Drug interaction :- DON'T use the following drug with digitalis ;

- ✓ Ca^{++} → Synergism .
- ✓ Adrenaline → Arrhythmia .
- ✓ Atropine → Anti-vagal .
- ✓ Virapamile → Negative inotropic & ↑ digitalis absorption → ↑ toxicity .
- ✓ All diuretics except K-retaining → hypokalaemia → precipitate for toxicity .
- ✓ β-blockers → -ve inotropic effect .

Preparations of digitalis :-

- ✓ ***Digoxine (Lanoxine) :-*** tablet (0.25 mg) , ampule (0.5 mg) ; metabolized in kidney .
- ✓ ***Digitoxine :-*** tablet (0.1 mg) , ampule (0.2 mg) ; metabolized in liver & GIT .
- ✓ ***Cedilanid :-*** ampule (0.4 mg) ; metabolized in kidney .
- ✓ ***Oubain :-*** ampule (0.5 mg) metabolized in kidney & GIT , rabid onset & short duration .

Dose of digitalis :-

- ✓ Therapeutic serum level of digitalis = 0.5 ng / ml (measured by radio-immuno assay) , if it ↑ to 2.5 ng/ml → toxicity .
- ✓ There are 2 doses for digitalis :-
  - ***Digitalizing dose :-*** 1.25 mg , till reach the therapeutic serum level .
  - ***Maintenance dose :-*** 0.5-1 tablet (about 0,25 mg)
- ✓ There are 2 methods to give digitalis :-
  - ***Non-Digitalizing method :-*** (in chronic stable HF)
    - ➥ Begin with maintenance dose & digitalis will reach therapeutic level in 2 weeks .
  - ***Digitalizing method :-*** (In acute HF & paroxysmal atrial tachycardia)
    - ➥ It can be given either I.V. or oral .
    - ➥ In I.V. method :-
      - ☒ Give 2-3 ampoules in one day (1mg / 1/2h) then continue by maintenance dose after end of digitalization .
      - ☒ It is important for patient not to take digitalis 2 weeks before digitalization to avoid toxicity
    - ➥ In Oral method :- It is given on 1 , 3 or 7 days , as follow ;

$$\text{Digitalization dose / day} = \frac{\textit{digitalizing dose} + (\textit{maintenance } X \textit{ No. of days})}{\textit{No. of days (1 , 3 or 7)}}$$

✍ Criteria of response to digitalis :-

- ✓ Improvement of symptoms & signs .
- ✓ Clearing of congested lung bases .
- ✓ Diuresis with loss of edema and ↓ BW .
- ✓ Slowing of heart rate .
- ✓ Early manifestations of digitalis toxicity .

✍ Digitalis toxicity :-

☆ Predisposing factors :- (2 O , 4 H & 2 D)

- ⅄ ***Old age & Over dose .***
- ⅄ ***Hypomagnisaemia .***
- ⅄ ***Hypothyroidism :-*** thyroxine ↑ clearance of digitalis .
- ⅄ ***Hypokalaemia :-*** It potentiate action of digitalis → K is pushed outside cells .
- ⅄ ***Hypocalcaemia :-*** It has synergetic effect .
- ⅄ ***Diseases :-*** liver , renal disease & failure .
- ⅄ ***Drugs :-*** Verapamile , quinidine , amiodarone & β-blocker .

☆ Clinical presentation :-

- ⅄ ***GIT :-*** Anorexia (1st) , nausea , vomiting & diarrhea .
- ⅄ ***CVS :-*** Bradycardia (1st) , Pulsus bigeminus or trigeminus (pathognomonic) , heart block & any type of arrhythmia except sinus tachycardia .
- ⅄ ***Occular :-*** Yellow vision blurring of vision & optic neuritis .
- ⅄ ***CNS :-*** Headache , confusion & convulsions .
- ⅄ ***Others :-*** Gynaecomastia & hyper-coagulability .

☆ Investigations to asses digitalis toxicity :-

- ⅄ ***Pulse :-*** ↑ in under-digitalization & ↓ in over digitalization .
- ⅄ ***ECG :-*** Electrical (pulsus) bigeminus .
- ⅄ ***Radio-immuno assay :-*** detect serum level of digitalis .

☆ **Treatment of digitalis toxicity :-**

- ***Stop the drug .***
- ***Stop any drug causing hypokalaemia*** (laxatives , diuretics & steroids) .
- ***Give KCl*** , I.V. , 1 gm , 3 times / day .
- ***Give Ca chelating agents :-*** as EDTA ; 4 gm / 500 cm glucose infusion .
- ***Symptomatic treatment :-*** for ;
  - Vomiting & nausea :- chloropromazine ; 25 mg .
  - Bradycadia :- atropine ; 1 mg / SC.
  - Heart block :- artificial pace-maker .
  - Cardiac arrest :- Intra-cardiac adrenalin , Cardiac massage & C-P resuscitation .
  - Ventricular tachy-arrhythmia :- anti-arrhythmic drugs (lidocaine & phenytoin) .
  - VF :- direct current cardioversion → depolarize all irritable areas except SAN .
- ***Digitalis antibodies :-*** FAB fragments from sheep RBCs *(recent & help digitalis excretion)*

N.B. :- Digitalis is bound to tissues so , it is un-dialyzable .

5) Treatment of Cardiogenic Pulmonary oedema (Acute HF)

1- Hospitalization . (دخل المستشفى)

2- Semi sitting position with leg hanging down . (قعد فيها)

3- Aspiration of secretions . (شفط)

4- Oxygen inhalation :- 5-6 L / min by mask or nasal tube . (شم)

5- Drugs :- (in order)

➲ Morphine :-

- Action :- ↓ Cardiac work , it is not given in non-cardiogenic pulmonary oedema .
- Dose :- 5-10 mg I.V. or S.C .
- Value :- ↓ preload , ↓ dyspnea , ↓ agitation , ↓ VF & Analgesic .

➲ Lasix :- till 1 gm (40 ampoules) , it ↓ cardiac work .

➲ Vasodilators :- ↓ pre- & after load .

➲ Dopamine & Dobutamine :- they have +ve inotropic effect .

➲ Aminophylin :- I.V. ; 250 gm slowly then 250 infusion (if rapid → arrhythmia) .

➲ Digitalis .

➲ Rotating tourniquet :- apply 3 tourniquets to 3 limbs & change their site to avoid ischemia .

➲ Correction of precipitating factors :- to ↓ VR .

➲ Treatment of complication :- e.g. digitalis toxicity .

N.B. :-
☒ *Medical venesection :- dilators & diuretics (↓ blood volume) .*
☒ *Surgical venesection :- Small incision in vein to loose some blood (not used now) .*
☒ *Treatment of acute pulmonary oedema :- (involve 2 items in answer)*
- *Treatment of Cardiogenic pulmonary oedema (as before) .*
- *Treatment of non-Cardiogenic pulmonary oedema :- ttt of the cause* (refer to G. medicine)

6) Treatment of refractory Heart failure (Chronic HF - CHF)

☆ ***Definition of refractory HF :-*** HF resisting the normal line of treatment .

☆ ***Aetiology :-*** there are 4 groups of causes ;

➥ Disease :- Un-corrected causes & Un-corrected pre-disposing factors . (mention)

➥ Patient :- Un-compliance (stop digitalis , excess salt & in-adequate rest) .

➥ Doctor :- either ;
- Wrong diagnosis :- pregnancy , Pericardial effusion , obesity , constrictive pericarditis .
- Iatrogenic :- under dose of digitalis or diuretics , inadequate salt restriction , CCBs , COC , β-blockers & NSAIDs .

➥ Others :- Sever damage of heart (advanced cardiomyopathy & extensive MI) .

☆ ***Treatment :-***

1- ***Treatment of the cause*** ⇨ example . مثال واحد

2- ***Treatment of precipitating factors*** ⇨ example . ٤ أمثلة

3- ***Proper diagnosis of HF .***

4- ***Proper dose of digitalis .***

5- ***Improve compliance :-***
- Adequate salt restriction (0.5-1 gm / day) .
- Strict instructions to patient (drugs given by nurse) .

6- ***If No response :-*** add I.V. , Dobutamine , diuretics & Vasodilators .

7- ***Surgical repair :-***
- Cardiomyoplasty :- using latissmus dorsi muscle to help heart in its work till cardiac transplantation .
- Cardiac transplantation .
- Intra-aortic ballon counter pulsations :- it acts as peripheral heart which relax in systole & contract in diastole (it is filled with Helium) .

Important N.B.

☒ Heart maybe enlarged & compensated without heart failure (as in athletes) ; so chamber enlargement not mean HF .

☒ Cardiomegally may be absent in HF (i.e. HF with normal sized heart) in ;

- ✓ Acute HF .
- ✓ MS .
- ✓ Restrictive cardiomyopathy .
- ✓ Constrictive pericarditis .
- ✓ Cor-pulmonale due to COPD because heart is compressed bilaterally by hyper-inflated lungs .

☒ ↓ severity of dyspnea in LSHF means ⇨ development of RSHF on top .

☒ Differential diagnosis of LSHF :-

- ✓ Other causes of dyspnea (chest dyspnea) .
- ✓ Cardiac asthma .
- ✓ DD of aetiology of HF .

Parameter	Chest dyspnea	Cardiac dyspnea
✯ Cough & expectoration :-	• Early .	• Late & positional .
✯ PN Dyspnea :-	• Not occur	• Characteristic
✯ Orthopnea :-	• late .	• Early , ↓ when RSHF occur
✯ Ejection fraction :-	• Of RV → ↓	• Of LV → ↓ .

☒ Digitalis has no effect on normal heart .

☒ If cardiac edema progress & HF resist treatment ⇨ Nephrotic syndrome or protein loosing enteropathy .

SYSTEMIC HYPERTENSION

⇨ ***Definition :-*** Persistent elevation of blood pressure above normal (140 / 90) .

⇨ ***Classification :-***

A) Systolic or diastolic ?

- ***Systolic HTN :-*** ↑ systolic blood pressure with normal diastolic blood pressure .
- ***Diastolic HTN :-*** ↑ diastolic blood pressure with normal or ↑ systolic BP .

B) Labile or established :-

- ***Labile HTN :-*** Transient ↑ in DBP during excitation , exercise & .... then return normal .
- ***Established HTN :-*** persistent .

C) Malignant or Benign :-

- ***Malignant HTN :-*** show the following criteria ;
  - ✓ Diastolic pressure > 130 mmHg .
  - ✓ Papilloedema .
  - ✓ Fibrinoid necrosis of blood vessels .
  - ✓ With or without ⇨ acute heart failure or acute renal failure .
- ***Benign HTN :-*** No presence of the above mentioned points .

D) Primary or secondary :-

- ***Primary HTN :-*** Has NO aetiology but theories (hereditary , neural & hormonal)
- ***Secondary HTN :-*** due to many causes ; renal , endocrinal , CNS , ... etc .

⇨ ***Aetiology of HTN :-***

A) Aetiology of Systolic hypertension :- (factors that ↑ SV & ↓ elasticity of aorta)

- ↓ Elasticity of aorta :- atherosclerosis .
- ↑ SV :- due to AR , complete HB , PDA & Thyrotoxicosis .

B) Aetiology of Diastolic HTN :- (common) ; it is either ;

I] Primary HTN (essential HTN) :- (95 % , 35-50 y , males = females)

☆ *Causes :-*

1- Hereditary theory .
2- Neural theory :- excessive emotion → ↑ adrenalin → HTN .
3- Hormonal theory :-
   - ✓ ↑ release of vasopressors (renin & corticosteroids)
   - ✓ ↓ release of vasodilators (PGs) .
4- Multifactorial theory :- (most accepted) ; different factors co-operate with each other.

☆ *Mechanism of Primary HTN :-*

In Labile HTN :-

- Stress → ↑ catecholamine → VC all over body → VC of renal blood vessels → renal ischemia →
  ↑ renin → ↑ Ag II → ↑ aldosterone → salt & water retention → HTN
  ↑ sensitivity of smooth muscle to caticolamines → HTN
- Removal of stress → ↓ caticolamines → VD → ↓ Blood pressure .

In established hypertension :-

- Persistent stress → ↑ catecholamines
  - → VC of renal blood vessels → Persistent HTN
  - → Renal ischemia
    - → ↑ renin
      - → ↑ sensitivity of smooth muscle to caticolamines → Persistent HTN
      - → ↑ Ag I → ↑ Ag II → ↑ aldosterone → Salt & water retention → Hypervolaemia → Persistent HTN

II) Secondary HTN :- It is due to 2^{ry} causes else where ;

1) Renal causes :-

Reno- paranchymatous causes :- (glomerular , tubular & interstitial tissue)

- Example :- TB , hydronephrosis , glomrulonephritis & ....etc .
- Mechanism :- salt & water retention , ↓ excretion of vasopressors & ↓ release of VDs .

Reno-vascular causes :-

- Example :- Renal artery stenosis → ↑ rennin secretion .
- Causes :-
  - ✓ Atherosclerosis :- bilateral , old age & male .
  - ✓ Congenital fibro-muscular dysplasia of wall :- unilateral , young & female .
  - ✓ Others :- trauma , thrombosis , compression by tumour & Vasculitis .

2) Endocrinal causes :-

- Pheochromocytoma (↑ catecholamine release) .
- Caushing's disease (↑ cortisone) .
- Conn's syndrome (↑ aldosterone) .
- Adreno-genital syndrome .
- Thyrotoxicosis → Systolic HTN .
- Myxedema :- due to associated atherosclerosis → Diastolic HTN .
- Acromegally (↑ GH).
- DM :- we diagnose HTN in diabetic patient if BP > 130 / 85 .
- Hyperparathyroidism :- due to hypercalcaemia .

3) CNS causes :-

- Bulbar poliomyelitis .
- Lead poising → Polyneuritis .
- Encephalitis .
- Transection of spinal cord .

4) Vascular causes :-

- Co-arcitation of aorta .
- Poly-arthritis noose .
- Polycythaemia rubra vera .
- Acute intermittent porphyria .

5) Iatrogenic causes :-

- Post-commissurotomy .
- Contraceptive pills .
- Corticosteroids .
- Sympathomimetics .
- Liquorice → Pseudo-hyperaldosteronism .
- MAOIs with excess tyramine → ↑ adrenaline & NE .

6) Miscellaneous causes :-

- Pre-eclampsia & eclampsia .
- Renin producing tumour .
- Barter's syndrome → ↑ renin .
- Hypercalcaemia & hypervolaemia .

⇨ ***Grading of HTN (Joint Nation Committee [JNC] classification) :-***

Grade	Systolic BP	Diastolic BP
✍ Normal :-	• 100-129	• 60-84
✍ High normal :-	• 130-139	• 85-89
✍ Mild HTN :-	• 140-159	• 90-99
✍ Moderate HTN :-	• 160-179	• 100-109
✍ Sever HTN :-	• ≥ 180	• ≥ 110

N.B. :- High normal = hypertensive diabetic patient .

⇨ ***Clinical picture of HTN :-***

A) Uncomplicated hypertension :-

I] Symptoms :- Asymptomatic , Occipital headache in morning , tinnitus & epistaxis .

II] Signs :-

✍ ↑ Blood pressure on measurement (refer to grades of HTN)

✍ Pulse :- it involves ;

☆ Pulse volume :- Big (in systolic HTN) & small or normal (in diastolic HTN) .

☆ Pulse character :- pulsus alternans (LV Strain) .

✍ Auscultation :- (as pulmonary HTN but on Lt. side)

☆ LV apex (mention its criteria) .

☆ Accentuated S_2 (paradoxical splitting if LSHF) .

☆ Ejection click on aortic area .

☆ Ejection systolic murmur :- due to functional AS ; due to dilatation distal to the valve .

☆ Later on → Early diastolic murmur ; due to functional AR ; due to dilatation of valve ring .

B) Complicated hypertension :- [Complications of HTN]

✍ ***Causes of these complications :-***

☆ Accelerated atherosclerosis .

☆ Sudden rapid ↑ in blood pressure → rupture vessel & haemorrhage .

☆ Thrombosis & embolism on top of atherosclerosis .

Types of Complications :-

1- Cerebral complications :-

☆ Transient ischemic attacks (TIAs) → refer to neurology .

☆ Haemorrhage (intra-cranial Haemorrhage) :- Sudden rise of BP → rupture vessel .

☆ Thrombosis → lacunar infarction .

☆ **Hypertensive Encephalopathy :-**

✓ *Definition :-* Transient neurological manifestations due to sudden ↑ in BP above cerebral auto-regulation mechanism .

✓ *Pathogenesis :-* Sudden ↑ BP → Reflex VD of cerebral b.v. → Brain oedema → ↑ capillary permeability → leakage of fluid from capillaries into brain → C/P .

✓ *Clinical picture :-*

- Sever HTN .
- C/P of ↑ ICT & brain edema :-
  - ➥ Headache , vomiting , disturbed consciousness .
  - ➥ Focal deficit → aphasia & hemiplegia , later ⇨ Coma without lateralization .

✓ *Treatment :-* all manifestations reversible with treatment .

N.B. :-

☆ Normally ; ↓BP → peripheral VC , but in brain , it causes VD to maintain cerebral blood flow .
☆ In HTN ; there is cerebral VC , so ; BP = 150 / 60 mmHg . If BP ↑ > 150 → VD of cerebral blood vessels → Brain oedema → Hypertensive encephalopathy with disturbed level of consciousness but without inflammation .

2- Cardiac complications :-

☆ Coronary heart disease .

☆ AF .

☆ Hypertensive HF .

☆ **Brenhime effect :-**

✓ Pressure over load on LV → concentric hypertrophy → bulging of septum into RV cavity → RVF → Systemic congestion .

✓ Reversed Brenhime effect :- In pulmonary HTN → the same occur but on Lt side → LSHF → Pulmonary congestion .

3- Renal complications :- (C / P of renal HTN)

☆ Accelerated atherosclerosis → renal artery stenosis → nephrosclerosis → ↑ BP , ↓ GFR , tubular dysfunction , proteinuria & microscopic haematuria .

☆ Chronic renal failure → due to glomerulosclerosis .

☆ Haematuria .

☆ Abnormal kidney function → urine examination , ↑ creatinine , ↑ blood urea .

☆ Acute renal failure in malignant HTN & Aortic dissection .

4- Retinal Complications :- (hypertensive retinopathy)

☆ It has the following grades (SNOP) ;

✓ Mild sclerosis of retinal vessels → Silver wire .

✓ Marked sclerosis of retinal vessels with compression on veins (Nicking of veins) by arteries at point of crossing .

✓ Flame shaped haemorrhage & fluffy cotton exudates ; once occur ⇨ accelerated HTN ; (Oedema , haemorrhage & Exudate) .

✓ Papilloedema ; once occur ⇨ Malignant hypertension .

5- Vascular complications :-

☆ Small b.v. :- rupture capillary → epistaxis , hypertensive retinopathy & fibrinoid necrosis of small blood vessels .

☆ Medium sized b.v. :- accelerated coronary and cerebral atherosclerosis , Hypertrophy of the media of arterioles (in malignant HTN) .

☆ Large b.v. :- Cystic necrosis in media of aorta → Dissecting aneurysm .

N.B. :-

↪ ***Accelerated HTN means diastolic BP > 130 with NO papilloedema .***

↪ ***On measuring BP :-***

★ ***Measure 2 times :-***

- ***The 1st → to get an idea about its level .***
- ***The 2nd → to read accurately .***

★ ***It must be under complete physical & mental rest .***

★ ***It must be after some period of interview to avoid (stress white coat HTN) which is treated by assurance & ampulatory blood pressure monitoring .***

⇨ Investigations of HTN :-

A) Basic investigation ; for all patient :- (3 U , sugar , salt , fat & 3 others)

1- Urine analysis :- Pus cell cast , red cell cast (GN) , fixed SG (RF) & sugar (DM) .

2- Urea & creation in blood :- to evaluate kidney function .

3- Uric acid in blood :- Hyperuricaemia & stop diuretic causing it .

4- Blood sugar :- DM , Pheochromocytoma , Cushing's & Diuretics .

5- Na^+, K^+ & Ca^{++} in blood :-

- ↑ Ca^{++} → first manifestation in HTN .
- Conn's syndrome → ↑ Na & ↓ K , before diuretic therapy .

6- Lipid in blood :- cholesterol & TGs .

7- X-ray chest :-

- Prominent aortic knuckle with unfolding of aorta (in non-complicated HTN) .
- Calcified Aortic knuckle .

8- ECG :- LVH .

9- Fundus examination :- to evaluate patient ; fundus is the mirror of kidney .

B) Selected investigations :- (according to suspected Aetiology) ; for example ;

1- Co-arcitation :- chest X-ray (Rosler sign) , catheter & Angiography .

2- Polycythaemia :- blood picture .

3- Investigations for renal HTN :-

☆ *Reno-parenchymatous :-* US kidney , kidney function test & IVP .

☆ *Reno-vascular causes :-* Angiography , DVI , Renal vein renin level of both kidneys (normally = 1:1 & changed if unilateral renal artery stenosis)

4- Investigations of endocrinal causes :-

☆ *Thyroid :-* T_3 , T_4 & TSH .

☆ *Acromegally :-* GH .

☆ *Cushing's syndrome :-* cortisone & Glucose in blood .

☆ *Conn's syndrome :-* aldosterone in blood , Na & K in blood .

☆ *Pheochromocytoma :-* COMT in blood & VMA in urine .

Treatment of Hypertension

When to treat HTN ?

☆ If diastolic BP > 90-100 mmHg .

☆ Marked symptoms .

☆ Target organ damage (kidney , heart & retina)

☆ Other risk factors → DM .

Aim of treatment of HTN :-

☆ ↓ Symptoms .

☆ Prevention of complications .

☆ Improvement of life style .

General (non-pharmacological) measures :-

☆ Assurance :- Avoid anxiety & stress .

☆ Diet :- Salt restriction , ↓ total calories & ↓ lipids .

☆ Habits :- stop smoking .

☆ Exercise :- Walking (best) , avoid vigorous exercise (complications) .

☆ Complete physical & Mental rest .

Treatment of primary HTN :-

A) Treatment of labile HTN :-

➥ General measures , if NO response , add ...

➥ β-blockers .

B) Treatment of established HTN :-

➲ *Mild HTN :-* (Stepped care approach)

➥ Begin with diuretics , if NO improvement , add , ...

➥ β-blockers , if NO improvement , add , ...

➥ Vasodilators .

N.B. :- Why we don't start with β-blockers in treatment of HTN ?

- ✓ *High renin HTN .*
- ✓ *Arrhythmia .*
- ✓ *Orthostatic HTN*
- ✓ *Hyperdynamic circulation .*
- ✓ *Ischemic heart diseases .*
- ✓ *Emotions .*

➲ ***Moderate & Sever HTN :-*** there are 2 strategies ;

1- Stepped care approach (Not used now) :-

- ➥ Begin with diuretic & β-blockers , If NO improvement , add , ...
- ➥ Vasodilator drugs , if NO improvement ⇨ Resistant HTN , which is due to :-
  - ✯ Drug interaction :- Sympsthomimetics in treatment of common cold .
  - ✯ Secondary HTN .
  - ✯ Non compliance of patient .
  - ✯ Wrong diagnosis .
  - ✯ Excess salt intake .
- ➥ Try o treat these causes , if NO improvement , the treatment will be as follows ;
  - ✯ α-blockers (prazocin) + β-blockers (propranolol) .
  - ✯ Centrally acting anti-hypertensives (stimulate VD center) + Peripheral α-blockers (block VC effect of α-receptors) .
  - ✯ Hydralazine .
  - ✯ Menoxidil .
  - ✯ Ca^{++} channel blockers (CCBs)
  - ✯ ACE inhibitors .

2- Direct use of strong anti-hypertensives :-

- ➥ As ; CCBs or ACEIs , with adjustment of the dose according to the degree of HTN .

Treatment of Secondary HTN :-

☆ Co-arcitation :- resection anastomosis .

☆ Conn's syndrome :- resection of the tumour .

☆ Reno-parenchymatous :- control renal condition , use drugs safe on kidney .

☆ Reno-vascular :- if the kidney is ;

- Damaged → Nephrectomy .
- Healthy → Per-cutaneous trans-luminal renal angioplasty .

☆ Thyrotoxicosis :- Anti-thyroid drugs .

☆ Myxedema :- replacement therapy (Thyroxin) .

Treatment of complications of HTN :-

A) Treatment of hypertensive encephalopathy :-

➥ Hospitalization .

➥ ↓ BP , by use of :-

- In urgent states → Nifedipene , diazoxide & Na nitroprosside .
- In less urgent states → Hydralazine , reserpine & α-methyl dopa .

➥ Anti-convulsant drugs :- Phenobarbitone .

➥ ↓ Brain oedema :- by using cerebral dehydrating measures , as ; frusemide , Glucose 25 % , Mg-Sulphate , Mannitol 25 % or 10 % & Dexamethazone .

B) Treatment of hypertensive nephropathy :-

➥ Use :- α-methyl dopa , Hydralazine , Menoxidil , CCBs , Prazocin , ACEIs (↑ intervals [ ] doses) & β-blockers .

➥ Don't use :- K-retaining diuretics (due to ↑ K) & Thiazides (as it ↓ RBF) .

➥ Dialysis & even Renal transplantation .

Anti-Hypertensive Drugs

1) Centrally acting Anti-hypertensives :-

☆ α-Methyl dopa (Aldomet) :-

- Dose :- tablet ; 250 & 500 mg .
- Mechanism :- Stimulate central α-receptors & act as a false transmitter .
- Side effects :- Headache , hypotension , Hepatitis , Haemolytic anaemia & Impotance .

☆ Clonidine (Catapress) :-

- Dose :- Pills ; 0.1 , 0.2 & 0.3 mg .
- Mechanism :- Central α-agonist → ↓ Sympathetic out flow .
- Side effects :- Rebound HTN after sudden withdrawal .

2) Ganglion Blockers :-

- Example :- Trimetaphan .
- Side effects :- Postural Hypotension & Atropine like side effects .

3) Sympatholytic drugs :-

☆ α-Methyl dopa :- It interferes with the synthesis of adrenaline & Nor-adrenaline .

☆ Reserpine (Bernardine) :-

- Dose :- Tablet ; 0.1 mg .
- Mechanism :- Prevention of Epinephrine & NE re-uptake → depletion of them in nerve endings
- Side effects :- Depression , Nasal congestion , ↑ muscle tone (parkinsonism) & PU

4) β-Blockers :-

- Examples :-
  - ✓ Propranolol (Indral) :- 10 & 40 mg ; Non-selective β-Blocker .
  - ✓ Atenolol (Tenormin) :- 50 & 100 mg ; Cardio-selective β_1 blocker .
- Mechanism :- ↓ Renin , ↓ COP & Re-adjustment of Baro-receptors .
- Side effects :- HB , precipitate HF , Bronchospasm , Aggrevate PVD & Mask hypoglycaemic symptoms .

5) α-Blockers :-

- Examples :- Prazocin (Minipress) ; 1 , 2 & 5 mg .
- Mechanism :- α-receptor blocker .
- Side effects :- First dose hypotension , so ; BEGIN with 0.5 mg , at bed time .

6) Combined α & β-Blockers :-

- Example :- Labetalol .
- Side effects :- Postural hypotension & Pheochromocytoma .

7) Angiotensin Converting Enzyme Inhibitors (ACEIs) :-

- Examples :-
  - ✓ SH-group :- Captopril (Capotin) ; 20 & 25 mg .
  - ✓ Non-SH group :- Enalapril , Ramipril , Lisinopril , Kenapril & Benasipril .
- Mechanism :- Inhibit ACE which convert Ag-I into Ag-II .
- Side effects :- Metallic taste , Irritating cough , Proteinuria & Leucopenia .
- Advantages of Captopril :- Contain SH group which protect Heart against active O_2 .

8) Ag-II Blockers :-

- Example :- Valsartan & Losartan .
- Side effects :- Less side effects than ACEIs .

9) Diuretics :- (↓ Pre-load → ↓ Plasma volume , ↓ Na in smooth muscles → ↓ sensitivity to NE)

☆ K-Loosing diuretics :-

- Examples :- Thiazides (↑ Ca) & Loop diuretics → Frusemide (↓ Ca)
- Side effects :- Hypokalaemia , Hyperuricaemia , Hyperglycaemia & Hyperlipidaemia .

☆ K-Retaining diuretics :-

- Examples :-
  - ✓ Spironolactone (Aldactone) :- 25 & 100 mg , SE :- Hyperkaemia & Gynaecomastia .
  - ✓ Triamterene :- 100 mg , Side effect :- Stone formation .
  - ✓ Ameloride :- 10 mg .

10) Calcium Channel Blockers (CCBs) :- It involves many members ,

☆ Nifedipene :-

- Trade name :- Epilat , Adalat & Epilat retard .
- Dose :- 10-20 mg , capsule (10 mg) . It acts mainly on blood vessels .
- SE :- Headache , Flushing , Hypotension , Tachycardia & oedema LL dt peripheral VD .

☆ Verapamil (Isoptin)

- Dose :- 80 mg . It's an anti-arrhythmic for SV tachycardia & act mainly on heart .
- Side effects :- Bradycardia due to -ve inotropic effect & Constipation .

☆ Diltiazem :- 60 mg , act on the heart & cause coronary VD with less SE than verapamil .

☆ Isradipine (Lomir) :- 2.5 mg , high coast & low side effects .

☆ Amlodipine (Norvasc , Vasonorm) :- 5 mg , low side effects .

11) Vasodilators :-

☆ Arteriolar vasodilators :- (↓ after load)

- Example :- Hydralazine , Saralazine & Minoxidil .
- Dose :- 10-20 mg ; Tablet .
- Mechanisms :- ↑ Blood flow to kidney .
- Side effects :-
  - ✓ Hydralazine :- Headache , palpitation , Tachycardia , SLE (6m)
  - ✓ Minoxidil :- Pericarditis , Hirsutism (used for treatment of alopecia) .

☆ Venodilators :- (↓ Pre-load)

- Example :- Nitrates .
- Side effects :- Headache , Tolerance & Met-haemoglobinuria .

☆ Balanced Vasodilators :- (cause VD of both arteries & veins)

- Examples :- Diazoxide (500) , Na-Nitroprosside (50 , 100) .
- Side effects :-
  - ✓ Diazoxide :- Hypotension , Salt and water retention (use diuretic before it) & Hyperglycaemia .
  - ✓ Na-Nitroprosside :- Hypotension , Salt and water retention & Cyanide poisoning (in liver) .

Special Conditions in treatment of HTN :-

Disease associated with HTN	Drugs used	Drugs NOT used
☆ Diabetes Mellitus	☞ ACEIs , CCBs & α-Blockers	☞ Diuretics & β-Blockers .
	➲ Diuretics causes hyperglycaemia .	
	➲ β-Blockers mask symptoms of hypoglycaemia .	
☆ Hyperlipidaemia	☞ As DM	☞ As DM .
	➲ Diuretics & β-Blockers cause Hyperlipidaemia .	
☆ **Peripheral Vascular Diseases** (PVD)	☞ Diuretics , CCBs & α-Blockers	☞ β-Blockers & ACEIs .
	➲ β-Blockers aggrevates PVD & cause ↓ renin → ↓ RBF → RF .	
☆ **Renal Artery Stenosis**	☞ AS PVD .	☞ As PVD .
	➲ ACEIs can precipitate Renal failure .	
	➲ β-Blockers causes ↓ renin → ↓ RBF → RF .	
☆ Pregnancy	☞ α-Methyl dopa , Hydralazine & diazoxide	☞ Diuretics , CCBs , ACEIs , α & β-Blockers .
	➲ Be sure that all drugs used are safe in pregnancy .	
☆ **Ischemic Heart diseases** (IHD)	☞ ACEIs , CCBs , Diuretics , α & β-Blockers .	☞ NO drugs
	➲ Best is Nitrates & β-Blockers as it ↓ Cardiac work .	
☆ Renal Failure	☞ β & α-Blockers , CCBs .	☞ Diuretics & ACEIs .
	➲ If diuretic is needed use Lasix only (ACEIs is used with caution)	
☆ Heart failure	☞ Diuretics , ACEIs & α-Blocker .	☞ β-Blockers & CCBs .
	➲ β-Blockers & CCBs aggrevate HF .	
☆ Bronchial Asthma	☞ Diuretics , ACEIs , α-Blockers & CCBs .	☞ β-Blockers .
	➲ β-Blockers cause → Bronchospasm .	
☆ Gout	☞ CCBs , ACEIs , α & β-Blockers .	☞ Diuretics .
	➲ Diuretics cause → Hyperuricaemia .	

Treatment of Hypertensive Emergencies :- (APCDEPhMM)

1- Acute renal failure :- Diuretics & Dialysis .

2- Pulmonary oedema :- Lasix & Vasodilators .

3- Cerebral Stroke (Haemorrhage & Thrombosis) :- Na nitroprosside .

4- Dissection of the aorta :- Na nitroprosside .

5- Encephalopathy :- Na nitroprosside .

6- Pheochromocytoma Crisis :- Combined α & β-Blockers .

7- Malignant HTN :- Diuretics & Na nitroprosside .

8- Myocardial Infarction :- Nitrates .

Types of Hypertensive Urgencies :-

1- Accelerated HTN .

2- HTN in renal transplant patient .

3- HTN in patient going to surgery .

N.B. :-

- ✓ ***Mean Blood pressure = Diastolic + 1/3 pulse volume .***
- ✓ ***Suspect secondary HTN , if :-***
  - ***Age < 35 or 50 years.***
  - ***No +ve family history .***
  - ***Detect Aetiology in clinical examination .***
  - ***Detect Aetiology in investigations .***

Examples of Curable HTN :-

A) Labile HTN .

B) Most types of Secondary HTN :-

☆ Iatrogenic HTN :- Stop the drug causing HTN .

☆ All Endocrinal HTN except DM .

☆ Pre-eclampsia & Eclampsia :- Treatment is Termination of pregnancy .

☆ Co-Arcitation of Aorta :- Surgery .

☆ Unilateral Kidney diseases :- Nephrectomy .

☆ AGN :- Corticosteroids .

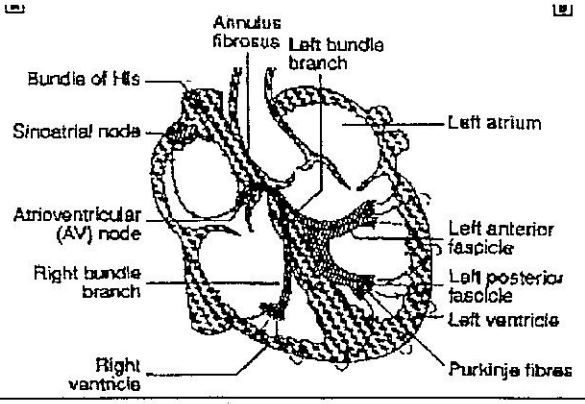
☆ Renal artery stenosis :- Angioplasty .

☆ Polycythaemia :- Treatment of the cause , Venesection & Cytotoxic drugs .

DYSRRHYTHMIA

⇨ Structure of conducting system of the heart :-

★ SAN → inter-nodal tracts → AVN → bundle of hiss → the left bundle branch only → divides into anterior & posterior hemi-branch → the 3 terminal branches give origin to Berkinje fibers → Myocardium .



⇨ Normal rate of impulses in the heart :-

★ SAN → 60-90 beat / m .

★ AVN → 40-60 beat / m .

★ Idio-ventricular rhythm → 25-40 beat / m .

N.B :-

➥ *Heart will obey the faster focus , so ; if ectopic focus is faster than SAN , heart will obey it .*

➥ *Types of ectopic cardiac rhythm :-*

* *SAN fails → another focus control heart ⇨ Passive rhythm .*

* *Focus faster than SAN controls the heart ⇨ Active rhythm .*

➥ *All cardiac fibers have the conductivity criteria while conductive fibers of heart ONLY have the automaticity criteria .*

☆ ***Definition of Dysrrhythmia :-*** It means any disturbance in rate or rhythm .

☆ Types of classifications of dysrrhythmia :-

☞ **Patho-Physiologial classification :-** there are 2 types ;

A) Disturbance of impulse formation :-

☆ ***Sinus dysrrhythmia :-*** [Normal SAN rhythm = 60-90 b / m]

- Sinus tachycardia → >90 b / m .
- Sinus bradycardia → <60 b / m .
- Sinus arrhythmia → 60-90 b / m ; but irregular rate .

☆ ***Ectopic dysrrhythmia :-*** [ectopic focus]

- Passive escape rhythm :- There is failure to SAN ; Atrial escape rhythm , Nodal rhythm & Idio-ventricular rhythm .
- Active ectopic rhythm :- There is an ectopic focus faster than SAN ;
  - ✓ Premature beats :- Atrial , Ventricular & Junctional .
  - ✓ Paroxysmal tachycardia :- Atrial , Ventricular & Junctional .
  - ✓ Flutter :- Atrial , Ventricular (Group of fibers contract simultaneously)
  - ✓ Fibrillation :- Atrial , Ventricular (each fiber give impulse) .

B) Disturbance of impulse conduction :-

☆ ↓ Conduction :- Heart block .

☆ ↑ Conduction :- Pre-excitation syndrome [e.g. WPW syndrome] .

N.B. :- ***Wolf Parkinsonian white syndrome*** *:-*

✓*Definition :- It is a syndrome in which ; there is accessory bundle [ ] atrium & ventricle which rapidly conduct impulses because ; there is NO physiological delay as in AVN .*
✓*ECG Findings :- Short P-R interval , wide QRS complex , Delta wave on ascending limb of R-wave .*
✓*Complications :- SVT , AF & Atrial flutter .*
✓*Treatment :- Surgery , Verapamil & Amiodarone .*

☞ Clinical classification of Dysrrhythmia :-

A) Tachycardia :-

☆ ***Regular tachycardia :-***

- Sinus tachycardia . (ST)
- Ventricular tachycardia (VT)
- Supra-ventricular tachycardia (SVT)
- Atrial flutter .

☆ ***Irregular Tachycardia :-***

- Sinus tachycardia + Premature beats .
- Supra-ventricular tachycardia (SVT) + Variable HB .
- Atrial flutter + Variable HB .
- Atrial fibrillation (AF)

B) Bradycardia :-

☆ ***Regular Bradycardia :-***

- Sinus bradycardia (SB) .
- Partial fixed HB (conduction 2:1 to ventricles) .
- Complete HB ⇨ Idio-Ventricular rhythm .
- A-V nodal rhythm (60 b / m) .

☆ ***Irregular Bradycardia :-***

- Sinus bradycardia with Premature beats .
- Partial variable HB .
- AF under Digitalis
- Sinus arrhythmia .

☞ Other classification of Dysrrhythmia :-

A) Formation abnormality :-

☆ Site :- Supra-ventricular or Ventricular .

☆ Rate :- Tachycardia , Bradycardia , Flutter & Fibrillation .

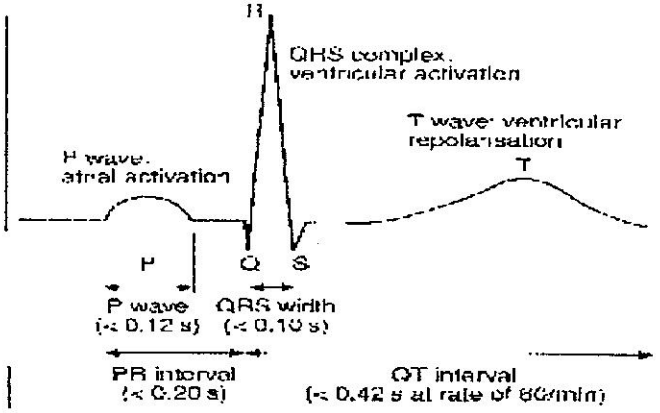
B) Propagation abnormality :- Sino-atrial , Intra-atrial , A-V & Intra-ventricular block (Lt. bundle , Rt. Bundle or Bifasicular block) .

C) Irregular heart with normal rate :- Pre-mature Beat & Slow AF .

Important Notes

☞ *Types of functional arrhythmia :-*

- ✓ Massive tachycardia .
- ✓ Massive Bradycardia .
- ✓ Sino-atrial block .
- ✓ Adam's stock attacks .
- ✓ Sick sinus syndrome .



☞ *Vagal stimulation is done by :-*

- ✓ Induction of vomiting .
- ✓ Occular compression .
- ✓ Carotid massage :- It MUST be ;
  - ➥ Unilateral not bilateral .
  - ➥ Contraindicated in Carotid bruit .
  - ➥ Compression is done against transverse process of cervical vertebrae .
  - ➥ Blow to epigastrium .
  - ➥ Neostigmine ; 0.5 mg / I.V. .

☞ *A scheme for the points which will be discussed in any type of arrhythmia :-*

- ✓ Definition :- It must involve ⇨ rate , rhythm & focus .
- ✓ Symptoms :- Asymptomatic , dyspnea , ...
- ✓ Signs :- There are 3 important signs ;
  - ➥ Radial pulse :- Denotes ventricular activity .
  - ➥ Neck veins :- Atrial activity (A wave ⇨ Atrial contraction & CV wave ⇨ Systole)
  - ➥ Auscultation .
- ✓ ECG :-
  - ➲ ***P-wave :-*** there are 4 possibilities ;
    - ➥ Originated from SAN ⇨ Normal P-wave .
    - ➥ Originated from atria but extra-nodal ⇨ Deformed P-wave .
    - ➥ Originated from AVN ⇨ Inverted P-wave .
    - ➥ Originated from Ventricles ⇨ Absent P-wave (NO retro-grade conduction)
  - ➲ ***QRS-complex :-***
    - ➥ If originated from supra-ventricular structures (SAN , Atria or AVN) ⇨ Normal .
    - ➥ If originated from ventricles ⇨ Wide complex .
  - ➲ ***The relation [ ] P-wave & QRS-complex*** is equal to that [ ] a-wave & cv-waves

☞ *Cannon a-wave occurs in :-* Nodal rhythm , Complete HB , Paroxysmal Nodal & V. tachycardia

☞ *a-wave is absent in AF .*

A) Sinus Dysrrhythmia

Parameter	1- Sinus Tachycardia	2- Sinus Bradycardia
☆ Definition :-	• Regular impulses from SAN > 100 b / m	• Regular impulse from SAN < 60 b / m
☆ Aetiology :-	• Physiological :- children , exercise & emotion . • Drugs :- parasymatholytics , Sympathomimetics & thyroxine • Pathological :- Hypotension , hypoxia , hyperthermia , HF & Hyperdynamic circulation .	• Physiological :- athelets , Sleep , Carotid sinus syndrome . • Drugs :- Parasympathomimetics , Sympatholytics , Digitalis & CCBs . • Pathological :- Obstructive jaundice , Myxedema , MI , Rapid ↑ in ICT , Ascending cholangitis & Meningitis .
☆ Symptoms :-	• Asymptomatic . • Palpitation . • Dyspnea (due to ↓ of cardiac reserve)	• Asymptomatic . • Palpitation . • Low COP symptoms .
	• Angina , MI , Syncope , nausea , vomiting polyuria & NO haemodynamic changes	
☆ Signs :-		
↪ Radial pulse :-	• Regular , > 100 b / m .	• Regular < 60 b / m .
↪ Neck veins :-	• ↑ No of wave = pulse , normal shape	• the same but ↓ No.
↪ Auscultation :-	• Tachycardia , ↑ S_1 .	• Bradycardia , Weak S_1 .
↪ Special test :-	• Vagal stimulation → ↓ HR .	• Sympathetic stimulation or vagal inhibition → ↑ HR gradually as they originate from atrium
☆ ECG :-		
↪ P-wave :-	• Normal shape .	• Normal shape .
↪ QRS-complex :-	• Normal shape .	• Normal shape .
↪ A & V rate :-	• Atrial rate = Ventricular rate > 100	• Atrial rate + V. rate < 60 b / m .
☆ Treatment :-	• Treatment of the cause . • Drugs :- ✓ Para.mimetics :- Prostigmine . ✓ Sympatholytics :- ☞ α-blocker :- reserpine . ☞ β-blocker :- Propranolol	• Treatment of the cause . • Drugs :- ✓ Para.lytics :- Atropine (not in glaucoma & senile prostate) ✓ Sympathmimetics :- Adrenaline & Isoprenaline ✓ Artificial pacing in resistant cases

N.B. :-

✓ *All paroxysmal tachycardias are of rapid onset & offset , as they are produced by ectopic focus except sinus tachycardia & nodal tachycardia , they are of gradual onset & offset as they are produced by normal foci ⇨* ***[Warming up phenomenon]*** .

3- Sinus Dysrrhythmia

☆ ***Definition :-*** Impulses arise from SAN at rate of 60-90 b / m but with alternating periods of slowing & acceleration .

☆ ***Aetiology :-*** It is common I young age with NO pathological significance .

☆ ***Types :-***

- **Respiratory sinus arrhythmia :-** ↑ HR with inspiration & ↓ with expiration .
- **Non respiratory sinus arrhythmia :-** due to congenital rhythmic variation of the vagal tone .
- **Sick sinus syndrome .**

☆ ***Clinical presentation :-***

- Asymptomatic .
- It can be missed clinically .
- It may mask underlying serious disorder .

☆ ***Investigations :-***

- ECG :- It shows the following ;
  - ✓ Rhythmic variation in the rhythm of cardiac cycle .
  - ✓ Periods of tachycardia & others of Bradycardia with normal intervals (in each period separately)

☆ ***Treatment :-***

- If Asymptomatic ⇨ NO need for treatment .
- If chronic ⇨ It may need artificial pace-maker .

B) Ectopic rhythm

Types of Ectopic rhythm :-

1- Pre-mature beats (Extra-systole) .

2- Paroxysmal tachycardia :- either supra-ventricular or Ventricular .

3- Atrial flutter .

4- Atrial Fibrillation .

1) Pre-Mature Beats (PMB - Extra-Systoles)

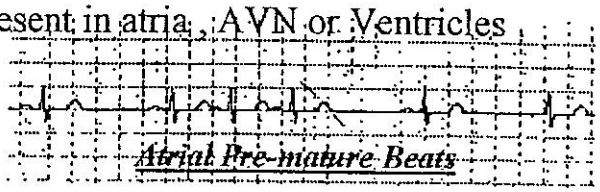
☆ ***Definition :-*** It is a condition in which the ectopic impulses occur earlier than expected , the focus present either in atrium, AVN or ventricles , it may occur once , the rate is either irregular , normal or Bradycardia .

☆ ***Aetiology :-***

- Physiological :- Exercise , Emotion , tea , Coffee & Fatigue .
- Drugs :- Digitalis toxicity , Tobacco , Alcohol , thyroxine & adrenaline .
- Pathological :- Coronary HD , CHD , Valvular HD , HTN , Fever , Hypoxia , ...

☆ ***Patho-Physiology :-*** The ectopic focus may present in atria , AVN or Ventricles .

☆ ***Types :-*** Atrial , Junctional or Ventricular .



Atrial Pre-mature Beats

☆ ***Clinical presentation :-***

↪ **Symptoms :-**

- Asymptomatic , Palpitations , Anxiety & Sweating .
- It the heart is diseased :- Angina , Infarction , Syncope , HF or Low COP symptoms .
- If Multiple extra-systoles :- Angina , Heart failure .

↪ **Signs :-**

- Radial pulse :- Usually Bradycardia (to allow its appearance) , occasional irregularity , pulse deficit < 10 min & you can count 4 regular successive beats .
- Neck veins :- It differs according to it origin ;
  - ✓ Atrial PMB :- Normal shaped waves but earlier in timing .
  - ✓ Junctional PMB :- Regular Cannon a-waves .
  - ✓ Ventricular PMB :- Occasional Cannon a-waves .
- Auscultation :- Occasional irregularities & NO Cannon heart sounds .
- Special tests :- Exercise → disappearance of PMBs as ↑ HR → ↓ chance for ectopic bear to appear .

☆ ***Investigations (ECG) :-***

- **Atrial PMB :-**
  - ✓ Deformed P-wave , or ;
  - ✓ Occasional irregularity occur earlier than expected followed by compensatory pause due to refractory period which mask next normal wave .
- **Junctional PMB :-**
  - ✓ Inverted P-wave , or ;
  - ✓ Masked by QRS complex with short PR interval .
- **Ventricular PMB :-**
  - ✓ No P-wave with wide QRS complex , or ;
  - ✓ Maybe associated with another normal atrial P-wave .

☆ ***Treatment :-***

1- Treatment of the cause .

2- Sedation & Assurance .

3- According to the type of Premature beats :-

➲ **Atrial or Junctional PMB :-**

- Digitalis , if associated with HF .
- Quinidine .

➲ **Ventricular PMB :-**

- Lidocaine , if associated with myocardial infarction .
- Phenytoin , if results from digitalis toxicity .

➲ **Both atrial & Ventricular PMB :-**

- Propranolol :- 1 gm / 3 min , I.V. .
- Procainamide :- 100 mg / 3 min , I.V. , till signs of toxicity .

N.B. :- The serious PMB are ⇨ Ventricular PMB & Multiple PMB .

2) Paroxysmal Tachycardias

I] Supra-Ventricular Tachycardia :-

☆ ***Definition :-*** Impulses arise from ectopic atrial or junctional focus regularly at rate of > 150 b/ m , with NO Heart block at all (conduction is maintained at 1 : 1)

☆ ***Aetiology :-*** as PMBs + GIT disturbance & chest infection .

☆ ***Clinical presentation :-***

↪ **Symptoms :-** (Sudden onset)

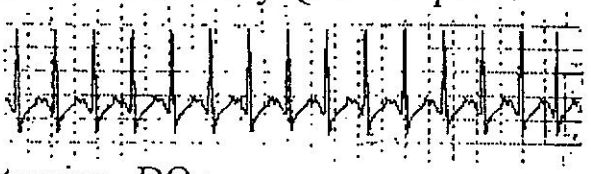
- Palpitation , Anxiety , Exhaustion & Dizziness .
- In diseased heart :- Angina , ... & Polyuria (due to ↑ ANF) .
- GIT disturbance .

↪ **Signs :-**

- Radial pulse :- Regular > 100 b / m .
- Neck veins :- No. of waves = Radial pulse , Regular Cannon (if junctional) .
- Auscultation :- Tachycardia & Accentuated S_1 .
- Special test :- Vagal stimulation → ↓ HR or disappearance of this tachycardia .

☆ ***Investigations (ECG) :-***

- P-wave :- Deformed or inverted (if junctional) , maybe before , after or masked by QRS complex .
- QRS complex :- Normal shape , each P-wave is followed by QRS complex .



☆ ***Treatment :-***

1- Sedation for anxiety & emotions .

2- Vagal stimulation & if the patient is hypotensive , DO ;

- Use Metaraminol (sympathomimetic) to ↑ BP then → Vagal stimulation .
- ↑ BP to 180 mmHg by infusion → reflex Vagal stimulation → ↓ HR ***(Marrie's law)***

3- Drugs therapy :-

- Verapamil :- 1 mg , I.V. .
- Propranolol :- 1 mg I.V.
- Digitalis to protect ventricles .

4- Direct current (DC) Cardioversion (Last choice) .

II] Ventricular tachycardia :-

☆ ***Definition :-*** Regular impulses arise in ventricles with rate > 100 b / m .

☆ ***Aetiology :-***

- Drugs :- Digitalis .
- Pathological :- As before .

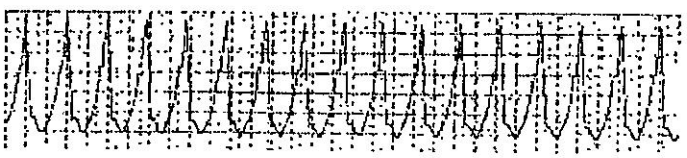
☆ ***Clinical presentation :-***

↪ **Symptoms :-** (sudden onset) .

- Palpitation , anxiety , dizziness .
- Diseased heart :- Angina , ... , syncope & sudden death due to VF .

↪ **Signs :-**

- Radial pulse :- Regular > 100 b / m .
- Neck veins :- No. of waves ≠ pulse → Occasional a-wave .
- Auscultation :- Tachycardia , Cannon S_1 due to exaggerated closure of valve as a result of simultaneous atrial & Ventricular contraction .
- Special test :- Vagal stimulation → No response (vagus don't supply ventricles) .



☆ ***Investigations (ECG) :-***

- P-wave :- Normal shape with rate = 80 b / m (Normal SAN rhythm) .
- QRS complex :- Wide with rate > 150 b / m .
- NO fixed relation [ ] P-wave & QRS complex ⇨ AV Dissociation .
- NO heart block but ⇨ The heart obey the faster focus .

☆ ***Treatment :-***

1- Emergency treatment :-

✓ DC Cardio-version (First choice) .

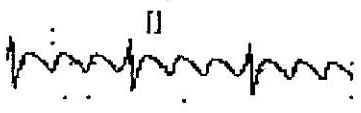
✓ Myocardial depressant :- as ;

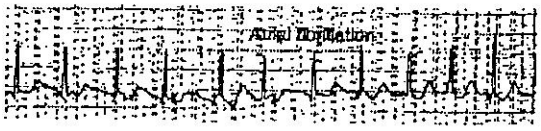
- Lidocaine :- 50-75 mg . I.V. .
- Procainamide :- I.V. , if lidocaine fails .
- Propranolol :- If both lidocaine & propranolol fail .
- Phenytoin .

2- In Resistant cases :- Intra-Cardiac pacing ⇨ Implantation of Cardiovertor Defibrillator (ICD) .

3- In [ ] the attacks :- Treatment of the cause .

Parameter	*3- Atrial Flutter*	*4- Atrial Fibrillation*
☆ ***Definition :-***	• Impulses arises from atrium , regular , at rate of 300 b / m but due to physiological delay only , 1/2 , 1/3 , 1/4 impulses are conducted to ventricles .	• Impulses arise from atrium , irregular , at rate of 400-600 b/m , due to physiological delay , Not all impulses are conducted to the ventricles (rate of V. = 150-200 b/ m)
☆ ***Aetiology :-***	• Drugs :- Digitalis Toxicity . • Diseases :- CHD , Coronary HD , Valvular HD , HTN , Thyrotoxicosis , Cardiomyopathy & Constrictive Pericarditis .	• Drugs :- Digitalis toxicity . • Diseases :- A.Flutter + Loan AF which is of unknown aetiology .





Parameter	3- Atrial Flutter	4- Atrial Fibrillation
☆ **Patho-Physiology :-**	◆ *Circus movement theory :-* → one impulse circulate around IVC or SVC opening at rate of 300 b/m & with each turn daughter impulse arise to aria & ventricles . ◆ *Ectopic focus theory :-* → Atrium contain ectopic focus produce impulses at rate of 300 b / m .	◆ *Circus movement theory :-* → As A.Flutter , but at a rate 400-600 , impulses rapidly fractionate & stimulate different fibers (Not accepted) . ◆ *Ectopic focus theory :-* → As A.Flutter but at rate of 400-600
☆ **Types :-**		◆ *Paroxysmal AF :-* Recent (new) ◆ *Established AF :-* > 2 weeks .
☆ **Symptoms :-**	◆ Sudden onset & offset . ◆ Palpitation . ◆ In diseased heart :-	◆ Paroxysmal AF :- as A.Flutter . ◆ Established AF :- minimal , better tolerated due to slow HR .
☆ **Signs :-**		
↳ Radial pulse :-	◆ Regular , 75 , 100 , 150 b/m	◆ Irregular , 150-200 b/m , pulse deficit > 10 min . You CAN'T count 4 regular successive beats .
↳ Neck Veins :-	◆ No. of (a) waves = double , treble or quadruple pulse rate .	◆ Absent (a) wave . ◆ Systolic expansion if with TR . ◆ Marked irregularity in force , rate , rhythm of contractions .
↳ Auscultation :-	◆ S_1 intensity depends on ventricular rate . ◆ Atrial contractions maybe heard as distinct clicks [ ] heart sounds	◆ Variable S_1 due to variable amount of blood in LV → Variable rhythm . ◆ Absent S_2 in some cycles dt weak impulse which can't open semi-lunar valves .
↳ Special signs :-	◆ Vagal stimulations → ↑ AV block from 2:1 to 3:1 or 4:1 in a mathematic fashion .	◆ Special test :- ✓ Vagal stimulation → ↓ HR & ↑ block . ✓ Exercise → ↑ HR & ↑ Irregularity .
☆ **Investigations :-** *(ECG)*	◆ P-wave :- replaced by regular flutter waves . ◆ QRS complex :- normal , rate = 75 , 100 , 150 . ◆ Regular P-R intervals .	◆ P-wave :- Replaced by irregular fibrillations waves . ◆ QRS-complex :- Normal shape & Irregular in timing . ◆ Irregular P-R interval .