate an attack of angina when ECG is free .
- ◆ BP & HR → No increase → Ischemia (supposed to ↑) .
- ◆ ECG :- Appearance of ischemic changes .

In infarction :- It is done 6 weeks after acute infarction to assess exercise tolerance & improvement before discharge .

★ It is considered +ve if ⇒ chest pain , Dyspnea , Fatigue , claudication & depressed ST segment > 1 m.volt .

3- ECHO :- During attack of angina & infraction , It shows ;

★ *Abnormal wall motion :-*

- ◆ Hypokinesia → weak movement .
- ◆ Dyskinesia → paradoxical movement .
- ◆ Akinesia → no movement .

★ *It helps in evaluation of ventricular function by ejection fraction :*

4- Stress ECHO :-

★ In angina :- done in between attacks .

★ In infraction :- done after 6 months .

5- Isotopic studies :-

★ In angina :-

- ◆ Using Thallium²⁰¹ , IV → go to heart → taken by healthy parts , then use γ -camera which show cold spot that means either dead area (MI) or area of hypoperfusion (Angina) .
- ◆ After 4 hours , take another picture ;
 - ✓ If the cold spot is absent ⇒ it was Angina .
 - ✓ If it persist ⇒ old infraction (fibrous tissue) .

★ In fraction :- Using Tc⁹⁹ pyrophosphate , IV → go to heart → taken by necrotic tissue → gives a hot spot ⇒ it indicates recent infraction .

6- Stress Isotopic studies :- Use Thallium in angina between attacks & in infarction .

7- Coronary Angiography :-**★ Indications :-**

- ♦ **In angina** :- in 2 cases ;
 - ✓ Persistent or recurrent angina with -ve investigations .
 - ✓ Narrowing of > 50 % of coronary lumen .
- ♦ **In infarction** :- It is done pre-operative & if there is occlusion of one artery .
- ♦ If there is concomitant AS .
- ♦ Pre-operative e.g. before any bypass operation .
- ♦ If there is persistent chest pain .

★ Disadvantages :- It maybe normal in the following cases ;

- ♦ Coronary artery spasm ; in 5-10 % .
- ♦ Syphilitic osteal stenosis .
- ♦ **Cardiac syndrome X** :- obliteration of small arterioles .

8- Evidence of tissue damage :-

★ They are :- ESR , WBCs count , Cardiac enzymes & Iso-enzymes , Cardiac troponin .

★ Results :-

- ♦ **In angina** :- ↓ ESR , leucopenia , ↓ Cardiac enzymes .
- ♦ **In infarction** :- ↑ ESR , leucocytosis ; ↑ Cardiac enzymes & ↑ Troponin .

★ Details on each cardiac enzyme & Isoenzymes :-

Enzyme	Normal level	Rises within	Return normal within
1) CPK	0 - 4 U/ml	6 h	3 days
2) AST	8 - 40 U/ml	12 h	7 days
3) LDH	150 - 250 U/ml	24 h	10 days
4) HBD	50 - 250 U/ml	48 h	12 days

N.B. :- these cardiac enzymes are named as follows ;

- ♦ **CBK** :- Creatine phosphokinase .
- ♦ **AST** :- Aspartate amino-transferase (It is also named SGOT) .
- ♦ **LDH** :- Lactate dehydrogenase .
- ♦ **HBD** :- Hydroxy Butyrate dehydrogenase .

5) Iso-enzyme :-

- ♦ They are fraction of the same enzyme having the same catalytic action but differ in some physical properties that help in their isolation .
- ♦ Examples :-
 - ✓ **CBK** :- CBK-BB → brain , CBK-MM → skeletal muscle & CPK-MB → heart .
 - ✓ **LDH** :- LDH₁ → heart & LDH₅ → liver .

6) Cardiac troponin :- It increase within one hour of infarction (most sensitive & specific) .

9- Investigations for risk factors :-

- ★ Blood sugar :- To exclude DM .
- ★ Wasserman test :- to exclude syphilitic aortic stenosis .
- ★ Uric acid :- to exclude Hyperuricaemia .
- ★ Lipids in blood :-
 - ◆ Cholesterol :- ↑ in 50 % of cases (N = 150 - 250 mg %) .
 - ◆ Lipoproteins :- normal LDL : HDL ratio = 2 : 1 , when it becomes > 2.5 : 1 , it means atherosclerosis .

ANGINA

★ **Definition :-** It is a clinical syndrome due to myocardial ischemia characterized by attacks of chest pain which is precipitated by effort & relieved by rest & sublingual nitrates .

★ **Aetiology :-** (the same precipitating , contributing & risk factors) . Causes are the same +

◆ **Low COP :-**

- ✓ Quantitative (↓ COP) :- ↓ filling , ↓ pumping & obstruction .
- ✓ Qualitative (↓ oxygen) :- Anemia & central cyanosis .

◆ **↑ demand :-** ventricular hypertrophy & Thyrotoxicosis .

★ **Clinical presentation :-**

A) In between attacks :- Patient is completely free .

B) During attack :-

1- Symptoms (PADE)

★ **Pain :-**

- ◆ For 3 - 30 min (never seconds , never hours) .
- ◆ Site :- retro-sternal (behind upper & middle 1/3) , Rt chest , epigastrium , back & never infra-mammary on left .
- ◆ Radiation :- Lt shoulder , medial aspect of forearm , little finger , epigastrium , Rt shoulder , back , jaw & tongue
- ◆ Characters :- Constricting , compressing , oppressing maybe burning , staping or heaviness & Never ; stitching (pericarditis) , bricking (neurosis) or throbbing (abscess) .
- ◆ ↑ by effort & ↓ by rest & sublingual nitrites .

★ **Angor enemi :-** fear of emending death .

★ **Dyspnea :-** Transient ischemia → LVF → lung congestion .

★ **Eructation :-** at end of attack ; may be autonomic .

2- Signs

- ★ No signs maybe present .
- ★ Pallor & cold skin .
- ★ ↑ HR & BP :- due to sever pain .
- ★ Auscultation :- Weak HS , Paradoxical splitting of S₂ due to delayed function .
- ★ Paradoxical pulsation of ischemic area..
- ★ Papillary muscle dysfunction → MR .



☆ Investigation :- As mentioned + negative tissue damage .

☆ Differential diagnosis :- of acute chest pain .

☆ Types of angina :-

1- Stable angina :- angina of effort (angina pectoris) , pain is relieved by rest .

2- Unstable angina :-

- ↳ Any recent angina within 8 weeks or recent change in pain of stable angina .
- ↳ Examples :-
 - ✓ Post infarction angina .
 - ✓ Pre-infarction syndrome :- attack of angina prolonged for hours with normal cardiac enzymes → develop MI in hours ...
- ↳ Treatment of pre-infarction syndrome :- Anti-coagulant & admission to ICU or CCU .

3- Silent angina :- Angina with NO pain , due to ;

4- Prinzmetal angina (Angina inversa or Variant angina) :-

- ↳ It occurs at fixed time during / day due to coronary spasm .
- ↳ ST segment is elevated then it become depressed again .
- ↳ Treatment :- CCB (amlodipine) & NOT β-blockers (as it → unopposed α-action → ↑ coronary artery spasm) .

5- Other types :-

1] Linked angina :-

- ◆ Diseased GB + diseased coronary → anginal pain felt at gall bladder site .
- ◆ So ; in gall bladder pain → Do ECG to exclude this cardiac link .

II] Angina of lewis :- (NARA)

- ◆ It is Nocturnal :- during sleep → ↓ HR → ↑ diastolic period → ↑ regurgitant blood form aorta → ↓ coronary blood flow .
- ◆ It is also ; Autonomic , Resistant to treatment & occur in AR .

III] Angina decubitus :-

- ◆ Pain occur on lying down & relieved by sitting .
- ◆ Caused by LVF :- lying down → ↑ VR → ↑ congestion → ↑ failure → ↓ COP → ↓ coronary filling .
- ◆ It is of bad prognosis as it develop infarction within weeks .
- ◆ Treatment :- Digitalis (0.25 mg) .

IV] Status angiosus :-

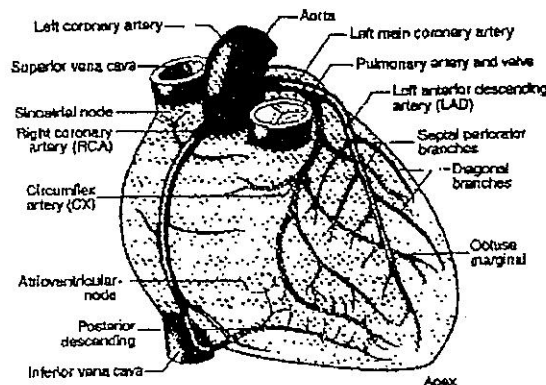
- ◆ It can occur even at rest .
- ◆ There is ↑ in frequency & duration → bad prognosis .
- ◆ It is resistant to treatment .

☆ Treatment of angina :-

A) During the attack :-

- 1- Rest .
- 2- Short acting vasodilators :- (Nitrates) , as ;
 - ↳ Nitroglycerine (Angised) :-
 - ◆ It has rapid action & it bypass the liver .
 - ◆ It is taken sublingual , transdermal , ointment or IV .
 - ↳ Isosorbide dinitrate (Isordil) :- only sublingual .

⊗ Action of nitrates :- Coronary VD & ↓ preload → ↓ heart work .



B) Between attacks :-1- Treatment of the cause, Contributing factors & Precipitating factors.2- Treatment of risk factors :- especially atherosclerosis by ;↳ Diet :-

- ♦ ↓ Total calories , ↓ fat to 30 % , ↓ cholesterol < 300 mg / day .
- ♦ ↑ polyunsaturated oils (fish oil & vegetable oil) .

↳ Drugs :-

- ♦ ↑ cholesterol & LDL → use cholestyramine .
- ♦ ↑ TGs & VLDL → use clofibrate .
- ♦ ↑ both → use nicotinic acid .

3- Bed rest :- till attack relieved in case of unstable angina .4- Exercise :- It has the following criteria ;

- ♦ Graduated & not Isometric (no muscular contraction) as it ↑ cardiac load .
- ♦ Value :- ↓ HR , ↓ BP , ↑ mechanical efficiency of skeletal muscle , sense of well-being & open the collaterals .

5- Sedation :- e.g. Valium .6- Anti-anginal drugs :-

★ **Long acting vasodilators :-** as Nitrite which are VD → ↓ pre-load → ↓ demand .

- ↳ Nitroglycerine (Nitromag) :- oral , 2.5 mg .
- ↳ Isosorbide dinitrate (Isosordil) :- oral ; 10 , 20 , 40 mg .

★ **β-Blockers :-**

- ↳ used in all types except Prinzmetal angina .
- ↳ Mechanism :- ↓ Cardiac work → ↓ HR → ↑ diastolic period → ↑ coronary filling .
- ↳ Example :- Propranolol (160-240 mg/d) & Atenolol (50-100 mg/d) .

N.B. :- If no response to β-blockers → use Prehexiline (pixid) → ↓ cardiac work .

★ **Calcium Channel Blockers (CCB) :-**

- ↳ used when β-blockers are ineffective & in Prinzmetal angina .
- ↳ Example :- Verapamil (80 mg t.d.s) & Diltiazem .
- ↳ Mechanism :- ↓ HR & Cardiac work → prevent V.C → coronary VD .

7- Anti-coagulants :- as ; Heparin , 5000 U/6h , in pre-infarction & unstable angina .

8- Family education :- about management during attack .

9- Anti-platelets :- (in stable angina) , as ;

- ↳ Aspirin :- not > 325 mg (if > 325 mg → analgesic) .
- ↳ Dipyridamole (persantin) :- 75 mg t.d.s. , it causes shift of blood from diseased area to healthy one ⇨ Coronary steal phenomenon .
- ↳ Ticlopedine .

10- Surgical treatment :-

- ★ It depends on results of cardiac catheterization ;
 - ↳ If coronary stenosis → Percutaneous transluminal coronary angioplasty (PTCA) .
 - ↳ If coronary occlusion → Coronary Aorta bypass grafting (CABG) ;
- ★ In CABG , we can use :-
 - ↳ Graft of great saphenous vein which is not under autonomic supply of the heart & liable for occlusion .
 - ↳ Graft of internal mammary artery (recent) .
- ★ Precautions of CABG :-
 - ↳ No major risk factors .
 - ↳ Normal heart size .
 - ↳ < 65 years old .
 - ↳ Normal LV functions .
 - ↳ Localized disease .

Myocardial Infarction

☆ Definition :- Necrosis of cardiac muscles due to sudden , complete & persistent stoppage of blood supply .

N.B. :- If this stoppage is transient ⇨ Prinzmetal angina .

☆ Aetiology of Myocardial Infarction (MI) :-

- ↳ Risk , contributing & precipitating factors :- as in angina .
- ↳ Cause :- as in angina but ; No ↑ in requirements & there's a spasm on top of thrombus .

☆ Pathology :-

- ↳ Coagulative necrosis after 1 week → granulation tissue formation which is after 5-8 weeks is replaced by fibrous scar .
- ↳ Consecutive frequency of affection :- Anterior descending artery → Circumflex artery → Rt coronary artery .

☆ Pathological types of infarction :-

- 1- Transmural infarction (associated with Pericarditis) .
- 2- Subendocardial infarction .
- 3- Non transmural infarction .

N.B.:-

- ☞ *Transmular infarction* → necrotic tissue which may reach pericardium → pericarditis → Pericardial rub .
- ☞ *This type is dangerous as it is liable to rupture* → cardiac tamponade except if it is closed by clotting .
- SO ;** ☞ *In a case of pericardial rub , there is absolute contraindication to use heparin as if it is transformed into infarction , it will lead to cardiac tamponade which is fatal .*

☆ Clinical presentation :-

A- Symptoms

1- Pain :-

- ◆ Site :- as angina but radiate more .
- ◆ Character :- as angina but more sever .
- ◆ Duration :- more than angina .
- ◆ Precipitating factors :- as angina BUT not relieved by rest or sublingual nitrates .

2- Shock :-

- ◆ Neurogenic due to pain :- good prognosis + bradycardia .
- ◆ Cardiogenic due to massive infarction :- bad prognosis + tachycardia .

3- Heart failure :-

- ◆ Especially ; LVH (anterior descending artery) with dyspnea & lung congestion → cardiac asthma & pulmonary edema .
- ◆ It maybe due to neurogenic shock .

4- Complications :- enumerate (mentioned later) .

N.B. :- Causes of painless infarction :-

- ⊗ *Diabetic neuropathy .*
- ⊗ *Tabes dorsalis .*
- ⊗ *Shock .*
- ⊗ *Syncope .*
- ⊗ *Pulmonary oedema .*
- ⊗ *During anaesthesia .*

B- Signs

I] General signs :-

1- General appearance :- in agony (pain) , dyspnea (HF) , collapsed (pallor & sweating) due to shock .

2- Closed fist sign (Le Veen sign) :- patient put his closed fist on sternum to support it as if it will burst out .

3- Vital signs :-

★ **Pulse :-**

↳ Rate :- either Normal , Bradycardia (HB , neurogenic shock) or tachycardia (pain & cardiogenic shock) .

↳ Rhythm :- Arrhythmia .

★ **Blood pressure :-** either ;

↳ Normal .

↳ Hypotension :- due to shock .

↳ Hypertension :- due to pain .

↳ ↓ systolic with normal diastolic :- in previous HTN (decapitation) [patient was 180/100 & when get MI becomes 130/100]

★ **Temperature :-** Fever in 2-6th day due to absorption of necrotic material .

★ **Respiration :-** Rapid & Shallow (shock) .

II] Cardiac signs :- as angina + pericardial rub .

★ **Investigation :-** As mentioned , urine examination → oliguria (shock) .



[A]

[B]

[C]



[D]

[E]

☆ Complication of Myocardial Infarction :- [layers of the heart]

A) Endocardial complications :-

- 1- Thrombosis .
- 2- Vegetations → Infective endocarditis .

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B) Myocardial complications :-

1- Shock :-

- ☆ Neurogenic shock :- leads to heart failure → Low COP .
- ☆ Cardiogenic shock :- 85 % mortality , treatment is cardiac transplantation .

2- Arrhythmia :-

- ☆ Tachycardia :- due to electrical instability of ischemic heart .
- ☆ Bradycardia :- due to damage of conducting system .
- ☆ Heart block .

3- localized complications in infarction :-

☆ Rupture of infarction :- in ;

- Cardiac muscles → Haemopericardium .
- Septum → VSD .
- Papillary muscle → MR .

☆ Dilatation of infarction scar (Myocardial Aneurysm) :-

- Suspected in :-
 - ✓ Double apex (on palpation)
 - ✓ Weak first heart sound on apex .
 - ✓ ECG :- Persistent elevation of ST segment (it is supposed to return to normal after few days) .
 - ✓ Echocardiography & Angiography :- Diagnostic .
- Complications of Myocardial aneurysm :- Rupture aneurysm , Resistant HF , Resistant arrhythmia , IE & thrombus formation .

C) Pericardial complications :-

1- Dry Pericarditis .

2- Haemorrhagic Pericarditis .

3- Haemopericardium .

4- Dressler's syndrome :- (3P + F)

- ☆ Absorption of necrotic tissue of infarction → act as antigen → stimulate Abs formation & after 2-6 weeks → Pleurisy , Pericarditis , Pneumonitis & Fever .
- ☆ It is autoimmune Pericarditis , so it is treated by Corticosteroids .

D) Miscellaneous complications :-

1- Depression .

2- Complications of prolonged bed rest .

3- Complication of anticoagulants (will be mentioned later) .

4- Frozen shoulder :- Stiffness with limitation of movements , due to

- ☆ Pain :- reflex spasm & ischemia , treatment is analgesics & physiotherapy .
- ☆ Immune reaction :- Auto-immune capsulitis , associated with auto-immune Pericarditis , treatment is corticosteroids .

N.B. :- Frozen shoulder occur in Myocardial ischemia & DM .

☆ Differential diagnosis of MI :- From causes acute chest pain .

☆ Treatment of Myocardial infarction :-

A) Pre-hospital treatment :- for ;

1- Pain :-

- ☆ Morphine :- 5-10 mg IV , SC ; not used in bradycardia as it ↑ vagal tone .
- ☆ Pethidine :- 50-100 mg , IM .

2- Arrhythmia :- (prophylactic as death occur in 1st 2.5 hours)

- ☆ If Ventricular extra-systole (PMB) :- Lidocaine , 50-100 mg , IM in deltoid muscle .
- ☆ If bradycardia or HB :- use atropine , 0.5-1 mg , IV or SC .

B) Hospitalization :-

1) Patient admitted to coronary care unit (CCU) ; where there is must be ,

- ☆ Well trained doctors & nurses .
- ☆ Continues monitoring by ECG .
- ☆ DC cardioversion .
- ☆ Pacemakers .

2) Thrombolytic drugs :- within 1st 5 hours ;

- ☆ Streptokinase ; 1.5 mU .
- ☆ Urokinase .
- ☆ Tissue plasminogen activator (TPA) :- at site of thrombus .

⊗ All of them breakdown the pre-formed thrombus but don't prevent formation of new one .

3) Anti-coagulants :- they prevent formation of new thrombus ;

- ☆ As heparin , warfarine , (discussed later)
- ☆ Given for all patients specially extensive infarction , extending infarction , shock , HF & DVT .

4) Symptomatic treatment :-

- ☆ Treatment of pain :- analgesics .
- ☆ Treatment of arrhythmia .
- ☆ Diet :- 1st day (fluids) , 2nd day (semi-fluid) & 3rd day (gradual building of diet) .
- ☆ Bowel care , Oxygen , stop smoking , laxative & Catheterization .

5) Treatment of complications :-

- ★ Treatment of cardiac asthma .
- ★ Treatment of arrhythmia :- anti arrhythmic drugs .
- ★ Treatment of heart block :- Pace-maker .

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مستشار
الطب
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6) Surgical treatment :-**★ For coronary arteries :-**

- ↳ PTCA .
- ↳ CABG .
- ↳ Remove atheroma by rotablator or by laser .

★ For complications :-

- ↳ VSD :- Closure .
- ↳ Papillary muscle rupture → Artificial valve .
- ↳ Aneurysm → Aneurysmectomy .

C) Post discharge care :-

Discharge patient after 7-10 days , if uncomplicated & after 14-20 days if complicated .

1- Vasodilators :- nitrites (describe from angina) .**2- Anti-platelets :-****★ Aspirin :-** (Rivo ; 325 mg & aspocid ; 75 mg) .

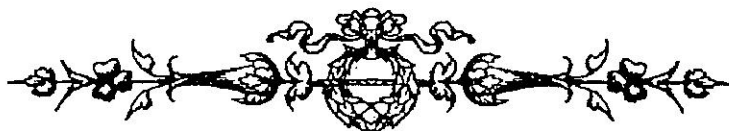
- ↳ If large dose → acts on thromboxane A₂ → ↑ thrombus .
- ↳ If small dose → act on PG → ↓ thrombus .

★ Dipyridamole (Persantine) :- 75 mg , 3 / day , before meal by 1 hour .

- ↳ ↑ Perfusion to ischemic area .
- ↳ ↓ Platelet adhesion .

3- Rehabilitation :-

- ★ Guide for graduated muscular exercise .
- ★ Full activity not allowed before 12 week .



Anti-Coagulants

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☆ Types :- Heparin & oral anti-coagulants (Warfarin).

Parameter	Heparin	Oral anti coagulants
☆ General :-	☞ Carry positive charge .	☞ <u>Groups</u> :- ♦ Dindevan ; 50 mg tablets . ♦ Warfarin ; 10 mg tablets .
☆ Onset :-	☞ Of immediate action .	☞ Of delayed action , 48-72h .
☆ Action :-	☞ Neutralize co-agulation factors (-ve charge) . ☞ ↑ anti-thrombin III → ↓ co-agulation factors (X) .	☞ Inhibit vit-K dependant co-agulation factors in liver (II , III , IV , X) , by competitive inhibition .
☆ Dose :-	☞ 5000 IU / 6h , SC or IV but not IM as it cause haematoma with heparinase enzyme .	☞ 1 st day (3 tablet) . ☞ 2 nd day (2 tablet) . ☞ 3 rd day (1 tablet) .
☆ Control factor :-	☞ Co-agulation time & APTT . ☞ Must be used till they are 3 times normal , not more (bleeding) & not less (ineffective) .	☞ Prothrombine concentration , which must ↓ to 30% of basal level .
☆ Antidote :-	☞ Fresh blood . ☞ Protamine sulphate (1 mg for each 1 mg) . ☞ Protamine zinc insulin + glucose .	☞ Fresh blood . ☞ Vitamine K (10-25 mg) .

☆ Indications :-

- ♦ Recent AF , AF + MS .
- ♦ Angina (unstable) , Pre-infraction syndrome & Myocardial infraction .
- ♦ After vascular surgery (DVT , pulmonary embolism) , Artificial valve .
- ♦ TIAs , Embolic hemiplegia in adults , Stoke in evolution .

☆ Complications (Side effects of prolonged usage) :-

- ◆ Bleeding .
- ◆ Hyper-coagulability on sudden stoppage .
- ◆ For oral :- Teratogenic , Hepatitis (Dendivan) .
- ◆ For Heparin :- (if exceeds 10 days use)
 - ✓ Alopecia .
 - ✓ Thrombocytopenia .
 - ✓ Allergy :- asthma , pruritis & anaphylaxis .
 - ✓ Osteoporosis .

N.B :- Begin with heparin & oral anti coagulants till they act then use oral drugs only .

☆ Contraindications :-

◆ Cardiac :-

- ✓ Infective endocarditis :- as embolization + drug → cerebral Haemorrhage .
- ✓ Dissecting aortic aneurysm :- prevent closure of bleeding point in aorta by haematoma .
- ✓ Infraction with pericardial rub :- If transmural type (see before) .

◆ Chest :- T.B → Haemoptysis .

◆ GIT :-

- ✓ Liver cell failure .
- ✓ Peptic ulcer :- It prevents closure of perforation if occur → haemo-peritoneum .

◆ Blood :- haemorrhagic blood diseases e.g. haemophilia .

N.B.

⌘ Elevation of ST segment occurs in 2 conditions :-

1- Myocardial infarction :-

- ◆ No S-wave .
- ◆ Convex ST segment .
- ◆ Deep Q-wave .
- ◆ Appears in one , 3 or 3 leads according to area of infarction .

2- Pericarditis :-

- ◆ No Deep Q-wave .
- ◆ Concave ST upwards .
- ◆ Appears in all leads ⇔ Universal .

THE MEDIASTINUM

☆ **Definition :-** It is the space [] the 2 lungs & pleural cavities including heart & other chest viscera.

☆ **Anatomy of the Mediastinum :-**

1. Superior Mediastinum :- above an imaginary line extending from the sternal angle to the 4th dorsal inter-vertebral disc .

2. Inferior Mediastinum :- It is divided by the heart into :-

☞ **Anterior Mediastinum :-** anterior to the heart.

☞ **Middle Mediastinum :-** contains the heart and the pericardium.

☞ **Posterior Mediastinum :-** posterior to the heart.

☆ **Boundaries :-**

↳ **Laterally :-** parietal pleura and the lungs.

↳ **Anteriorly :-** sternum.

↳ **Posteriorly :-** para-vertebral gutters and ribs.

↳ **Superiorly :-** thoracic inlet.

↳ **Inferiorly :-** diaphragm.

☆ **Contents :-**

A. Contents of the superior Mediastinum :-

- ◆ Aortic arch and its 3 large arteries. (innominate, Lt common carotid & Lt subclavian).
- ◆ Upper 1/2 of the superior vena cava (SVC) and its 2 innominate veins.
- ◆ Trachea and esophagus.
- ◆ Thoracic duct & superior sympathetic ganglia .
- ◆ Nerves :- phrenic, vagus, cardiac & left recurrent laryngeal .

B. Contents of the posterior Mediastinum :-

- ◆ Spinal nerve roots and the sympathetic chain.
- ◆ Vagus and the splanchnic nerves.
- ◆ Descending aorta.
- ◆ The azygos and hemiazygos veins.
- ◆ Thoracic duct & Oesophagus.

C. Contents of the anterior Mediastinum :- Thymus gland & fat .

D. Contents of the middle Mediastinum :-

- ◆ Heart and pericardium.
- ◆ Ascending aorta, Pulmonary artery and its main branches.
- ◆ Lower 1/2 of SVC and part of the azygos vein.
- ◆ Pulmonary veins & Inferior vena cava.
- ◆ Lower part of the trachea and its bifurcation.
- ◆ Phrenic nerves.

NB:- The 3 components contain lymph nodes, connective tissue, lymphatics and nerves.

☆ Diseases that affect the Mediastinum :-

1. Inflammation :- mediastinitis.

2. Fibrosis .

3. Pneumomediastinum .

4. Masses :- benign or malignant.

☆ Definition of Mediastinal Syndrome :-

☞ It is a syndrome of compression due to space occupying lesion in Mediastinum causing pressure manifestation .

☆ Clinical manifestations of mediastinal masses :-

1. Asymptomatic masses :- 50 % of all mediastinal masses are Asymptomatic (50 % of them are benign)

2. Clinical presentation of the causes :- Mention some examples .

3. Clinical presentation of compression :- (*dt compression or invasion of the adjacent structures*)

☞ Pressure on tubes :- (4 tubes) ;

☞ Trachea :- leading to ;

- ◆ Stridor :- inspiratory .
- ◆ Cough :- brassy with metal tone .
- ◆ Dyspnea :- especially on lying backwards , so patient prefers leaning forwards (Prayer's position) .

☞ Bronchi :- leading to either ;

- ◆ Complete obstruction → Atelectasis .
- ◆ Incomplete obstruction → Emphysema & Broncho-pneumonia .

☞ Oesophagus :- leading to Dysphagia & Regurgitation .

☞ Thoracic duct :- leading to chylous effusion at pleura , pericardium & peritoneum .

☞ Pressure on vessels :-

☞ SVC :- leading to ;

- ◆ Congested non pulsating neck veins .
- ◆ Oedema & cyanosis of face & upper limb .
- ◆ Dilated veins over the chest .

☞ Azygos veins :- leading to ;

- ◆ Engorged veins over upper part of chest filled from above downwards .
- ◆ Right pleural effusion .