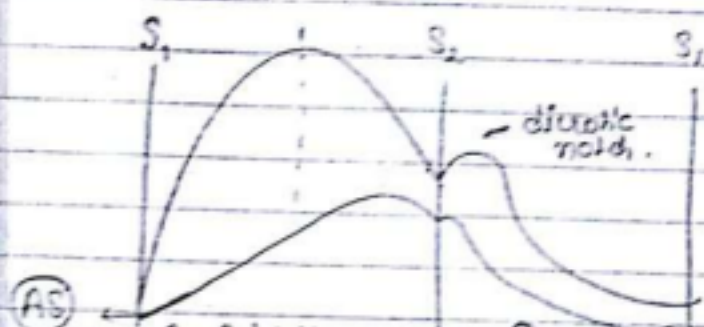


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 Subject: Physiology

CVS

① PULSE :



AS

- slow rise initially, amplitude ②, diastolic notch ①/②
- Aortic valve = 2.5 cm^2
- Severe A. stenosis = $< 1 \text{ cm}^2$

Ejection velocity $> 4 \text{ m/sec}$ (②) = 1 m/s
 transvalvular gradient $> 40 \text{ mm}$
 (Left ventricle - Aorta)

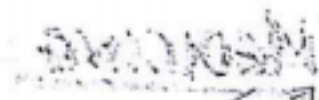
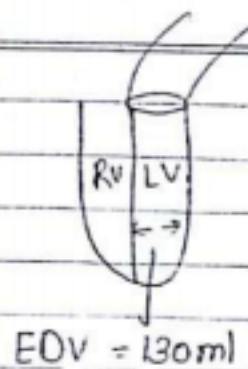
- Super-severe = Ejection $> 5 \text{ m/sec}$
 TV gradient $> 55 \text{ mm}$.

AS

- ↳ slow rise (Pulsus tardus et parvus)
- ↳ Amplitude ②
- ↳ diastolic notch ①/② (Anacrotic Pulse)
- ↳ ② or ① notch

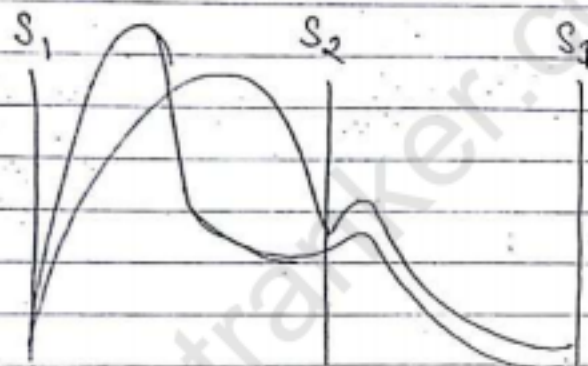
② HOCM :

- AD
- β myosin gene defect
- Chr. 14



- 1) - Asymmetrical Septal Hypertrophy
- 2) - LV outflow tract obstruction (LVOTO)
- 3) - Diastolic dysfunction
Systolic dysfunction

(4)



collapsing pulse
↓ Radial (A)
↑ Carotid

HOCM

- fast rise
- fast fall
- "Jerky pulse"
- Pulsus Bisferiens

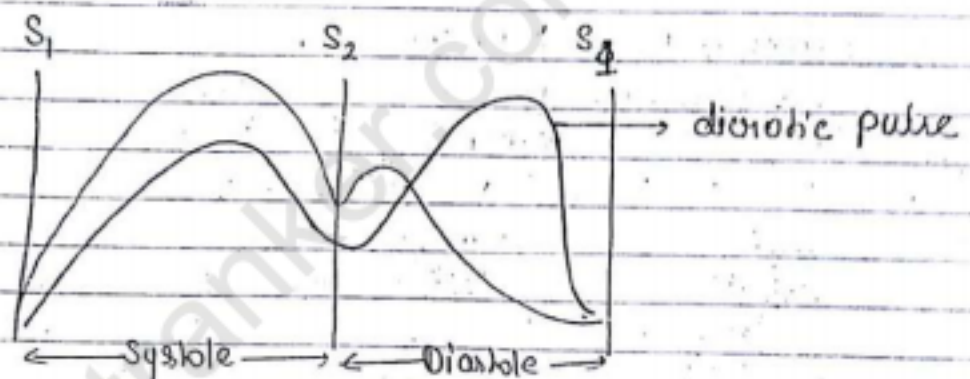
↳ Character → Carotid (A)

(3) Water Hammer pulse / Corrigan's / collapsing pulse

- Radial (A) = character
- Aortic Regurgitation

③ Dilated Cardiomyopathy (DCM): Globular,

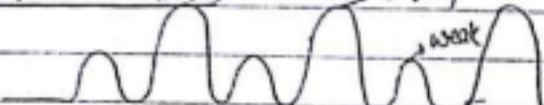
- Alcohol - toxin
- Sequelae of viral myocarditis
↳ Coxsackie B
- m.c. non-infective = sarcoidosis
- Chemotherapy in Hodgkin lymphoma → ABVD
 - A - Adriamycin = Doxorubicin
 - B - Bleomycin
 - V - Vinblastine
 - D - Dacarbazine



- twice beating pulse (systolic + diastolic)

- A - Atherosclerosis → LVEF
- B - Bigeminy → V. Bigeminy
- A → Anacrotic → AS
- B → Bisferiens → HOCM ('Jerky pulse')
- C → Collapsing → AR
- D → Dicrotic → D.C.M. ('twice beating pulse')

P. Alternans:



- LVEF ① Anterior wall MI = LAD
- ② Wet beriberi = thiamine ①
- ③ S. Arterio

④ Viral myocarditis

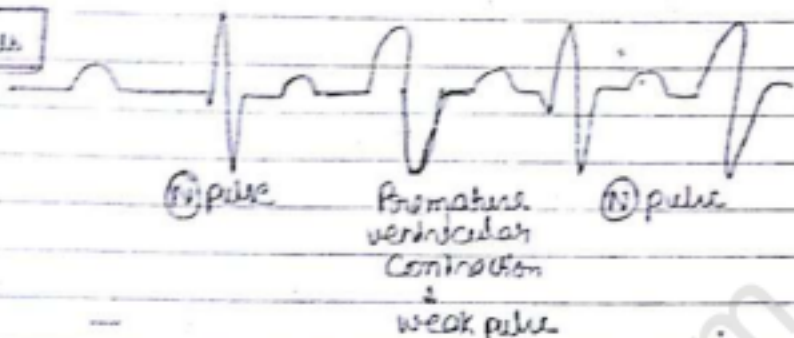
⑦ Digoxin toxicity

→ m.c. Arrhythmia = Ventricular Bigeminy

DOC = lignocaine / Phenytoin

P. Bigeminy

- ① pulse weak pulse
- ② pulse weak pulse



digoxin toxicity DOC = digiband

↓ IS line Mx

- ① KCl correction (i.v.)
- ② Mg correction ($MgSO_4$) (i.m.)
- ③ digiband

hemodialysis (not done)

↳ b/c digoxin = $\uparrow\uparrow V_d$ (volume distributed)
 $\uparrow\uparrow$ protein binding

① Urine output = 1ml/kg/hr = (1-3L)
 Oliguria = <0.3ml/kg/hr
 Polyuria = >2ml/kg/hr

② CHF

① Acute CHF:

1st earliest symptoms

- ① - diaphoresis (+)
- ② - Palpitations
- ③ - Pink frothy sputum
- ④ - Dyspnea grade III
(minimal activity)
- ⑤ - dizziness / vertigo / syncope

Sympathoadrenergic
overactivity

O/E

- tachycardia (earliest sign)

LVF

RVF

- ① - SBP ↓
- ② - oliguria
- ③ - pulmonary edema
- B/L fine crepitations

- ① m.c.c. of RVF = LVF > cor Pulmon
- ② JVP ↑↑ [5-8 cm H₂O]
- Pulsatile JVP ↑↑

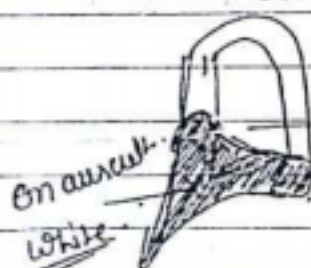
* Bi-Basilar Crep = ILO
(Inverted lung ds)

non pulsatile ↑
JVP

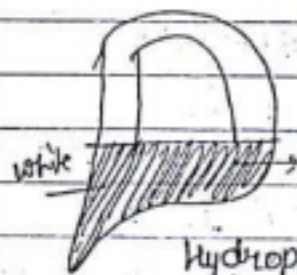
- ① Cardiac tamponade
- ② SVO
Superior vena cava obstruction

- ④ S₃: Ventricular gallop
rhythm
(low pitch sound - BELL)

- ⑤ B/L infra-axillary breath
sound ↓↓



Meniscus sign
(Pl. effusion B/L
C.P. angle blunting)



Hydro-pneumothorax
C.P. angle blunting

JVP pulsation

- pulsation seen
- never felt
- below carotid frequency
- deep inspiration (X) = JVP falls
- RVE f3 + deep inspiration = JVP rise (compliance (X)) (Kussmaul sign (X))
 - (1) Constrictive Pericarditis
 - (2) RCM
 - (3) Left wall MI
 - not (X) in Cardiac tamponade

Abdomino-Jugular Reflex

- JVP (X) palpable
- Kussmaul sign (X)
- (X) Tender Hepatomegaly → indicate RVE
 - ↳ sudden stretching of capsule of liver
- Palpable liver = TR (tricuspid Regurgitation)
- sysolic pulsation liver = TR
- post-sysolic ' ' = TS

FRAMINGHAM CRITERIA - feature of acute CHFminor criteria

- (1) Tender Hepatomegaly (right heart failure)
- (2) Hypotension
- (3) oliguria

major criteria

- (1) ↑ JVP
- (2) S₃ creptum (fine)

Pedal edema

↳ feature of chronic CHF

Investigation: (Acute CHF)

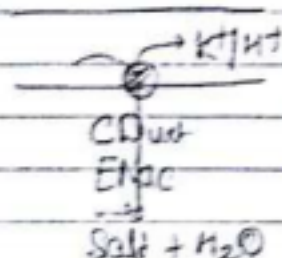
① - BNP level ↑

B-type natriuretic peptide ↑

Venicle ↑ → volume overloading

② SBP ↑ → GFR ↓ → RAAS ↑ → aldosterone ↑

↑ = Efficacy



② Metabolic Alkalosis

③ urinary sodium: low

④ CXR

↳ earliest radiological sign of pulmonary edema

- prominent upper lobe veins (cephalization)

- CT Ratio ↑ > 0.5

- PCWP ↑ (↑ = 8-12 mmHg)

↳ due to ↑ transudation

- Bat wing pulmonary edema

- Cardiac border not visible

- Silhouette sign

⑤ - Kerley B line

(seen 1 to pleural surface)

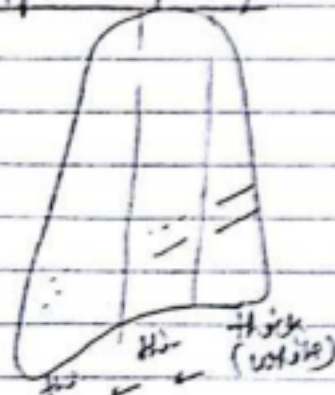
Other findings

① CHF

② lymphangiomatosis

③ Constrictive

Vascular pattern of lung



IOC for CHF = Echocardiography

a) Systolic dysfunction

$$= EF = \frac{SV}{EDV} = 65\%$$

$$EF < 65\%$$

b) diastolic dysfunction = $\frac{SV}{EDV}$ (compliance ↓)

↓
Pulmonary edema (pooling of blood in lungs) $EF > \textcircled{N} / \textcircled{\uparrow}$

Ejection Fraction method calculation: $(EF) = \text{Volume 3D concept}$

- | | |
|------------------|--|
| ① Thermodilution | cardiac MRI (best) |
| ② Echo | V |
| ③ MUGA scan | multiple uptake gated acquisition scan = 1c 99 |
| ④ Cardiac MRI | |

Rx: Acute CHF

- ① Reverse Trendelenburg position
- ② O_2 & Rebreathing Mask $> 60\%$
- ③ i.v. Furosemide 20mg
- ④ $\textcircled{i.v.}$ Morphine (pulmonary edema reduction)
causes shifting of blood from pulmonary to systemic system
(3mg i.v. / 10mg i.m. / 15mg sc)
- ⑤ sympathetic (↓ infarct size)
- ⑥ Air hunger ↓
- ⑦ Pain ↓

⑤ (i.v) NTG drip

Dobutamine - β_1 - HR(↑)

Dopamine

1-2 $\mu\text{g}/\text{kg}/\text{min}$ D_1 ↑ GFR
 2-10 $\mu\text{g}/\text{kg}/\text{min}$ β_1 ↑ CO
 >10 $\mu\text{g}/\text{kg}/\text{min}$ α_1 $\alpha_1 \rightarrow \text{VC} \rightarrow \text{DBP}$

nor-epinephrine

↳ DBP (↑) → coronary flow (↑)

Acute CHF convention
 L - Lasix
 M - Morphine
 N - Nitrates
 O - O_2
 P - Positioning

↓
 SpO₂ - 80%
 Crustation - +++

↓
Cardiogenic Shock

⑥ (a) Nor-epinephrine (best drug
 (DBP - ↑) to rise

(b) add dopamine
 SBP - 100 mmHg

(c) dobutamine
 (only given when SBP rising)

↓
 ⑦ SpO₂ : 70%
 Crustation - +++

↓
 NESIRITIDE = natriuretic
 MILRINONE = ino-dilator
 (↑ power, ↓ load)

↓
 ⑧ central cyanosis ++
 ↳ left-ventricle assist device (LVAD)
 [HEART-MATE™]

- no role of Digoxin → Acute CHF

① ↳ Na^+/K^+ pump
 ↑ Ca^{2+} - inotropic (↑)
 ↑ O_2 consumption

② vagus stimulation
 ↓ HR → ↓ O_2 consumption

③ proarrhythmic drug


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Ref/Companion _____

β -blocker C/I in acute CHF

→ preferred agents = Mx chronic compensatory CHF

↳ mortality reducing drug in chr CHF

(metoprolol

Bisoprolol

Carvedilol)

Carvedilol > metoprolol

Chr CHF Ventricular remodelling

ACE $\ominus$

β -blocker = O_2 consumption $\uparrow$



edema in
chr CHF

① Pedal edema / Ascites / Periorbital edema

- spironolactone (s/e gynecomastia)

- eplerenone (no s/e)

Acute CHF = LMNOP

cardiogenic shock = only shock CVP $\uparrow$

NE + dopamine + dobutamine

Chronic CHF = β -blocker = DOE

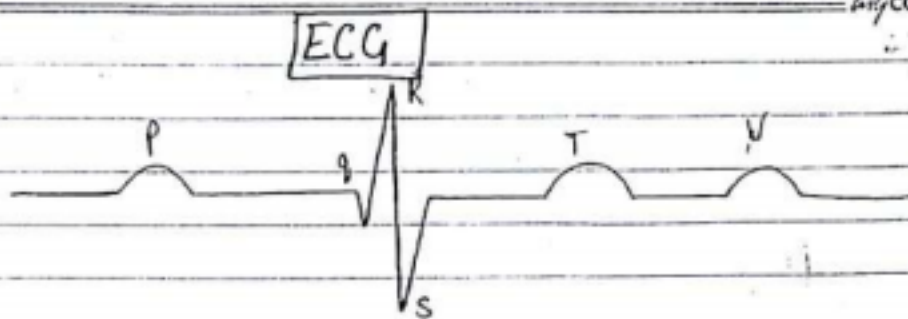
① pedal edema

- ACE $\ominus$

② Ascites

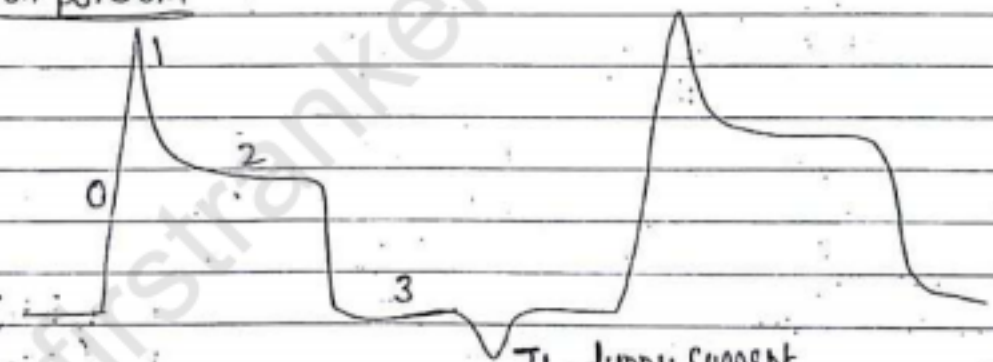
- diuretics (uphill edema)

③ periorbital edema



- U → delay Repolarisation of papillary muscle
- T → Repolarization
- Q → septal activation
- QRS → ventricular depolarization
- P → Atrial depolarization
- P-R interval → A-V nodal conduction
- S-T segment → iso-electric segment

Cardiac Action potential



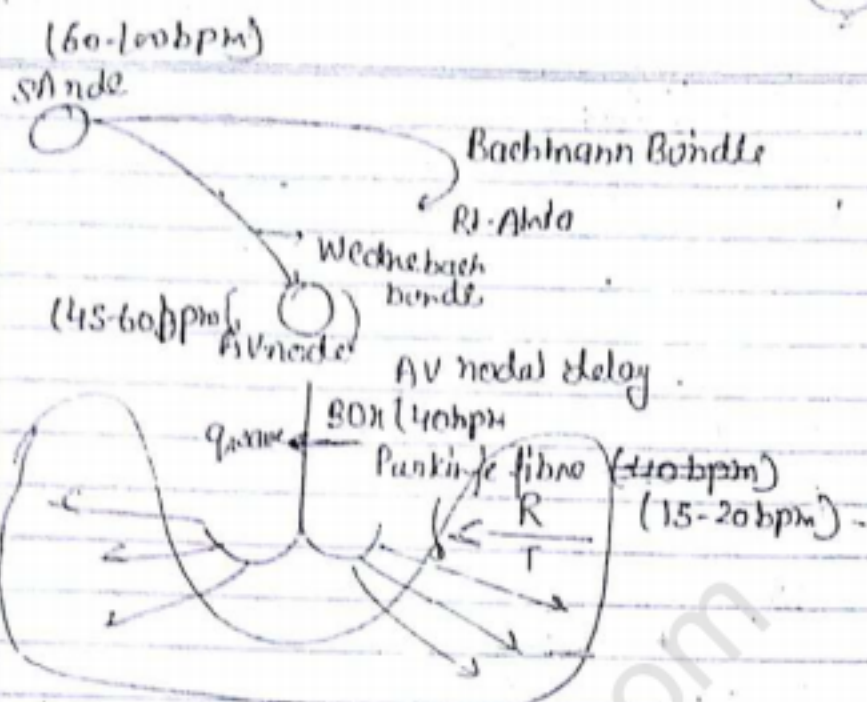
- phase 2 → ST segment
- phase 0 → QRS
- phase 1 → QRS
- phase 3 → T wave

SA node potential = -55mV

firing potential SA node = 60-100 bpm.

100

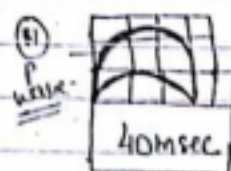
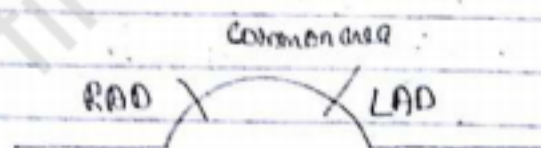
1934 Date ____/____/____
Page ____
1st companion



depolarisation = $QRS = \text{endo} - \text{epi}$
Repolarisation = $T = \text{epi} - \text{endocardial}$

"Isolated Cardiac tissue"

↓
depolarization = $\text{epi} - \text{endo}$
Repolarization = $\text{endo} - \text{epi}$



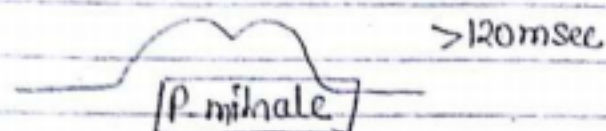
P wave

$P_{\text{wave}} = < 120 \text{ msec} = 3 \text{ small squares}$

$P_{\text{wave}} (\text{HR}) = < 2.5 \text{ mm} = \text{limb lead}$

$< 1.5 \text{ mm} = \text{chest lead}$

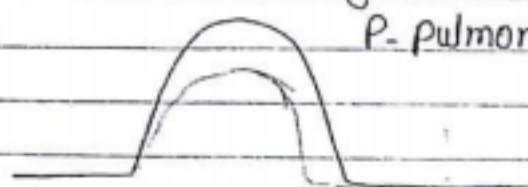
① MS : LA ⊕



② M.S. = LA enlarge

PA Hypertension

RVH : RA overloading

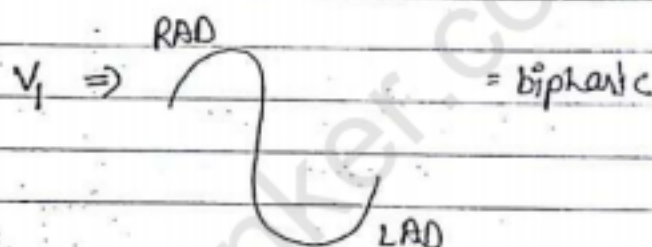


P-pulmonale = long standing M.S.

> 2.5 mm limb lead

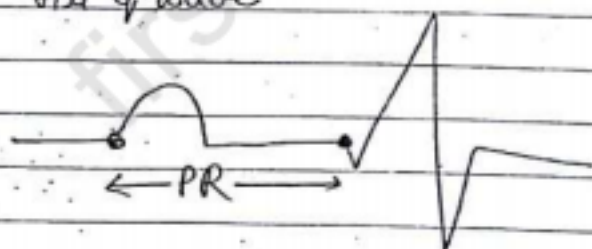
(P-wave in lead I & II)

P-wave always upright < 120 msec



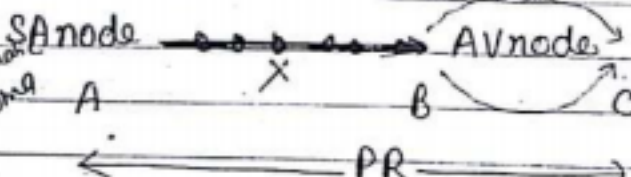
② PR interval

all q-wave



↓
1st degree heart block

- ① Athletes (Marfan)
- ② Aschoff nodule - Rheumatism
- ③ Sarcoidosis - granuloma
- ④ Hemochromatosis
- ⑤ endomyocardial fibroelastosis (conduction system)



$$PR \propto \frac{1}{HR}$$

④ PR = 120 - 200 msec
(3-5 small sq.)

① PR = 160 msec

Setup: HR ①

PR = 140 msec

1st degree block = effort intolerance

ECG = P-R = 200 msec

(after exercise no change of PR)

Connection
Problem
not pacemaker

Rx = Oral Atropine

(anticholinergic drug)

defect

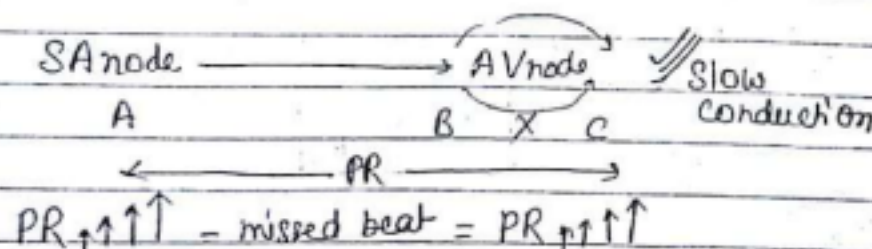
		HR	PR
SA node	→ Sick sinus syndrome	45-60bpm	①
AV node	→ Complete heart block	<40bpm	
BOH	→ Mobitz II heart block	<15-20bpm	

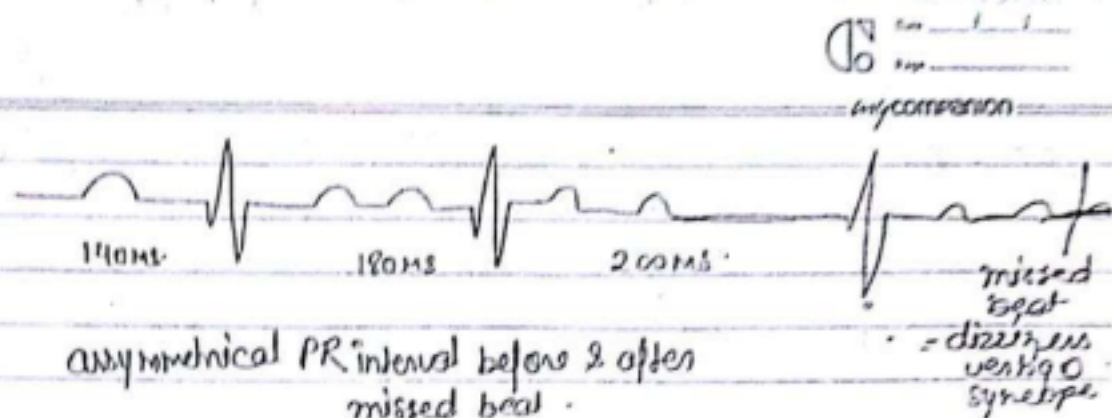
- m.c. bradyarrhythmia causing Sudden Cardiac death post MI
↳ Mobitz II H-Block

- m.c. tachyarrhythmia SCD post MI -
(m.c. arrhythmia after MI) (2 Levine sign)
↳ ventricular fibrillation
" < 1 hr (golden period)

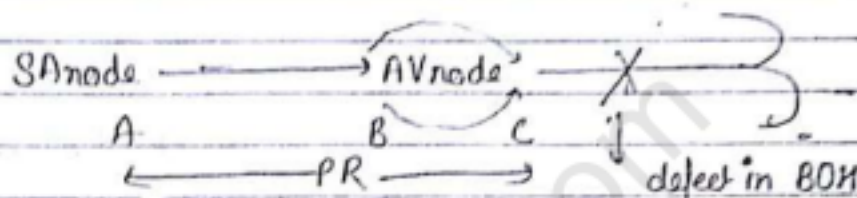
② 2nd degree heart block

① Mobitz I / Weckreback phenomenon = problem inside the AV node

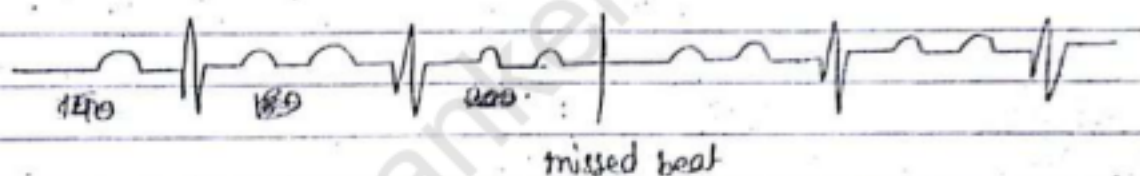




(b) Mobitz II



- no change in PR interval

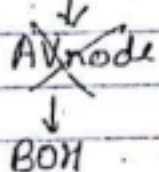


- Symmetrical PR before & after missed beat
- lethal Arrhythmia (anteroseptal myocardial infarction)
- Pacemaker (Temporary pacemaker insertion = best Ht)

3rd degree heart block

SA node → atrial Rate = 100 bpm

no conduction (complete damage)



AV dissociation (Int) → low Cardiac Output

→ ventricular Rate = 40 bpm

- 1) Bradycardia
- 2) AV dissociation

Symptoms
On stand up, postural day
HR, no change
- syncope/vertigo
- dizziness
(Holt's test, Korte & 201)

K/A
Stokes Adam Syndrome/
complete heart block

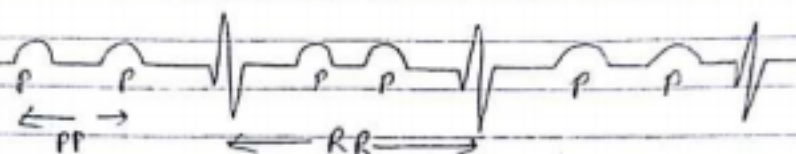
Rheumatoid Arthritis → improve during pregnancy. (exception)

See _____
Page _____

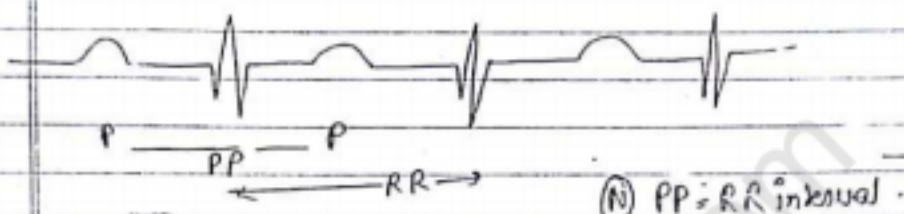
my companion

On E.C.G.

2nd degree



(N) P⁺



2nd degree block

- ① absence of (N) Sinus rhythm
- ② P-P interval } unequal
R-R interval }

1/1 of choice = Dual Pace

I	2	3
SA node → AV node	MI: week kebach	SLE - autoimmune
effort intolerance	PR ↑↑ → missed beat → ↑↑	Ro Ab → IgG
PR ①	HR ↓↓ → dizziness → ↓↓	transplacental spread
Symp (+): PR ①		fetus
Rx: oral Atropine		SA node → 100 bpm
		AV node
		BDH → < 40 bpm
		destroy before birth of baby
	MII	
	PR: missed beat: PR	
	BDH #	
		(N) neonate HR = 120 bpm
		↓
		SLE fetus
		Appar scans ①
		(N) delivery

Baby born from SLE mother:

HR = 40 bpm

marrow Reflex = ↓ / sluggish

(N) delivery

Apgar score = low

on ECG = P-P, R-R } unequal

Kf9

neonatal
lupus

Caused by Lo Antibodies

Rx: Dual Pacing (on 1st day of life)

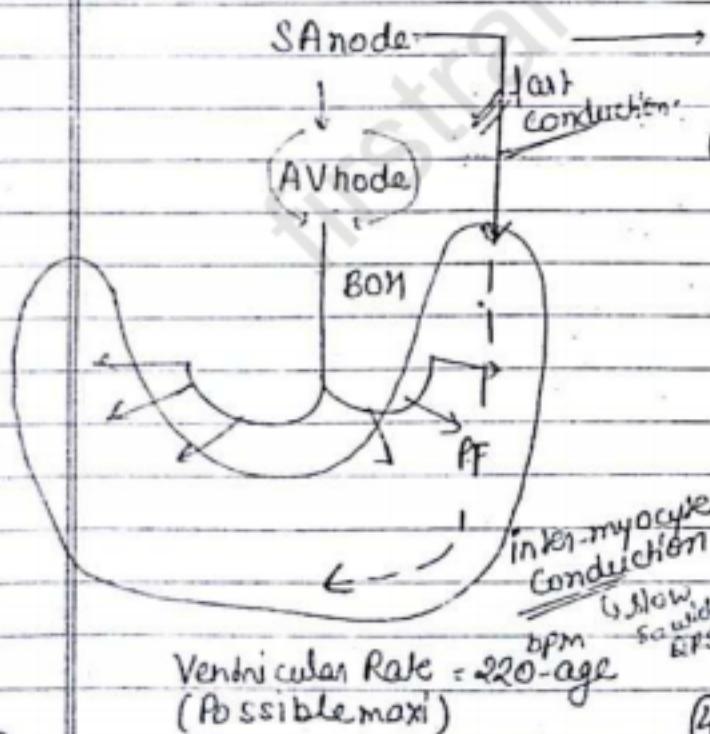
neonatal lupus

① Ro - IgG₁ (cross placenta)

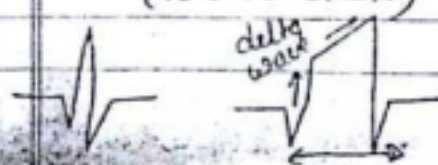
② Butterfly Rash

③ HR ↓; ECG

④

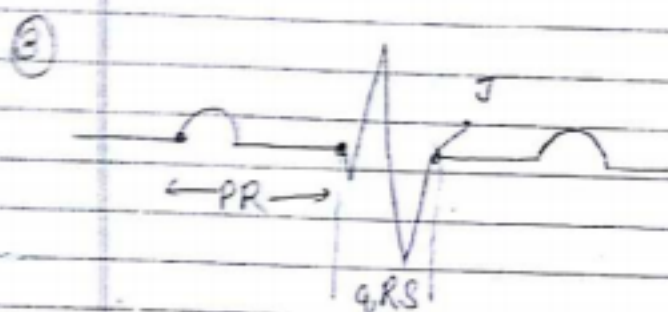


(N)



② Q.P. complex = 80-100 msec = 2 small square

wide QRS = WPW syndrome
(Intertruncal conduction)



$$PJ = PR + QRS$$

Confident

Short Kill

broad
intermyocyte
conduct

i.e. in WPW syndrome

PJ interval: Consistent

22 May

asymptomatic
medical fitness

ECG = PR < 20 msec
< 3 small square

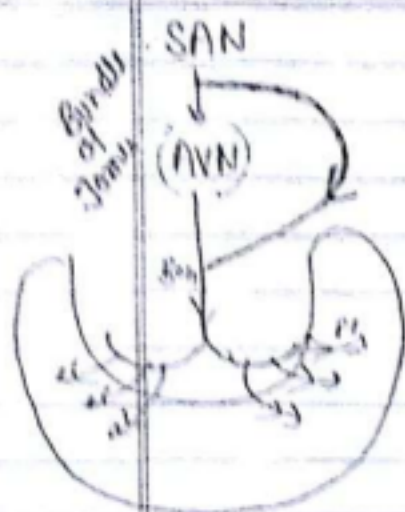
delta wave

$> 9, R8$: 2 small square.

$PJ = \mathbb{N}$

UNFIT

$R_x \Rightarrow$ Oral flecainide = DOC
Radio frequency Ablation = TOC



Low - ganong levine syndrome

- 1) accessory pathway
- 2) Sudden Cardiac death in sibling
- 3) Asymptomatic
Palpitation

Syncope on exertion

(4) ECE :

PR - $< 120 \text{ msec}$ < 3 small squares

QRS - (N) $\approx$ 2 small square

PJ - (↓)/short

no della wave

unfit

R_x: Oral flecainide (DOC)

Radiofrequency Ablation (TOC)

Psyche excitation Syndrome.

- ① WPW Syndrome
- ② Kent's Bundle
- PR ④
- delta wave ④
- (seen in upstroke of R wave)

QRS complex - wide

PJ interval (N)

DOC oral flecainide

TOC RFA

LCU Syndrome

James' Bundle pathway

PR ①

②

④

Short

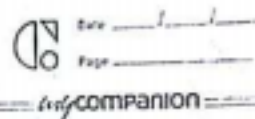
and flecainide.

RFA

SCO

- ① MI $\rightarrow$ V-fibrillation $\Rightarrow$ Mobitz II $\rightarrow$ block actual cause of death =
- ② HOCM - athlete/football $\rightarrow$ Ischemic Ventricular fibrillation
- ③ WPW syndrome $\rightarrow$ HR $\uparrow$ $\rightarrow$ EDV $\downarrow$ $\rightarrow$ CO $\downarrow$
- ④ LGL syndrome $\rightarrow$ m.c. of sudden nocturnal death = males.
- ⑤ BRUGADA syndrome $\rightarrow$ Sodium channel defect $\rightarrow$ sudden cardiac death

MRI Relative C/I for = Pacemaker pt.



Bradycardia: Pacemaker required

- ① Sick-Sinus syndrome = 40-60 bpm → SA node #
- ② Complete H-Block = <40 bpm → AV node #
- ③ Mobitz II H-Block = 15-20 bpm → BOM #
↳ (Temporary pacemaker insertion)

1st degree H-block = oral atropine

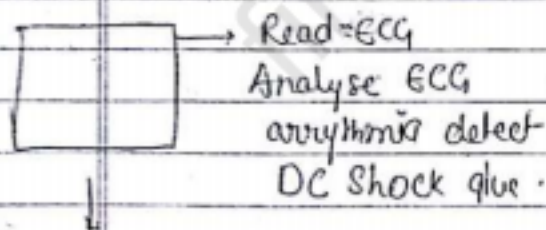
1st degree H-block in Athlete = may be (N) = no Ht.

Site of the pacemaker = left side infraclavicular area below the skin of chest (Computer ...)

- having titanium coating
- Battery life = 5-7 yrs
- Leads (Radio-opaque)
- ↳ touch Left Atrium

Right ventricle (not Rt Atrium)

- Single lead pacemaker = RV
- double lead pacemaker = RA-RV
- triple lead pacemaker = RA RV LV (Superior)



implantable Cardioverter defibrillator (ICD) = for tachyarrhythmia pt.

Site = where tachyarrhythmia

- ① DCM → alcohol
- ② HCM
- ③ HOCM
- ④ LV aneurysm → MI
- ⑤ Brugada Syndrome → S
- ⑥ Long QT syndrome (paralytic cord)
- ⑦ Romano-ward syndrome (AD inheritance)


 Date: / /
Page:

Last companion

Holiday Heart Syndrome

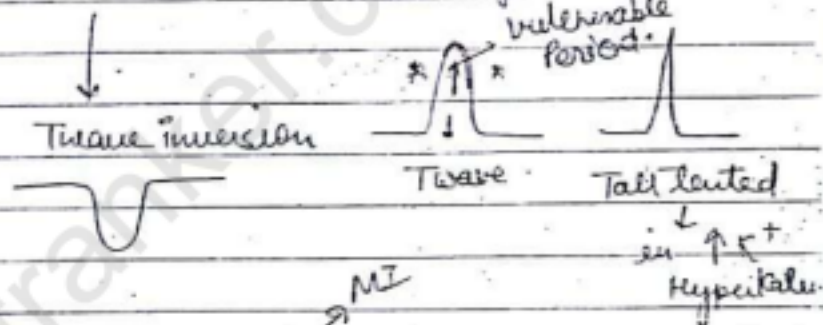
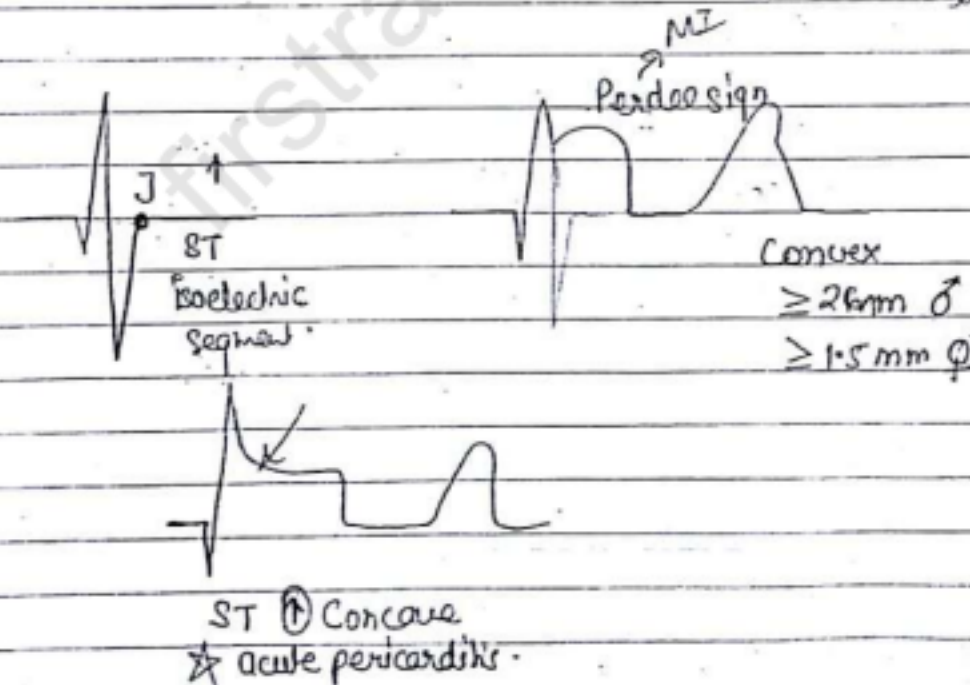
- ↳ Binge drinking → DCM
- ↳ Atrial fibrillation.
- ↳ SCD
- ↳ $T/I = ICD$

② RCM → Amyloidosis

 ③ HOCM → AD, chr.
→ $1/2$

T wave

MI → 1st sign in ECG is tall T wave (Hyper acute T wave)


 ②
minute


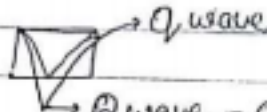
Now (3) deep Q wave

Q = Septal activation (+)

= Lead V_5, V_6

= 40 msec

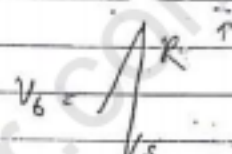
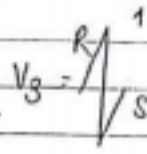
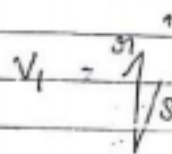
< 1mm



Q wave = cell death = can't reverse
 (in lead V_5, V_6) = ECG finding persists
 for life

Q = previous/old MI
 Persists all life

(N)



non-progression of R-wave = ECG finding of MI

- | | | |
|-----------------------------|---------------------------------|-------|
| ① Hyperacute T |] permanent myocardial ischemia | → see |
| ② T-wave inversion | | |
| ③ ST ↑ Pardee | → myocardial injury | → min |
| ④ deep Q |] cell death | → hr |
| ⑤ non-progression of R wave | | |
| ⑥ | | |

Current of injury =

= ST ↑

= Pardee sign

STEMI → ST elevation MI:

- Catheter lab facility (+)
- door to device time < 90 min
- Percutaneous intervention (PCI)
 (Primary PCI)

Cath lab facility ⊖

- Thrombolysis
- door to needle time < 30 min
- PCI >> thrombolysis

①

full compensation
thrombolysis

- ① STEMI
- ② Stroke
- ③ large pulmonary embolism
- ④ Severe deep vein thrombosis
- ⑤ Acute limb ischaemia

NSTE-AMI := ABE-MOAN

- A - Abciximab (glycoprotein II_b/III_a (R) antagonist)
- B - β-blocker
- E - enoxaparin (Blood thinner)
- M - Morphine
- O - O₂
- A - Aspirin
- N - NTG → DOC

↓

check SpO₂, BP, CRTs (if not improved)

↓

delayed PCI (delayed percutaneous intervention)

T-wave inversion :

- ① myocardial ischemia (in all leads)

myocardial injury

→ Troponin I = (N) < 0.04 mg/dL

(most)

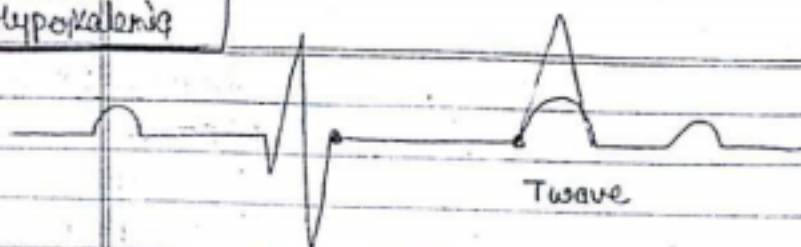
in MI = (↑) at least 2 times, [X5] times, [X10] times

minimum for MI

seen in type 4A MI

type 5 MI

Hypokalemia



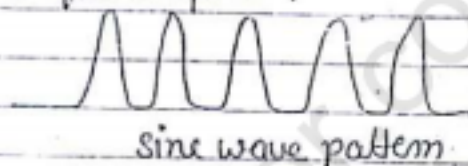
K⁺ ↑ = Repolarization ↑

>6.5 = tall tented T wave
= ST ↑

>7.0 = P wave ↓/↑

>7.5 = QRS broadens

>8.0 = QRS merge to T



Sine wave pattern

↓
death

↓
Cause → diastolic Arrest

Rx: ① DOC: Calcium gluconate (i.v.)

② Insuline Regular iv. (most effective drug)^Q
via infusion pump.
(send K⁺ inside cells → K⁺ ↓ all)
(0.5 meq - 1 meq) ←

③ Salbutamol nebulization

④ LASIX / Furosemide

↓ loss of K⁺ through urine = kaliuria

⑤ K⁺ binding Resin exema

Kalyxate (action ^{after} > 4 hrs)

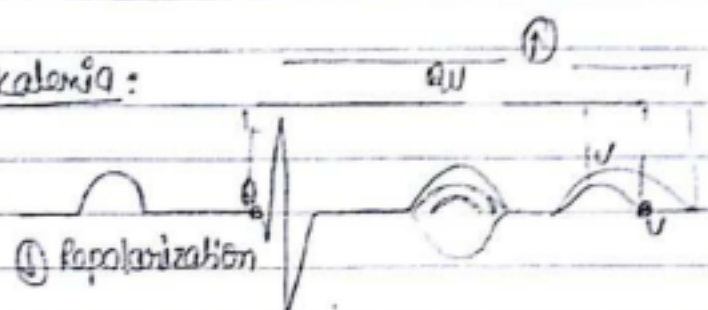
⑥ Hemodialysis (most effective strategy)^Q

In Hypokalemia 2nd ECG changes not used is →
(i.e. Sine wave pattern not present in ECG)
So no immediate threat to life

↓
So Calcium gluconate is not given

① not routinely used for Ht of hypok⁺ → Soda-bicarbonate
(used when metabolic acidosis)

② Hypokalemia:



① Twave ↓↓ / Ent

② Twave inversion⁺ → myocardial ischemia

③ Prominent U wave
(duration of U-wave ①
not vertical height)

④ Prolonged QU interval
death → due to Respiratory paralysis → due to ① V⁺

R_x: KCL + IVF

③ ST-elevation

① electrolyte - K⁺

② LBBB

③ early repolarization variants = Physiological ST ①

④ Ventricular Aneurysm

T ⑤ Trauma : Pericarditis

I ⑥ Injury : Ischemia : MI

O ⑦ Osbourne wave - in hypokalemia

N ⑧ non-occlusive vasospasm | Prinzmetal angina → only cause of ST ① angina
Variant angina

Acute pericarditis : Concave upwards

Brugada syndrome → ECG : ST ① in V₁, V₂

Tako-tsubo cardiomyopathy



Date _____

Page _____

Any companion _____

Brugada Syndrome

- ST $\uparrow$ in V_1, V_2
- SCN5A #
- RV epicardium
- Torsades de pointes $\rightarrow$ SCD

ST depression

① Chronic stable angina:

- $\downarrow$ Chest pain $\rightarrow$ exertion/emotion
- $>70\%$ obstruction duration <10 min
- in any coronary (A) Recurrent attack
- Post prandial angina
- Kla Hibernating myocardium / Reversible ischemia

② LVH:

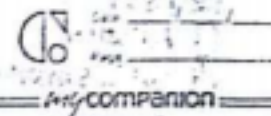
- $\downarrow$ in pt HOCM / Aortic stenosis / HTN (long standing)
- demand of O_2 $\uparrow$
- supply $\downarrow$
- $\downarrow$ Subendocardial ischemia

③ (N) Speed $\heartsuit$

- a) Cocaine snorting (vasoconstriction)
- b) severe Anemia $\rightarrow$ Hb $\downarrow$ $\rightarrow$ O_2 carrying capacity $\downarrow$ $\rightarrow$ ischemia

④ Hypokalemia (K^+ $\downarrow$)

- ⑤ Digoxin (Hockey stick sign)
- (not digoxin toxicity it causes coronary thrombosis)



Digoxin administration (not toxicity)

- PR ↑ : HR ↓
- ST ↓
- QT ↓

Digoxin toxicity = digiband

extra cardiac >> Cardiac

m.c. S/E

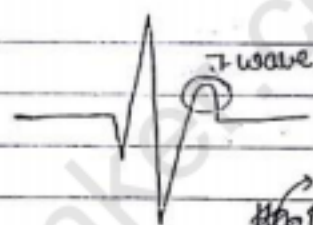
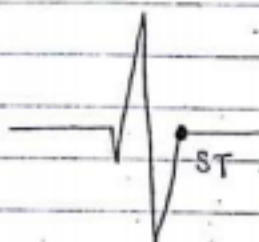
N/V

V. bigeminal = lignocaine

Characteristic

Xanthopsia
(yellow vision)

Nonparoxysmal Atrial = No 1st
Tachycardia (NPAT) require
2 AV block



J-wave

Osborne wave

Hypothermia

Core temp < 35°C

mild 32-35

moderate 28-32

Severe < 28°C

① Pulmonary A

② Rectum

③ Lower part of esophagus

④ tympanic memb.

active Rewarming

TOC

① warm saline

peritoneal

dialysis

② space

blanket

most accurate site for checking core body temp

delta wave = WPW syndrome

Epsilon wave

Arrhythmogenic (ARVD)
Rt. ventricular dysplasia

MI

acute pericarditis

- SVT (10) AF
 (2) PSVT
 (3) Aflutter
 (4) WPW syndrome

Date: / /
 Page: /

SVT = narrow complex QRS = ≤ 1 small square
 (Supraventricular (1))



ectopic focus: 200 bpm
 intermyocyte conduction: slow

(N) QRS = 20-100 msec = 2 small square

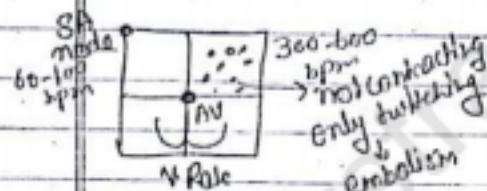
VT = wide complex QRS = > 3 small square

A-fibrillation m.c. sustained arrhythmia = A-fibrillation

A-flutter

PSVT

VT



- (1) - multiple ectopic foci
- (2) - + no Q or PT (more left > right)
- (3) - ectopic foci rate 300-600 bpm
- (4) - P-wave absent
- (5) - AV nodal block

	V-Rate
2:1	200
3:1	133
4:1	100 bpm

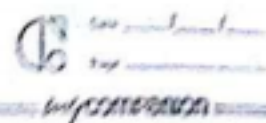
- m.c.c. of embolic stroke = non Rheumatic A-fibrillation

(b) irregularly irregular pulse

A-fibrillation

Q: 40 yrs alcoholic → [DM]

↳ Binge drinking → C/O palpitation
 dizziness
 Vertigo
 Syncope



Q16

- Pulse : fast, irregular
- Count pulse Rate
- auscultate heart Rate
- BP ↓ ↓

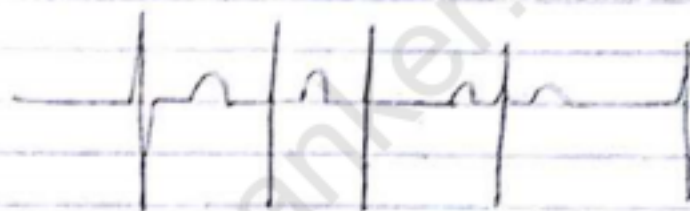
does not narrow, MISTEN →

significant
Pulse deficit = tachycardia
> 10bpm

S_1 : loud S_2 : intensity $\propto$ HR (1)
variable.

- ECG

I	aVL	V_1	V_4
II	aVR	V_2	V_5
III	aVF	V_3	V_6
II	Synth strip - HR		



Q1
Only available
of variable
P-R intervals.

- ① RR (1) ($P-R \propto \frac{1}{HR}$)
- ② P-R - variable
- ③ P wave (1)
- ④ narrow QRS

Rx:

- ① Rate control : HR ↓ (diastolic duration (1))

↳ Nesmolol (iv) (1) EDV (1)
(short acting beta blocker) CO (1)
Digoxin (iv) (1) (2)

- ② anticoagulation (transesophageal echocardiography) - TEE (1)

- oral dabigatran
- oral rivaroxaban

Warfarin - intracranial Hemorrhagic risk

③ Rhythm control

- IV Ibutilide

- Anti-chemical cardioversion

class III : MOA :

ectopic focus : ↓↓



fails

⇒ electrical Cardioversion

- (200 J biphasic DC shock)

↳ causes permanent ablation of ectopic focus.

R - Rate control

A - Anticoagulation

C - Chemical Cardioversion

E - electrical Cardioversion

Protocol
for A-Fib
of A-fibrillation

Anticoagulation in A-fibrillation

CHA₂DS₂ VAS score

C - CHF 1

H - HTN 1

A - Age 2 (65-75 yrs : 1)

D - D.M. 1 >75 : 2

S - previous TIA/stroke 2

V - Vascular dis in pt / coronary dis / pulmonary dis

A - age (65-75) 1

S - sex (♀) 1

Net score ≥ 1 = anticoagulation

best 1st line

Q. A fibrillation + acute CHF

① esmolol → C/I in acute CHF

② digoxin → Vagus ⊕ → AV nodal conduction slower
Ventricular Rate ⊕

A. fibrillation:

① SBP ↓↓ → DC shock C/I
Risk of cerebral embolism ⊕

② Esmolol

③ CHA₂DS₂ VAS : dabigatran

④ Rhythm control : ibutilide

⑤

↓
if chemical cardioversion fail

↓
electrical cardioversion

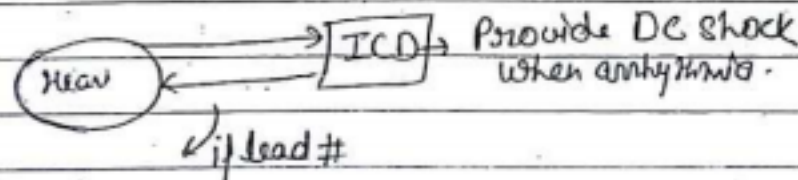
⑥ Recurrent A. fibrillation

a) medical Ht : oral amiodrone

↓ fails

b) MAZE procedure (microtome Ht) = tissue burn around pole

c) ICD (implantable cardioverter defibrillator)



pt. on ICD

C/O shocks electrical on chest

what is 1st investigation

→ CXR

malposition

lead fracture

↓
Redeployment ICD

A. Flutter



- (1) foci - single.
- (2) site - Rf sided
- (3) location - Cavotricuspid isthmus
- (4) firing frequency - 240 - 350 bpm
- (5) AV nodal block - lower grade

2:1 block $\Rightarrow$ 17s bpm

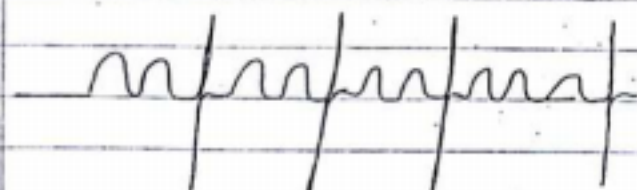
constant tachycardia
(not change like AF)

boy ♂
COPD (2 packs / day)
c/o palpitations
syncope

O/E HR = 175 bpm, regular
Pulse deficit $\rightarrow$ Ent
BP = 111 / ERROR (unrecordable)

ECC₁

I	a_{VL}	V_1	V_4
II	a_{VF}	V_2	V_5
III	a_{VR}	V_3	V_6
II			



- ① Saw tooth / flutter wave - lead II, III, aVF
- ② R-R ①
- ③ R-R regular
- ④

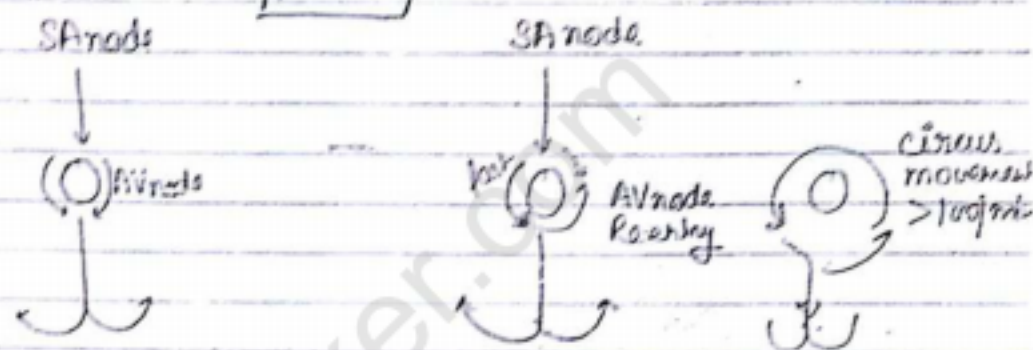
Rx: ① iv Esmolol
(↓HR → ① diastole
① EDV
① SV ① CO)

② Anticoagulation (oral dose 1mg/kg BID)
Aspirin (pulmonary embolism)

③ Ibutilide - for shut down ectopic foci

④ DC shock - 50 J ^{1st}
(biphasic)

PSVT



AV-nodal Re-entrant tachycardia : PSVT

- Clinically ①

- Young ♀ = palpitation, dizziness, syncope, vertigo

Self termination of arrhythmia = in PSVT

ECG = ①

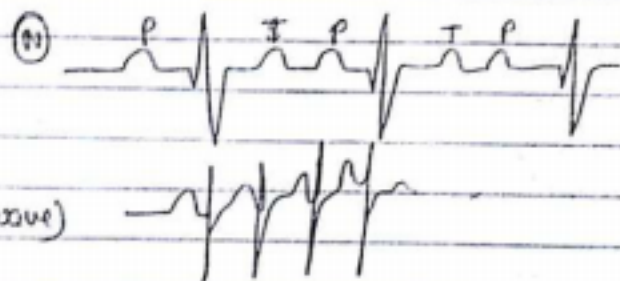
HOLTER (24-48 hrs) = device for ECG record

① R-R ①

② R-R = Regular

③ ST ①

④ Hidden P wave (merging T wave)



Rx:

① Carotid Sinus massage (1st line tx) = vagal stimulation

② for 10 sec. 1 to angle of jaw
burst of (not continuous - b/c desensitization of R)



Date ____/____/____

Page ____

Self-companion

in paediatric 1st line Mx PSVT

- 1) = face ice pack
- 2) Oculocardiac massage
- 3) Valsalva maneuver

 CSM → C/T in pt having atherosclerosis in
internal carotid (A)


if tear Carotid (A) bruis = ICA atherosclerosis

② i.v. adenosine = 6mg/12mg

MOA: AV nodal delay. (↑)

S/E

bronchospasm (self-limiting)

③ verapamil (iv)

MOA - AV nodal delay (A)

④ DC Shock (20-200J) - biphasic

 PSVT pt. + SBP ↓↓ = DC Shock
(hemodynamic compromise)

VT + SBP ↓↓ = DC Shock

V Fib + SBP ↓↓ = DC Shock

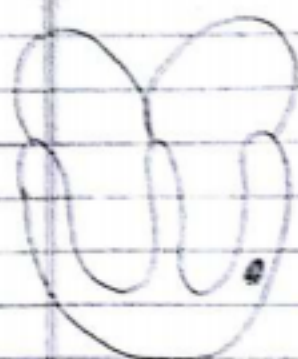
 RR: A-fib + SBP ↓↓ = Esmolol
exception:

lignocaine never be given in 1st 30 mins → death can occur

Don't _____
Pain _____

Asy. companion

VT



monomorphic VT

- Atrial Rate = 100 bpm
- ectopic focus = automaticity
- V. Rate = 250 bpm
- Pulseless VT

① unstable

② EDV

- AV dissociation = k/a VT

→ 3 Premature Ventricular contraction
HR > 100/min

- wide QRS complex

(Intermyocyte conduction)

- Capture beats

- AV dissociation (Hidden P. wave)

Rx:

DC Shock 200 J biphasic

VT. (stable) + BP = 100/70

↳ Rx:

DOC = Post MI - VT = Lignocaine (iv)

Xylocaine / Lignocaine Local Anesthetic = contains

(never inject (blood vessels))

Soda metabisulphite
Cardiotoxic

Xylocard Lignocaine - Cardiology

Plain (not +nt Soda metabisulphite)

So given i.v.

DOC

Stable VT = amiodarone

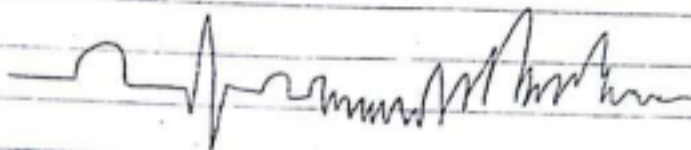
(Post MI) Stable VT = Lignocaine i.v.

Pulseless VT = DC shock (200 J)


 Date _____
Page _____

my companion

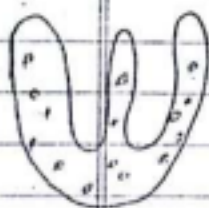
Polymorphic VT / Torsade de pointes
= >3 PVC, HR >100
amplitude - variable



Causes:

- ① Hypokalemia → villous adenoma → laxatory → $\downarrow$ K⁺ diuresis
- ② Hypomagnesemia
- ③ Gitelman syndrome (Mg losing/wasting)
- ④ Class IA, IC, III antiarrhythmic drugs
- ⑤ Erythromycin + ketoconazole
proarrhythmic drug if combined these drugs
- Astemizole
- Terfenadine
- Cisapride

Rx: DOC = Torsade de pointes
= MgSO₄ (iv)



Ventricular fibrillation

- 'Bag of worms'
- Twitch: SBP $\downarrow\downarrow$
Pulse $\ominus$

ECG

<5 min: DC shock

>5 min: ① check pulse

② DC shock

③ iv adrenaline

④ CPR

CPR:① 30:2 X 60-90 ~~min~~ sec.

Chest compression: 100-120/min

Sternal depression - 5cm

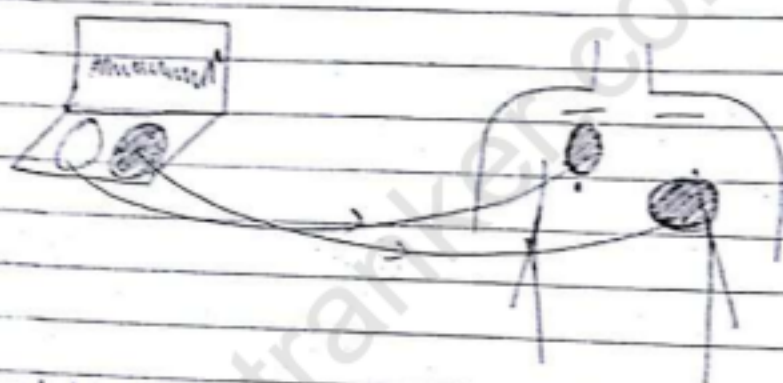
lower 1/3 sternum

- m.c. solid organ lacerated in CPR = liver (left lobe)

- m.c. Rib # in CPR = 4-6th Rib

② DC Shock

- AED (Automated external defibrillator)



③ Repeat 1+2

④ Repeat 1+2

⑤ IV adrenaline

① coronary perfusion

② hypoxia

Asystole

① CPR: 30:2 X 60-90 sec

② iv adrenaline ③ SAN

failed i.v access

→ Intraosseous adrenaline

Tibia - 2cm below tibial tuberosity

* Intracardiac Adrenaline $\Rightarrow$ never given

* Neonate = umbilical vein

$\hookrightarrow$ endotracheal tube of baby
+ AMBU bag

③ Rept Adrenaline

④ DC shock is c/z in flat line ECG

⑤ adrenaline

ventricular
fibrillation
 $\downarrow$ then
DC shock

Pulseless BP $\downarrow$

ECG

ventricular

V-fib

① BLS 30:2
(basic life support)

② DC shock X3

③ iV adrenaline
+ coronary
perfusion

asystole

BLS : 30:2

adrenaline, repeat

$\downarrow$ then
DC shock

[Vasopressin
atropine] AHA 2015
 $\hookrightarrow$ withdraw

NaHCO₃ - can be use

if $P_{H_2O} < 7.15$


 Date _____
 Page _____

FirstRanker.com

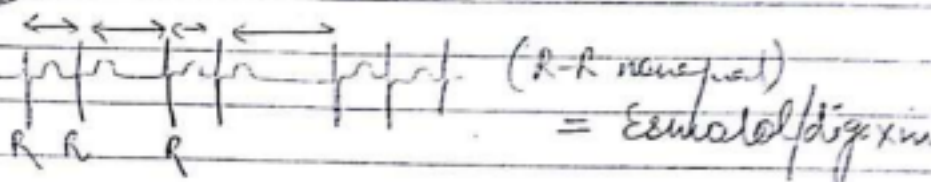
Post resuscitation V.T

→ amiodarone

• Pulseless VT = DC shock

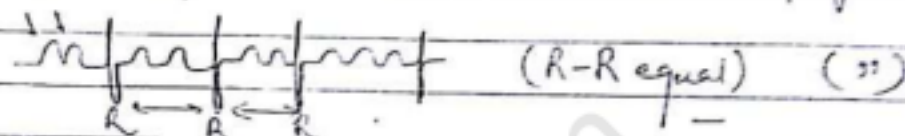
SUMMARY - see lead II

A. fib



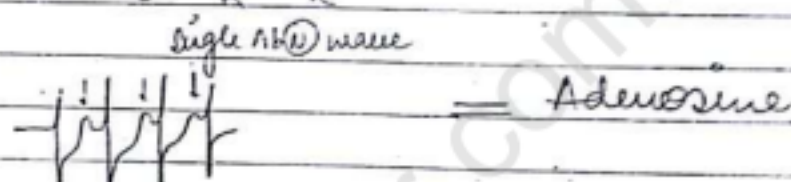
A. flutter

II, III, aVF

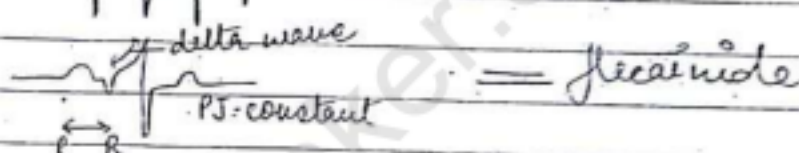


AVNRT

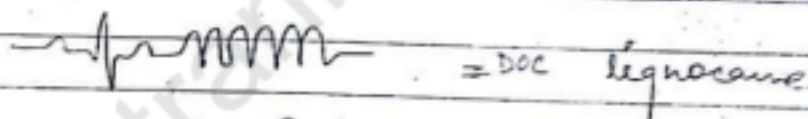
(PSVT)



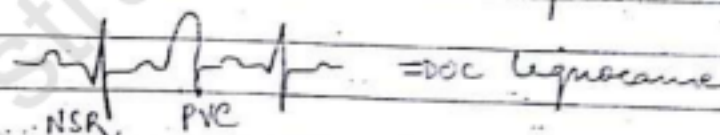
WPW



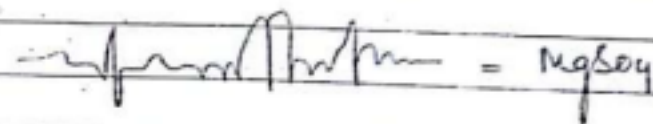
VT



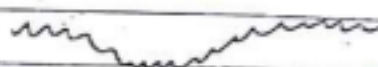
V. Bigeminy



T. de pointes



V. fibrillation



12 lead ECG

paediatric 12 lead = 12 lead + (V₄R)
(Physiological RVII)

Chest leads used

EITHOVEN

V₁ = 4 I/c space, R, P.S.L

V₂ = " " L = Para sternal line (Pst)

V₃ = V₂ - V₄

V₄ = 5 I/c space L = mid claviculal line

V₅ = " " = AAL

V₆ = " " = MAL

V₇ = " " = PAL (Post Axillary line)

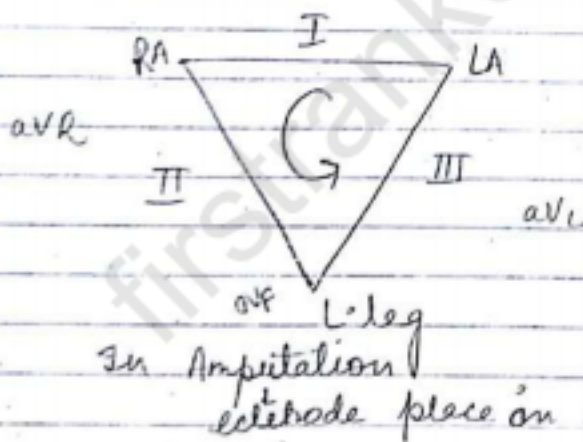
V₈ = " " = Scapular line

V₉ = " " = paraneostolal line



Post wall MI

limb lead



Augmented lead : → Volatage is 1.5 times
than limb lead

in aVR - Right atria

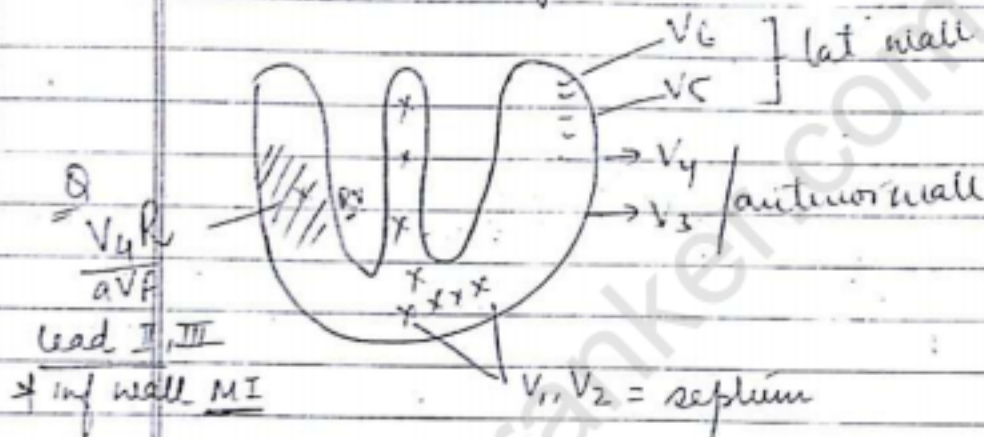
V_P , V_T

aVF = Right ventricle

for RV = Lead II, III, aVF
 V_{4R}

V_1, V_2 = Septum & some part of anterior wall

V_5, V_6 = Lateral part of ~~anterior~~ myocardium



I	aVL	V_1	V_4
II	aVR	V_2	V_5
III	aVF	V_3	V_6

II $\Rightarrow$ count Heart Rate $\Rightarrow$ rhythm etc

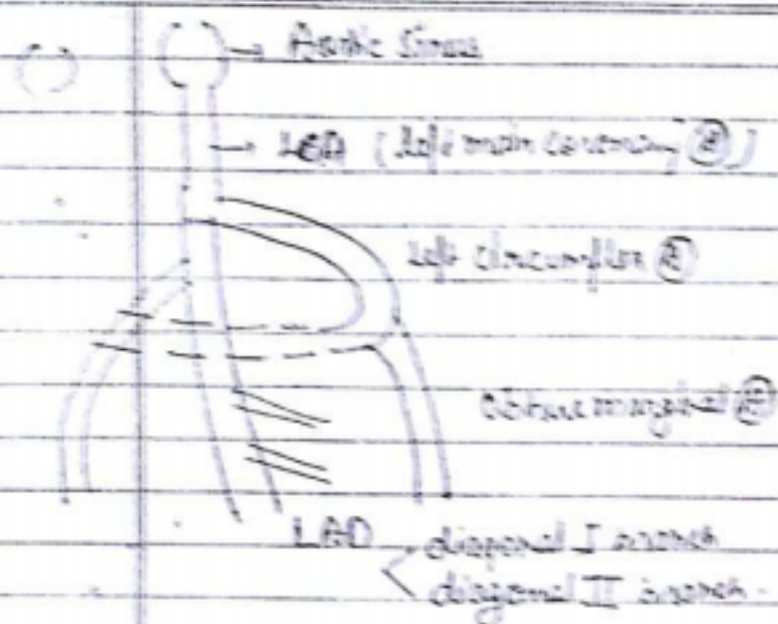
- ① HR
- ② Axis = I/aVF
- ③ P : upright : < 3 small square (s.s)
P-R : 3-5 s.s $\begin{cases} \downarrow = \text{WPW, LGL} \\ \uparrow = \text{Heart block} \end{cases}$
- ④ QRS : 2 s.s $\begin{cases} \text{narrow} = \text{SVT} \\ \text{wide} = \text{VT} \end{cases}$

- ⑤ ST segment - elevation/depression
- ⑥ T wave, lesion wave

① QT interval $\propto \frac{1}{Ca, Mg}$ $\rightarrow 360-460 \text{ ms}$
= 10-11 sec $\rightarrow$ hyperkalemia

arrhythmia

septal MI $\rightarrow$ LAD septal branch block V_1, V_2, I, aVL



In-Wall MI = R Coronary (4)

ECG findings

Algorithm

- 1) Count HR
- 2) Calculate axis
- 3) P-QRS-ST-T

3 2 10-11

PR = 3-5

- 4) P - pulmonary / minute
- 5) QRS : narrow / wide / delta / J wave / epsilon

PR = 6 = WPW / LGL synd.

ST = 1/2

RTx 1/2

Bradyarrhythmias

28/10/2014

and

in companion

CAD

① Atherosclerosis

Q: CAD

Cancer

Infection

PCM

→ m.c.c. of mortality in India / USA = CAD (50%)

→ m.c. blood vessels involve = (ACF)

Abd. Aorta > Coronary (A) > Popliteal
(m.c. peripheral (A))

→ coronary (A) m.c. involving = Left Anterior descending (A)

→ least involve blood vessels = internal mammary (A)

located in
Coronary (A) type
(CAD, etc.)

if involve

① Abdominal (A)

→ AA aneurysm = > 5.5 cm
(spontaneous rupture)

② Coronary (A)

→ Acute Coronary Syndrome

① MI

② UA (unstable angina)

③ PA (prinzmetal angina)

chest pain at
rest

not Chronic stable angina

→ chest pain on exercise

③ Popliteal (A)

→ Claudication

T.A.O. → lesion distal to
origin of tibial (A)

→ < 45 years of age

→ smoker

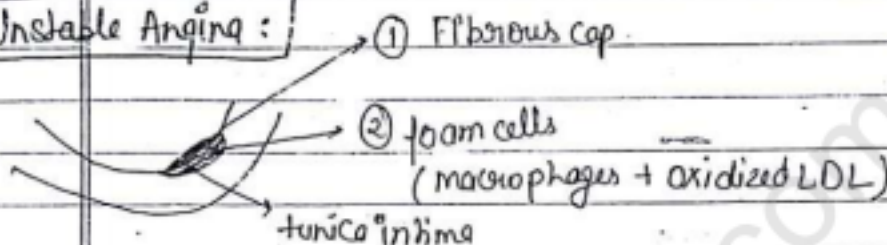


SCA (sickle cell @)

Acute chest syndrome

- sticky RBC
- developing MI / stroke
- no Atherosclerosis
- no acute chest syndrome
- not K/a acute coronary syndrome.

Unstable Angina:



Plaque Fissure/tear (due to high flow of blood).

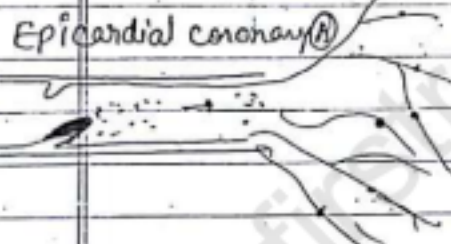
Collagen exposed

attract platelets plug formation

Clot formation

↑ in size

anticoagulating body system activates
Protein C/S/ATIII



Athero-embolism Perforation

Chest pain at Rest

- 60 y/o ♂
- Chest pain at Rest X 3 hr
- diaphoretic / dyspnoea
- ECG → ST @ / ↓ 50% / 25%
T wave inversion 25%

Troponin I = (N) value = 0.04 ng/dl

= (↑) but not so much

(2x, 3x, 5x, 10x never seen)

→ seen in large / main coronary @ block

Rx:

- ① i.v. abciximab gp II_b / III_a ⊖
- ② inf. enoxaparin (s.c.)
- ③ i.v. Metoprolol (↓HR)
- ④ morphine ↓O₂ consumption

C/I of cardiac selective β-blockers & metoprolol (↓HR)

- ① acute CHF
- ② Sick sinus syn
- ③ Complete H-block
- ④ Mobitz II H-block
- ⑤ inf. wall MI

C/I of non-selective

- COPD
- Asthma
- PAD (?)
- Burgoyne's ds

⑤ O₂

⑥ Aspirin 325 mg chewable tablet uncoated

⑦ iv NTC

→ observe pt → spO₂ ↓
BP ↓
Crepitus

spO₂ ↓

BP ↓

Crepitus ++

PC-I

Percutaneous coronary intervention

UA / NSTEMI

↓ ↓ UA

ST (N)

ST (N)

troponin I ↑

↑

NSTEMI

ST (N)

↑ x 2 times

Rx:

ABE - MOAN iv

↓
failure of HF

↓
P.C.I.

Indication of PCI:

- ① STEMI
- ② NSTEMI[ⓐ]
- ③ UA[ⓐ]

Clinical initiation of UA"accelerating Angina"

chest pain, exertion/emotion



chest pain at rest

↓
Chronic stable
Angina

(more
atherosclerosis
↓
chance of
heart
attack)

luminal reduction of diameter
of coronary[ⓐ] > 70%

atheroembolism

(less fibrosis)

more chances of
embolism

(more dangerous)

Prinzmetal Angina:spasm of epicardial coronary[ⓐ]in[ⓐ]
healthier pt↓
can fall asleep

in PA.

↓
endothelial cell malfunction
(due to atherosclerosis)↓
① amount of NO release↓
ⓐ chance of spasm.

- 60 yrs

- ♀ female

- chest pain at Rest

- X 3 hrs (succumbent episodes)

- winter months > summer mth

- early morning (m.c.) than evening

- No migratory attacks

Aspirin given at time of surgery

Varicospastic dx

(1) Prinzmetal A

(2) Migraine

(3) Raynaud's phenomenon



day _____
night _____

fasting

- Raynaud's phenomenon (white-blue-red)

- ECG:

ST[↑] [Variant Angina]

- Troponin I = (N)

(no cell death so (N) troponin I
different from MI)

Rx:

(1) i.v. NTG drip = (DOC)

tab. isosorbide mononitrate (after discharge)

+ CCB (amlodipine) (at time of bed)

(to prevent tolerance from nitrate
→ early morning vasospasm)

(2) Statin = HMG CoA Reductase (N)

(all pt. & ASCVD)

atherosclerotic Cardiovascular dx)

Pitavastatin > Rosuvastatin > Atorvastatin

(19h)

(14h)

(maxi. cholesterol synthesis - at night)

so statin taken at bed time

Aspirin 75mg ECASA

(enteric coated)

Atorvastatin 40mg

Telmisartan 40mg

→ scheduled for sx

medicines (N) = day of operat.

↓
(1) risk of intra op-MI

during sx if (Lab cholelithotomy OT: MI)

(1) SBP ↓

(2) Pulmonary edema (N)

(3) SpO₂ ↓

(1) trauma to major BV

(2) Anaesthetic drug: vasodilation

(3) MI → for Δ → TEE (transesophageal echocardiography)

= stunned myocardium

sudden (N) contractility

- chest pain at rest > 20 min
- Posterior wall ischaemia → ① ECG and/or
- RV ischaemia → ② Troponin and/or
- most accurate way for diagnosis of MI → ③ T.E.E
- operation dependent
- ↓
- elevated Cardio Biomarkers
- (troponin I) > troponin T > CK-MB
- ① Type I MI : ^(MI) due to thrombus formation → Atherosclerosis.
- ② Type 2 MI : Coronary (A) dissection → nonatherosclerotic
Cocaine
Severe Anemia
- ③ Type 3 MI : development of SC Death
(V-fibrillation > Mobitz II H-block)
- ④ Type 4A MI : during P.C.I. → balloon & Material
↓
Clot form (A)
- ④B MI : latent silent thrombosis
↓
(Bare metal & drug eluting stent)
① Sirolimus
② Everolimus } reduce chances of MI
- ⑤ Type 5 MI : during C.A.B.G. (coronary (A) bypass grafting)
a) suture F-body → Clot form
b) intraop. bleeding
c) clamp Aortic sinus → block left main coronary (A)
- for diagnosis of Type 4A MI = troponin I (↑) x 5 L.V.F
Type 5 MI = troponin I (↑) x 10

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 D.M. pt = have
Silent MI
↓
Sudden cardiac death
in D.M. = Silent MI

PA → Rt side of

Coronary - left side of In valve
Left ant descending @

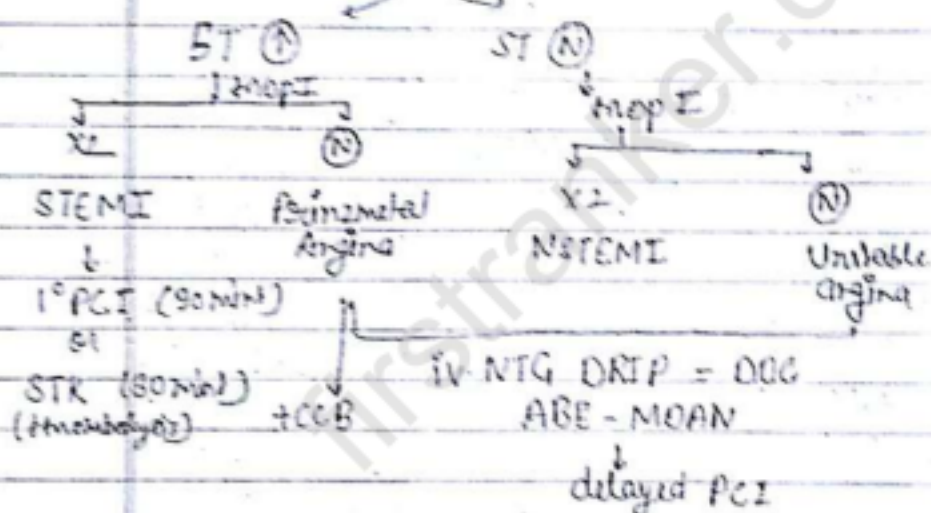
Coronary
no companion

Expanded definition of MI:

STEMI	STEMI	NSTEMI	UA	PA
ECG	ST ⊕	ST ⊖	ST ⊖	ST ⊕
troponin	Y2	Y2	⊕	⊖
PCI	PCI	ABE - NOAN delayed PCI		IV NTG Tab ISB + CCB

Acute Coronary Syndrome
Chest pain Rest X 3-4 hrs

ECG



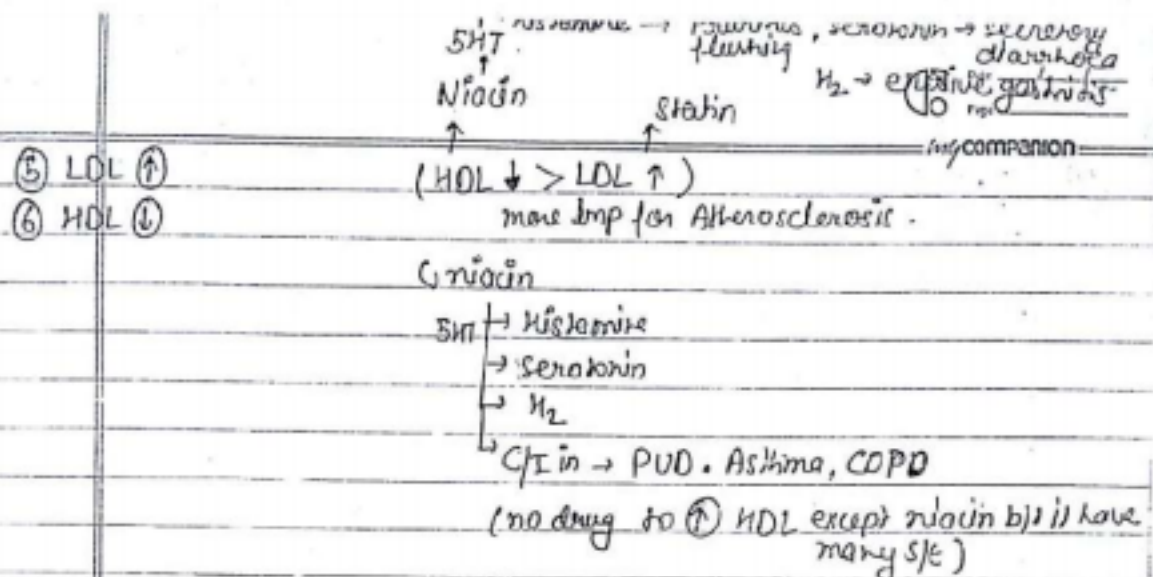
Atherosclerosis Markers:

High sensitive CRP ⊕ → predictor for future coronary ⊕ events

② total cholesterol ↑
HDL ↓ > 3.5

③ Lipoprotein A ↑ = ⊕ incidence
Apolipoprotein B ↓

④ Homocysteine ↑ : AR
↳ Biomarker atherosclerosis



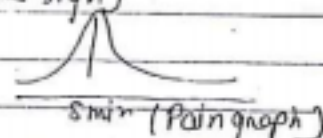
Imaging for Atherosclerosis:

- ① Intra-vascular USG (best)
- ② Coronary CT angiography



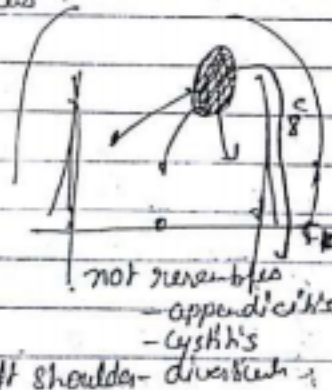
Chronic stable Angina: chest pain on exercise, b/c development of collaterals

- luminal diameter reduction > 70%
- 50 yrs HTN (non-compliance)
- smoker
- ♂
- chest pain at exertion (Levine sign)
- diaphoresis (+)
- duration < 10 min
- Radiating in nature (C₆, T₁)
(medial side of Arm/forearm/Jaw upper jaw)
- never go below level of umbilicus



Cardiac plexus → responsible for pain

- ① Sup. Cervical Cardiac (N) → Jaw
 - ② Inf. Cervical Cardiac (N) → Levine sign
 - ③ Thoracic splanchnic (N) → downward
- nerve mediating pain of MI
- (N) mediating pain of acute pericarditis = phrenic (N)
→ Radiation of pain to left shoulder - diverticulitis





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Post-prandial Angina:

ECG - ST (N), asymptomatic

Stress test - symptomatic $\rightarrow$ chronic stable angina
(treadmill)

ECG - ST (↓)

Drug given = S.L. NTG + Rest

Repeat ECG: ST (N)

K/A Reversible Ischemia

Stress test:

(1) Treadmill test (IST test to be used)

Bower protocol

Speed (1) gradually 3 min; 7 cycles

ECG $\rightarrow$ ST (↓) $\geq 1\text{mm}$ $\geq 80\text{sec}$: 2 contiguouslead V_1, V_2, V_4, V_5, V_6

Premature termination of test if

(1) Chest pain:

(2) ST (↓) $> 3\text{mm}$ (3) BP $\downarrow > 20\text{mmHg}$

achieve

Target Heart Rate: = 85% (220 - age)

Treadmill test C/I

(1) Paraplegia

(2) Charcot joints (DM)

(3) Buerger's dis/TAO

(4) deep vein thrombosis

(5) B/L severe osteoarthritis of knee

(6) morbid obesity

(7) Superheaven/severe AS

(8) Unstable Angina/PA

(9) Ischemic Aorta

(10) MI $< 48\text{M}$

modified Bower protocol

(1) Protocol +

(2) Target +

(3) C/I

Sensitivity $> 80\%$

morbid obesity

chest pain on minimal activity

(3) Test do Stress Echocardiography → drug stress

 I.V Dobutamine : β_1 : HR ↑

 ECG → ST ↓ $\geq 1\text{mm}$ $\geq 80\text{msec}$, 2 leads concomitant

Echo → sensitivity (4)

sensitivity → 90%

3: Test Myocardial Perfusion Imaging (most accurate test)

Thallium - 201 : Gamma Camera

(Thallium Scan)

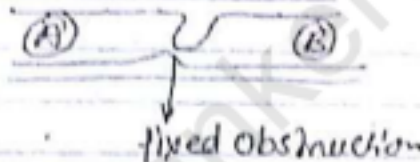
give digital overview of obstructed vessels (anatomical)

(Thallium 201)

Same sensitivity

Sestamibi Scan

Tc 99



Radioactivity of

 $A > B$ due to (B) blood flow

Sensitivity = 95%

 4: Test PET Scan best test for Δ of → chronic stable Angina

 Hibernating myocardium
Reversible Angina

[Best test]

(1) PET Scan > 95%

(2) Thallium Scan / sestamibi scan 95%

(3) Stress echo 90%

(4) TMT 80%

Rx of Chronic stable Angina

 (1) DCC = β -blocker

(major mortality (4) : metoprolol : cardioselective)

(2) Aspirin Tab 75mg (enteric coated) (ECASA)

If Aspirin gives GI bleed then give

Clopidogrel = 75mg

 } life-long
} (4) mortality

2. S.L. NTG = emergency tab

Dosing: ^{sublingual} repeat
max 3 tabs even 15 min

Bottle: 3 Buccal spray
transdermal patch

3. Tab. Isorbide mononitrate
(post prandial angina)

long acting nitrate,
do 1/2 prandial tolerance
during holidays
= 1 tab/day

④ Tab. Metoprolol 50mg
↓ HR: Conserve fuel

⑤ Tab. Atorvastatin
(Requires Atherogenesis)

⑥ Tab. Ranolazine
Ivabradine
Trimetazidine

metabolism efficient
If: funny current
⑦ site of depolarisation

⑦ B6/B12 = Homocystinemia

⑧ Stop smoking: nicotine → vasoconstriction

↓
failure of medical therapy

Coronary Angiography: Gold standard test for
determining rate of CVD

femoral ①: local Ana +
Sedation +
(b/c not sleep)

no. of blockage
site: ?
% of

} Rest
time

- Seldinger technique
- Judkins Catheter
- Under fluoroscopic guidance


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Self-companion

Single vessel ds. → Ht of choice
 PCI + stenting

destroy plaque → balloon
 steel wire
 pressure 1800 mmHg
 6 debrts → PII plug → thrombosis
 Type 4A-ME
 pre-op (antiplatelet drug)

- Prasugrel
 - Ticlopidine
 - Ticagrelor
 - enoxaparin
 } P₂Y₁₂ ⊖

Intra op

- Eptifibatide
 - Abciximab
 - Tirofiban
 } GP II b/IIIa

② double vessel ds → PCI + stenting

③ double vessel ds + multiple atherosclerosis block → C.A.B.G.
 Coronary (A) bypass grafting

③ triple vessel ds

i.e. LAD blockage → Anterior surface of heart → C.A.B.G.

LCX # → Post/lateral surface

RCA # → Inf. surface

(preferred graft)

① internal mammary (A)

② greater saphenous vein

③ Radial (A)

(if consume)

④ gastroepiploic (A)

blockage



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companion

PCI
blockage

2AD #, EF < 40% → CABG

CABG Indication

- ① Triple v. ds
- ② double v. ds + multise #
- ③ 2AD # & EF < 40%

Revascularization strategy in hibernating myocardium

PCI → 4A
Bare 4B
metal stent

PCI + stent
(drug eluting stent)
everolimus
sirolimus

CABG

Mortality Reduction in CSA

statin +
Aspirin

Metoprolol → maxi. benefit

PCI/CABG

Nitrate → no benefit / no survival benefit

Indication of PCI

- ① NSTEMI
- ② STEMI
- ③ UA
- ④ single vessel ds-CSA
- ⑤ double v. ds

β-blocker used in

- ① STEMI
- ② NSTEMI
- ③ UA
- ④ CSA
- ⑤ chr. CCF

C/I in (β-blocker)

- ① acute CCF
- ② Bradycardia
- ③ inf. wall MI

ABE → Community acquired: *Streptococcus*
Hospital → *Staph aureus*, *companion*

Infective Endocarditis: (IE)

- ① SAGE: *Strep viridans* > *enterococci*
- ② iv drug abuser: R sided endocarditis: *Staph aureus* > *pseudomonas*
- ③ Prosthetic valve endocarditis: CONS.

< 1yr: (coagulase negative staph)

> 1yr: *Streptococcus viridans*.

Left Sided Endocarditis

- patent fossa ovalis
- *Enterococci*

NVE = native valve endocarditis

mitral valve (high pressure diff. gradient)

PVE = prosthetic valve endocarditis

Aortic valve

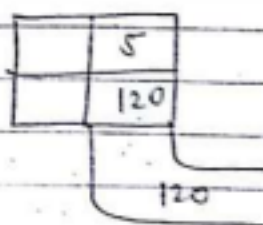
maxi. chances of IE

AS: LV-AO

AR: AO-LV

MS: LA-LV

✓ MR: LV-LA

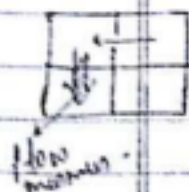


least chances of IE: ASD

-(LA-RV = 4mm)

- no shunt murmur

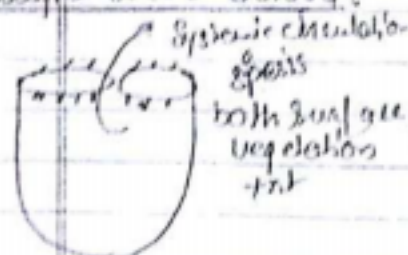
- low murmur → mid diastolic murmur



Duke's Criteria = IE
Duke's staging = Colonized

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modified Duke's criteria:



Splenic circulation
splenic
both 2nd & 3rd
vegetations
+ abs

fever & chills/rigors
splenic abscess

spleen tip palpable

- Brain Abscess

C/L Hemiplegia

- gangrene toes/fingers

H/O

RHD & fever x 2 wks, spleen 4 = IE

(Preexisting 2nd deg)
RHD
fibrin

back to school
valves

LV

- blood leak

- new onset murmur in pt of preexisting vds

major criteria

① Echo finding

- vegetation, friable

- valve abscess

- Ring abscess

- Perforation

- Jet of blood: Regurgitation

② Blood culture 4

- 3 blood sample, 3 diff. site

@ 1 hr gap in 24 hr

2+ → Same organism

1+ → Coxiella Burnetii: Q fever
Ornithobacterium: fever x 2 wks

minor criteria

① fever > 101°F

② predisposing condition of
iv drug abuser
central line

Patent foramen ovale

Post strep. Glomerulonephritis
(Hematuria): rare

③ Osler nodes: tip/finger

④ Roth spots: fundus eye

also seen in
anemia
leukopenia

Rifampin → is being replaced by rifampin
used in valve ablation cases
(Ovarian cancer)

③ new onset murmur
in pre-existing H. dx.

embolic manifestation

① splinter Hemorrh (nail bed)

② Janeway : erythematous macula
fever / pain.

Δ O IE :

IE : 1 major + 3 minor criteria

5 minor criteria (increase of antibiotic)

Δ : Culture ⊕ endocarditis :

ampicillin + gentamycin + Cloxacillin.

→ in drug abuse

MRSA : Vancomycin

VRSA : Linezolid

Ethacrynic acid

after blood report
coming.

↓

Culture / Sensitivity

if

↓ fail (if fever not gone)

Prosthetic valve deployment in pt.

- Largest vegetation in ♀ seen in → fungal inf. (not bacterial)
↳ candida albicans.

- Libman Sacks endocarditis : - SLE (DOC SLE = steroids)
(LSE)

- no infection

- sterile vegetation

[no bacteria + only fibrin]

- inf. surface of ♀ valve

!! - MR (acute [Pulmonary edema])

Rx:

- valvuloplasty (best HT)

- steroids C/I in (LSE)

Non-bacterial thrombotic endocarditis = NBTE

- large friable

Cause - malignancy [M₂ ALL]

(acute promyelocytic leukaemia) $\rightarrow$ DIC - vit A

Px:

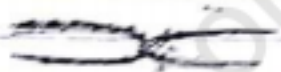
- Ht the malignancy.

Sub-trans
catheter and
arterial trioxide

Rheumatic endocarditis -

- Characterised by Aschoff nodules.

- most common site: commissural
and



IE (not a criteria for Δ)

① fever

② iv drug abuse

③ murmur

✓ splenomegaly (2 complications not Δ criteria)

RHF-

Jones criteria

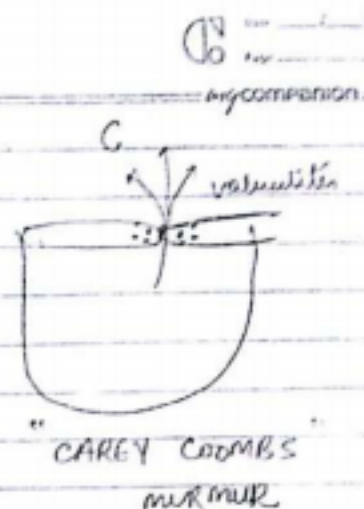
① Carditis

↳ Subclinical Carditis

Echo findings (+)

Inflammation of valve cusps

Jet of blood - cusps.



① CARDITIS

Rheumatic

Pericarditis

< 15yrs

Chest pain at Rest

Radiation to the left shoulder

Recurrent Sore throat (+)

o/e pericardial friction rub

equal in both I & Expiration

but Pleural rub = Inspiration

ECG

ST ↑

11 out of 12 lead

↓ same terminology

aVR: ST ↓

✗✗ In pericarditis: P-R segment ↓ depression
11+/12 lead expect - aVR

Rx

: STEROID (DOC of Rheumatic pericarditis)

↳ sudden collapse is C/I d/t "Addisonian Crisis" (hypoglycaemia)

Rheumatic myocarditis

acute CHF

S3 (+)

B/L crepts (+)

due to dilation of heart

functional MR/TR (Pansystolic murmur)

Rx LMNOP

Rheumatic endocarditis

Valves damage	valvular lesion	Surface of valve involved
a/c: mitral a/e: Pulmonic	* in active carditis in MR: child (<18y) in Carditis M.S: adult (>18y) M.S → MR	Commissural end tt ↓ Caley Comb (delayed Diastolic murmur)

ARTHRITIS (EARLY)

R. sore throat → 2 week → inability to walk

ankle → knee → elbow
asymmetric (migratory polyarthritis)

- NON ERODIVE arthritis
- no deformities (rarest deformities: JACOBS
99.9% arthritis
0.01%)

low endemicity

- USA
- Polyarthritis

Rx: Aspirin

High endemic

- India
- * monoarthritis
(is also major criteria)

Sydenham Chorea: (LATE)

Sore throat → 3-6 months → CHOREA

- Semi purposive, fast
- Involuntary movement in hand
- * Poor performance at school
Poor Hand writing

LESION = CAUDATE nucleus

✱

Case _____/_____/_____
Page _____

Rx Self limiting condition (No treatment)

- Haloperidol $\rightarrow$ dopamine = (drug induce Parkinson)
- phenobarbitone - sp sedation
- valproate - sedation

(IV) Subcutaneous Nodules:

Extensor

Tender [

- olecranon
- shin
- spinous process of vertebrae

[but Rheumatoid Nodule - Non-tender]

⑤ *Exythemna marginatum*
(Rice spot - typhoid)

m/c	=	arthritidis
-----	---	-------------

minor

- Fever
- arthralgia / polyarthralgia

طما

TLC = ↑
ESR = ↑ ————— low endemic (U.S.A) > 60 mm
 |
 └ High endemic > 30 mm
 (india)

CRP = (+)

$\neq P-R = \uparrow$ (1st degree Heart block)

Essential criteria

• Aso liter ↑ > 200 IU > 18 yr
> 333 IU (in paedia) (5-15 yr)

Recent streptococcal infection = < 45 days

or Rapid streptococcal antigen test

or Throat Swab : (+) Streptococcus

Δ

2 major + Essential

1 major + 2 minor + Essential

ARTHRITIS

< 2 wk

"can't co"
 exist

CHOREA

> 3 month

* CHOREA gravidarum

↳ Recurrence of chorea in pregnancy

Q

* CHOREA associated in Normal Asotoler

Rx

Aspirin = Pain

Steroid = R. Pericarditis

MR = Valvuloplasty *

* M.S = < 1.5 cm²

severe

RVH

LA enlargement ⇒ R.L.N = ORTNER syndrome *

PVH : pul edema

PAH : RVH (compliance ↓)

Hepatomegaly ⊕

Ascites / pedal edema ⊕

* embolic stroke (only valvular lesion)

causing
 in MS

Rx

Percutaneous mitral balloon

valvotomy *

(PMBV)

↳ Severe MS HI



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Bacterial valve

subclavian

↓
RA

↓
IA septum puncture

↓
mitral valve (balloon)

- ✗ Calcified Severe mitral stenosis → PMBV is c/z
- ✗ Severe MS & MR
- ✗ Severe MS & LA clots
appendage

Prophylaxis 1/1

- Inj Benzathine penicillin i.m.
every 3 weeks
(to prevent future Sore Throat)

↓
5yr RHD & MR : Life long basis
(RHD & any valvular lesion) ✓ 40 yr & (for examp polio & others)
10 yr from date of Δ

5yr RHD → Life long basis
✓ 21 yr &
10 yr from date of Δ

5yr RF → Life long basis
✓ 21 yr &
5 yr from date of Δ

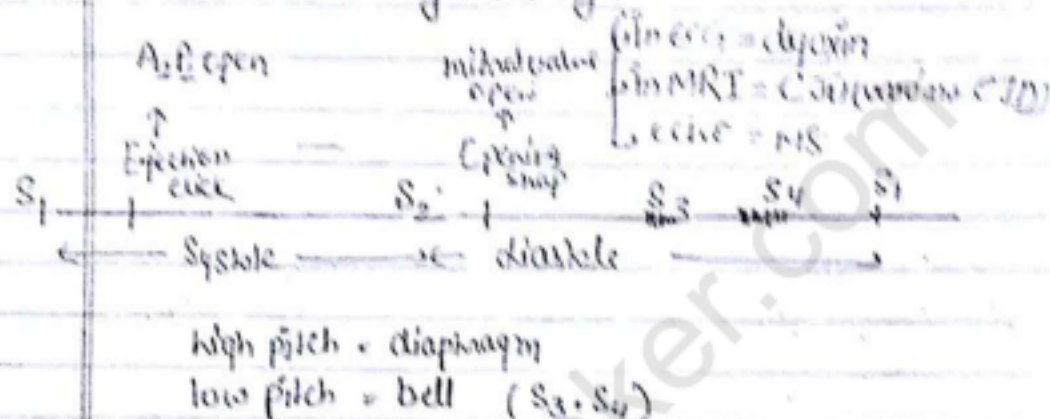
- if pt/child is allergic to penicillin
prophylaxis RF = macrolides = Azithromycin
- if macrolide not first choices (M.C.G.)
Sulpradiazine

duration of
Ab prophylaxis
is
same

Updates (2018)

- ① Echo ④
- ② monocanthosis
- ③ minor: polyarthralgia
- ④ ESR $\begin{cases} \text{ESO} \\ \text{EO} \end{cases}$

M.S. → Echo: Hockey stick sign



- fine systolic M-sound → S₄
- S₃ → Ventricular gallop: early diastolic
- S₄ → Atrial gallop: late diastolic

Atrial Myxoma

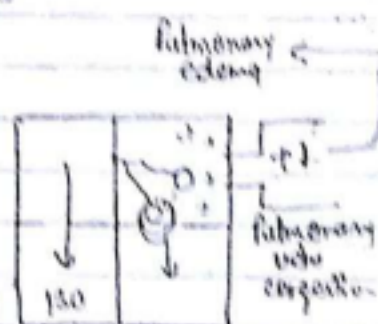
- Rough &
- platypnea (difficulty in breathing in sitting)
- effort intolerance

On/auscultation

- Tumor plop sound
- coincide with S₂ snap

IOC = Transcatheter aortic valve replacement (TAVI)

Rx: Sx [C.T.V.S] 21
Direction of tumor



Tumor plop sound
Hits an open mitral valve.

Coincides with S₂ snap.

S₂ snap: high pitch M-sound

Tumor plop = low pitch M-sound

Low pitch 11 sound (early) = bell

(1) S₃

(2) S₄

(3) Tumor plop sound

In Adult

Overall m.c. Tumor of Heart = 2^o (Oat cell Ca
Breast Ca
malignant melanoma)

m.c. tumor 1^o malignant = Angiosarcoma
(in)

m.c. benign tumor = Atrial Myxoma

m.c. tumor originating from heart valve tissue = papillary elastoma

Best test to detect tumor of heart = Cardiac MRI

Pediatric heart

m.c. 1^o malignant = Rhabdomyosarcoma

TB pericarditis (extrapulmonary)

m.c. extrapul. TB → Cervical lymphadenitis Δ FNAC
(Gohn focus : Tonsil
Gohn complex : LN)

TB pericarditis

- Chest pain at rest

- ST ↑ concave 11/12 lead

- IOC = extrapul. TB = $\rightarrow$ gene Xpert $\rightarrow$ MTB $\oplus/\ominus$
(Can disseminated) $\checkmark$ $\rightarrow$ $\oplus$ to Rifampicin

2) TB gold test = Quantiferon test
Latent TB (for m.c.)
(differentiate to latent & active TB)

$\oplus$ - INH : inh A gene

- Rifampicin : Rpo. B gene

U.S. → opening of tricuspid valve

Date: _____
Page: _____
Any comment: _____

Rx:



ATT X 6 mth X



→ calcification

- Calcification

- Constrictive pericarditis

SO give

ATT X 6 mth + Steroids X 6 wks

- turbulence created

pericardial shudder

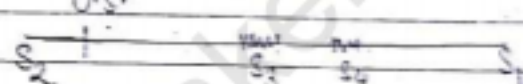
Knock

Shock

→ diastolic finding ($S_2 - S_1$)

(at same time of S_3)

O.S.



pericardial shudder = high pitch H.S.

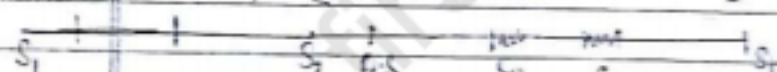
S_3 = low pitch H.S.

} Con differential
ZIF

Systole

EF

diastole



Turner plop

A. Myxoma

P. shudder

C. pericarditis

mid
systolic
click

N.V.P



Date: / /
Page: /

Self/Companion

M.V.P.:



(M.V.P.)

day 2.

Post MI: Streptokinase

Acute MR

Asymptomatic

O/E = mid systolic clicks

extension → Chondro tendinae

Investigation

IOC = echocardiography

Rx = non-selective β -blocker

Propranolol ⊕ HR

acute MR

day 2.

- O₂ dependent
- Orthopnea
- Monosyllables

O/E:

- Pansystolic murmur

Bed side echo: ⊕

Rx: C.T.V.S. (Cardiothoracic Vascular Surgeon)
Valvuloplasty

Post MI

MVP

MR

mid systolic click

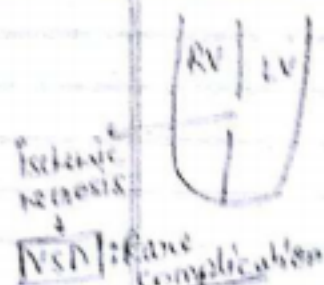
pansystolic murmur

← echo →

Propranolol

Valvuloplasty ⊕

Q3



Paroxysmal Nocturnal Dyspnea

3 LS

1 large square = 0.2 sec
5 " " = 1 sec
30 " " = 6 sec

Irregular R-R interval

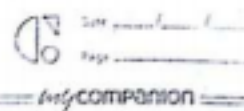
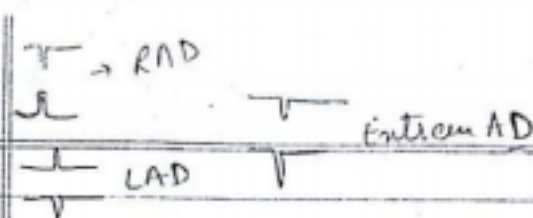
30 LS = $n \times \text{QRS complex}$

$n \times 10$

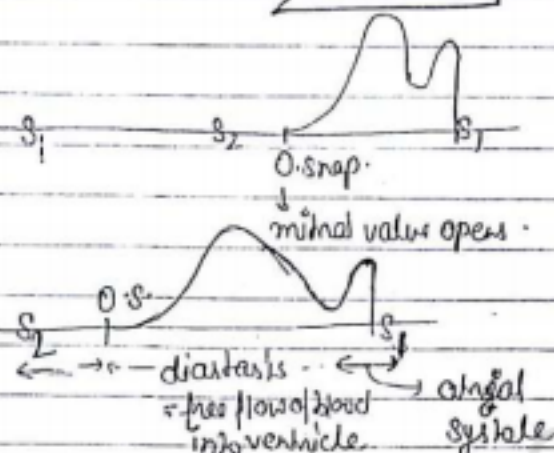
$\rightarrow$ actual heart rate of p.

HR measured by

- ① LS
- ② $1500/SS$
- ③ $30 \text{ LS} = n \text{ complex} \times 10$



Murmurs



M.S.
mid diastolic
murmurs
Pre-systolic
accentuation

↓
due to progression
of M.S.
high pressure generated
in LA
result in early
opening of mitral
valve

M.S. = pre-systolic accentuation
disappears $\Rightarrow$ A. fibrillation

Severity of MS divided by

- ① Length of / duration of murmur. (↑ transit-time)
- ② not by loud S_1
- ③ not by loud P_2
- ④ intensity of murmur

M.S.

→ Left Atrial Pressure (LAP)

faster opening of M. valve
faster elastic recoil of m. valve
✓ Loud S_1

① trans-valvular gradient

Calcification of M.S. = mobility (↓)

✓ Soft S_1

S_1 = Mitral valve Triumphi closure



- narrow split S_1
- Single S_1
- Reverse split S_1



Date ____/____/____

Page ____

my companion

M.S. symptoms :

~1849

- $\downarrow$ CO $\rightarrow$ effort intolerance
- dyspnea on exertion
- orthopnea
- Paroxysmal nocturnal dyspnea
- Hoarseness of voice (LA $\uparrow$ $\rightarrow$ compression $\rightarrow$ RZ $\odot$)
- palpitation / syncope - A. fibrilla
- Hemiplegia / Aphasia - embolic stroke
- PA Hypertension / Ascitis / pedal edema

O/E
 S_1 = Loud S_1

 (Soft S_1 = calcified M.S.)

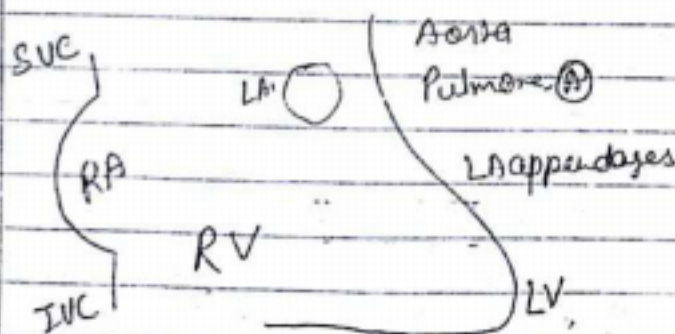
 Severity of dis $\odot$ $\rightarrow$ narrow split S_1
 Single S_1
 Reverse split S_1
 S_2 = $\odot$ $A_2 P_2$ closure

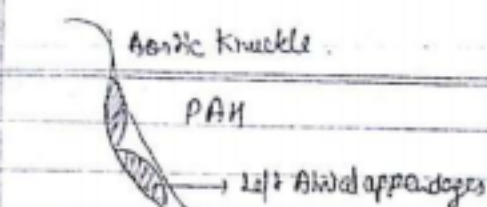
 PAH = Loud P_2

 murmur = mid diastolic $\odot$ = Presystolic accentuation (PSA)

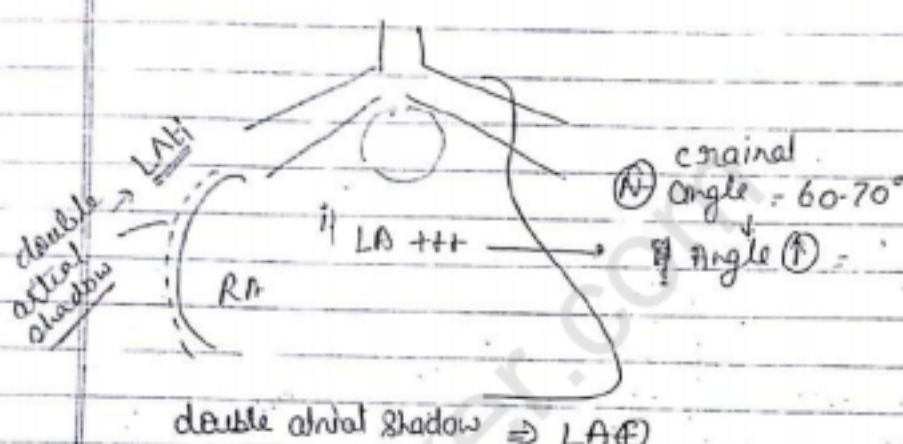
 length $\uparrow$ / duration $\uparrow$ = severity

PSA disappear = A. fibrillation

Inv. CXR = pulmonary edema $\oplus$




Straightening of left H. border = M.S.



double atrial shadow $\Rightarrow$ LAE

M.S.

- ① Bat wing edema
 - ② Straightening of L. H. border
 - ③ Pulmonary (A) fullness
L.A. appendages fullness
LA enlargement
- crinal angle ①
double atrial shadow

IOC after M.S. = Echo

Mx

mild to moderate M.S. = digoxin + spironolactone

Severe M.S. = P.M.B.V. (percutaneous mitral balloon valvotomy)

Calcified severe M.S. = Prosthetic valve

- metallic valve (requires life time ORAL warfarin)
- Biological valve (no need for warfarin, life span = 10-12 yrs)

Scrub

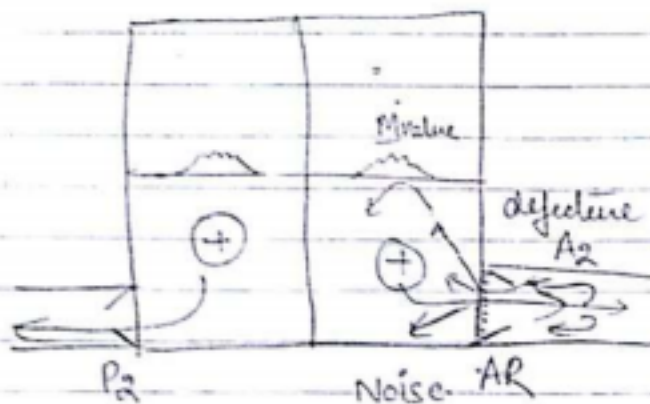
AK



Deposited in _____

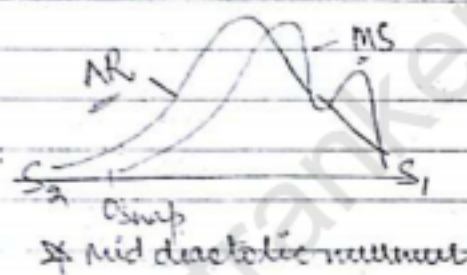
Figure 1

= 4th companion

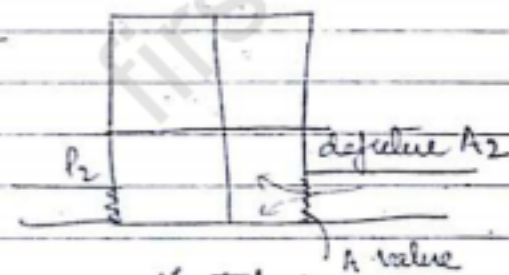


← diastole →

Serial AR = AUSTIN FLINT Mammals



4 Nuld AR
RR



«diatels»

✓ ΔP is directly proportional to Δt

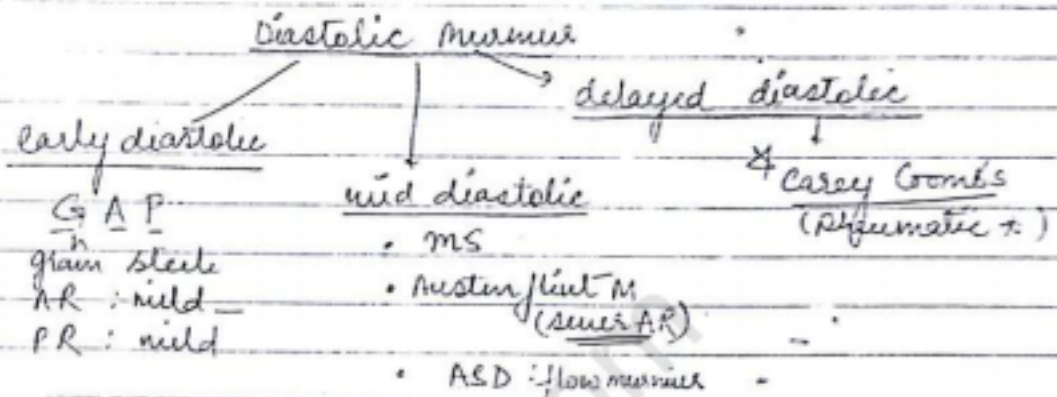
5. Δ

$$A_{\frac{1}{2}} = 0.5$$

30mSec

- mild PR : early diastolic murmur
- cause PAH
- GRAHAM Steele murmur

Date: _____
 Page: _____
 my comparison: _____



Co A
 m/c site
 * aortic isthmus
 distal to origin
 of Lt. Subclavian
 Artery



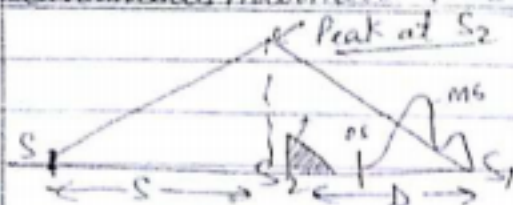
fingertips : Pink
 1. claudication
 2. swollen shock, some
 3. LVH : muscle ↑
 demand ↑
 coronary A : (n)
 subendocardial
 ischemia
 angina / chest
 4. HTN = daily Headache ⊕
 Toes : Blue

P/E : Wasting leg muscle
 • Radio femoral delay
 • differential cyanosis

(N) B.P. Ulimb 120/80 → aortic recoil
 Lower limb 140/80

in AR
 * Co A = Ulimb BP = ↑
 Lower limb BP = ↓

CoA - continuous murmur (due to collaterals)



intercostal A. pulsation
↓ lower border Scapula

1. CXR = inferior Notching of Ribs

↓
Ribs
↓ inferior Notching

2. IOC - MRI / Angiography

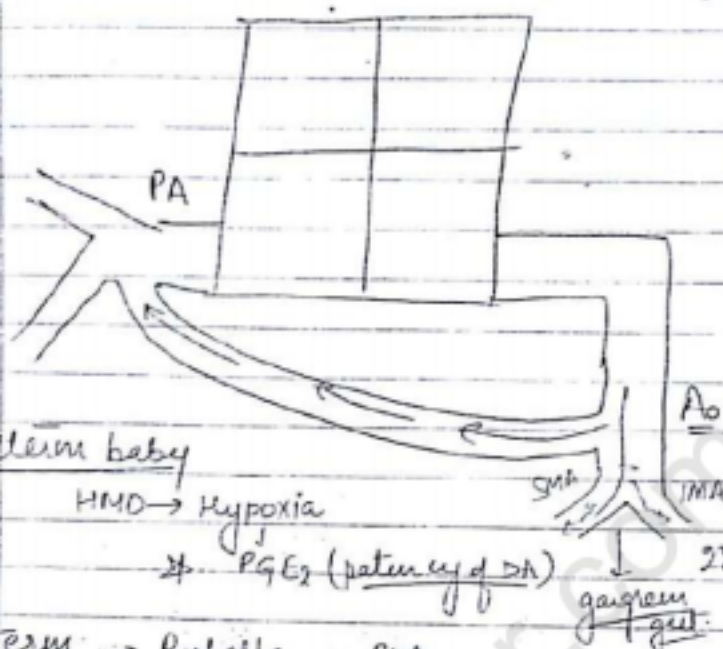
3. Ba Swallow = "3" sign

superior notching of Rib
Hyperparathyroidism

Rx Balloon dilatation + stenting

↓ Tail
CTVS
artificial blood vessel
↓ Teflon (PTFE)
Dacron (outdate)

PDA → Left ventricular failure (LVF) - narrow split S₂ Study companion



PA DA Ao
day 0
PA DA Ao
* Closure begins:
10-15 hrs
functional closure
= 7 day
28 day = anatomical
closes
↓
L. Asteronum

* Preterm baby

HMO → Hypoxia

* PGE₂ (patency of DA)

* Term → Rubella → PDA
(Teratogenic)

c/f asymptomatic in Preterm at birth
" " Term at 6 week

- ①. dyspnea on exertion → Breast feeding
- ②. diaphoresis
- ③. irritable

c/f

LVS = narrow split S₂

- Crepitation B/L (fine)
- Continuous murmur (machinery)
- Necrotizing enterocolitis (NEC) = Hematochezia

IOC → T.T.E

Rx PT = INDOMETHACIN i.v
IBUPROFEN i.v Q

Term = CTVS → Sx banding

* 1/3 c PDA = Sx banding

Continuous Murmurs

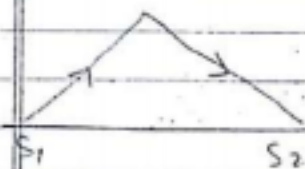
1. CoA
2. PDA
3. mammary souffle ($\uparrow$ flow IMA)
4. Venous Hum (dilated vein)
5. A-V fistula : CIMINO-BRESCIA fistula
(Radial A - cephalic vein)

Hemodialysis

@ 3/week
Session = 4hr

6. Rupture sinus of Valsalva (Aorta $\rightarrow$ RA)

AS



Ejection systolic murmur
intensity $\uparrow/\downarrow$

MS



Pansystolic
= intensity = constant

Systolic M

S1 S2
E. Systolic
[PASS]

- Aortic Stenosis : Valvular AS
- Pulmonic Stenosis
- HOCM : subvalvular AS
- Williams Syn : $\downarrow$ Supravalvular AS
Vit D₃++ (Teratogenic vit)

S1 S2
Pansystolic
LMH/TR
• VSD

Late Systolic
M.V.O.P
Ec
mid systolic
clicks

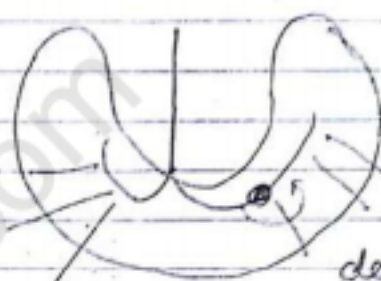
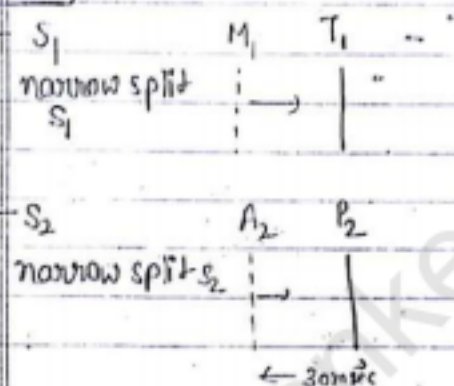
MVP cause

1. myxomatous degeneration of valve
2. Aschoff : Rheumatic
3. Ischemia : MI
4. infection : SAGE
5. Marfan's? Tall

- S. Marfan MVP
- ⑤ Marfan: Tall arm span > HL
 - fibrillate, ch. ⑤
 - Aortic root dilation
 - Aortic dissection
 - Coronary A. dissection
 - Arachnodactyl
 - Steinberg sign
 - ST-ectopia lentis

⑤
compensation

LBBB:



depolarisation
R L
Left side valve close later

LBBD

Onset q wave due to (R→L) depolarisation

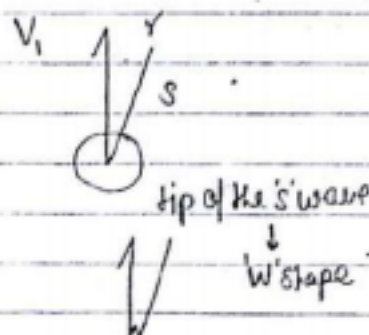
in (N) person

$$q \text{ wave} = V_5 / V_6$$

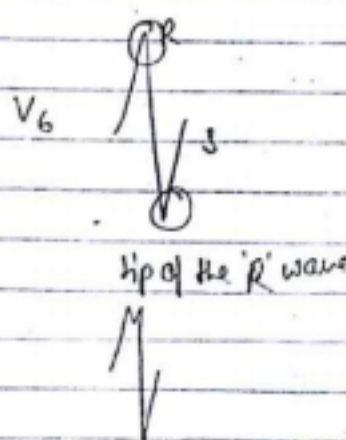
Low ①
w/ ②
(narrow split)
dangerous

Sequential contraction
(1st R side → left side)

Intermyocyte spread → Broad QRS



tip of the S wave
↓
W'slope



tip of the R wave

BBB

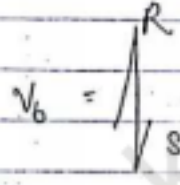
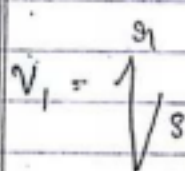
WILLIAM

- ① $V_1 =$ Broad S : W
- ② $V_6 =$ Broad R : M
- ③ absent q (R → L)
- ④ ST segment elevation.

↳ LBBB.

- ⑤ more dangerous
b/c sequential contraction
of ventricle (not simultaneous)
↓
SCD Can cause

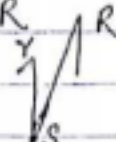
⑥ person



RBBB

MARROW + MEDICAL

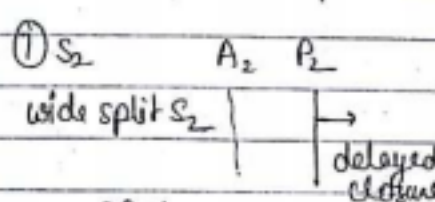
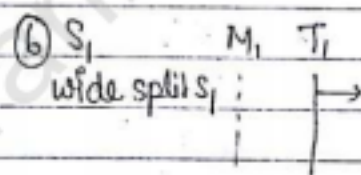
- ① $V_1 =$ rSR



- ② $V_6 =$



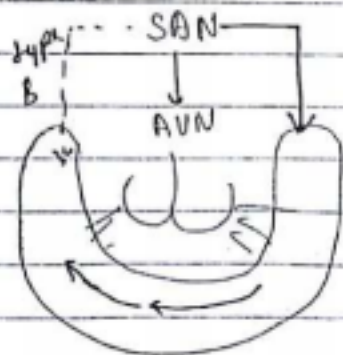
- ③ Broad qRS
- ④ ST depression
- ⑤ Physiological



WPW synd type A

behaves like RBBB.

S_1 wide split S_1, S_2



type A

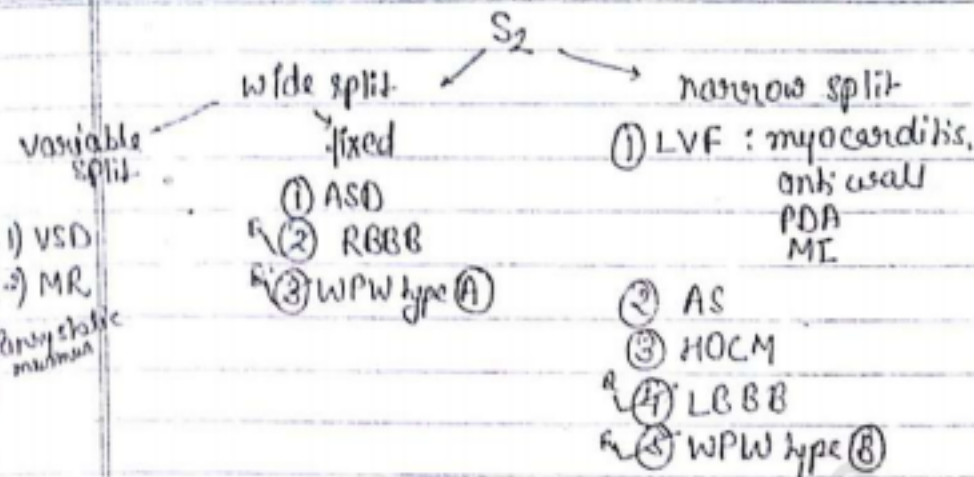
WPW synd type B

like LBBB

S_1 narrow split


 Date _____
Page _____

Study Companion



- S₃**
- early diastolic H-sound
- Rapid ventricular filling
 - ② - ventricle dilatation
 - ↓ turbulence
 - ventricular gallop
- 1) DCM
 - 2) CHF → CT ratio ①
 - 3) con-pulmonale
↳ RVE (due to COPD) ②
 - 4) acute con pulmonale
↳ RVE (due to PE) ③

- S₄**
- late diastolic H-s.
- Outflow tract obstruction
 - LVH
 - LAH → Atrial gallop
- eg ① HOCM / left sided S₄
- ② AS
- ③ PS → RI-sided S₄
- ④ HTN → LI " "
- ⑤ PAH → RI " "

[PAH]

(N) = 25/10 mmHg

mean = 15 mmHg

HTN K10 = >25 mmHg at rest
(PAH) or
>30 mmHg at exertion

[CHF]

- 1) exercise intolerance
(nausea → Hemoptysis)
- 2

Date: _____
 Page: _____
 Information: _____

OG:

- Loud P₂
- parasternal heave (+)

Inv:

- Pulmonary @
- CXR - PA fullness (+)
- Echo - doppler

IO: → Cardiac catheterization

Rx: DOH = FAH → Bosentan
Ambrisentan

- NYHA grade I dysnea → CCB (amlodipine)
- II " → Sildenafil / Tadalafil (PDE-5i @)
- III " → Ambrisentan (ET @ antagonist)
- IV " → i.v. Epoprostenol (PGI₂)
[inhaled iloprost]
- changing cloths
washroom

Systemic HTN:

$$\textcircled{N} < 115/75$$

$$\frac{120-139}{80-89} = \text{Pre-HTN}$$

$$\frac{>140}{90} = \text{HTN}$$

$$\text{Stage I HTN} = 140-159 / 90-99$$

$$\text{II} = >160 / 100$$

HTN emergency / crisis > 220/120 + papillary edema
(target organ damage)

HTN urgency > 180/120 EOW target organ damage.

target $\rightarrow$ $\frac{<185}{<110}$

HTN sive emergency

Rx: aggressive reduction BP

iv. Nicardipine > Clevidipine (CCB)

Sodium nitropruside

C/I $\rightarrow$ in HTN sive emergency

b/c $\uparrow$ IOP

(no neurological deficit)

HTN sive urgency

target $\rightarrow$ 160/90 mmHg

Rx: ACEi or ARB

(always in low dose $\rightarrow$ for gradual $\downarrow$ of BP)

b/c high dose $\rightarrow$

Can cause brain damage

Target organ damage in HTN:

① Heart $\rightarrow$ LVH : subendocardial ischemia : ST $\downarrow$

② eyes $\rightarrow$ Hypertensive Retinopathy : earliest finding I focal Attenuation of Arterioles

③ Kidney $\rightarrow$ K.F.T.

Stage II : I + A-V nipping (Salv sign)

④ Brain

⑤ Aorta

III : I + II + Cotton wool spots (soft exudate)

IV : I + II + III + papilloedema

① K.F.T.

① Cystatin-C (sensitive test for K. damage)

② KIM-I (kidney injury marker)

③ Neutrophil gelatinase associated lipocalin

④ COCKROFT CAULT formula (eGFR)

⑤ Creatinine clearance

⑥ S. creatinine $\uparrow$ = 60-90% damage

$\rightarrow$ most specific test for K.F.T.

Biomarkers of Kidney injury

Brain

Hemorrhagic stroke

m.o. site : putamen (middle cerebral $\uparrow$)

Aorta



Date _____

Page _____

Self-companion

Aorta

- Aortic dissection

(m.c.c.) ① HTN = 70%

② Marfan's syn

③ Syphilis

④ cystic medial necrosis.

C/F

① chest pain at rest (localized at interscapular area)

② tear can be spread

Subclavian - coronary (A) → MI like symptom - chest pain

Anterograde = ICA # - C/F: Hemiplegia
(dissection of) ② Horner syndrome

IOC = T-EE (transesophageal echo)

MRI in hemodynamically unstable pt.

Angiography → C/I in A. dissection.

TEE:

① intraoperative MI

② Aortic dissection

③ Atrial myxoma

④ IE (both type TEE & Transcatheter echo)

Rx:

TOC = surgical Reconstruction/Repair

DOC = Esmolol (i.v.)

Labetalol (HR ↓ → heart progression relatively slow)

(α+β blocker)

→ If BP is high (due to reflux of B.F.)

- earliest / commonest organ damage in HTN → Heart

- m.c.c. of chronic renal failure → D. Nephropathy

Rx of HTN:

70 ysi HTN → CCB

>55 ysi (old) → CCB

<55 ysi (young) → ACEi

diuretics = thiazide

① HbA1c 1

① lipid

JNC 8

Joint National Committee

ISHT like Mx of HTN	Young	Old
	A ₁	C ₁
	+ C ₁	+ A ₁
	+ D	+ D

β-blocker

Coronary Vaso
indication

→ CSA

UA

PA

Recovery MI

Chronic CCF

Resistant HTN

- uncontrolled HTN inspite of 3 classes of anti HTN drugs (D+)

- m.c.c. of Resistant HTN

① non-compliance

② Renal (A) Stenosis → doppler, IOC

③ COA → MRI > Angiogram

④ CONN's synd → plasma renin/aldosterone levels

⑤ Acromegaly → IGF-1 / glucose challenge

⑥ Pheochromocytoma → plasma fractionated metanephrine

HTN

① m.c.c. → essential HTN / 1° HTN

② m.c.c. of 2° HTN → Renal parenchymal disorder = Chronic glomerular nephritis (CGN)

③ m.c.c. of HTN in children = CGN

definition

140/90 in Kg (normal)

100 mmHg
60 mmHg
systolic

Oscillometric device

cut off HTN $\Rightarrow \geq 135/85$

Syndrome X / metabolic syndrome:

① centripetal Obesity

Wabt circumference	> 102 cm ♂	> 90 cm ♂
	> 88 cm ♀	> 80 cm ♀

India

② Peripheral Resistance $\uparrow \rightarrow$ HTN

cut off for HTN $> \frac{135}{85}$ mmHg

③ Insuline Resistance

FBS $\rightarrow 100-125$ mg %

2 hr $\rightarrow 140-199$

impaired
glucose
tolerance

④ Lipide $\uparrow$

Cholesterol $\uparrow$

Triglyceride $\uparrow$

LDL $\uparrow$

HDL $\downarrow$

accelerated atherosclerosis

(30-40 yrs of age)

① DM

② Synd X

③ SLE

④ nephrotic
syndrome

Coronary Syndrome X

- blockage in very small blood vessels

C/P

(not coronary $\uparrow$ main)

Similar to CSA (Chronic Stable Angina)

① Trade mll test ST : 80 $\oplus$

angiography = $\ominus$



th

tab ISM

metoprolol

statin

Ranolazine.

1:500 → familial Hypercholesterolemia
→ AD

Q: → Tendon xanthoma : achilles tendon
(Touffain's cells)

-- lipid profile. (↑)

cholesterol ↑↑

TG (N)

LDL (↑)

HDL (N) ↓

Rx:

- Statin : Atorvastatin

- (no dietary restriction)


 Date _____
 Page _____

FirstRanker.com

Headache

① m.c.c. of headache = Tension headache

- Young people
- fronto-occipital
- D of exclusion

② m.c.c. of 2nd headache = infection

③ m.c.c. of headache ♂ → tension > migraine > cluster headache
 ♀ → tension > migraine

m.c.c. of headache frontal : tension > ICP
 (10-20 mmHg)

temporal : Giant Cell Arteritis

occipital : tension > HTN > Basilar migraine

Migraine /:

① C.G.R.P. (Calcitonin gene related peptide) → act on

② Cortical spreading depression → nociceptive Receptors

③ 5-HT : serotonin → Perception of pain

↳ vasoconstriction of intracranial blood vessels

Reflex vasodilation

↳ extracranial blood vessels

↳ dural matter (pain sensitive)

↳ stretching of dura

Pain

Pulsatile / throbbing headache

♀ : sunlight / missed breakfast / nausea : sight/smell of food
 Physical exertion +

- severe photophobia (aversion to light)

- Phonophobia (" " sound)


 Date _____
Page _____

No. of pages _____

Pain ⊕ : ① by physical movement of head

- min. duration = 4hr - 24 hr

 POUND = In 4 of migraine ∴ (+4/5) should be +ve

P - pulsatile headache

O - one day illness

U - U/L → B/L

N - nausea

D - disabling in character

↳ ① pain on head/neck movement

≥ 5 attacks/yr

 Clinical △

Rx: mild-moderate attack

① Indomethacin (oral)

s/e gastritis

② Etoricoxib (cox-2)

③ P.C.M [19m] (cox-3)

+ Caffeine (v.c.)

Severe migraine

① Triptans

Sumatriptan

- (m.o. tab.)

- methocarbamol

- nasal spray

- transdermal patch

- (best way)

triptans C/I in

① Prinzmetal Angina

② peripheral A.D.

③ Pregnancy

④ Basilar migraine

① Fastest acting triptans: Rizatriptan (nasal spray)

② Longest acting triptans: Frovatriptan

Migraine attack known case

attack lasting > 72 hr

K/a

Status Migrainosus

① Sumatriptan nasal spray i.m.

② Diclofenac i.m.

③ Pentazocine (Pentwin)

Page _____
Date _____
In/COMPARTION

Status migrainosus

- psychosis

Rx - i.v.F NS

10% dextros

DOC = Prochlorperazine (i.v.)

migraine variants : (MV)

① cluster headache

♂ : Retroorbital pain

epiphonia (tear + nr)

bulbar congestion +

Nasal congestion +

→ Recurrent attacks

multiple attacks of pain / day

duration attack : 1-4 hrs

attack : can be during sleep

(migraine attack = rare during sleep)

awaken the pt.

Rx:

Ist line Mx : ① high flow O₂

② 12 L/min

② lignocaine jelly : nasal

(trigeminal (V) ending)

③ Sumatriptan inj (DOC)

medakay

prophylaxis:

① Verapamil

② Gabapentin

③ Valproate

Nerve block

(greater occipital (V) block)

⊕

Lithium (if self mutilation +)

DOC for prophylaxis
of migraine

Propranolol

If highly H/O OH

Flunarizine

(calcium antagonist)

so severe
pain
mutilation
tendency
send to
psychiatry
② q/day

01/03/2017

 Page 3rd class

only companion

Migraine Variant:

 ① Cluster headache (DOC) = Triptan, 1^o flunarizine

② Ophthalmoplegic migraine

P.O.U.N.D. → triptan

→ resolution of symptoms

 [I/L 3rd (N) palsy] (neurological defect after migraine)

① Levator palpebrae superioris: ptosis

② MR: divergent squint

 - Diplopia (not in 3rd (N) palsy)

 1st 2 of stroke → imaging is done

Ischemic (S) → hemolytic (S)

DW-MRI

NCCT

(diffusion weighted-MRI)

③ BASILAR MIGRAINE:

- Occipital headache (bilateral & involve)

- Cranial (N) palsy (during headache)

 6th (N) → squint/diplopia

 8th (N) → Vertigo/Deafness

 Stylopharyngeal 9th (N) → Nasal regurgitation of fluid.
Sensation → Nasal twang

 - Conduction of Ate → 10th (N) → palpitation

- Glottal mobility → gurgling

- Vocal cord → constipation

dysarthria (unclear speech)

Rule out stroke R/O = imaging

DW-MRI > NCCT

- gradual improvement of symptoms (in migraine not stroke)

30 min, headache severe X hrs

nausea/vomiting episodes

O/E

Neck Rigidity (+)

DTR = brisk

Babinski sign (+) (upgoing plantar)

Post-auricular (A) - Card size - 1cm long

Q/D
Date: _____
Page: _____
Self-companion

Q/D

① SAM (Subarachnoid hemorrhage)

② meningitis (fever)

③ Altered consciousness

④ nuchal rigidity

⑤ seizure (flux → choked disc → TCS form)

⑥ Headache (TCS →)

⑦ associated photophobia

⑧ migraine

⑨ Brain tumor (have long term if not short)

Giant cell Arteritis (GCA): (extra cranial causes of headache)

- Vasculitis (granulomatous)

- Ext. Carotid (A) (ECA) branches involves

[ICA - involve more major
Ophthalmic (A)]

- Superficial temporal (A)

supply - skin of scalp

- TMJ joint

ischemia

develop pain (burning pain)

- Jaw claudication (pain in jaw on eating)

- age group > 65 yrs

- ① fever (F.U.O.)

② Temporal headache

(non-throbbing - nonpulsatile headache)

③ Jaw claudication

Q/E:

- Card like structure (A) (onto tragus
thrombosed Artery)

Inv. ESR (A) : 100 mm fall/hr.

① (C-20 mm fall/hr)
② (C-5-7 mm)

Biopsy: granulomatous vasculitis

Rx: DOC = steroids

(branches)

Ext. Carotid (A)

① Sup. Hypobid (A)

② Lingual (A)

③ Facial (A)

④ Maxillary (A)

⑤ Superficial temporal (A)

⑥ Post-auricular (A)

⑦ Oculophal (A)

⑧ Ascending pharyngeal

Q. 70yr old Retired Military Person C/F led feverish (PCM tab)
pain on temples = what is probable Ans:

- ① GCA
- ② Fibromyalgia - musculoskeletal pain
- ③ Intra cranial space occupied lesion (IC SOL) - papilloedema + early morning headache
- ④ Tension headache - fronto occipital pain
relatively young person

[IC SOL]:

- ① IOP
- Brain tumor - m.c. tumor of brain = metastasis
(Oat cell Ca
Breast Ca
malignant melanoma)

[BBB]

- foot process of neuroepithelial Astrocytes
- lobes m.c. involve in metastasis → Cortex (MCA) (Parieto-temp)
- m.c. 1^o tumor (malignant) of brain - Glioma
(Astrocytoma)
- m.c. 1^o benign brain tumor - meningioma
- (Intracalvarial calcification)
- visible on X-ray skull
- On CT = "Comet tail sign"
- causing erosion of the skull
(damage of inner table of cranium)

Incidence

2^o (metastasis) > Meningioma > Astrocytoma
(34%)

- Brain Tumor 2 worst prognosis = Glioblastoma multiforme
(multicentricity)

IOC for brain Tumor: gadolinium enhanced MRI

DOC for cerebral edema - dexamethasone

DOC for ① ~~IC~~ ICT: Mannitol

Scanned by CamScanner

Apnea: Involuntary cessation of breathing > 20 sec
bradycardia

Cushing triad

- ① Bradycardia
- ② Hypertension
- ③ Periodic breathing / Cheyne-Stokes breathing

Cushing ulcer

= stress / ↑ ICP
= stomach.

Cameron Wilson

- Gnathus herni'g
- G = stomach.

Н. рѣлоуѣ убоу

→ 1st part of duodenum
→ curling ulcers

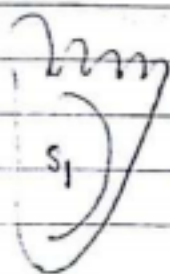
CNS examination of pt. G/ brain Tumor: ① ICP

- (4) DTR : Bisk (UMNL)
(Loss of Ew Control)

Pectoral Girdle	C5/6	} Brisk Reflex
Biceps (1)	C5/6	
Knee (1)	L2/3/4	
Ankle (1)	S1/S2	

Superficial Reflex = $\ominus$ nr

Cremasteric Reflex	L ₁ : genitofemoral (N)
Bulbo cavernosus Reflex	S _{2/3/4}
Anal Reflex	S _{4/5}
↳ Perianal skin	



Plantar flexion = (N)

UMNL : Dorsiflexion of great toe
+ fanning small toe

Baltinski sign +

(NREM stage III, infant - physiologically)

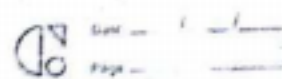
Hyperkeratosis sole foot:

lateral malleolus - on lateral malleolus → little toe

↳ same finding $\oplus \rightarrow k/a$ "Chaddock sign"

Spasticity: Same & opposite resistance to flexion & extension.

Rigidity: Same resistance on flexion & extension movements.



only comparison

Sign: Thial laxity - downwards

L.Kla. "Eppenheim sign"

Squeeze calf muscle

L.Kla. "Gordon sign"

Pathology of Upper limb K/a

Hoffman sign +
(terminal phalanx)

tone (1): spasticity C/L

Involvement of muscles -
- Biceps
- Hamstrings
- Dorsiflexor foot

(2) Fundus examination - Papilloedema (+)

Phenylephrine

- earliest fundus finding - blurring of disc margin

IOC = gadolinium enhanced MRI

Rx:

- Radiotherapy

↳ 5% Radiation necrosis.

: PET [18-FDG]



Gamma Knife Ex → for isolated/focal lesion.
(Stereotactic Ex)

Brain tumor in children:

(1) m.c. (1) in children → cerebellar Astrocytoma > Medulloblastoma
(Pilocytic " ")

(2) m.c. benign brain (1) → craniopharyngioma

Craniopharyngioma

- Rathke pouch
- Cystic Tx
- Intracranial calcification
- visible on X-ray of skull

Bitemporal Hemianopia

- Vasopressin (1) → central diabetes insipidus
Polyuria, polydipsia
- precocious puberty
- Short stature

Brain Tx = worst prognosis in children = Brain stem glioma
- 6th month mortality rate = 100%

Bad prognosis

(Medulloblastoma)

- CSF spread
- Cranio-spinal axis spread

IOC:

MR: CSF cytology

(R)

DE-BULKING Sx
+ RT

HPE = Chang classification

IOC =

① IOC = gadolinium MRI

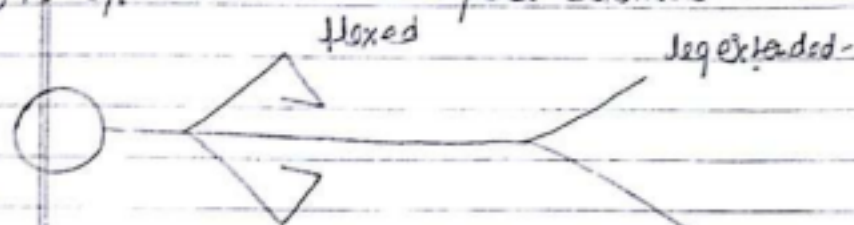
↳ for central edema

= demyelination

↑ ICP

Px:

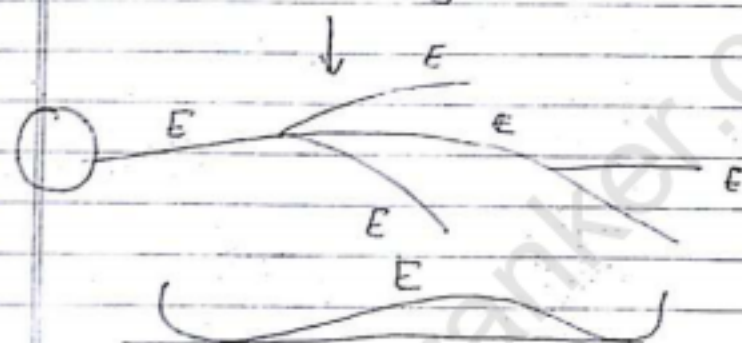
① i.v. 3% saline or mannitol / acetazolamide



decorticate posturing

(mid brain herniation process started)

[Uncal Herniation]



Ophisthotonus - total body extension

"decerebrate posturing"

Brain death = Brain stem death
not brain cortex

Spontaneous

- movement of toes/fingers
- DTR : elicit

↓

Organ Harvesting - save 8 life

- Heart
- 2 lungs
- 2 kidney
- 1 liver
- 1 pancreas
- 1 small intestine

② Ventriculostomy

automated ICP monitor catheter : lateral horn ventricle
if sensor records $> 20 \text{ mm Hg}$
means attached to one way valve - open automatically
↓
drainage of CSF
↓
sterile container

③ Intubate (Endotracheal tube + IPPV)

Elective
Hyperventilation

R.R ↑

hyperventilation

CO_2 washout

Cerebral plexus : vasoconstriction

↓ CSF production [@ 20 mm Hg]

lower Raised ICP

Q. most beneficial for pt survival of ① ICP

① ↑ PO_2

② ↓ PO_2

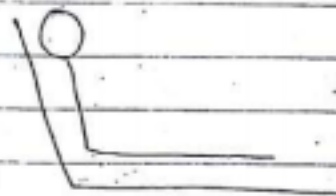
③ ↑ PCO_2

④ ↓ $\text{PCO}_2 \rightarrow$ (hyperventilation)

④ Positioning

- sitting position is beneficial

- "Reverse Trendelenburg position"



⑤ Nm blocking Agent → ① ICP

↳ Nm paralysis (done)

⑥ Tier II therapy → Pentobarbital coma

Barbiturates : ① metabolism of neurons

② survival

- ⑦ therapeutic Hypothermia
temp brain = (N) 32°C
if (D) temp $< 32^{\circ}\text{C}$
survival $\uparrow$

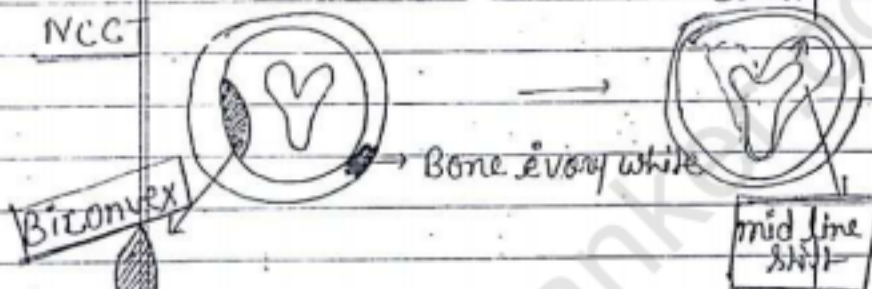
Head injury : ICH (Intracranial Hemorrhage)

- 20 yrs : Bike accident

- head slammed into road

- Unconscious $\rightarrow$ Conscious $\rightarrow$ Hospital
- lucid interval
- pt. sleep
- COMA / death

NCC



Lenticular
Hyperdensity

extradural Hx
middle meningeal (A) #

immediate Mx $\rightarrow$
or
craniotomy
to reduce P
to ICP.

Burr Hole Sx

TOH for ICH
(EDH)

Hemicraniectomy

Peripheral neuropathy
Diabetic neuropathy

High Steppage gait
(Stamping gait)

70 yr old obese T2DM
Slipped in bathroom
Head slammed against
wall/floor

- no loss of consciousness
- bump on head
- subsequently develop
daily headaches

2 wks back develop
- focal weakness arm

O/E

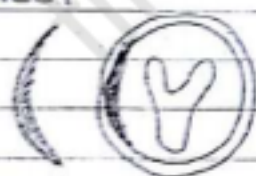
fundus: papilloedema ⊕

DTR: brisk

Babinski: ⊕

inv

- NCCT



Concave

Chronic subdural Hx

(Cortical bridging vein) ⊕

Px

ICH score

- age > 75 yr ⊕

- BP > 140/90

- GCS < 7

- volume of bleeding > 30 cc

- location of bleeding intratentorial

severe condition

Hemicraniectomy

mild cases

conservative Hx

- glycerol
- acetazolamide

Pt + nt & late presentation

> 4 wks: bleed can be
absorbed so
(missed)

- isodense

(hypodense
convert into
isodense)

CT become ⊕

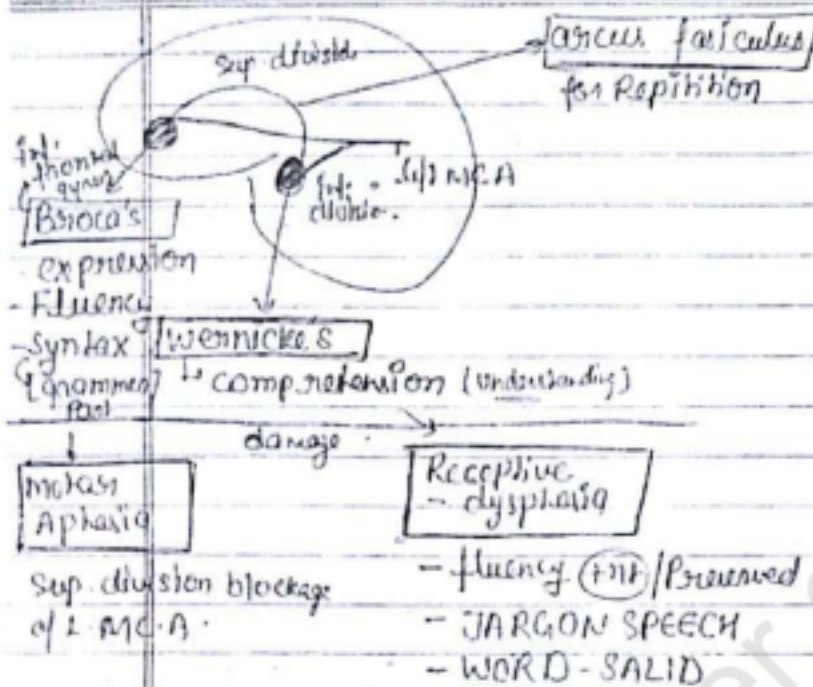
(so if symptoms + nt
SCT ⊕)

conservative Mx
to be done

MCA stroke
 Cerebrum (A)

 Date _____
 Page _____

My companion _____



Manifestation of blockage of R MCA

(1) Global Aphasia

Ques: 50 ym ♂ CEO, HTN/smoker
 sales meeting @
 Q/O sudden onset to
 inability to speak
 inability to move arm
 facial asymmetry

O/E

STR.O.K.E.

Can't smile: deviation

Can't talk

Can't raise arm

Optical moplegia

O/E

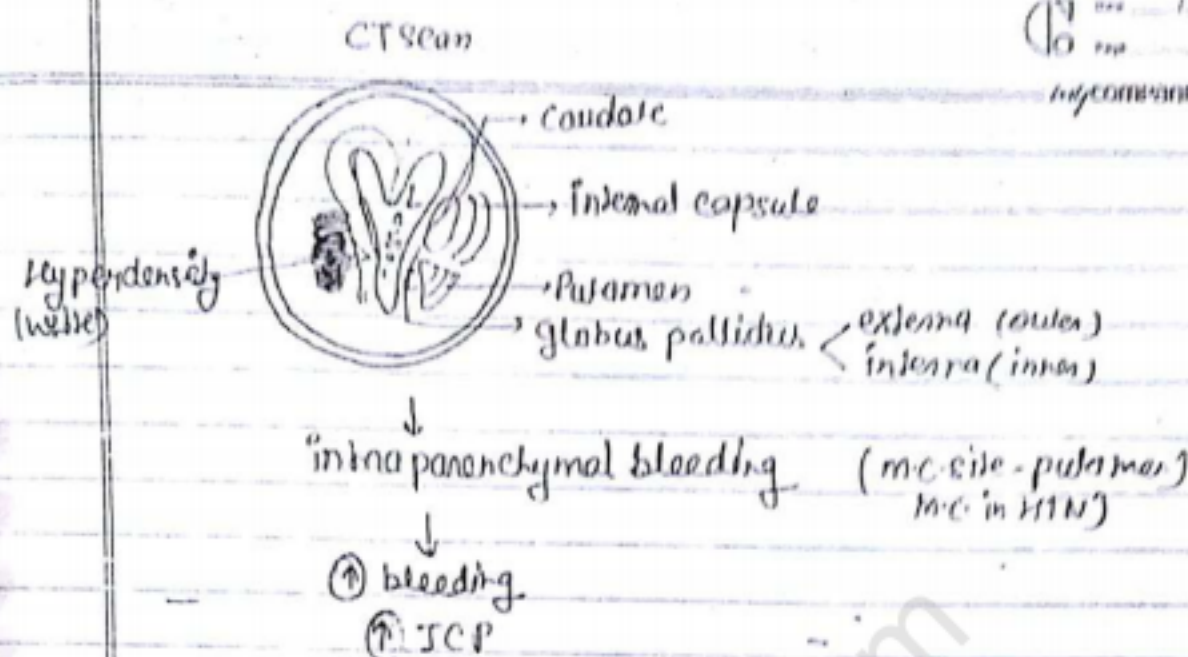
DTR: Brisk

Babinski sign (+)

Fundus (+)

↓

MCA Territory stroke



Rx: HTSive Crisis ↑ ICP

iv Nicardipine Ventriculostomy

Clevidipine Craniectomy

IS step
of Ns Aggressive reduction of
BP in minute.

target ~ 185/110 mmHg

Subarachnoid Bleeding:

- Causes: Trauma (m.c.c. overall)
- Rupture Berry Aneurysm
- " Charcot (C)] → HTN
- " [Bouchar (B)
- " Mycotic (M) →
- (bacterial inf.)
- = Staph aureus

C/F

- warning symptoms
- Pin point excruciating headache
- for seconds (few)
- ↓ hrs-day
- Headache: Worst Headache of life
- Thunder Clap headache

Ⓞ Date _____
Page _____
Any companion _____

- Vomiting projectile
- photo/phonophobia

O/E

- Nuchal Rigidity (+)
(Blood : meningeal irritation)
- DTR Brisk / barbinski (+)

Inv:

actual
bleeding
is
very low



NCCT : blood in Sylvian fissure / interhemispheric fissure.

Rx:

NIHSS DOC: SAH : Nimodipine (CCB)
(Prevent vasospasm)

pt. of SAH cause of death

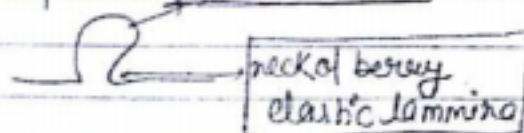
1. Vasospasm → infarction
2. bleeding
3. Rebleeding
4. Hydrocephalus

Berry Aneurysm

- m.c site → Ant communicating (A) ↔ Ant cerebral (A)
(Ant circulation of brain)

Rare → Vertebral (A) Body of (A)

- which layer defective = Tunica media



- m.c. cranial (A) involve in unruptured berry = 3rd (A) palsy

MRI 1-5 Tesla
(3-8 Tesla)

Date: / /
Page: /

last companion

5th CN palsy - ptosis (I/L)
Squint

-mc cranial CN involve in saphed berry A = 3rd CN palsy

IOC:

unruptured = MRA angiography

IOC for unruptured berry Aneurysm

① Cath lab

②

① endovascular coiling

② Aneurysmal clip

(MRI = C/I)

MRI = C/I relative

① Pacemaker

② Aneurysmal clip

③ Piston prostheses

Total Hip Replacement / T. knee R

non ferromagnetic material

- molybdenum - cobalt alloy

- MRI can be done

I.C.H.

① SDH → gradual onset neurological deficit → concavoconcave

② EDH → immediate symptoms / lucid interval → biconvex

③ SAH → Thunderclap H + nuclear rigidity → whiteness on sylvian fissure

④ IPH (mc type) = HTN → irregular hyperdensity on putamen

Boxing / mix martial Art:

- Knock-out punch

- Unconscious → conscious

Lucid interval + 21

2014

① EDH

② SDH

acute subdural

1/2 (SDH)

Unconscious

- Shunt

Hemicraniectomy



Cerebro-conver

Boxing → trauma: Basal ganglia trauma

Parkinsonism

① Akathic
② Multism

Frontal lobe #

- aggressive

- anti-social behaviour

Cortical Atrophy

- dementia

SAH

- NCCT = ①

① - ~~gated~~ guarded lumbar puncture - **Bloody CSF**

① Healthy CSF

- 0-4 lymphocytes/mm

- Clear

Sugar - 2/3 blood sugar

Prot - 15-45 mg%

Pressure - 10-20 mm Hg

RBC in CSF

Red

↑

↑

↑

3rd or 4th
Cerebral

> 24 hrs

① NCCT - (N)

guided L.P. - Xanthochromic CSF

(due to RBC lysis - bilirubin
yellow or orange)

② pt. are under high stress

① Catecholamines

- coronary (R) ischemia

MI : Tissue infarction

② B.N.P. level

- natriuretic (+)

- Hyponatremia

Reserve if Na < 120 meq]

3rd pt base line inv.

① NCCT

② L.P.

③ ECG

④ B. sodium

Intraventricular bleeding (IVB)

① Term Baby

⇒ Outlet for tears - Birth trauma

CSF skull

Bulging Ant. Fontalis.

DTR brisk

Moro's exaggerated

Palmar ++ (Pink → white)

IOC - IVB in term baby/neonate

= USG skull

Rx: iv phenobarbitone

iv mannitol

Blood clots +:

Aggravated of Sylvius

foramen of minos

Obstructive

hydrocephalus

Obstructive hydrocephalus

- Head circumference ↑↑ - delayed milestones.

Ry: V-P shunting (ventricular-peritoneal shunt)

Preterm baby

or

term baby

} some Myx.

PRION ds

- proteinaceous inf. particles, smallest living particle

DNA/RNA ⊖, Protein coat

(R) + heat : 121°C

Spread : cross the species barrier
• genetic Basis

↳ chro. 20 defect

BOVINE SPONGIFORM (mad Cows.)

Encephalopathy

myoclonus in body

Human consuming beef

Prion → cross BBB
(gut)

PrP^{Sc} → Scrapie



c/f

Beef consuming
6-18m

1. myoclonus : few muscle group involuntary twitches
2. dementia

AMNESIA

Short term memory loss

long term memory; loss

3. Paracentral lobule

↳ control of U. bladder loss
URGE incontinence

4. APATHY

Prion

5. ATAXIA : gait

Bed sore : infection
SEPSIS

• Myoclonus

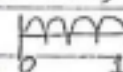
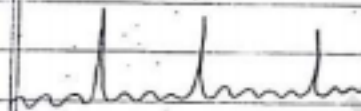
• Jolt upon EEG

* Variant CREUTZFELT JACOB ds.

inv ① L-P = CSF protein 14-3:3

② EEG

NERM-3 = delta wave (slowest)
(0-4 Hz)



EEG = 2 electrode

periodic sharp wave complexes

CCV
myoclonus
Jerk

③ MRI head = Hockey stick Sign

ecg: digoxin
echo: MS

* Cortical ribbing (grey matter damage)

classical CJD : same C/F why?

1. Corneal transplant : instrument
135° > 4 Hz

2. Cadaveric pituitary : GH extract

3. Dura matter transplant

KURU (1950) : Cannibalism

↳ Tribal : west indies

• familial fatal insomnia

• [Gellman / Schankler Synd.]

Chr. 20H guinea base

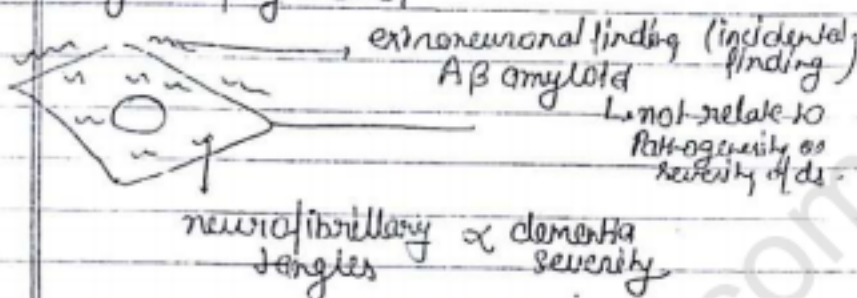
- Gersdman-Straumen-

↓ Scheinker syndrome

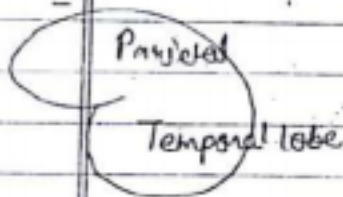
= transmissible spongiform
encephalopathy

ALZHEIMER'S ds :

- ① Ach
- nucleus of Meynert Basalis
- damage in grey matter



- genetic ds chr 1 / chr 14 / chr 19 / 21 / 22



trisomy 21 (if survive)
> 35 yrs : pre-senile dementia

- 4A

- ① short term memory : loss
- ② long term memory : loss

③ **Amnesia**

- ② dominant parietal lobe : Atrophy

③ **Aphasia**

- ③ non-dominant parietal lobe :
loss of visio-spatial skill

④ **Apraxia** (constructional)

- ④ inability to appreciate force full U. Bladder, force full loaded Rectum, self neglect

⑤ **Anosognosia**

21-24 → mild (1)

10-20 → mod (2)

<10 → severe (3)

<24 K1a dementia
30 items.

no/companion

Inv (1) M.M.S.E. (mini mental score examination)

date / month / year / festival

cell phone, mother's

Serial subtraction = (dyscalculia) (not acalculia)

$$100 - 5 = 95 \quad 000000 - 5 = 9000000$$

Depression

= pseudo-dementia

(2) IOC (AD) = functional MRI (fMRI)

- metabolism (1) - (parietal & temporal lobe)

(3) MRI = late stage = cortical atrophy.

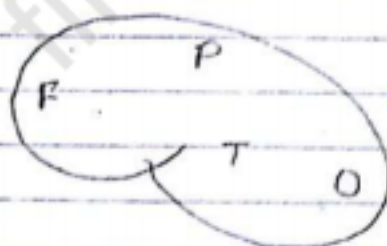
pseudotumour ventricle + + +

DOC (AD) = donepezil / memantine

Rivastigmine

galantamine

Tacrine - hepatotoxicity



Rt-handed person:

Dominant parietal lobe → left

left MCA

MCA

block

(1) MATHS

(2) Understanding written text

(3) Rt-left orientation

(4) speech

A Acalculia

A Agnosia

A finger Agnosia

A Aphasia (global)

Gerstmann Syndrome



non-dominant parietal lobe : #1

visuo-spatial skills

Apraxia

neglect of non-dominant side of body
(hemineglect) (not both half body)

Temporal lobe :

→ #

① Short term memory : Hippocampus
long term " : neo-cortex

1) Anterograde Amnesia
Short term memory loss

② memory of faces

2) Prosopagnosia
(impaired facial recognition)

3) Complex hallucination

taste : metallic taste

smell : Rotten fish

hearing : Music

④ Déjà-vu
familiar to you
(unknown blt)

⑤ Jamai vu
unfamiliar

Frontal lobe #

① Aggressive

Anti-social behaviour

② Personality change

③ Urge incontinence

(Paracentral lobule #
loss of U. bladder)

④ Apathy

⑤ Abulia

(lack of desire to speak)

⑥ Primitive reflexes #

Rooting Reflex persists

grasp reflex #

⑦

Rooting Reflex

= Persists upto 1 month

grasp reflex

= Persists upto 4 months

Motor reflex — least upto 6m
Nerve sheath ~~is~~

- ⑦ "Magnetic gait" = gait Apraxia
(programming of gait defective)

Occipital lobe #

- ① visual hallucinations
- ② PCA #



Homonymous Hemianopia &
macular sparing

(macula ← MCA)

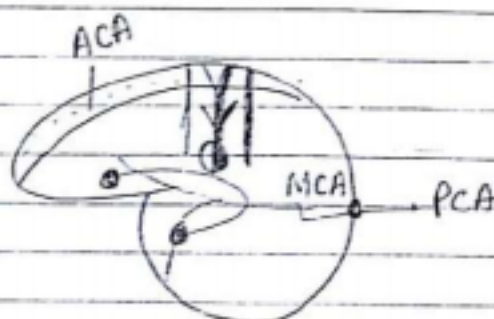
- ③ B/L PCA #



- Tubular vision
- Bumping into objects / falling
- GUNBARREL SIGN

ANTON Syndrome
(visual Anosognosia)

- ④ Palinopsia = persistence of image even object removed from field of vision



ACA # = C/L spastic monoplegia

- ① B/L " paraplegia
- ② Aggressive / antisocial behaviour
- ③ Abulia
- ④ Urge incontinence

Date _____
Page _____

MCA

- C/L face weakness
- Inability to raise arm

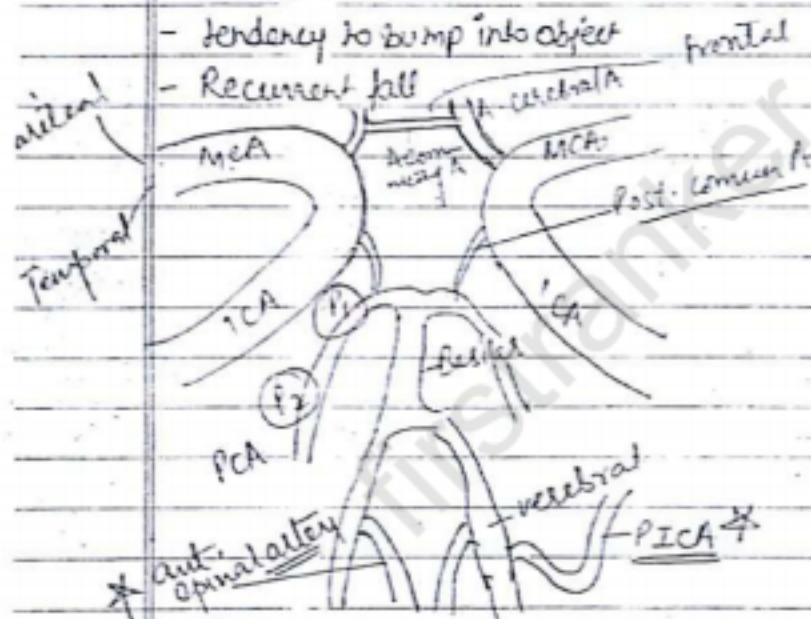
① MCA # - Aphasia

② MCA # Apraxia

Complex hallucination
Prosopagnosia.

PCA

- visual hallucination
- tendency to bump into object
- Recurrent fall



CIRCLE OF WILLIS

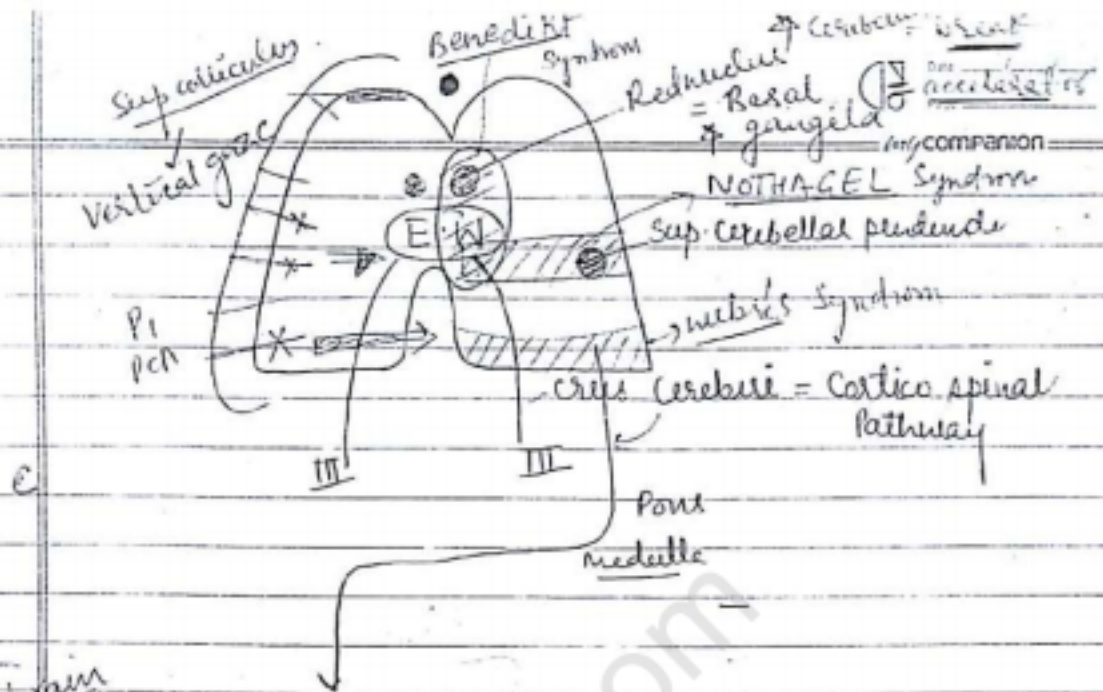
MCA is not a part of

PCA P₁ = midbrain

PCA P₂ = occipital cortex

* Basilar artery = pons (pontine stroke)

* Vertebral artery = medulla



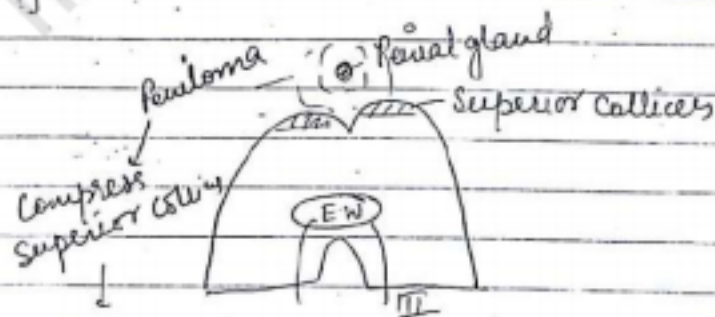
Mid brain
stroke

Weber's = 1/2 3rd N palsy + c/l hemiplegia

nothage = 1/2 3rd N palsy + 1/2 gait ataxia
(intentional tremor)
(Post. printing)

Benedikt's syndrome = 1/2 3rd palsy + c/l resting tremor
Bradykinesia
c/l rigidity
↓
Basal ganglia damage

Single
syndrome of
mid brain
stroke
not involve
IIIrd

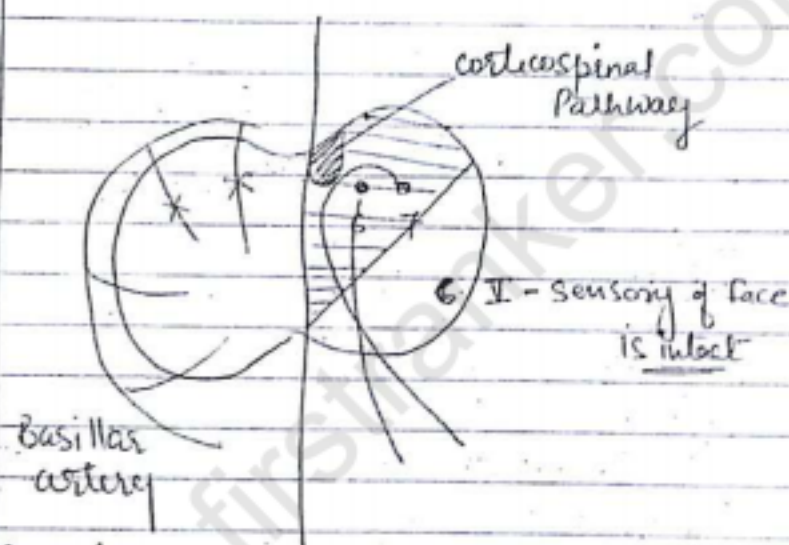


• No vertical gaze
• Recurrent fall
• Spilling of food } Parinaud Sy.

Mid brain #: 1, PCA

Perinaud's syn. Claude → features of Weber's	Pinealoma: impaired vertical gaze Benedikt + nonHagerl: 1/2 3 rd & 4 th palsy + 1/2 ataxia 1/2 3 rd & 4 th palsy + 1/2 hemiplegia
--	--

PONTINE STROKE



Millard gibber

1/2 6th Palsy
 1/2 7th Palsy - motor # face
 c/l Hemiplegia
 ≠ Sensory face intact

MEDULLA chole
castey

* 7
Medullary
Syndrome

р/с. б.

→ Corticospinal pathway

Only COMPANION

Restiform body $\rightarrow$ Cerebellum

Sympathetic tract

I Secondary nucleus

Lat. Spinothalamic

Palmer

M. haemorrhoidalis

$\therefore \frac{1}{L} \ln$
Temp

Nonambiguous

7/9/10

lateral medullary Syndrome +
(5, 6, 7, 10)

- 12 not involved

vertical
align

Original
no 402
②

Thyrogland
nucleus
Smear

Poni

medulla

$C_1 - C_2$ (lower limit)

Mesencephalic N

- Jaw Jerk (V_s, V_m)

Integration at Pons

Lateral medullary synd.

* Vertebral artery = Wallenberg synd

muscle

① Resiform body # $\rightarrow$ I/L ataxia

② Sympathetic $\uparrow$ $\rightarrow$ Hormonal syndrome

(P-MEAL)

③ V sensor

- loss of hot/cold/all kind of sensation

④ Lateral spinothalamic

⑤ Agnesia

P. phosis

Amiosis

Ενφθαλμός

L₂ (oxid. cilia)

18 y Reflex

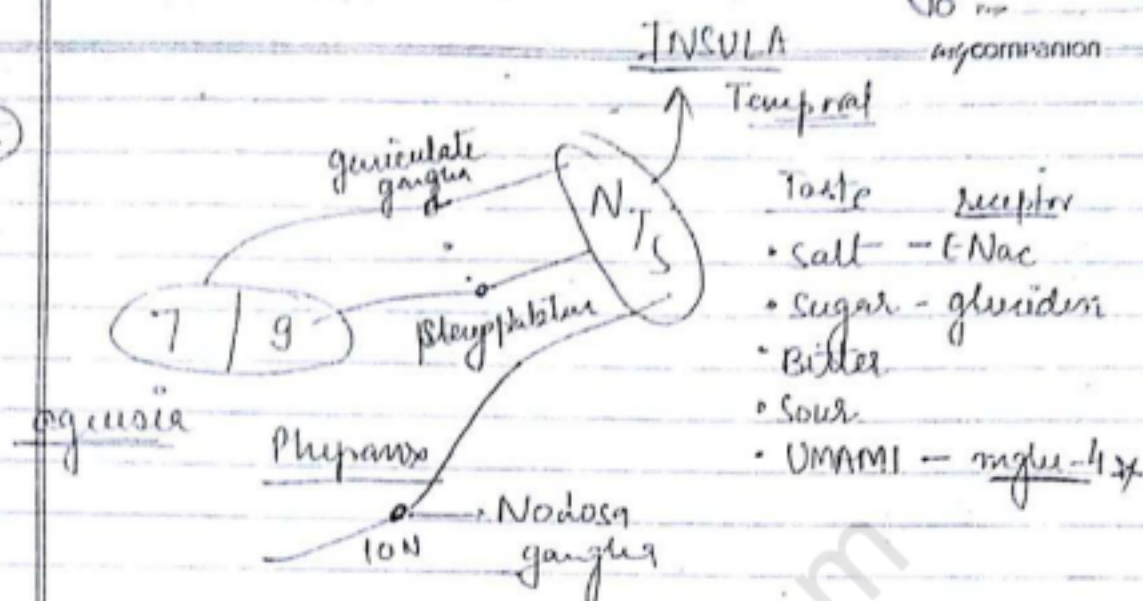
Reflex

Crossed
Kam - Anas, Kam

Pain, less.

Date _____
Page _____
as companion

(5)



(6)

9^{th} N Nasal Trunc
Nasal Reg fluid

(7)

10^{th} N
Dysarthria
palpitation
gastroparesis
constipation

gag reflex ⊖
aspiration

(8)

11^{th} N = drooping shoulder

medial medullary seg

1/2 12th N palsy
1/2 Hemiplegia

→ Tongue protrusion
1/2 tongue deviation

Hemiplegia
midbrain

1. MCA #

2. PCA # P; Weber

Pons 3. Basilar A # : millard gibber

medulla 4. Ant. spinal A # medial medullary seg

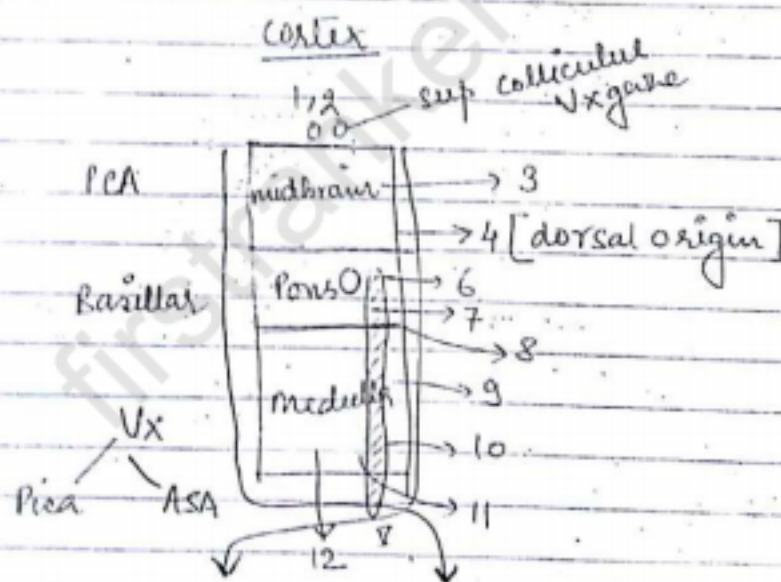
Brain stem stroke

3 N

6/7 N

12 N

* Hemiplegia not present in PCA #



R/L Brain stem STROKE

1. B/L corticospinal # B/L Babinski

quadriplegia

2. 9, 10, 12th N palsy : can't drink
can't eat
can't talk

3. 3, 4, 6th N palsy → eye muscles impaired

* 4. CORTEX : RAS : ALERT AWAKE ⇒ **LOCKED IN Syndrome**

* VERTICAL gaze possible in locked in
involts syndrome

DATE 10/11/21
PAGE 1

MULTI INFART dementia

- Lipohyalinosis of perforators
- Risk factors: Smoking, DM, HTN

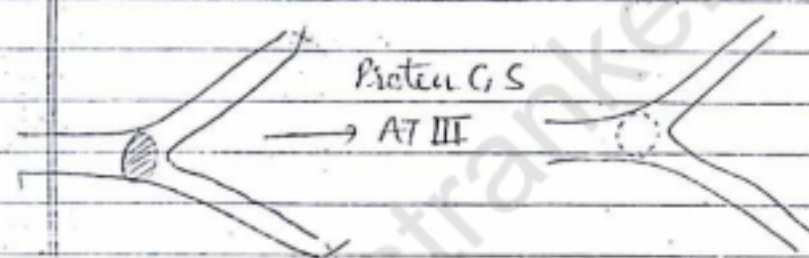
lacunar
stroke

c/e Progressive ↑ amnesia

grey matter #
dementia

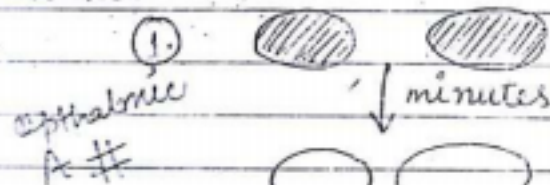
* Biswanger's ds

white matter # spasticity
Buck DTR
Babinski



Transient Ischemic attack (TIA)
warning symptoms for stroke

* Soybean



Amaurosis fugax
(Transient blindness) *

ACA #

(2) Paraplegia

→ Spontaneous
resolⁿ

- ↳ spontaneous resolution

PCA # ④ Palinopsia

VxA # ⑤ Nasal regurgitation
fluid / Nasal twang
Dysarthria

(c) Pins & needle sensation
Parathesia (tingling Sens)

Symptoms (s) disappeared < 24 Hr.
CT / DW MRI = (n)

7:45

Symptom(s) persist > 24hr
CT / DW MRI = Hypodensity
Hypodensity

TRUE

TIA $\xrightarrow{\text{48hr}}$ STROKE
AFSCMG SCORE

- Age > 65 1
- BP > 140/90 1
- C/F: facial asymmetry +
arm weakness + 1
- dural tear: < 10 min
> 10 min + High tendency 1
- DM + - 1

$$\text{score} = 5$$

Chance $\Rightarrow 22\%$

- inv: ① ECG = r/o atrial fibrillation = 1/ (N)
- ② TTE / TEE
 ↓
 → clot / nonbenign aortic atherosclerosis = 1/ (N)
- ③ Doppler ICA: Atherosclerosis = 1/ (N)
- ④ Lipid profile: ① : type 2A hypercholesterolemia (FHC, AD)
- ⑤ Homocysteine: ④ thrombus ④

Rx: ① tab Aspirin 300mg
 Clopidogrel 300mg (loading dose) → 75mg for life long
 75mg (dual antiplatelet drug)

② tab Rosuvastatin - (for atherosclerosis)

③ Rx 9/12

depends on report
 self-regulate

④ → if clots ④ : oral dabigatran
 " rivaroxaban
 " warfarin

50 y/o ♂, HTN / smoker, neglected symptoms of T.I.A before, come (last 11/10)

6am : morning tea

6:30am : unconscious, unresponsive sofa

7:00am : in hospital

O/E

① GCS = 5, OTA brisk, Chaddock sign +ve

① eye opening

4 = on command

4 = spontaneous eye open

3 = on command

2 = on pain ④
 knuckles → sternum
 thumb → supra-orbital margin

1 = no response

↓
 Comatose pt.


 Date _____
Page _____

only companion

② Verbal response

- 5 = conscious, oriented, time
- 4 = conscious, disoriented to time/place/person
- 3 = inappropriate words
- 2 = incomprehensible words (murmuring) (can't understand)
- 1 = no response

③ Motor Activity

- 6 = follows commands
- 5 = localizing pain
- 4 = withdrawal (CL side, not localizing pain)
- 3 = decorticate 
- 2 = decerebrate 
- 1 = no movement

Due COPD pt.

pt. on ventilator, wean off from ventilator
↓ dose sedation, stop sch

evening → spontaneous eye opening ④

→ follow commands ⑤

→ intubated (ET) 1

GCS

= 11

→ 10ET (if given intubate)

Calculate GCS in dead person

E, V, M, = 3

GCS < 7 = coma

< 7 = indication for intubation

Mx of comatose pt:

① Rapid sequence intubation

intubation $\rightarrow$ ① ICP

Fentanyl iv

(blunts the effect of intubation on ① ICP)

Sellick's maneuver : cricoid pressure

E-T + IPPV : RR ↑

CO₂ ↓ - Hyperventilation

VC - Capillaries carotid plexus

Elective Hyperventilation

② BP $\rightarrow$ $> 220/130$ + papilloedema - i.v. nicardipine

$160/100 \rightarrow$ maintain BP not ① $\rightarrow$ i.v. normal saline

(b/c maintain)

CPP = MAP - ICP

73 93 - 20 mmHg

② CPP = 60-80 mmHg

(5% Dextrose Hypotonic fluids)

cause cerebral edema

never given

gives either
Isotonic (0.9%)
or
hypertonic

③ i.v. phenytoin loading

④ NCCT $\rightarrow$ Hypodensity

(ischemic stroke)

$\gg$ Hyperdensity

(hemorrhagic stroke)

⑤

i.v. Alteplase

(Plasmin: fibrin $\rightarrow$ fibrin)

Window in stroke period for thrombolysis $\leftarrow$ 3 hrs on onset of symptoms
 $\downarrow$
walk/talk again

① thrombolysis - C/I

② Manage raised ICP

③ Warfarin toxicity
: PT ↑↑

Rx: FFP $>$ Cryoppt

Heparin toxicity: aPTT ↑

Rx: FFP $>$ Cryoppt

Jacks favor ⑨

(N) PT = 11-16 sec
OPTT = 30-45 sec

Clotting times = 9
whole blood clots = 5.8
Richer source of clotting = FFP
factor companion

if transit time > 4 hrs from onset of symptoms

Cath. lab : angiography

intra-arterial Reperfusion

for thrombosis

(upper limit for 1/3 of ischemic stroke : 4.5 hrs (4 1/2 hrs))

in MI : ≤ 12 hrs

Antidote for

Heparin = protamine

warfarin = Vit K₁

Vit K₂ = gut bacteria
(Bacteroides)

STK toxicity - E.A.C.A.
(epsilon-amino-caproic acid)
① Tx A₂

EEG

- invented by Hansberger
- 20 electrodes

Seizure

abn electrical activity
generated from focus

Convulsion

- violent jerking of all muscles
- uprolling of eyeball
- frothing : saliva corners of mouth
- peri-oral cyanosis
- tongue bite (+)
- Urine incontinence
- stool incontinence

brain damage $\leftarrow$ muscle tearing $\leftarrow$ (hyperthermia)

Unconscious, DTR: Brisk
Corneal Reflex On
Kia post-ictal deficit

after
mint-hr

conscious, oriented, DTR = (N)

Recording EEG = K10

montage



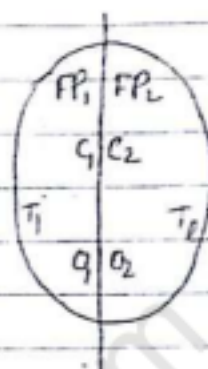
second
video-EEG
→ routine EEG

K/0

Epilepsy

≥ 2 consecutive episodes

Montage



α - eye closed : 8-13 Hz

β - eye Open : 13-30 Hz

γ - problem solving : 30-100 Hz

NREM

REM

NREM 1, 2, 3

25% sleep time

NREM 2 - longest phase

-(60-90 min)

Sleep spindle

- 4-6 REM cycle / 1 hr sleep

mu - complex

eye closed = β

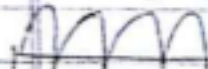
"paradoxical sleep"

NREM 3 - tone ①

deep sleep

delta wave = 0-4 Hz

slowest ECG pattern



highest Amplitude

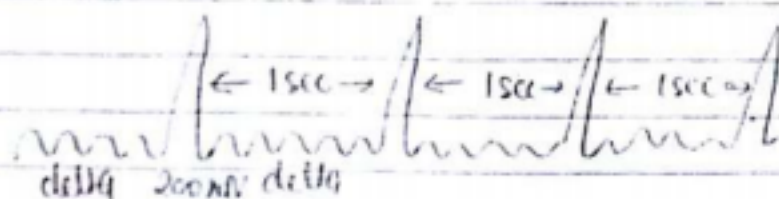
slowest

NREM-3

Delta sleep

Variant CJDs:

NREM-3



high voltage Burst (b/w delta wave - NREM-3)
Periodic sharp wave complexes
myoclonus (+)

≈ GTCs
Ab(N) spike - 20/20 leads
Ab(N) spike - T₁, T₂ only
focal seizure

m.c. epilepsy in children - Bering Rolandic epilepsy (BRE)
m.c. seizure in children - Febrile seizure

[FS]

- 6mth - 5yr
- Sudden in spike fever
- PCM: 15mg/kg/dose X 2
- sponging & chilled water
↓
Vasoconstriction
↓
Tonus → clonus
(violent shaking)
peri-oral cyanosis
(30-60 sec.)

[BRE]

- 2-13 yr
- focal seizures
- twitching facial
muscle + one side
- saliva drooling
- EEG
- Carbamazepine
(DOC)

Crying
conscious

Post ictal deficit: Absent

familial H/O (+) - 30%
genetic predisposition (+)

1^o febrile seizure Mx → **oral diazepam** (for prophylaxis)
(as long as fever +nt)
intermittent prophylaxis ↑

Mx of an episode of febrile seizure: (at home)

- ① intranasal midazolam/
Rectal diazepam

Typical febrile seizure

- 1) usually on day 1: fever
- 2) duration: < 15 min
- 3) post ictal deficit $\ominus$

Atypical febrile seizure

post ictal deficit $\oplus$ —
1st = oral valproate
continuous prophylaxis

episodes:

- Hospital: i.v. lorazepam
- Home: intranasal midazolam $\gg$ Rectal diazepam

Ques: Child 2 first episode of febrile seizure.

Lumbar puncture $\Rightarrow$ L3-L4 (to rule out meningitis)
CSF = turbid
> 1000 PMN
CSF sugar $\downarrow$
Protein $\uparrow$

$\downarrow$
acute bacterial/pyogenic $\rightarrow$ i.v. ceftriaxone
meningitis (ABM)

ABM

— m.c. cause of bacterial meningitis in neonate = grp B strept.
(in world) (Strep. agalactiae)

In India = Klebsiella > E. coli >

Rare = Listeria monocytogenes ~~Q. 200~~

(Actin Rockets = cell 2 cell spreads
not responsive to 2nd gen. cephalosporins
hence Ampicillin)

m.c.c. in child = Strep pneumoniae
H. influenza type B
 → Hib vaccine = 2/4/6/18 mths.
 → incidence (1)
 → Pus: 3rd (N) gliosis → SN death

In adult = pneumococcus
meningococcus

Sporadic (m.c.c.) → pneumococcus

Epidemic (winter) → meningococcus

↳ early spread w/o droplets

meningi HS

meningococci

- Sepsis

- DIC

- adrenal hemorrhage

- Addison's

- Addison's crisis

Waterhouse-Friedrichsen Syndrome

Chemical Prophylaxis (1 day)
 Ceftriaxone (1mg)
 Ciprofloxacin
 Rifampicin

↓ aldosterone
 ↓ cortisol

mask

N95 - Respirator

N99 - Respirator

H₁N₁

H₅N₁

Prevent

Person

Person

transmission

Prophylaxis → nasal vaccine

Oseltamivir - 75mg

mask

- cause of death in swine flu = ARDS

Absence seizure / Petit mal Epilepsy

- vacant sharing spells
- post idal deficit Θ_{ni}

LEG

(reproduce in laboratory)

Hyperventilation } Seizure
Photic stimulation (↑)

Rx: DOC for absence seizure = Sod. valproate

(C/I in < 4 yr age)

Deweg for <4 yrs age child = Ethosuximide

Age (↑) → severity (↓)

Juvenile myoclonic epilepsy : (Janz Syndrome)

10-19 42

- early morning myoclonus (Jerks: Hands)

difficulty in wearing clothes/brushing....)

Jonc - myoclonic jerks
- Persists : in sleep

Widow EEG

NREM-3 | REM = β wave

Age ↑ → future GTCs
(Bad prognosis)

- 4-6 Hz variable
- Polyspike pattern

R_x DOC for JME = Sod. Valproate

Generalised tonic clonic status epilepticus (GCSE)

Seizure > 5 min

i.v. lorazepam / diazepam i.v.
(DOC)

i.v. phenytoin : NS over 20 min.

i.v. Valproate bolus / phenobarbitone

↓ refractory GCSE

i.v. midazolam (DOC)

(I.P.P.V. + E-tube)

General Anaesthesia

GTCS :

Tone ① = tonic
clonus

Atonic Seizure

Tone ①
clonus

① Sod. Valproate : GTCS / Atonic / J.M.E / Absence

② focal seizure : Oxcarbazepine

Carbamazepine

lamotrigine

Phenytoine

③ Febrile seizure : intranasal midazolam > Rectal diazepam

④ GCSE : lorazepam

⑤ Infantile spasm : Inj ACTH

(WEST syndrome)

myoclonic Jerk Arm

(Salmon Seizure)

EEG

Hypsarhythmia gross
Chaotic pattern

Infantile spasm

& Tuberous sclerosis

Vigabatrin (oral) DOC

Tuberous Sclerosis: (AD)

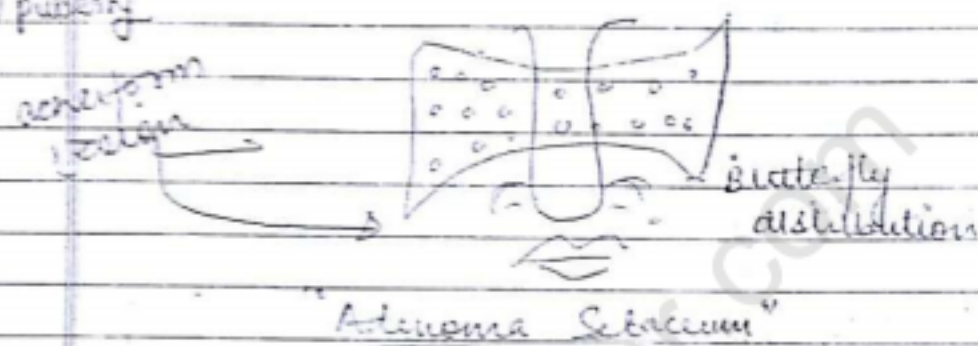
skin

- ① Ash-leaf macule (Hypopigmented) = trunk
↳ mc. 3 earliest dermatological manifestation.

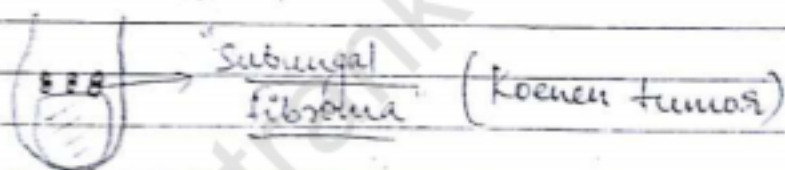
②

Shagreen patch (orange peel)

③ puberty



④



CNS

myoclonic Seizures

- < 1yr: infantile spasm = Vigabatrin
> 1yr: focal seizures = OXC/BZ

Mental Retardation

Tuberous sclerosis

- A - Ashleaf spots
S - Shagreen patches
H - Hamman-Richardson rhabdomyosarcoma
L - Long hamartoma
E - Epilepsy from cortical tubers
A - Angiomyolipoma in kidney
F - facial Angiofibroma



Periventricular lesion

Subependymal Nodule (SEN)

↳ (Astrocytoma)

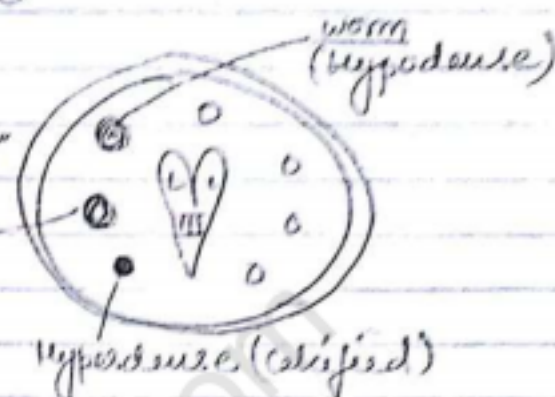
notependymoma

medically refractory epilepsy (MRI)

1. Ketogenic diet
2. Vagus Nerve Stimulation (VNS) → if Vagus ⊕
3. Surgery - most effective

STARRY SKY appearance

MRS → Neurocytotoxicity
CT → Isodense edema ⊕



- * imaging modality = choice + MRI - Hypodense lesion
- CSF immunoblot -
 - neurocytotoxicity Ag ⊕
 - CSF EUSA NCCA = X

f/r

SEIZURES

GTCs

- lumps/bumps in muscles
- low socio-economic
- non neg/neg = focally contaminated soil

Rx

MRI = worm ⊕ : albendazole

- dexamethasone i.v : 42 hrs.
- before anti Helminthic
- albendazole orally 7.8 day / 22 day

* Hypodense ⊕ lesion = No role of anti Helminthic
→ Valproate

STURGE WEBER

D/D T/S

- * Port wine stain : child ←
- * I/c cavernous angioma
- S - SEIZURES : focal
- T - Trigeminal N distribution
- V - unilateral weakness
- R - Mental retardation
- G - glaucoma
- E - eye : Bupthalmos

Xray skull = Tram track appearance

* Xray chest = tram track app = Bronchiectasis

* Kidney Biopsy = Tram Track app
MPGN

PHAKOMATOSIS

Neurocutaneous Disorder

1. TS
2. SW Syndrome
3. NF-1 - chi. 17, AD

✓ Cafe-au-lait macules (CALM) > 6

✓ axillary freckling

✓ sphenoid dysplasia : Pulsating exophthalmos

✓ Iris : Lisch nodules

✓ Neurofibroma

* CNS manifestation of NF-1 (Recklinghausen's)

→ neurofibroma : firm
skin

mobility : Single direction

all body *

NF-1

 optic glioma : Marcus Gunn pupil

 mutation of the Merlin gene, Chr 22q13.2

 NF-2 acoustic Neuroma
(Cranial N8)

 my comparison
 • Biggest gene = 1
 • Biggest gene = 2

④ ataxia Telangiectasia

* IgA ↓ (c.f. HSP = IgA1)

↳ R. infection

* nail ataxia

* dilated BV : sclera

* chr. 11 defect

Friedrich ataxia

 • gene = frataxin
trinucleotide

 mitochondrial
 metabolism

CVS c/f

HOCM

andocrine c/f

T2 DM

CNS c/f

• dorsal column damage

Sensory ataxia : Proprioception loss

 • corticospinal path #
 ↳ Babinski (+)
 • P. nerves # : Areflexia (LMN)

⑤ VHL chromosome - 3

• RCC = clear cell Ca

 CNS * cerebellar Hemangioblastoma
 (Pericytes)

* Retinal Hemangioblastoma

* Spinal cord

A. Epileptic drugs → folic acid ↓

Safest AED in pregnancy = lamotrigine

Phenytoin = NTD incidence 10%

valproate = 5%

lamotrigine = 2-3%

ordinary pop = 2%

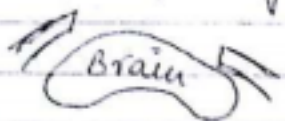
NTD : Mc : spina bifida occulta

• Mc in NTD IDM = 22

• most characteristic NTD IDM = Sacral agenesis

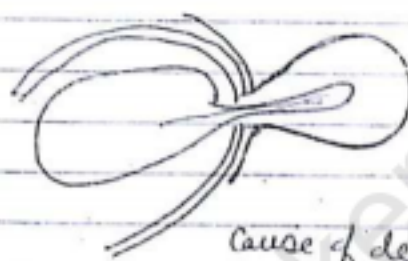
NTD cluster - 24 day after fertilization, companion

1. anencephaly



- do not resorb
- cortex, cerebellum is initially develop
- Brain stem only developed suckling (+)
- pit. agenesis
- adrenal gland H:

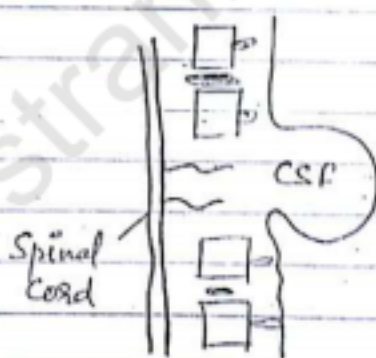
2.



Transillumination (+)
Encephalocele

Cause of death = intracranial Hemorrhage

3.



myelomeningocele &

- * flaccid paralysis
- * Nursing in prone position cover the defect -
- * Saline soaked gauze
- * Arnold-Chiari malformation type II (an. c II)

ACM

- type I - an. c syringomyelia

- m.c.c. of cong. hydrocephalus - aqueduct obstruction/stenosis


 Date _____
 Page _____

Only companion

④ Meningocele:

- no neurological deficit
- Maxi. Survival
- maxi. viability &
- Sp. repair : possible

⑤ most severe neural tube defect = Craniorachischisis totalis Anencephaly + myelomeningocele

⑥ Iniencephaly:

- Cervical spine/vertebra : agenesis
- "STAR GAZER BABY"

⑦ Spina-bifida occulta:

- Sacral dimple : Tuft of Hair

 NTD
 IAC

① USG (antenatal): 100%

Anencephaly : 10 wks (frog eye sign)

Lemon/Banana sign : Arnold-Chiari Malformation Type II

② Amniotic fluid:

- Δ - acetylcholinesterase 98%
- α - S-dFP (mother $\uparrow$) - 95%

NTD

to prevent

- 400 mg

1/1 new born N/O

= 4 gm.

- London bus app
 - Pro eye app
 - military app
 Date: 02/03/2017
 Page: 4th class

1st companion

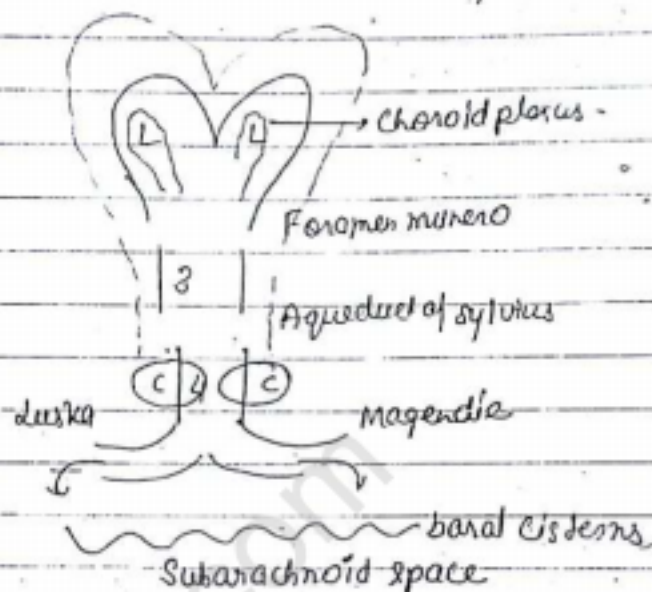
Arnold Chiari Malformation types:

production rate = 20 ml/hr

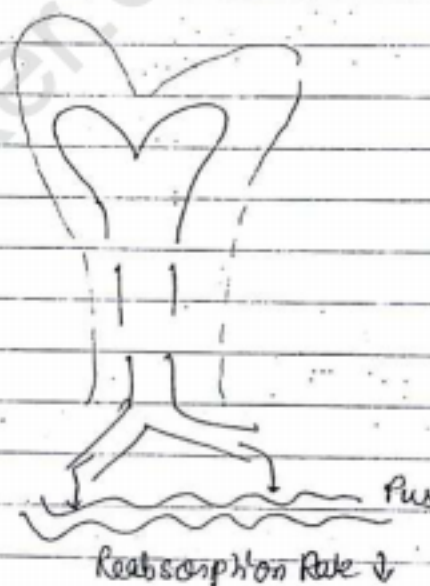
reabsorption rate = 20 ml/hr

Arnold Chiari Malf. type II

- myelomeningocele
- small post. fossa
- herniation of cerebellar tonsils
- IV ventricle #
- Congenital Hydrocephalus



Rx: V-P shunt

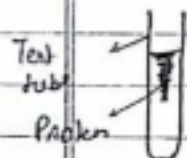


TBM

- NCC: Basal exudates
- dilated ventricles

IOC: PCR of CSF → Mycobacterium TB

L.P. (Lumbar puncture) →



- Straw colour
- CoB web coagulum (banked ball set off)
- (rich AFB)
- ZN stain
- LJ media

Path: rich focus

- CF:
- BCG scar: absent
 - PEM grade III-IV
 - Contact c Koch's

fewer
altered sensorium } weeks
Homiplegia : TB endarteritis

Fundus finding:

Chorioid tubercles = disseminated TB
(most reliable finding)

Rx:

ATT + Steroids (6wks)

(147)

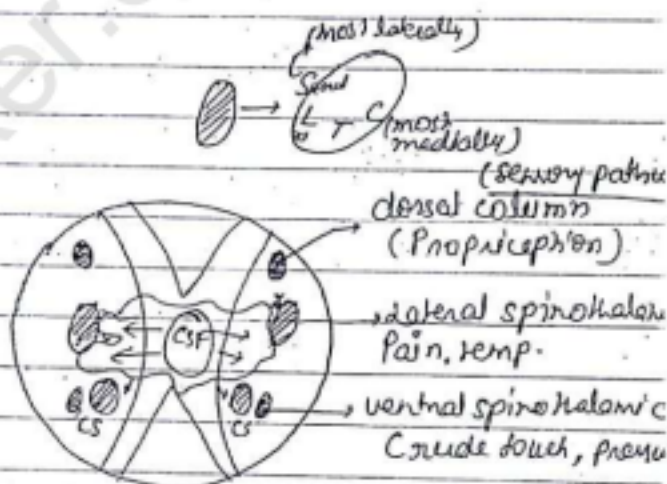
- (i) permeability of BBB → then ATT can be reached to brain
(ii) cerebral edema → (iii) seizure risk
thin out consistency of pus → (iv) chances of hydrocephalus

Arnold Chiari Mal. I:

ass. C syringomyelia
dilatation of central canal
since

↓
Progressive condition
Sacral sparing (b/c most
laterally)

Asymmetrical expansion



C/F

18yrs ♀/♂

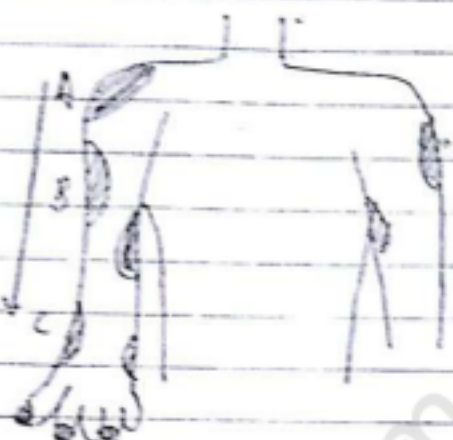
- ① Painless Burn in Hand
- ② non-healing ulcer (b/c recurrent burn injury → due to neuropathy)
- ③ Charcot joints in hand (Painless, paralyzed joints) (in foot = DM nephropathy)
- ④ Dissociative Anaesthesia

Painless joints

- ① DM : Foot
- ② Tabes dorsalis : Ankle
- ③ Syringomyelia : Hands

Dissociative Anesthesia:

→ progresses from proximal to distal



(motor deficit in spingo):

⑤ at the level of lesion: (LMNL)

: Biceps
: intrinsic muscles etc } walking
fasciculation
Anreflexia

⑥ below the lesion: (UMNL) = (USG) ^{muscle}

①: spasticity → ① tone } I/L C1
② Babinski sign ⊕ } S/L
③ brisk DTR ⊕

Investigation

IOC = MRI spine

Rx:

Sx decompression

↳ b/c if not decompressed

* complication sponds → syringomyelia → Bulbar palsy
of 5th
unilateral
syringomyelia
9/10/11/12th N palsy (swallow) 2)
- Can't drink
- Swallow
- Talk
- eat

Spinal Cords

length = 45 cm

neonate = L₃

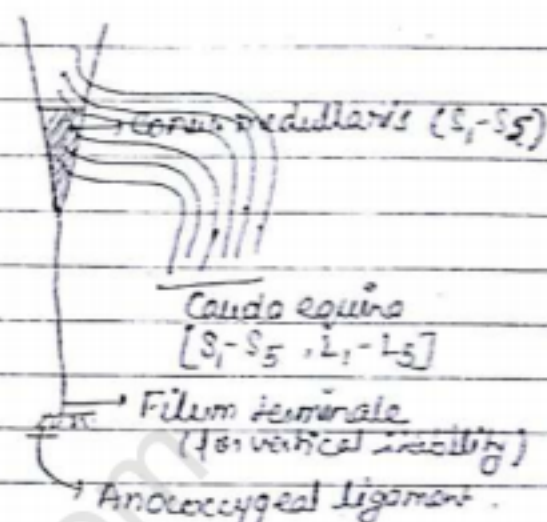
Adult = L₁

Subarachnoid space = S₂

if filum terminale = small

Kla tethered cord syndrome

causes neurological deficit



Conus medullaris syndrome: → [S₁-S₅ #]

m.c.c. of spinal cord = 2°

m.c.c. of tumor 1° = glioma

benign tumor = meningioma

vascular tumor = hemangioblastoma

to Δ

① Ankle jerk - S₁, S₂

→ disappears / -ve

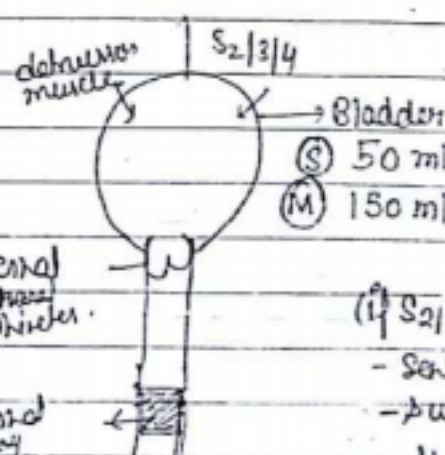
② Knee jerk - L₂/3/4

→ Preserved

③ Sensation of perineum - S₂/3/4

→ Saddle anaesthesia

④ Bladder - S₂/3/4



⑤ 50 ml urine - aware → motor
⑥ 150 ml - urge → sensory

(if S₂/3/4 damage) = **LMN bladder**

- Sensation (no)

- Urge (no)

- flaccid bladder

Pudendal

⑦

Can ↑/↓ I/O of urine pressure

if denervated bladder

- Overflow incontinence

- & involuntary passage urine

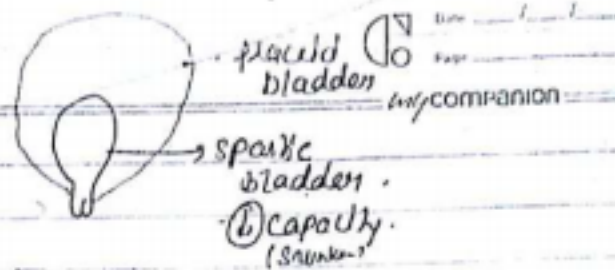
Post void residual

size

→ UTI

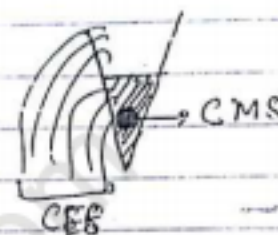
(catheterised)

[Choice] → spastic bladder
 w/ incontinence
 ↓
 (recurrent urge of urine)



Cauda Equina Syndrome: (L₁-L₅, S₁-S₅)
 (same side of damage)

- ① Ankle Jerk (AJ) → ⊖
- ② Knee Jerk (KJ) → ⊖
- ③ Sensation perineum → saddle anesthesia
- ④ Bladder → overflow incontinence



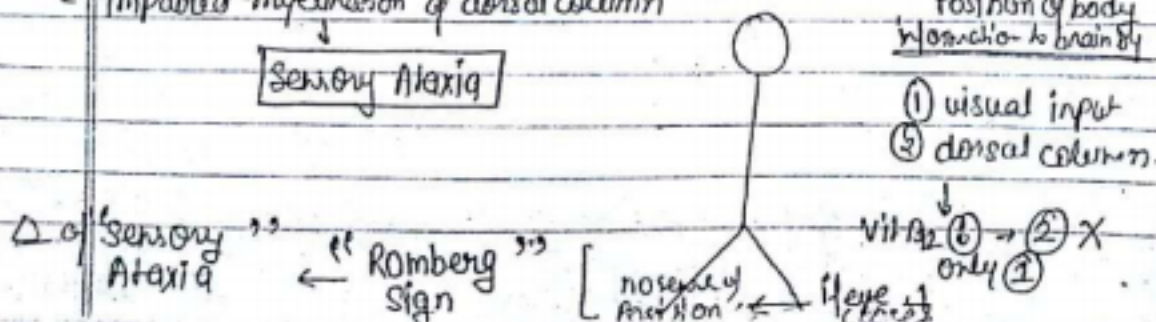
- Best clinical finding to differentiate CMS to CES → knee jerk

	CMS	CES
m.c. in	Tumor	Trauma
CF	Bladder complaints	Radicular pain
	AJ: ⊖	⊖
	KJ: ⊕	⊖ I/L or B/L
	- Saddle Anesthesia	
	- Overflow incontinence	
	- MRI spine	
		folic acid ⊕ = 3-5 mth.

③ Subacute demyelination of spinal cord:

- Vit B₁₂ ⊕ = veg. diet (even not take milk) = 3-5 yrs.
- impaired myelination of dorsal column

Sensory Ataxia



folic acid - FOLU test
(Jejunum)

2) Impaired myelination of Cortico-spinal pathway

2- spasticity I/L or B/L : clonus (+)

3- B/L DTR

4- Babinski sign (+)

Inv:

① MRI spine → demyelination (b) it also occur in Cauda E- sy-

② B₁₂ deficiency test

① S. vit B₁₂ level (↓)

② methyl-malonic acid (MMA) (↑)

③ Homocysteine (↑)

④ Schilling test (Radioactive dye - so not used after 1960s)

Rx:

inj. vit B₁₂ (i.m.) (

Oral vit B₁₂ (lifetime)

Cause of B₁₂ deficiency

① vegan diet

② Type A gastritis (Intrinsic factor ↓)

③ Chn-pancreatitis

④ Ileum ds = Crohn's

✓ Bacterial overgrowth syndrome



Cabot ring

① Anemia : Macrocytic (A)

✓ Pallor + / Jaundice +

② peripheral smear

✓ Hypersegmented neutrophils

✓ RBC size (↑)



Compare
small lymphocyte
to RBC size

macrocytic lymphocyte


 Date _____
 Page _____

my companion

② Subacute demyelination

 spinal cord : sensory Ataxia
 spasticity

 MRI spine + S. vit B₁₂ ①

Rx:

 Oral vit-B₁₂ + folic acid supplementation

Q:

 if given folic acid table alone
 CNS features worsen
 (b/c B₁₂ divert to form RBC)

4) G.B.S. : involves

- sensory
- motor
- autonomic
- Bladder → usually not involved.

- Campylobacter jejuni (etiology).
- acute dysentery

Rx

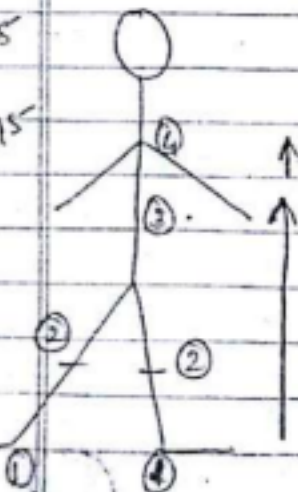
Quinolones : Symptoms ①

 Antibody agins it
 cross react c myelin

demyelination start

segmental demyelination

- take 2 wks approx to appa-

 Biceps = C5
 triaplex = C5/4/5


① flacid paraplegia

② Tone ①

↳ truncal paralysis

③ Quadriplegia

④ diaphragmatic paralysis

 ⑤ CO₂ ① : CO₂ narcosis

Pulses bounding

ET-IPPV

 ⑤ neck muscle paralysis
 (neck floppiness)

Resp.

acidosis.

GBS

distal areflexia (earliest symptoms/manifestation)
Ascending symmetrical flaccid paralysis.

⑥ Tth (N) (B/L) LMNL

- k/a Facial Diplegia

- continuous drooling of saliva

(also seen in

① Sarcoidosis

② Melkersson Rosenha Syndrome

⑦ paresthesias

⑧ T₄-T₈ → sympathomimetic ♡

#

#

Bradycardia
Hypotension

Vasoconstriction ++
Hypertension

labile BP

(Autonomic insufficiency)

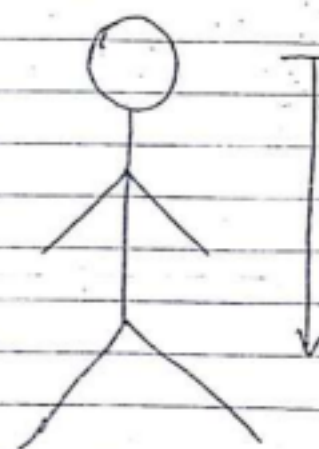
variants

① Acute motor Axonal Neuropathy → AMAN

② Acute motor + sensory " → AMSAN

③ Acute inflammatory demyelinating neuropathy → motor + sensory + Autonomic involvement
(AIDP)

peripheral (N) also involve



④ Miller-Fisher Syndrome

O: Ophthalmoplegia → mc (N) = 3rd N palsy

A: Areflexia

A: Ataxia: sensory

Inv:

① L.P. = CSF (L₃-L₄)

Quincke / spinothoracic needle 25G

lateral decubitus position > sitting position . .

dirⁿ of needle : cephalad :

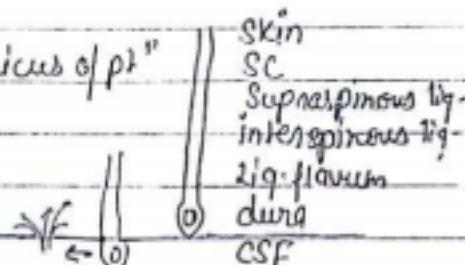
"aim for umbilicus of pt"

L.P. = CSF

- clear
- pressure (N)
- cells (N)
- Blood sugar (N)
- Proteins (H)

Ka Albumino-Cytological Dissociation

↳ also seen in
Froin syndrome



↳ Headache post L.P.
Bed Rest / diclofenac

> 12 hrs → Caffeine i.v.
Pain

> 24 hrs → **low volume blood patch**

(self blood inj. inside 5-10 ml)

most effective method for pain control
clot seal the tear in dura

Froin syndrome :

- Spinal cord block
- due to either tumors or TB (pus)
- C

② MRI spine : demyelination

③ Nerve conduction velocity : (N)

↳ H-Reflex latency period (H)

④ **IOC for GBS :**

Anti-GM₁, AB line : GBS

anti GQ, AB : miller fishes

Rx: ① IVIg x 7-10 days = TOC
 Single day delay in tx = 10% ① chances even of walking again
 Steroids C/I = GBS ^{dissemination}

② plasmapheresis (equiv. efficacious)

③ Ventilator support
type II R. failure : $CO_2 \uparrow$

DD of GBS

① Transverse myelitis
URT inf. | : Rx : Resolution symptoms.

> 2 wks : A/B → inflammation of spinal cord.

① flaccid paraplegia

② Ascending paralysis

③ Resp. insufficiency

④ sensory : sensory level (below this)
- girdle like pain
- Burning pain
Pain +++

⑤ Bladder - overflow incontinence (+nt)
S=3/4

Inv

MRI spine : inflammation

Rx:

iv methylprednisolone X 7 day (7-10d)

→ progression to touch 4 wks

GBS : paralysis to a day or wk

Legs	1	1	1
Trunk	2	2	2
Arm	3	3	3
Diaphragm	4	4	4

① Inque.

progression of symptoms

> 4 wks

↓

CIDP.

Chronic inflammatory
demyelinating
polyneuropathy

CIDP

Rx: DOC = steroids

spinal shock:

- spine #

Rx: iv. methylprednisolone

Cervical #

(0-7 day)

① flaccid quadriplegia

② Areflexia

③ fasciculation

④ Superficial Reflex $\ominus$

⑤ Resp. insufficiency

Tracheostomy
Portable ventilator

>7 day

Bulbocavernosus Reflex $\oplus$

below the
level
of lesion

spasticity

DTR brisk

Cervical spine # $\rightarrow$ Resp. insufficiency

$\rightarrow$ wheelchair

if spinal cord # T₁ - L₁ # $\rightarrow$ Arm spares

- autonomic insufficiency

crutch

>L₁ # $\rightarrow$ cauda equina syndrome $\rightarrow$ mobility $\oplus$

M. q. n. a. s.:

- autoimmune

- type 5 > type 2 Hypersensitivity Rxn

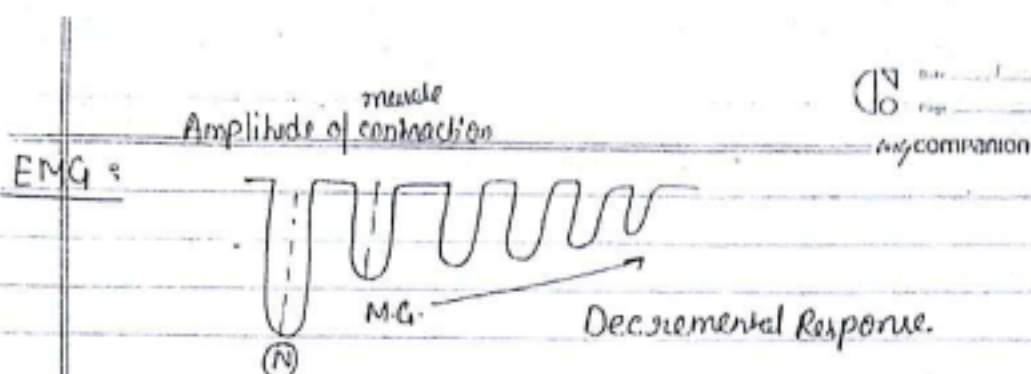
$\rightarrow$ Anti-Ach $\oplus$ blocking A/B

- 65% pt. of M. q. n. a. s. $\rightarrow$ Thymus Hypertrophy

- 10% " " " - Thymoma

Ca channel
open
Ach.

• • • • •
skeletal
muscle



diurnal variation of symptoms

① ptosis (earliest manifest)

- B/L

- Asymmetrical

- Sustained upward gaze > 30 sec

② Diplopia

③ (Frowning) SNARLING FACIES

④ Jaw muscle weakness

(Chewing muscle weakness)

and dysphagia

Pharyngeal

Genioglossus

Stylopharyngeus

Uvulopharyngeus

⑤ Shoulder girdle weakness

- difficulty in combing of hair

⑥ Pregnancy: M.C. worsening

M.C. crisis

- diaphragmatic paralysis

Rx: IVIg (TOC)

if ↓ PO₂, ↑ PCO₂ →

Rx: ET + IPPV (earliest 1/2)

⑦ neonatal M.C.

neonatal

transient M.C.

b/c A/B drops 4-6wk

transplacental spread: IgG

- failure to establish respiration

- Breast-feeding problems

↳ Rx: neostigmine drops (4wks)

- good prognosis

b/c contraction makes not itself.

M. gravis.

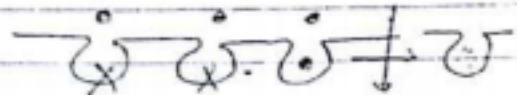
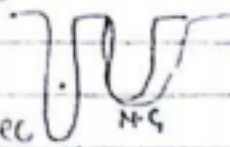


inv ① Tensilon test → most sensitive test for Δ M-G.

Edrophonium

onset > 30 sec

peak - 2 min



cholinesterase

Ach: ++ duration of action

↑ AOP

↑ twitch duration

strength of muscle

Suspected M. gravis ②

① sustained upward gaze > 30 sec

↳ ptosis ④ B/L

② iv 10 mg edrophonium (2 mg shot)

onset: > 30 sec → ptosis ↓

2 min → ptosis ④

> 10 min → ptosis ④

20% can
cause
soda
OT no nrd

Cholinergic crisis

S Salivary gland + : hyperalivation

L Lacrimal : lacrimation

U U-Bladder : urination

G GIT motility : diarrhoea

E eyes : miosis

SLUDGE Symptoms

Rx: i.v. Atropine

false ④ in: motor neurone dis

② Ice-Pack test

- non-invasive test

- sensitivity equal to Tensilon test

H 13

→ Tensilon test to be done "only in difficult to diagnose cases"

75% Thyroiditis < 6% T4 ↑
10% Thyroiditis
25% Thyroiditis → TB - MUSK (PSE)

① ...
② ...

myotonia

INUS

blocking

- ① anti Ach Receptor, A/B titers → most specific
- ② IOC : Single fibre electromyography (EMG) : JITTER
- ③ Repetitive Nerve stimulation test
- ④ CT test : Thyroid +
- mass effect
- ⑤ Hashimoto thyroiditis [coexist c MG (autoimmune disease)]
[anti TPO A/B] anti-thyroglobulin, anti-mitochondria A/B
- ⑥ if all tests
⑦ Tensilon test

Px

TOC : Thyroidectomy

DOC : Pyridostigmine (10mg/day)

Pyridostigmine →

CI

Cross RBB

Central Action

Ocular M.G.

• Thyroiditis - (N)

• Thyroidectomy - (C/I)

• Anti M.U.S.K. A/B

[muscle specific virus antibody]

TOC : steroids

DOC : Pyridostigmine

GLUT 1-9 & GANONG

 Date: _____
 Page: _____
 Self-companion

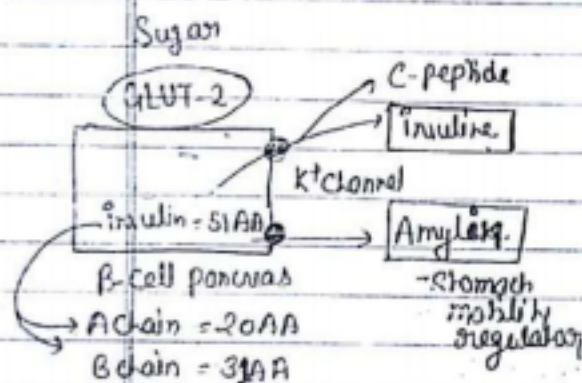
Diabetes Mellitus

type 1

type 1.5 → L.A.D.A → Latent autoimmune Diabetes in adult

type 2 (m.c. type)

MODY (Rare)



type 1 DM

Rx: Insulin

- > 90% # of β-cell pancreas
- C/F to appears (before it's honeymoon phase)

Causes

① autoimmunity

HLA DQ2, DR3, DR4

② Fulminant diabetes

 ↳ Coxsackie, B virus
 mumps, Rubella

③ Hemochromatosis: Iron ++

- Bronzing skin

- Cirrhosis

Pancreas # β cell ↓ : Type 1 DM

↳ k/a Bronze Diabetes

④ Tropical diabetes

PEM grade II/III / starvation ⇒ WASTING

(extremely poor people)

Atrophy organs

↓ Anorexia

exocrine > endocrine (malabsorption) (type 1-DM)

② type 1.5 (Variant of type 1)

- Latent autoimmune diabetes in young

① - Anti-glutamic acid decarboxylase A/B ⊕ (GAD)

② - Anti-islet cell A/B (ICA)

③ type 2 : Insuline Resistance

- polygenic inheritance (defective gene) ^{due to}

① - Apo [Adipokines ⊕] [↑] fat deposition
obesity ⊕

② [Adiponectin ⊕] [↓] : guardian angel against obesity

③ [Resistin ⊕] [↑]

Rx : diet control (Carbohydrate ⊕) ^{take} - low glycemic index → oats
Brown rice, multi-grain, etc.
2) exercise (Jogging) → GLUT-4 ⊕ (muscle)
promotes entry of sugar into muscles

3) OHG (oral hypoglycemic drugs) :

4) insulin

40 yrs = DM

Father = ⊕

Grandfather = DM

(Skipping of generation)

④ MODY.

- maturity onset diabetes in young

- peak age of onset = 25 yrs

- Autosomal dominance

- MODY 1-6

- m.c. variety MODY-3 (India/USA)

Chr 12 #

HNF-1 α gene #

⊕ ^{history of consanguinity} type-2 DM

RTA (insulin therapy) = ⊕

✓ 25 yrs male

Routine blood screening = ⊕

no symptoms

Father = DM

Grandfather = DM

↓
M.O.D.Y.

RTA (insulin therapy) = ⊕



Date: ____/____/____

Page: ____

	Insulin		Rx	Comparison
type 1	①	Autoimmune	Insulin (S.C)	
1.5	②	"	" "	
2	↑	Polygenic	OHG: metformin	
MODY	N	AD: ch 12 # HNF 1α # MODY-3	OHG: Sulfonylureas	

C/F

① Polyuria : Osmotic diuresis

RBS > 180 mg : Sugar comes in urine

 ② Osmoreceptor = Organum vasculosum lamina terminalis (OVLT) ^{stimulation}

- Polydipsia

③ Polyphagia

④ T1DM : ① wt loss

Sugar cannot enter in muscle.

burning of subcutaneous fat oxidation

FFA

Ketones → energy

Protein # → AA

⑤ Children : loose folds of skin (like old age)

: growth retardation

: prone to D. Ketoacidosis (D.K.A.)

: pneumonia, UTI

⑥ T2DM :

wt. gain

Obesity BMI > 30

morbid ① > 40

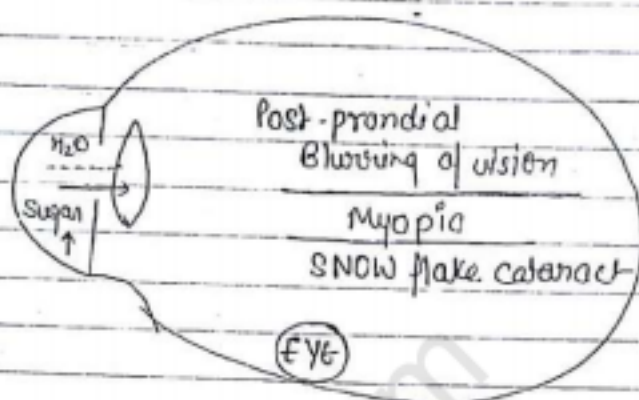
Super ① > 50

⑦ GDM : Recurrent vulvovaginitis

Candida ①

UTI : E. coli : incidence

⑦ ♂ DM : Balanitis
UTI



⑧ M.O.D.Y.

- asymptomatic
- by chance

	to child
Type 2 DM ♂ Type 2 DM ♀	40% chance
MODY any parents	75% chance

inv:

① HbA1c $\geq 6.5\%$

(Retrospective test = 8-12 wks sugar profile)

② FBG

$< 100 \text{ mg\%}$	100-125	$\geq 126 \text{ mg\%}$
75gm glucose		
2hr value $< 140 \text{ mg\%}$	140-199	$> 200 \text{ mg\%}$
	impaired glucose tolerance	D.M.

GTT : 100 gm glucose
0.1, 2 hr glucose

GCT : 50 gm glucose
0.1, 2 hr

Acute
Renal failure
risk factor

HyperTG (triglycerides)
HyperCa²⁺

		Target in Δ DM pt	DM companion
③ lipids ① : (accelerated atherosclerosis)	Cholesterol	< 200 mg %	(N)
	Triglycerides	< 150 mg %	↑↑↑
	LDL	< 100 mg %	(N)
	HDL	♂ 40 ♀ 30	↓
		< 70 mg %	

Rx: Hypertiglyceridaemia
↑ TG
Cholesterol (N)

Fenofibrate

④ Urine = sugar / ketones / protein
(N) person ⊖ ⊖ ⊖

24 hr
Protein in urine in (N) person
< 150 mg / 24 hr.

1 comparison

Glomerulus	Tubules
Albumin	Tamm Horsfall
< 30 mg / 24 hr	< 120 mg / 24 hr

Screening for D. Nephropathy:

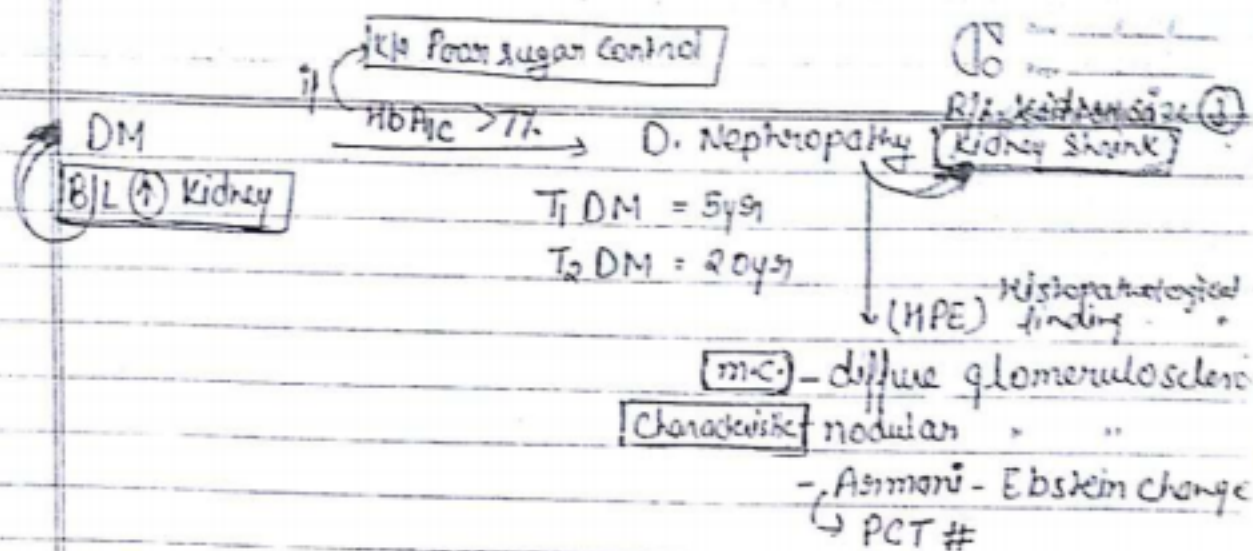
① Urine microalbuminuria (+)
(Best test) for Δ

Urine prot kit: ⊕ prot
> 1 gm / day

Rx:
low dose ACE ⊖
Candesartan 2.5 mg
↓
Slow the progression towards
development of E.S.R.D.

in DM
Glomerulus
↓
microalbuminuria
30-300 mg / 24 hr
(albumin)

S. Creatinine
appears
(> 60-90%
kidney damage)



Chronic Kidney disease (CKD)

GFR	< 60 ml/min/1.73 m ² X 3 months
Hemodialysis dose	GFR < 30 ml/min/1.73 m ²
Transplantation (allogeneic) 1st degree	< 15 ml/min/1.73 m ²

- Ques
- ① polyuria
 - ② polydipsia
 - ③ wt. loss
 - ④ polyphagia
- } not a classical symptoms of DM

Method of Δ of D.M.

- ① Older
Classical symptoms + RBS ≥ 200 mg%.
 - ② newer
Asymptomatic FBS > 126 mg%
2hr > 200 mg%.
 - ③
Asymptomatic HbA_{1c} ≥ 6.5%.
- ✗ Post prandial sugar
↳ never use for Δ of D.M.
↳ use only for follow up.

Phenformin (withdrawn) - Lactic acidosis.

Due _____
Page _____
Date/Companion

Rx:

① Type 2 DM

① OHG (oral hypoglycemic drug)

① Biguanide

MOA: ⊖ Hepatic gluconeogenesis.

HbA1c ↓ [↓ 2% fall]

	HbA1c	10%	9%	8%
best test for				
- long control of DM		X25	X25	X25
- 1st Best test		250	228	200
- Retrospective		Ⓢ blood sugar ≈ 8-12 wks		

test for

Short term control of DM

↳ S. fructosamine

Retrospective test ≈ 3-4 wks

Long term control of Bronz diabetes

↳ Glycated Albumin

① Metformin : 500mg / 850mg = 1gm

maxi. ≈ 2.5 gm/day

↳ taken c meal

S/E - N/V

B₁₂ ↓

Lactic acidosis (if pt. have kidney #)

• excreted via kidney.

DOC for DM, obese = metformin

DOC for DM, obese c nephropathy = Tolbutamide

↳ lives metabolized
GLP1ide
(compliance better)

↓ if HbA_{1c} even not ↓

Page _____
Date _____

my companion

② Sulfonylureas

MOA: ↑ Burst of insulin
↑ Receptor sensitivity

HbA_{1c} ↓ [1-2% fall]

S/E

① Hypoglycaemia
→ Palpitation, Anger
→ Irritability, Confusion
→ Excessive sweating

(<54 mg %) cutoff

Rx: sugar intake

Symptoms persist

Silent MI suspect

③ Thiazolidinediones

MOA: ↑ GLUT 4 receptor

↓ S. TG

↓ Hepatic gluconeogenesis

HbA_{1c} ↓ = [1% fall]

① Rosiglitazone } O.D.

② Pioglitazone

④

↓ P.P. spike post prandial spikes

α-glucosidase

MOA: ↓ dietary absorption of sugar

HbA_{1c} ↓ = 0.25% fall

① Acarbose

② Voglibose

③ Miglitol

S/E

Osmotic diarrhea

⑤ Meglinide

MOA: ↑ Burst of insulin

↑ Receptor sensitivity

(short acting)

t_{1/2} ⇒ 1-2 hrs only (so for P.P. spike only)

① Nateglinide

② Repaglinide

S/E: Hypoglycaemia

Page _____
Date _____
Page companion

⑥ iv glucose 10gm

in (IV) person

iv glucose 10gm = Blood sugar $\uparrow\uparrow$

Oral " " " $\uparrow$

enterocytes = ileum = L cells

GLP-1

glucose like
linked insulin-
analogic peptide

Send sugar into
muscle.

1-2
hr

DPP-4 inhibit
GLP-1 in
1-2 hr.

⑥ DPP-4 $\ominus$
dipeptidyl peptidase 4 $\ominus$ (oral)

① Sitagliptin

② Saxagliptin

③ Vildagliptin

⑦ **Insulins** = Parenteral (s.c.)

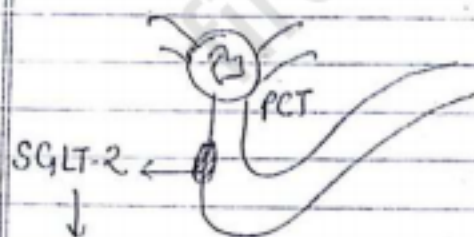
MOA: $\uparrow$ production of GLP-1

① Exenatide (s.c.)

② Liraglutide (s.c.)

Polymers - once a week
(Only antidiabetic approach
where drug gives once a
week polymer of
exenatide)

⑧



SGLT-2 $\ominus$

promote urinary loss of sugar
① **Canagliflozin**

Stimuli
like
Hormone
not Antidiabetic

drug
Rx: Type 1 & type 2 DM both

- ① Pramlintide → MOA: stomach emptying ①
- ② insulin (regulating entry of sugar in SI)

Insulin:

① Basal / PanK insulin

- lipodystrophy
- insulin Resistance

② DNA - Recombinant technique

- C-DNA
- SI AA

		Onset	Total Actn
① Insulin Aspart	SC	20 min	4 hr
② Insulin-Lispro	SC	20 "	"
③ Glulisine	SC	20 "	"

Regular ① SC 30 " 4-6 hr
 ↳ i.v. = used in emergency
 D.K.A.
 Non Ketotic hyperosmolar coma
 K⁺ ①

Lente

Glargine : 24 hr
 (Basal time insulin)

Delemis 24 hr (longest acting insulin)

Site:

1) abd. wall (umbilicus)

Arm / thigh

delivery

① insulin pump = microprocessor : Basal insulin
 most effective delivery Basal insulin → start eating
 Cartridge (pre-filled insulin)

② Insulin pen : 31 G lancet : painless delivery

③ Inhaled insulin :

- Alfrezza (brand name)

④ multi-dosage vials insulin

+ 1 ml syringe

Pre-filled syringe : 0.5 ml / 50 U

3/E of insulin :

① wt. gain

② hypoglycemia

(extra) more dose take

Overall
m.c. complication
of insulin

Somogyi phenomenon

- early morning hypoglycemia

Sym + : palpitation, tremor, sweating

Mx : dose correction

↳ Bed time

Insulin
secret

③ **DAWN Phenomenon**

(less I)

- early morning hyperglycemia

- self monitoring Blood glucose : glucometer

fasting : 300 mg %

P.P. : 200 mg %

Mx : dose regulation

↳ at bed time

Microvascular Complications :

① Retinopathy : Blindness X25 ①

② Neuropathy : non-healing ulcer

③ Nephropathy : CKD → **ESRD** : < 15 ml/min GFR

Control of HbA1c : < 7 HbA1c

↳ ↓ micro complication

Macrovascular Complication:

① CAD : MI $\times 5 \uparrow$

② PAD

↳ Peripheral Arterial Disease

$\times 100$ times $\uparrow$

② = by strict BP control

Diabetic Retinopathy:

fundus : microaneurysm (leakage)

③ Exudates form
Inner nuclear layer

non-proliferative Retinopathy

↳ (macular edema) $\oplus$

m.c.c. of visual loss
in D. Retinopathy

Proliferative Retinopathy

Neovascularization
vitreous hemorrhage

Tractional Retinal detachment $\rightarrow$ m.c.c. of
blindness in Diabetes

Tx Pan-Retinal photocoagulation

Nd : YAG LASER

+
inj Bevacizumab (Intra-vitreal)
[anti V.E.G.F.]

- Best way to prevent blindness in Diabetic = $HbA_{1c} < 7\%$

If $HbA_{1c} > 7\%$

blindness

T1DM = 54%

T2DM = 204%

④ Incidence of Retinopathy in DM

S. Homocysteine = $\uparrow$

S. Creatinine = $\uparrow$

Homocysteine ↑

- ① MI
- ② Stroke
- ③ D. retinopathy progression
- ④ Alzheimer's severity

Mx: B6/B12

food fortification to reduce homocysteine level

ADRENAL GLAND:

- Asymmetrical gland (only endocrine gland)
- One pyramidal, other semilunar

CRH

↓
ACTH

Conical
only 2nd layer
(Hercules)
not 1st 3rd
layer of
gland

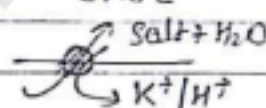


medulla

epinephrin > Norepinephrin
60% 40%

① Glomerulosa: aldosterone

ENaC



② Fasciculata: Cortisol
Sugar/stress

③ Reticularis: DHEAS

pheochromocytoma: NE > E

Short: 10 minutes case of coma

 08/03/17
5th class

 Possible causes of
Unconscious diabetic GCS = 8

- ① Hypoglycemia
- ② D.K.A.
- ③ Non-Ketotic Hyperosmolar coma
- ④ Lactic acidosis

 Reversible
Cause of
Coma

 only medical condition
used glucose not
all hypoglycemia
Non-Ketotic D.K.A.
(Glucose 6-phosphatase)
(Hypoglycemia due to
low glycogen)
↑
glycogen and/or
glucose-6-phosphatase

Investigation

 (A) Blood sugar 45 mg%.
Rx: iv 25-50% Dextrose.

 Seizure: iv [failed to get iv access]
(hypoglycemia)

[inj. glucagon (s.c.)]

inj. Adrenaline (s.c.)

{ early hypoglycemia

(B) if Blood sugar is 300 mg%.

↓ check

	(N)	① Possibility	②
pH	7.35-7.45	< 7.35	< 7.35
HCO ₃ ⁻	(22-26)	< 22	< 22
urine ketone		+	-
Blood sugar		300 mg%	300 mg%

D.K.A.

lactic acidosis

Adrenaline

iv: V-fibrillation / Atrial fibrillation

im: Anaphylaxis

sc: hypoglycemia

 inhaled: Laryngotracheobronchitis
(diabetic) (Croup)
Branched cough

Honey bee sting

iv hydrocortisone

(s.c.)

im Atel

(Phephamine)

Bivacort

iv adrenaline

 Angioedema
(non-pitting)

← ACE ⊖

Site: lips, tongue, swollen abdomen

- woody induration

- Bradykinin ⊕

Rx: ICATIBANT

DANAZOL

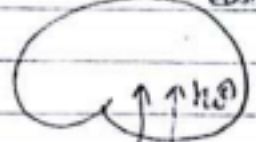
(C) pH 7.38

 HCO₃⁻ 24

U-ketone ⊖

Blood sugar 1000 mg%

cerebral edema



BBB

sugar

 ↓
urine slows

 Non-ketotic
Hyperosmolar coma

- ↓
- Rx:
- 1) airway control (TV way of Mx)
 - 2) iv normal saline
 - 3) insulin drip

↳ + sugar entry into cell

↓
 so ketone : production stop

RL

- 1) Burns
- 2) Cholelithiasis

↓

DKA

↓

- Insulinopenia

- acidosis : K^+ efflux out of cell

↓
 $K^+ \uparrow \uparrow$

- Insulin drip : K^+ influx into cell

↓
 $K^+ \uparrow$

Complication of H/H DKA

↳ hypokalemia (Resp. paralysis)

1° death : Add KCl + NS drip

Complication of H/H NKHO

NS = 10 L over 48 hr :

↳ water intoxication

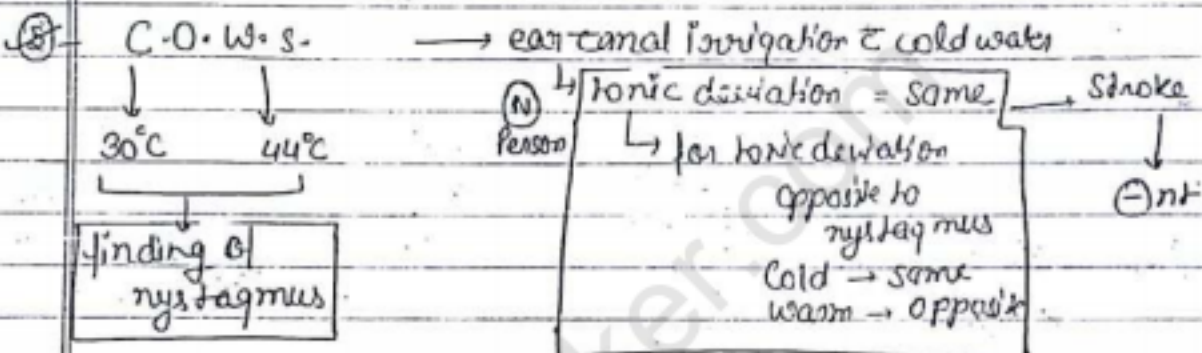
large amount administration


 Date ____/____/____
 Page ____

My companion

Acute audiosis :
STROKE : BRAIN DEATH (Criteria of)

- ① - Irreversible Coma (GCS < 7)
- ② - Light Reflex ^{Rec. value} (2,3) = pupil dilated
(midbrain) = NO Rxn to light
- ③ - Corneal Reflex (5,7) = $\ominus$ Blnk B/L
(Pons)
- ④ - Gag Reflex (9,10) = $\ominus$ cough
(medulla)



⑦ - Oculocephalic Reflex $\Rightarrow$ Absent
(Doll eye reflex)

⑧ - Disconnect from ventilator

PCO₂ ↑ $\rightarrow$ stimulate R. centre

b/c even absence of spontaneous breathing effort

⑨ - EEG (20 electrodes) = FLAT isoelectric line > 30 min.

MR-A $\Rightarrow$ Brain stem
Blow flow signal $\ominus$ nt

for declare pt as brain death $\xrightarrow{\text{2 doctor signature}}$

↓

organ transplantation team

① Heart : D.C.M / R.C.M. / HOCM

② Lung : single lung Tx → COPD : emphysema
 B/L → Cystic fibrosis

③ Liver : ~~MCA~~ HCV

④ Kidney : Diabetic nephropathy

⑤ Pancreas : type 1 / 1.5 DM.

↓ donor β -cell extract

Recipient

(Portal vein)

→ β cell go
 in liver
 (produce insulin)

⑥ Short bowel : CROHN'S ds

Organ Harvested

delhi → Ahmedabad
 (1 1/2 hr) transported via

UNIVERSITY OF WINCONSON
 SOLUTION

shelf life maxi. = liver → 50 hr

mini. = small bowel → 8 hr

ADDISON DISEASE

↓ involves only Cortex layer (1,2,3)
b/t not medulla

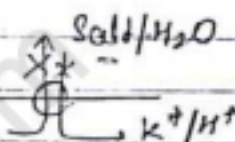
↳ m.c.c. (India) = TB
(world) = Autoimmune

- ↓
- ① aldosterone
 - ① cortisol
 - ① BHEAS

C/F:

- ① ① aldosterone

- ↓
- salt wasting → salt craving
 - polyuria $> 2 \text{ ml/kg/hr}$ $\Rightarrow > 3 \text{ L/d}$
 - postural hypotension
dizziness/vertigo



BP: supine $\xrightarrow{3 \text{ min}}$ standing
(SBP $\downarrow > 20 \text{ mmHg}$
DBP $\downarrow > 10 \text{ mmHg}$)

Δ of Postural hypotension

- inability to excrete K^+ → K^+
- H^+ → Metabolic acidosis

- ② ① Cortisol

- ↓
- Hypoglycemia : Sym ⊕
fine tremors finger
Diaphoresis, palpitation

① ACTH ① = partial melanocytes stimulating hormone like action

↓ hyperpigmentation

- Palm/sole crease
- areola/ groin/ axilla/ cubital/ossa
- Previous Sx scar
- Oral mucosa/ lips/ nails

③ Sex steroids ↓

- Libido ↓
- pubic hair / axilla hair → fall / loss of

Ix:

① Na^+/K^+ :

Na^+ ↓
 K^+ ↑

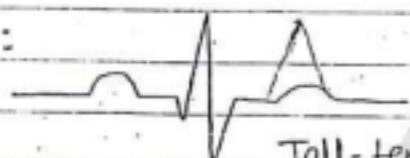
Aldosterone (always)

$\text{Na}^+ \propto \frac{1}{\text{K}^+}$ opp. dirn

Renal tubular cells

$\text{Na}^+ \downarrow \propto \text{K}^+ \downarrow$
same dirn

② ECG:



Tall-tented T-wave

[K^+ sample = 23G needle]

↓
Cause Hemolysis

K^+ of RBC efflux

no

ECG changes

← Iatrogenic hyperkalemia

↓
so always take thick bore needle

③ Imaging: CT abdomen

④ gene expert TB quantification

⑤ IOC: ACTH stimulation test

ACTH (1mg) → stimulation of 2nd layer of A.C. → cortisol ↑
sugar ↑

if gland damage → cortisol (not ↑ / or less ↑)
sugar (" ")

$R_2 =$ $BP(\mathbb{Q})$

= 6941 Hydrocarbonsol

Sugon® = oral dexamethasone

DOC = anal by dicarbonyl $\frac{\text{half of BP}}{\text{BP sugar}}$

Addiction CRISIS :

- 1) Sudden stoppage of steroids
2) Waterhouse, Frerichsen syndrome
 ↳ Meningococcus / pseudomonas
 ↳ adrenal hemorrhage

R_2 : hydrocortisone + IVF (NS)

Derque. Hemorrhagic fever

- ### 3) Adrenal Hemorrhage

SECONDARY ADDISON'S Ds

- (1) Stephen's Syndrome :

Q. PPH

Antiparasitic infection

ACTH④

Conkise (J) : J. Sugan

R_f : enol dioxanone.

TERTIARY ADDISON'S DZ

Hypothalamus damage (trauma / AVN / aneurysm / tumor)

↓ CRH ↓

ACTH 4

$\Delta \rightarrow$ control (1)

R₁ : endoxanthenone.

1° Addison's dis → TB autoimmune (w/d)
2° " " → Sheehan's Simmonds' dis (non-obstructive cause of pituitary dis)
3° " " → Hypothalamus damage
Addisonian Crisis → Sudden stoppage of steroids

1° AD	ACTH ↑	Hyperpigmentation ↑↑↑	Hydrocortisone
2° AD	ACTH ↓	Ent	dexamethasone
3° AD	ACTH ↓	Ent	dexamethasone
Crisis	ACTH (N)	Ent	i.v. Hydrocortisone

HyperALDOSTERONISM:

B/L adrenal
hyperplasia
(90%)

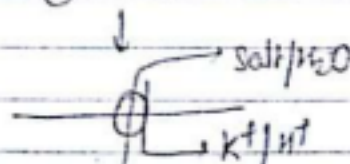
(m.c. cause)

adrenal
adenoma
(10%)

Conn Syndrome
(= adrenal Adenoma)

- m.c.c. of Aldosteronism → B/L adrenal hyperplasia
- m.c.c. of Conn syndrome → adrenal adenoma

↑ Aldosterone



① gain of salt/H₂O : BP ↑ Systolic ↑
diastolic ↑ $\approx \frac{120}{100}$

(isolated diastolic HTN presentation)

(IDHn)

CV
Comp
companion

m.c.c. of

- ① essential HTN
- ② Hypothyroidism
- ③ Conn's syndrome

② urinary loss of K⁺ → K⁺ ↓ → muscle cramp

③ H⁺ → H⁺ ↓ → metabolic alkalosis

④ gain of H₂O

↓ venous return ↑

Rt atria stretch → A.N.F. ↑

Cancel water gain by

[loss of water]

(gain of water = loss of water)

(no net gain of water) (counters balance)

↓
Pul edema absent

3P

⑤ Polyuria

⑥ Polydipsia

Inu:

① Na⁺ ↑

② K⁺ ↓

②



ECG ⇒

T wave ↓/absent

④ Ht of T wave < 10 mm

Hypok⁺ = small Qr

Hyperk⁺ > 10 mm

③ CT abdomen : imaging modality

Adrenal Adenoma / Conn Syndrome

B/L adrenal hyperplasia → Medical Mx.

↓
Sx resection

not hyperplasia

$$\frac{\text{Plasma Renin}}{\text{Plasma Aldosterone}} \text{ Ratio } \frac{\downarrow}{\uparrow} = \text{④}$$

Tumor (autonomous) - aldosterone ①

RAAS ⊖ feedback

Renin ①

Low Renin Hypertension

⑤ IOC Conn's / Hyperaldosteronism = Salt loading test

Rx:

: oral spironolactone
eplerenone ♂

B/L adrenal hyperplasia : life long Ht

Conn's tumor : electrolytes ①

to control BP

PAC fitness
↓
transmission

Lap. adrenalectomy U/L

Addison

Conn

Autoimmune

Autoimmune

Tumor of J¹ layer of AG

BP ①
K⁺ ①
H⁺ ①

①
①
①

hyperpigmentation

ACTH stimulation test

Cosyntropin test

pedal edema ⊖

salt loading test

renal parenchymal
/ arterial ds

B/L Renal ① slow

GFR ↓

Renin ①

BP ①

AD-CKD

GFR ↓

Renin ①

BP ↑

Ch. Glom. ds

GFR ↓

Renin ①

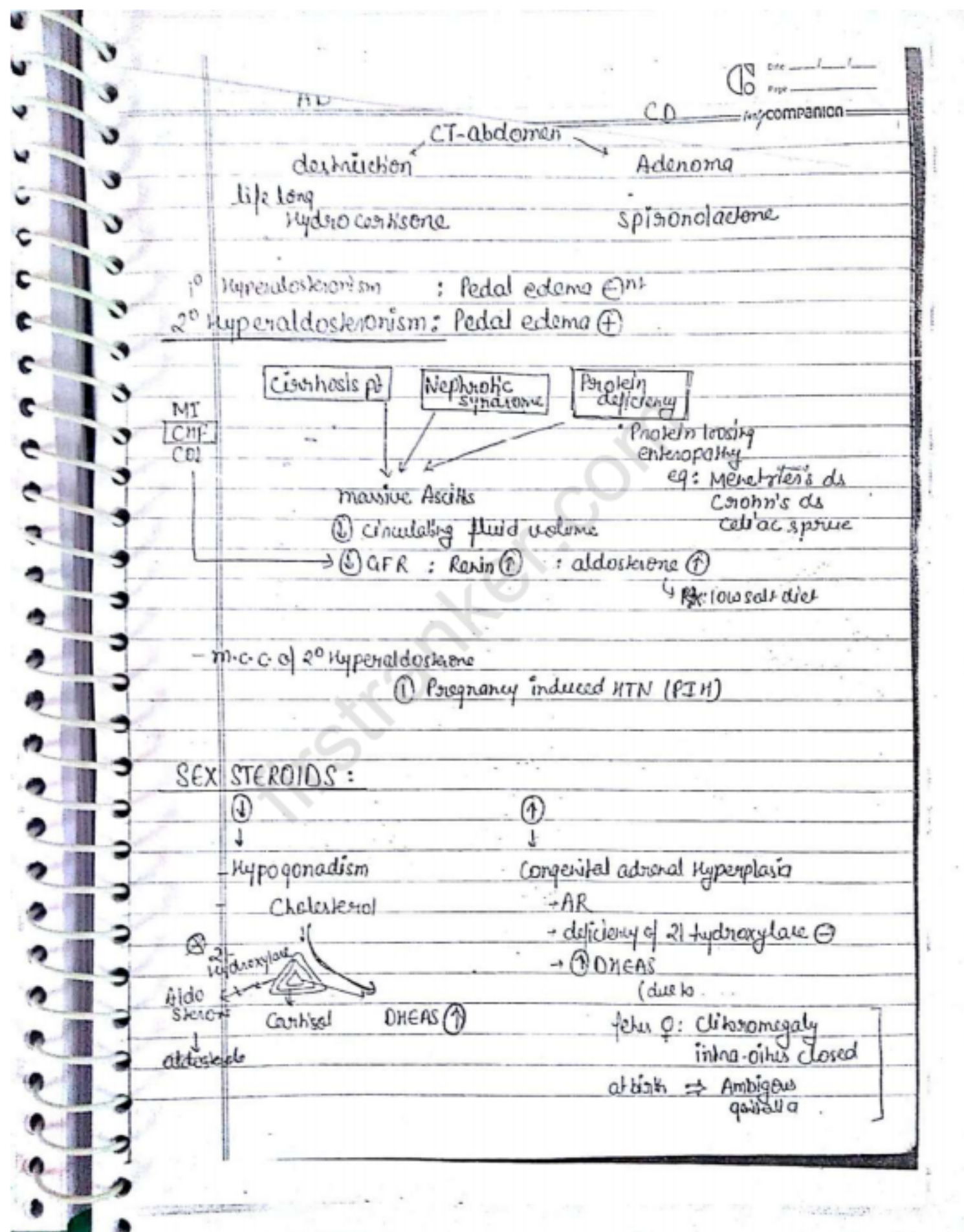
BP ↑

always

causes

High Renin

Hypertension



(ma - ma steroid) Q3 2018
 my companion
 fetus ♂ : (N) at birth
 precocious puberty
 {

- Short stature
- Aggressive
- muscular ⊕
(anabolic steroids)
- phallic ↑
- Pubic hair

HERCULES APPEARANCE

family H/O ⊕ : CAH

25% chance recurrence

Pregnancy 2 → if 17 keto-steroids ⊕ in blood of

17 keto-steroids ⊕ in amniotic fluid

17 keto-steroids ⊕ in maternal urine

Screening : 17 K.S. in maternal urine ⊕

ICH CAH : CORDOCENTESIS

if 17 K.S. ⊕

Rx:

if ♀ child

before birth
of child
highly
mother

Tab : dexamethasone

→ Severity ↓
of symptoms

→ fetal therapy

if ♂ child

• (N) genitals - at birth

→ Precocious puberty

⊖ by

• Euprolide (given at birth)
(antiandrogenic action)

21-hydroxylase $\ominus$

- ① aldosterone
- ① cortisol
- ① ACTH (MSH) = hyperpigmentation
- ① DHEAS = enlarged genitals

♀ neonate, home delivery

day 1: poor cry / low activity
sluggish Moro's reflex
clitoromegaly
hyperpigmentation around genitals

inv

Na = 130

K⁺ = 6

[① aldosterone]

dextrostix = 30mg% (↓ cortisol)

↓
Δ of CAH

baby after
birth CAH
Rx

Hydrocortisone
drops: life long

♀ → Clitoromegaly = "SHE"
[46XX]

>puberty: plastic sx

• Higher mortality in CAH
more in ♂ b/c

due to ① genitals

① BP ① sugar
no HT

(N) neonate BP : Oscillometric device
 (65/48 mm Hg)

DN

by combination

① 21-hydroxylase ⊖

♀ : Virilization
 Hyperpigmentation
 BP ⊕

② 11-hydroxylase ⊖

♀ : virilization
 Hyperpigmentation
 BP = 100/70
 (ie. Hypertension)

③ 17-hydroxylase ⊖

♂ : Ambiguous genitalia
 BP = ⊕ (HTN)

④ 17-hydroxylase ⊖

♂ : Ambiguous genitalia
 BP ⊕

For prenatal Δ of these condition

- ① • Cordocentesis
- ② • Maternal urine

fetal therapy : oral dexamethasone

(Severity ↓)

	Glucocorticoids	Mineralo-	Androgen	Gene	Δ marker
21-hydroxylase deficiency	deficiency	deficiency	↑	CYP-21A2	17-hydroxyprogesterone
11-hydroxylase deficiency	"	↑	↑	CYP-11B1	11-deoxy-Cortisol
17-hydroxylase deficiency	"	↑	deficiency	CYP-17A1	11-deoxy-Corticosteroid
3-hydroxysteroid dehydrogenase deficiency	"	deficiency	↑	HSD3B2	17-hydroxyprogesterone

Cushing Syndrome :

Cause (m.c.c.)

① iatrogenic steroids : Cortisol ↑

ACTH ↓

② Lung cancer (Oat cell ca)

ectopic

ACTH ↑

more than 10 stimulation
to 2nd layer of Adrenal

Cortisol ↑

hyperpigmentation.

③ pituitary adenoma → ACTH ↑

Cortisol ↑

(Cushing ds)

m.c.c. of Cushing ds : pituitary adenoma.

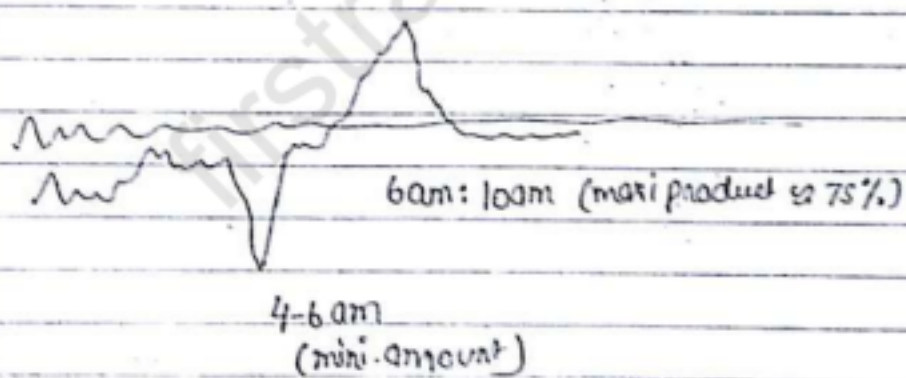
m.c.c. of Cushing syndrome : iatrogenic steroids.

④ Adrenal adenoma



Cortisol ↑ : ACTH ↓

C/F



Q. - earliest manifestation of Cushing syndrome : Loss of diurnal variation of Cortisol production.

- moon faces
- buffalo hump
- neck circumference ↑ : Obstructive sleep Apnea (snoring ↑)



• Striae (purplish)

• Thin skin

• Easy bruisability

• proximal weakness
myopathy

• wasting muscles
(arm, thigh)

• LEMON ON STICKS appearance

in pregnancy: pink striae

② wt gain

Peripheral Resistance

= HTN

③ Cortisol $\uparrow$ $\rightarrow$ Sugar $\uparrow$
Insulin Resistance

develop 2^o D.M.

FBS $\rightarrow$ > 126 mg/l

2hr > 200 mg/l

Rx: METFORMIN

④ Cortisol $\uparrow$

$\rightarrow$ partial aldosterone activity $\uparrow$ $\rightarrow$ ENac $\uparrow$ activate
Hypokalemic Metabolic Alkalosis
• muscle cramp

⑤ Cortisol $\uparrow$

$\rightarrow$ activates sex steroids Receptors

♀: Hirsutism
oligomenorrhoea
wt. gain

DiD

① P.C.O.D

② Cushing Syndrome
(rare)

⑥ ACTH $\uparrow$

• Hyperpigmentation

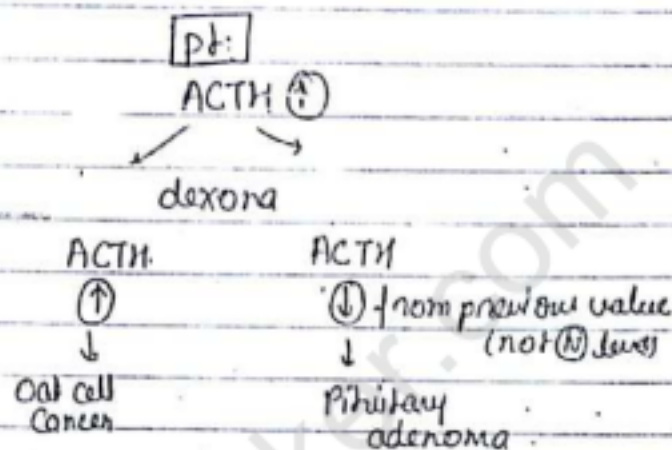
• ectopic ACTH produce = Oat cell Ca

• Cushing's = pituitary adenoma

ACTH $\uparrow$: Hyperpigmentation $\rightarrow$
1. iatrogenic steroids
2. adrenal adenoma

Ix:

① High dose dexamethasone suppression test: Screening test

 ② Low dose dexamethasone suppression test: IOC
0.5mg dexona TDS X 3 days


③ Imaging:

MRI head - pituitary adenoma

CT chest - cort cell ca

CT abd - adrenal adenoma

④ 24 hr. urinary cortisol ↑

⑤ Salivary cortisol (spot sample) ↑

Rx: depends on causes

① Iatrogenic steroids →

ocular M.G. = prednisolone X 5mg

 c/o: post-subcapsular cataract
wt gain ↑, sugar ↑, BP ↑

 ↓
• prednisolone ↓↓ (gradually taper off)

• Azathioprine (Steroid sparing Agents)

TOC

② Oat cell ca lung → ^{toxin} chemotherapeutic / Radiotherapeutic

• micro metastatic

• Brain > Heart > spine > Bone > Adrenal

Px:

Cisplatin + Irinotecan
Carboplatin Etoposide

③ Pituitary adenoma

<10mm microadenoma

≥10mm macroadenoma



Bitemporal Hemianopia

Px:

Trans-sphenoidal surgery

④ Adrenal Adenoma



Px: medical Adrenalectomy

oral: Ketoconazole (best drug)

i.v. Aminoglutethimide

i.v. mitotane



mass effect
invade both gland

Px:

B/L adrenalectomy

(i.v. Hydrocortisone) → during surgery

post-op

oral Hydrocortisone

(life long)

Post op visit

ACTH release ↑↑

Hyperpigmentation ↑↑↑

Prostaglandins

NELSON Syndrome

Hyperpigmentation: (+) = [CAN]

- | | | | |
|---|-------------------|----------------------------|------------|
| C | ① Cushing ds | : pituitary adenoma | } ACTH (+) |
| A | ② Addison ds | : 1° ADis = TB | |
| N | ③ Nelson syndrome | : B/L Adrenal Resection | |
| C | ④ CAH | (cong adrenal hyperplasia) | |

Hyperpigmentation (-)

- ① Iatrogenic steroids : ACTH (-)
- ② Adrenal adenoma "
- ③ Sheehan/Simmond ds "
- ④ 3° Addison ds "

PHEOCHROMOCYTOMA :

- Adrenal medulla
- Chromaffinoma
- NE (80%) > Epi (20%) (N) Epi 60% > NE (40%)
- dopamine : 0.01%

↳ pheochromocytoma producing dopamine

Kls Paraganglioma/
 Chemodectoma/
 Potato Tumor } neck area

- 85% benign, 15% malignant → for differentiation

• FNAC	not possible b/c destroy ② gland
• Biopsy ↑ (CT)	

MRI-abdomen

15% Cases : extra adrenal
 85% Cases : adrenal

• sympathetic ganglion/chain

Tx size can
 be as small as
 pin
 b/l
 high level
 resection
 of EN.

1st imaging modality : MRI - abdomen

Imaging modality of choice for

adrenal
Pheo

MIBG scan

[methyl iodobenzyl]
guanidine scan

Extradrrenal
Pheo

PET-DOPA

organal
Zucker-Kandl

Date _____
Page _____
FirstRanker.com

③ 10% familial

20yrs : pheochromocytoma : Sx

40yrs :

Kidney stones (Recurrent)

PTH (check)

Parathyroid Adenoma : Sx

boys : medullary Carcinoma thyroid

Klg

multiple endocrine neoplasia

[MEN : IIA → Sipple syndrome]

Chr. 10 defect

RET protooncogene

④ 10% Bilateral

C/F:
(triad)

P - Palpitation

H - HTN (episodic)

D - Diaphoresis

• episodic hypertension

• Postural hypotension

• Hypercalcemia

• Cafe-au-lait spot

• diarrhea

① $\alpha_1 \rightarrow$ Vasoconstriction [HTN: m.c.] presentation

② $\beta_1 \rightarrow$ HR $\uparrow$: palpitation

③ β_2 : muscles
↳ fine tremors fingers

④ Sugar $\uparrow$

FBS = 100-125

2hr = 140-200

(impaired glucose tolerance)

⑤ Catecholamine $\uparrow$: symptomatic $\oplus$
wt. loss (involuntary)

Anxiety Neurosis
misdiagnosed

Inv

① 24 hr urine : Catecholamines
(screening) Vanil mandelic acid level (VMA)
fractionated metanephrine

② IOC :
plasma fractionated metanephrine levels: $\uparrow$

③ MRI abdomen

④ if MRI abd $\rightarrow$ (N)

↓
MIBG Scan (85%) $\rightarrow$ if (N)

↓
PET Scan (15%)

Rx:

Pheochromocytoma

TOC : Surgery

DOC (HTN) : Oral phenoxybenzamine
(non selective α -blocker)

Palpitation : Propranolol
fine tremor



BP $\uparrow$
6am
 $\downarrow$
oral phenoxybenzamine
(early morning)

+
post breakfast
oral propranolol

$\alpha + \beta = \checkmark$

if propranolol
take 1st
 $\beta_2 \uparrow \rightarrow V.O. \#$
 $\alpha \rightarrow V.C. : \text{unopposed}$
BP $\uparrow \uparrow$

(HTN crisis)

($\beta + \alpha = \times$)

symptoms : control

PAC fitment $\oplus$

lap Rx : Tx resection

Intra op. HTN

2 i.v. line :

1st for anesthetic drug

2nd $\rightarrow$ i.v. phentolamine
(non-selective α blocker)

if Intra op HTN crisis : LVF

SpO₂ $\downarrow$, Guph $\oplus$, BP $\downarrow$

Rx : iv. NTG drip

① HTN crisis / emergency
iv Nicardipine

② HTN urgency
oral ACE $\ominus$

③ intra op HTN crisis
iv NTG drip


 Date: / /
Page:

my companion

Pheochromocytoma (Benign)

Rx:

 TOC : S_x [S_x C/I in malignant pheochromocytoma]

DOC:

 $\rightarrow \alpha$: phenoxybenzamine

 β : propranolol

intraop HTN : phentolamine

intraop HTN crisis : iv NTG drip

RAS $\Rightarrow$ Cause

20yrs ♀ : fibromuscular dysplasia

60yrs ♂ / smoker : Atherosclerosis

In India : ① TAKAYASU Arteritis

② Non specific Arteritis



TOC : Doppler > MRA

DOC : ACEI / CCB

 TOC : P.T.R.A $\pm$ stenting

 HTN = not usual ABCD
 ① Renal artery stenosis
 ② B/L Renal artery stenosis
 ③ Pheochromocytoma

U/L RAS = ACEI

 B/L RAS = C/I
 ACEI

 Percutaneous trans-
 luminal Renal angioplasty
 $\pm$ stenting
 (P.T.R.A $\pm$ stenting)

Carcinoid Tumor:

Argentaffinoma

5-HT derivatives : serotonin

Tryptophan

 $\downarrow$ availability

Niacin

Pellagra

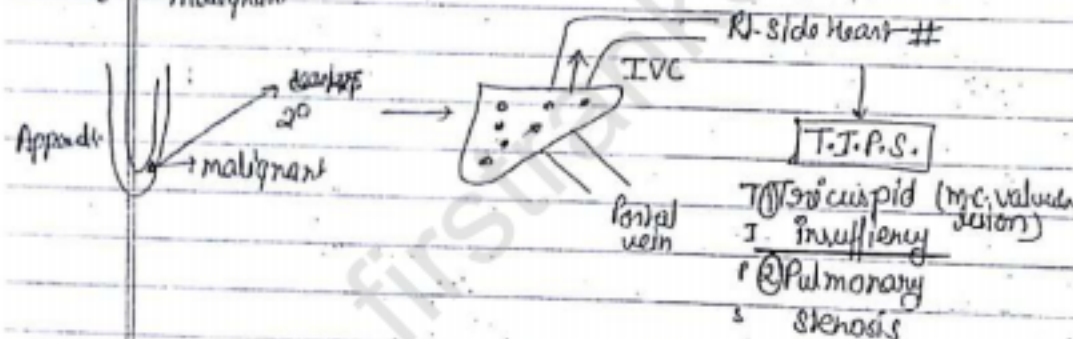
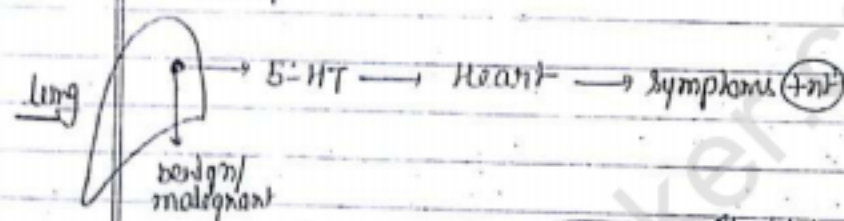
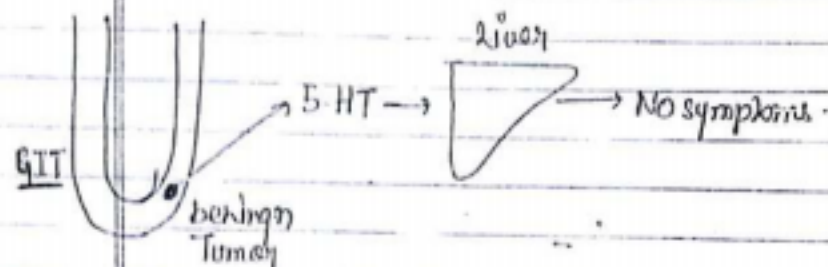
Histamine

Bradykinin

mc site :

GIT tract	28%
Bronchus	27%
ileum	14%
Rectum	13%
Appendix	1%

Uremia + Edeema + Anorexia → ify companion



• mc. valvular lesion in Carcinoid syndrome.

Tricuspid insufficiency : PSM for systolic

Pulmonary stenosis : ESM.

(ejection systolic murmur)

Carcinoid syndrome:

① Serotonin : GIT → secretory diarrhea

 ② Histamine H_1 → Pruritus

 ③ H_2 → Acid ① : epigastric pain

④ Smooth muscle airway → Bronchospasm (Rhonchi)

 [mixed as Asthma]
Wheeze (when Rhonchi
very loud
loud sound & whee)

⑤ TIPS → pulsatile liver (RV → RA)
- capsize intolerance -



Appendix → Acute
appendicitis
(acute abdomen)

mc complication → perforation
Rebound tenderness

① Rebound tenderness
No Blumberg Sign

② Rovsing Sign
(If ill on left → Right side Pain)

③ DUNPHY Sign
(Tenderness)

④ Psoas sign: Retrocecal appendix

⑤ Obturator sign: pelvic appendix

IOC of Appendicitis

adult: CT scan

child/pregnancy: USG

Invs:

① 24 hr: urinary 5-HIAA level (↑)
(5-hydroxy indole Acetic acid)

② 24 hr: urinary 5-HTP (↑)
(5-hydroxy Tryptophan)
[Atypical Carcinoids] HPE/Leakage

③ Imaging modality
whole body PET

Rx:

DOC Carcinoid syndrome / atypical Carcinoid
= Octreotide inf (Crisis)

5-HT antagonist: Cyproheptadine

: Phentermine H₁ #

: Ranitidine H₂ #
(Antacids)

≥ 7 mm dilatation
= : diameter appendix

Stump size < 3mm
(to minimize the chances
Stump Recurrence)

MANTREL SCORE > 7 (kg Appendix)

M. Migration of pain

A. Anorexia

N. Nausea

T. Temp ↑ > 38°C : perforation

R. Rebound tenderness

E. elevated Leucocyte count

BALATHAZAR SCORE: CTBI
(Severity of Appendicitis)

Neuroendocrine

1. C. ep. 2. D. medulla

Carcinoid

- Serotonin
- Histamine
- Bradykinin

3. Affin cell

Angiotensin

Secretory diarrhea

Asthma like

Appendicitis

24 hr. Urine test

4. Fractionated metanephrine

5-HIAA

5-HTP (atypical)

5. Phenylethanolamine

Ocreotide

Parathyroid Gland:

1) PTH = 34 amino acid

2) Bone resorption = Ca^{2+} ↑

3) PCT. Kidney → PO_4 loss → PO_4 ↓

4) Bone turnover = S. Alkaline phosphatase ↑

Osteoblast

Osteoclast

1) Hyper-parathyroidism:

a) PTH:

Parathyroid Adenoma

Parathyroid hyperplasia

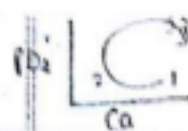
PTH ↑ ⇒ Ca^{2+} ↑

spasm of sphincter GI

1) Refractory constipation

2) Nephrocalcinosis

a) $Ca^{2+} \times PO_4 > 55$



Recurrent Abdo Pain
Renal colic
Urethric colic
Hematuria
CalCOy stones
flank pain
? flank pain
→ Umbilicus
→ hip point/valve

Kidney stone < 2.5 cm : ESWL
> 2.5 cm : PCNL

ESWL c/I

Pregnancy
bleeding diathesis

S. Ca^{+2}
12-15 mg%

- ③ Hardening blood vessels : P.R. ↑ → HTN
- ④ Calcinosi s : Hand chalky plaque

ulcerate
(multiple ulceration)
on skin

⑤ 2° parkinsonism

→ m.c.c of parkinsonism = parkinson's
(PARK gene #
Chr 1)

C/F (12/3)

- ① Resting tremor
- ② Bradykinesia (Akinesia
mildism)
- ③ Rigidity

2° parkinsonism m.c.c = drug induced

- ① dopamine | Haloperidol /
- ② Ach | Chlorpromazine

(PTH ↑)
Hyperparathyroidism
Hypoparathyroidism^{PTH↓}

⑥ psychosis

⑦

S. Ca^{+2} > 15 mg%

Systolic arrest of heart

K⁺
diastolic arrest of heart

 Date: _____
 Page: _____

22 *daily* companion

①: ① S. Calcium : ↑
PO₄ ↓
S. AP ↑

$$[\text{Calcium}] \propto \frac{1}{PO_2}$$

② Serum PTH assay : ↑↑

③ Tc₉₉ scan → imaging modality

R_x:

medical stabilization

- ① IVF : NS
- ② Furosemide drip
- ③ iv Ibuprofen
- ④ Calcitonin nasal spray
(send Ca^{2+} into bone)

Parathyroid S_x Rejection of T_x

2° HyperPTH ↑ :

7 dehydrocholesterol
| (UV-5min)

D, Chateaufort

Silver

$$D_2 \quad 25(OH) \quad "$$

↓ क्या

D₃ 1,25 (OH)₂ Cholecalciferol

[PCT: site of synthesis]

Erythropoietin: Peritubular cells.

$$V_{it}D_3: PCT$$

Perin : JG cell / granular cell

2° HyperPTH = m.c.c. Chronic Renal ds.

Q11- C.R.F.

Vit D₃ synthesis ↓

Hypocalcemia

CaSR ⊕ : PTH release ↑

↓
bone resorption ↑

(Ribs / clavicle / vertebra)

OSTEITIS CYSTICA FIBROSA

↓
if bleeding ⊕ → Hemosiderosis

BROWN TUMOR

↓
Release of Ca²⁺ from bones

Ca²⁺ × PO₄

↓
Calcification of paravertebral ligament

X-ray spine : Ruger Jersey Spine

↓
Azotemic Osteodystrophy

• bone density ↓

• # incidence ↑

• Ruger Jersey Spine

• X-ray hand : sub-periosteal resorption
Phalanges

X-ray skull = pepper pot skull

C/F of 2° PTH :

• Bone pain / # bone

Ix

① K.F.T. → Cockcroft gault formula

② S-Calcium = (↓) [Vit D₃ ↓]
S-PO₄ (↑)
S-AP

① ECG-QT

③ X-ray spine / Hands / Skull

Rx:

Cinacalcet: $\ominus$ PTH release

Vit D₃ / Ca²⁺ not given as a drug

Hypoparathyroidism = $\downarrow$ PTH

① autoimmune # glands

Type 1 / 1.5 DM addition dx $\downarrow$ PTH

② thyroid surgery

total thyroidectomy
inadvertent parathyroid resection
Papillary Ca thyroid

Radiation exposure

③ DiGeorge Syndrome

thymus

Parathyroid gland

- hypocalcemia
- hypoplasia

Cell mediated immunity

Tetany

Recurrent infection

Acute hypocalcemia

< 7mg% = Tetany

① perioral / ungual parosmia (earliest manifestation)

② BP cuff

SBP + 20mmHg
 $\downarrow$ 3min

Carpopedal spasm

Trousseau sign

Osteoinduction Hand

③ CHVOSTEK SIGN:

facial

facial grimace

④ Death $\Rightarrow$ laryngospasm
ECG - QT

Chronic hypocalcemia

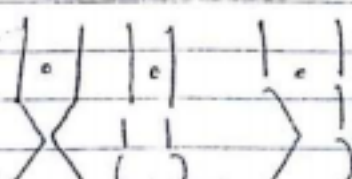
① Rickets / Osteomalacia

Cranio tabes (flattening of fontanelles)

Ping pong skull

delayed dentition

wide open Ant. fontanelle



genu valgum genu varum

wind swept deformity

1 2 3

ECG: QT ↑ [360-440 msec]
9-11 sec

total Ca ↓

ionized Ca ↓

pH: (N)

albumin (N)

Rx:

- ① i.v. 10% Calcium (slow)
gluconate rate
(ECG monitoring always)

↓ Ca
↑ PO₄

Ca × PO₄ > 55

nephrocalcinosis: (PTH ↓)
(deposited Ca in basal ganglia)
2° parkinsonism
Psychosis.

Ix:

① Ca ↓ PTH ↓
PO₄ ↑↑
SAP (N)

SAP ①

Hypophosphatasia
(only one medical
condition)

② S. PTH assay: ↓

③ Tc 99 scan ① uptake: autoimmune
② uptake: ex removal

Rx:

inj Teriparatide: DOC for Hypo PTH

Pseudo-Hypo PTH:

- PTH +nt = ↑ (N)
- PTH Receptor #
- GNAS gene defect

Rickets like illness / Albright Hereditary
Osteodystrophy

- Craniofacial
- delayed dentition (if teeth not come
upto 13 months)
- Bones short

metacarpals (3rd & 4th
relatively short)
① nuckle-nuckle-dimple-dimple
② 1 2 3 4
Hist forming

C/F

: same as hypoPTH

 ① Ca ↓
PO₄ ↑
SAP (N)

 ② PTH Assay ↑
Tegs scan uptake (N)

Rx:
No Ht Available

Pseudo-pseudo hypo PTH : (PPHP)

PTH

Action of PTH on kidney = (N)

" " " " on bone = defective

Rickets like illness

 Albright hereditary (AHO)
osteodystrophy

 S-PO₄ low

PPHP : S-PO ₄ low	→ AHO
PHP : S-PO ₄ ↑	→ AHO

	1° PTH ↑	2° PTH ↑	HP	PMP
Adenoma		CRF	autoimmunity	GNAS gene
PTH (↑↑↑)		↑	↓	↑↑↑
Ca ↑		↓	↓	↓
PO ₄ ↓		↓	↑	↑
SAP ↑		↑	(N)	(N) (↑)
Rx:				Ht
Sx		Cinacalcet	Teriparatide	No Ht??

(The kidney stone)

6 Oxalate Stone : Kidney

Ca²⁺

① Idiopathic Hypercalcaemia : Stone formation

② RTA type 1

24hr Urinary Ca²⁺ ↑

Rx : Thiazide diuretic

They reduce urinary loss of Ca²⁺promotes U-tile
of Ca²⁺ - Hypercalcaemiagiven in
HypercalcaemiaRx: thiazide diuretic
First Ranker's choiceStruvite : protons : Spheron → Aceto-hydroxamic acid drug in

Urate - Colchicine → Rasburicase / allopurinol / probenecid

Cytine - Cytidine

Xanthine - Xanthine

d-penicillamine

Ticophorin

24hr urinary
uric acid
to differentiate
stone

IOC :

Kidney stone - CT scan

urinary stone - CT scan

urinary stone < 5mm diameter = spontaneous expulsion possible

Bladder stone 1° : oxalate stone / malferous stone

2° : infection → Struvite stone

Rx :

Lithotripsy = IOC

Due: / /
Page: /

Self-companion

Thyroid Gland:



Large vascular thyroid

ideally dense

Lugol's iodine X 4 wks

• gland shrink relatively

• I₂ trapping ①

T₄ synthesis ↓

T₃ synthesis ↓

Wolff-Chaikoff effect

then suffered to surgery

Thyroid Storm

suffered to surgery

intra: Op

normal pressure hand

T₄ ↑ → T₃ ↑ symp ①

General Anesthesia

① HR ↑↑↑

high output CCF

② temp. ① > 41°C → HR ↑
• Calorigenesis

Px:

① Iv. Propranolol

β₁ → HR

β₂ - muscle heat

② Ice packs

Air conditioning

Remove blankets

③ Iv. Hydrocortisone

④ Iv. Soda bicarb

DOC

thyroid storm

⑤ Non-proprietary

gastro-intest

Stop conversion of

T₄ → T₃

⑥ Potassium iodide (Warriner)

/oral

Thyroid Storm

Cause: inadequate preparation of pt.

prevention: Lugol I₂

MOA: Wolff-Chaikoff

CF: CHF: ↑HR

Px: DOC: PTU (T₄ → T₃)

Thyroid storm
② MI/stroke : in hosp.

Jod ^{Excess} Basedow Effect

↑ ^{any} companion
Thyrotoxicosis

① T_4

① I_2 TRAP

① I_2 (salt) →
 I_2 Replete population

MC of Thyrotoxicosis

① 1st Cause

Grove's ds :

TSI : thyroid stimulating immunoglobulin

LATS : long acting thyroid stimulating A/B



$T_4 \uparrow, T_3 \uparrow$
 $TSH \downarrow$

② BEEF (Cattle thyroid)

Human consumption

Thyrotoxicosis

Klo

low
salt

Thyrotoxicosis
Factitia

③ Ayurvedic (wt. loss)

Herbs

Levothyroxine extract

BMR ① : wt loss +

① O_2 consumption
angina

Thyrotoxicosis
Factitia

② 2nd Cause

Pituitary adenoma:

$TSH \uparrow$



$T_4 \uparrow, T_3 \uparrow$



PA > 10mm size

B/L Hemianopia

③ Struma Ovarii (ectopic)

Teratoma

④ Jod Basedow effect

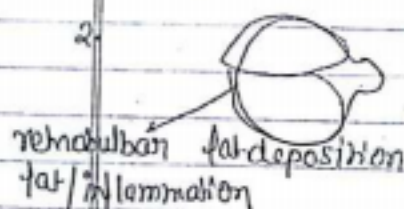
⑤ Thyrotoxicosis factitia

C/Fs: (Graves's dis): young ♀

- palpitation
 - fine tremor
 - diaphoresis
 - wt. loss
- } Sym ⊕
- HEAT INTOLERANCE
(calorigenesis ↑)
 - Oligomenorrhoea
 - infertility

O/G:

1. Sleeping pulse Rate : Resting tachycardia
1. (most) Reliable sign



- Proptosis B/L or U/L
asymmetrical.
- Inf. Rachus (m.c. involve
(IR) muscle in eye)
- Diplopia

3. Acropachy



4. Pre-Tibial myxedema ⊕
5. diffuse ⊕ gland
6. CVS

Loud S₁

S₃ ⊕

Mean - Jermain Scratch

Inv:

- ① T.F.T

total T ₄ , T ₃	↑
free T ₄ , T ₃	↑
TSH	↓↓



Date _____

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Page comparison

② T.S.I. A/B titre (↑)

③ No 2^o or 3^o thyrotoxicosis : MRI head.

④ RAIU : uptake (↑)

I 123	8 hr
I 131	8 days
I 132	2-3 hr

preferred : $I_{132} > I_{23} > I_{131}$ Rx:

<45 yrs :

Anti Thyroid drugs

PTU, carbimazole

↓ dose limiting s/e

(agranulocytosis)

Sub-total thyroidectomy

(6-8 gm gland left behind)

Retrosternal goitre

↳ SVC obstruction, dyspnea

• Pemberton sign

facial congestion

• CT chest

• Rx : Surgery

>45 yrs :

Radio-iodine

(oral) I_{131} (β -Rays)

↳ Thyroid ablation

C/I : pregnancy, Breast feeding

⊗ Propranol : used for symptoms control

Grave's Ophthalmopathy:

① $T_4 \uparrow : T_3 \uparrow$

↓
Sympathetic stimulation

Müller muscle spasm/contraction

STARE SIGN

earliest presentation of
Grave's ophthalmopathy

$T_4 \xrightarrow{\text{D, deiodinase}} T_3$



② Blinking inadequate

exposure keratitis
corneal ulcers
ciliary congestion

Methylcellulose
eye drops.

more severe cases

lateral
tarsorrhaphy

③ fat-in muscles

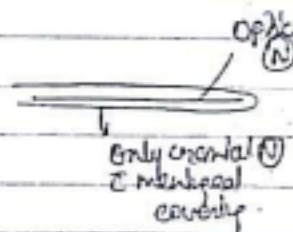
④ proptosis - U/L / asymmetrical $\xrightarrow{\text{later}}$ B/L

④ diplopia

(external ophthalmoplegia) = no cranial (III) palsy
inferior Rectus

⑤ Blindness

Retinobulbar neuritis



Rx: ① DOC : steroids

(Methyl-prednisolone)

② Orbital Radiation

m.c. % of pituitary adenoma:

- ① non-functional pit Tx
- ② Prolactinoma

Cabergoline → (dopamine)
Bromocriptine

Prolactin
↓
LH/FSH

- Pituitary Hormones
1. GH
 2. TSH
 3. ACTH
 4. LH
 5. FSH
 6. Prolactin

♀ 30y → prolactinoma

- ① ↓ LH = anovulation
- ② ↓ FSH = Amenorrhea

3° infertility

③ galactorrhea

>10mm (4) B/L Hemianopia (macro adenoma)

Tx:

S. prolactin ↑↑
MRI head = pit. Tx

Rx:

① visual deficit ⊕
↳ transsphenoidal Sx

② if visual deficit ⊖
• Cabergoline
• Bromocriptine

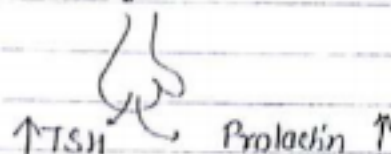
♂ galactorrhea ⊕
Libido ↓, Erectile dysfunction ⊕
visual deficit ⊕

↓
MRI head
S. prolactin

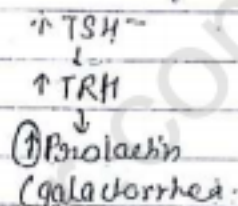
Rx: transsphenoidal Sx
Cabergoline } Medical
Bromocriptine } Rx

Causes of Galactorrhea:

- ① Prolactinoma : S. prolactin
- ② 1^o Hypothyroidism : TRH test
- ③ Anti-psychotic drug TRH
- ④ C.P.F. : KFT



T₂ deficient area → goitre : T₄ ↓, T₃ ↓
(Hypothyroidism)



Sheehan's syndrome:

[2^o Hypothyroidism] TSH ↓, T₄ ↓, T₃ ↓
↓ PRL = Failure of lactation

Panhypopituitarism - all pituitary hormones deficient

Hypopituitarism - only GH deficiency

↓
GH ↓

- Short stature / dwarfism
- height < 100cm
ht < 3rd centile
- High pitch voice
- "Doll like faces"

(N) L = 50cm at birth
100cm = 4 1/2 yrs

Doll like faces

Von Gierke's
Hypopituitarism

Ix:

- ① IGF-1 level
 - ② Insulin challenge test
 - ③ Arginine challenge test
- fail to stimulate gland

IOC

Not to be confused with
Hypopituitarism



Rx:

GH inj. DNA recombinant tech.

(up to the age of puberty) → then stop.

LARON Syndrome:

GH Receptor defect

Cfr-

Hypopituitarism

Rx: ?

Gigantism/Acromegaly

Pituitary Tx

GH ↑

Since birth

Gigantism

GH ↑

after puberty

Acromegaly

① ht ↑↑

(monitor growth)

ht. same

X-ray: Heel pad thickness

≥30mm

(Parameter to monitor growth)

② wt. ++

③ Cardiomegaly +

high output CCF

④ Organomegaly +

② Acral ④

Hands ↑

Fingers - thicker

Foot size ↑

Head circumference ↑

Lower jaw + (Prognathism)

macroglossia

(obstructive sleep apnea)

Cor pulmonale

Common finding in both

• coarse facies

HTN

• Sebun ④ : Acne ④

• impaired glucose tolerance : GH ↑ → Sugar ↑

• wt. gain ↑↑ : Obesity

• B/L osteoarthritis - knee

• X-ray Paranasal sinus ④

Page No. _____
Date _____
Topic _____

Inv:

- ① IGF-1 level - screening
 - ② Glucose challenge test
- (Confirmatory test) glucose → GH release from Pituitary
- [75gm glucose GH < 1 μ g/dl]

Tx of pituitary

↓ failure to suppress GH levels
so GH > 1 μ g/dl

Gigantism

Rx:

Trans-sphenoidal Sx ← Hx all
if visual deficit even not occur even

↓
Recurrence: pit. adenoma

Rx: Pegvisomant (new) → GH(R) blocker
Inj. octreotide (older time)

GH ↓ doll like faces Rx: Inj GH
IOL Insulin challenge test

GH ↑ gigantism T.S.S.
Pegvisomant

Acromegaly
[arm span > ht]
also in marfan synd.

IOL 75gm glucose challenge test

Sheehan Syndrome: (Pituitary Necrosis)

- all pituitary hormones reduce

GH ↓ → Ist to reduce → hypoglycemic symptoms

ACTH ↓ → cortisol ↓ → anger/rage attacks

PRL ↓ → failure of lactation → hypoglycemic symptoms (19) → fine tremor

LN ↓ → 2^o amenorrhea → palpitations

FSH ↓ → 2^o amenorrhea

TSH ↓ → last to fall

→ T₄ ↓ T₃ ↓ Cold intolerance

→ 2^o Hypothyroidism

Rx:

Tab dexamethasone

Tab O.C.P. (estrogen) → life long H₂

Tab levothyroxine

imaging modality - MRI head

Osteoporosis ⇒ dis of bone matrix = (not) a mineralization dis

Osteoclasts ↑

Osteoblasts (N)

>45 yrs ♀ / >25 yrs ♀ (Hypogonadism) FSH ↓

• low back ache = microfractures # in vertebra

• thigh pain

• tibial pain

} Pain resistant to NSAIDs

Ix:

DEXA-SCAN (Dual-energy X-ray Absorptiometry) Bone Scan = for metastasis to bone

Bone density check

① spine

② head of femur

③ calcaneum


 Date ____/____/____
 Page ____

1st/COMPANION

Osteoporosis
 $T\text{score} \leq -2.5 \text{ SD}$
 $Z\text{score} \leq -2.5 \text{ SD}$
Osteopenia
 $T\text{score} \leq -1.5 \text{ SD}$
 $Z\text{score} \leq -1.5 \text{ SD}$

(1/2)

quickies = T-Score

① Bisphosphonates

Risedronate 35 mg. once/wks

S/E if taken empty stomach

erosive esophagitis

(do not lie for 1hr)

 not taken ≥ 5 yrs

 causes pathological fr
 (femur)

② Calcitonin nasal spray

(analgesic effect also)

 ③ Calcium/vit D₃ = R.D.A.

Que:

70 yr ♀ on bisphosphonate x 5 yrs

c/o lump, pain in thigh

 T₂ Inv. → X-ray thigh

RESPIRATORY SYSTEM

Pulmonary embolism:

- ① fat embolism
- ② Air "
- ③ Thrombo "
- ④ Amniotic fluid "

Fat Embolism:

20yr, Bike accident, femur #

C/F CURD Criteria

major
criteria

Cytokines:

- damage blood supply of lungs
- Respiratory depression

$$\text{④ } \frac{\text{Ventilation}}{\text{Perfusion}} = \frac{3.5 \text{ L/min}}{4.5 \text{ L/min}} = 0.8$$

- V/P imbalance
- fast breathing
- intercostal Retraction
- Subcostal Retraction
- Central cyanosis

major
criteria

② Cytokines: damage microvasculature of brain → Reticular activating system (RAS)

GCS < 7 → STUPOR Coma

minor
criteria

- ③ Fever (high grade)
- ④ Rash: axilla → skin of chest
- ⑤ HR ↑
- ⑥ petechiae (look like mosquito bite - but not bloody)
- ⑦ urine/sputum

examination
under microscope

FAT
globules

Sudan
Black

spiral # of femur

fat ← Bone marrow

fat globules come in
circulation

cytokines stimulate

IL-1 → Hypothalamus
• fever

C/F develop after > 24 hr of #

no 10 criteria

Clinical

CURD Criteria for
of fat embolism

1 major + 4 major
criteria

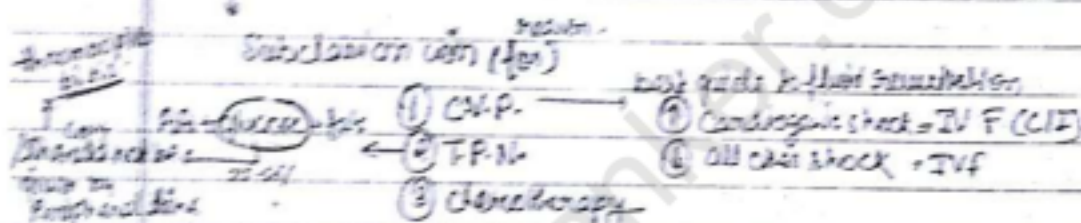
(Mortality Rate = high)

Mx:

- ① High flow O_2
- ② dexamethasone
- ③ Heparin
(antithrombotic drug) + antithrombotic effect
dissolve fat globules

② ATR Embolism:

- ① trauma to internal jugular vein
(Accident / Poking)
- ② Central line insertion
(Air seal membrane)



③ By causing hypoxia, hypotension to develop air embolism

Causes = venous air embolism

- ① transcutaneous venous access
Air sucked in

② sitting position (more prone)

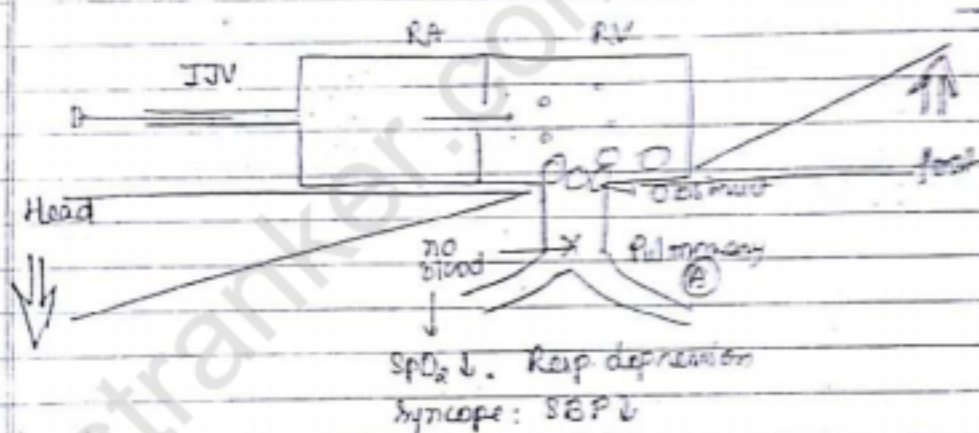
④ decompression illness / caisson disease:

deep sea diver
↓
Air tank (compressed air)
↑
Rapid ascent
N₂ bubbles in blood stream

Workup: Central chamber - Hemiplegia
CNS - Hemiparesis
CNS - Hemiparesis

Rx:

- ① Decompression chamber
↓
[X10 atm pressure]
dissolves N_2 bubbles
- ② Hyperbaric O_2 therapy
↳ also done in
1) gas gangrene
2) high altitude pul. edema
3) Caission's dis.
4) CO poisoning



Rx: 1st step @ Mx: change position of pt.

- ① Turn pt: left lateral decubitus
(sudden change of bubble site)
Obstruction removed

- ② Tredelenberg position = head below
foot (up)

- ③ Cath lab: T.E.E. (beats) = IOC
ET_{CO₂} = 0 (end tidal CO₂ = 0)
ET_{N₂} = 0 (N₂ = 0)

- ④ mini. amount of air to cause clinical features in air = 2-3 ml

- ⑤ En accumulation: Mill-wheel murmur

Rx: Aspiration of Air / R.H. Catheterization

Date _____
Page _____
Any companion _____

80yrs old E meningioma scheduled for NS. Dr
intubated in supine position
position shifted to sitting position

$$EtCO_2 = 0$$

↓
Sx not started

$$EtCO_2 = 0$$

↓
dislodgment of
E-Tube

if Sx is doing same

$$EtCO_2 = 0$$

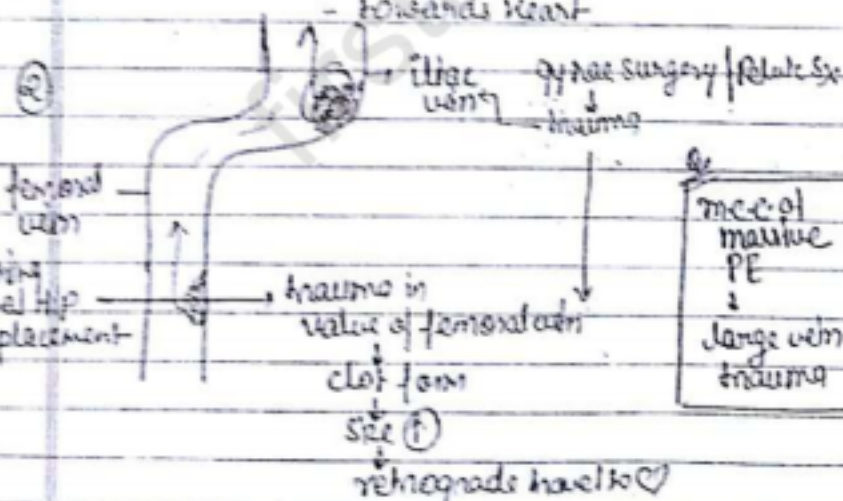
↓
Air embolism

Thromboembolism

Causes

① DVT : immobilization X 5 day
mcc of PE

starts in calf veins
↓
thrombus formation
retrograde travel
- towards heart



At risk of PE in NS. Dr. X

③ Nephrotic Syndrome

proteinuria $> 3.5 \text{ gm/day}$
 urinary loss of protein C/S/Antithrombin III.
 Hypercoagulable state

Clot formation (thk) no large
 no loose (exception)
 [Fibrinogen X]
 fibrin &
 plasminogen &
 all other prot loss

Que:

Case: long distance flight
 known C/O nephrotic syndrome
 collapse at immigration counter
 SpO₂ ↓, BP ↓, Lung = clear
 ↓
 Clinical Δ: pulmonary embolism

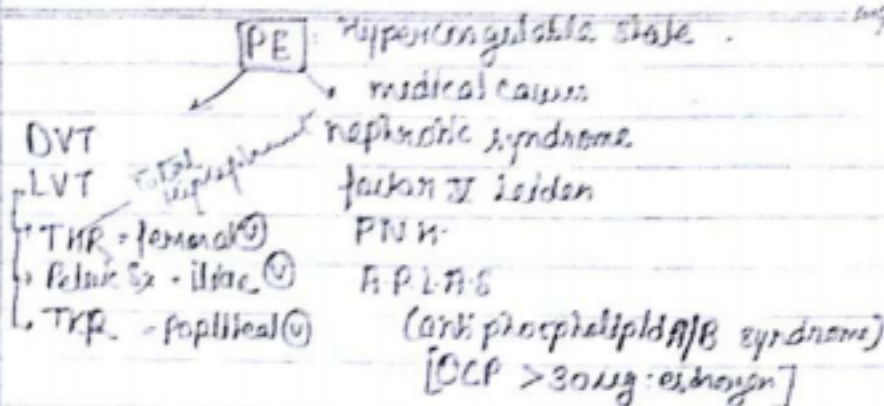
④ Factor V Leiden mutation:

Factor V activity $\longleftrightarrow$ Protein C
 ↓ when mutation
 binding defect (V → prot C)
 unchecked factor V activity
 ↓
 Hypercoagulable state
 Clot form (bleeding - m)

(Kla para-hemophilia)
 if factor V deficiency
 ↓
 bleeding + m

⑤ Paroxysmal nocturnal hemoglobinuria (PNH)

1st morning sample urine = Black
 ✓ platelets count - (N)
 ✓ PIGA gene defect
 ↓
 A₂ liberation (row stimulation/trauma)
 ✓ platelet aggregation
 clots



To 438: THR (BP) yesterday morning

Today

UO: sudden onset difficulty in breathing, chest pain

O/E: Accessory muscle (+)

R-R = 40/min (N) 10-16/min

JVP = neck veins full

S₁ = loud (tachycardia)

S₂ = wide split S₂ = RVF

S₃ = ventricular gallop (+)

Lungs = clear (crackles (-))

not LV involvement
R-V involve

Tx:

① ECG: r/o MI

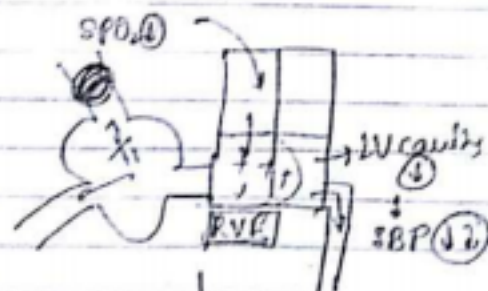
PE = RV strain

• deep S = lead I

deep Q = lead III

inverted T = lead III

S₁ Q₃ T₃



No Acute cor pulmonale

① # pulm. P

② PAH

③ acute RVF

④ septal deviation also McConnell sign

Due _____
Page _____
for companion _____

② CXR

⑤ LV cavity size

⑥ EDV : hemodynamic compromise

PALLA sign

Rt. descending pulmonary (R)

R-DPA

Wedge opacity +

Horton hump

Pulm. edema
Ent.

③ D-dimer assay → Screening test

④ V/Q scan

⑤ CT angiography → IOC for CT (A)

⑥ Pulmonary angiography → Gold standard test

if given old neg
plain CT
V/Q scan

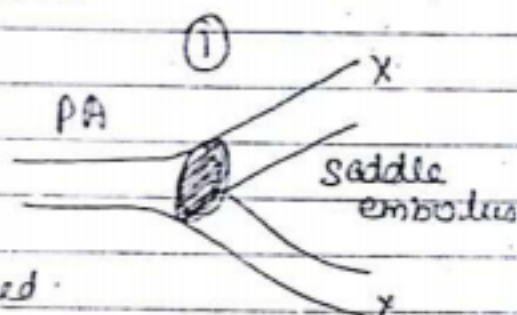
Ranker CT (A) > spiral CT
multidetector CT scan > V/Q scan

Rx: ① Alteplase (iv)

C/I = Recent H/O

Stroke

≤ (in 3 months)



② Cath lab: Fogarty Catheter is used

③ Cath lab

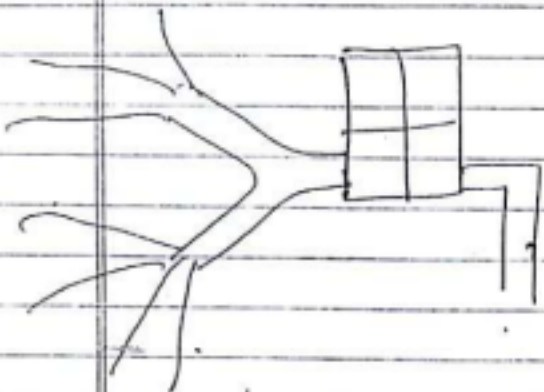
Pulmonary thromboembolism

Thrombolysis

- ① STEMI
- ② Acute ischemic stroke (AIS)
- ③ massive P.E.

(C/I)

NSTEMI
Hemorrhagic stroke
P.E.



PE

- SBP = $\downarrow$
- no septal deviation
- b/c blockage small.

massive PE

PE

• SBP $\downarrow$

$\downarrow$

Echo: RV dyskinesia
functional TR
septal deviation
(McConnell sign)

$\ominus$
 $\ominus$
 $\ominus$

ECG: $S_1Q_3T_3$

Sinus tachycardia

CXR: Palla sign
Hampton hump

(N) (b/c small R/L blockage
not seen)

Post-op Care = Pelvic Sx / TKR
day 2: Chest pain + Respiratory distress

1st D/D: MI $\gg$ PE

(Anterior) LVE: • Cupitation (+)
• HR $\uparrow$

Tachycardia
Cupitation

(Inferior) RV: Cup $\ominus$
Bradycardia

PE >> massive PE
(common)



date _____
page _____

1st companion

IOC : A CT angiography
Screening : D-dimer assay

Rx: Alteplase
+ Heparin

Alteplase (C/I)

Rx: Heparin

Q1 b/c PE >> common massive PE

m.c. ECG finding of PE = Sinus tachycardia
m.c. CXR - finding = (N)

Dyspnea = most frequent symptoms of PE
tachypnea = sign

Pneumonia :

m.c.c. of

CCAP Community Acquired (P) = pneumococcus

(VAP Ventilator acq (P) → MDR → pseudomonas
non-MDR → pneumococcus
H. influenzae

H.A.P. = S. Aureus
(Pneumatocele)

AIDS = P. Jirovecii

exchange
Rifabutin

m.c. opp. infection in AIDS = TB

Rifampin → Protease

CD4 < 500

TB

= ATT + CART (4wk gap)

< 200

P. Jirovecii = Co-trimoxazole

< 100

Toxoplasma = Pyrimethamine

< 50

CMV retinitis = Ganciclovir

Mycob. Avium Intra → Clarithromycin
(MAI)

tomato Ketchup - pizza cheese opp.

Cryptococcal Meningitis

m.c. CNS inf. (+) in AIDS.

Cryptococcus neoformans.

LP = Cell count: Lympho > 20 cells/
Cumm.

CSF sugar = (N)

protein = (↑)

Black background  India ink-stain
capsulated organisms
(mucicarmine)

IOC: CSF ELISA for cryptococcal Antigen.

Rx:

Amphotericin B

Immunosuppression

P. Jirovecii:

BAL (bronchoalveolar lavage) = *giemsa*

Rx:

Cotrimoxazole

Prophylaxis $\rightarrow$ " same

Alcoholics → pneumonia

① Pneumococcus

② "Red Current Jelly sputum"

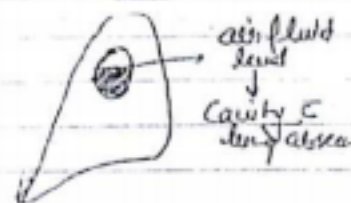
Klebsiella pneumoniae

CXR: Bulging fissure sign
- (Lax P: 2 lobes)

Neurotizing pneumonia
- Cavity / lung Abscess.

Rx:

Cefotaxime + Amikacin (iv)



Bird Handler's pneumonia:

Chlamydia psittaci

Rx: Azithromycin / doxycycline

Mycoplasma pneumoniae:

Atypical Pneumonia

- minimal Respiratory distress
- CXR



- AC ducts / piped water supply
Inhalation aerosol

(H)

Azithromycin

(Atypical pneumonia)

- Mycoplasma

(RBC)

- Autoimmune Hemolytic Anemia
- Hemoglobinuria: Black urine

Paroxysmal
Cold
Hemoglobinuria
(PCH)

- Mycoplasma
- P antigen
- Donath Landsteiner

CO₂ ↑
respiration

IF
Skin infections - erythema multiforme.

Rx: Azithromycin

Legionella pneumophila : (Atypical pneumonia)

• Legionnaire's dx

• Pontiac fever

• Relative Bradycardia

(Typhoid, Brucella, Legionella) causes (not by leptospirosis)

Step ladder

undulant fever

Pontiac fever

toxin produced

allergic rxn

SO
Bradycardia (relative)

• SIADH

Rx: Azithromycin

SIADH:

A.D.H: Hypothalamus lesion

release from post. pituitary



Dilutional Hyponatremia
Confusion, Stupor
Seizure (due to electrolyte imbalance)

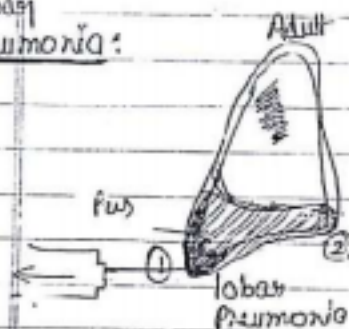
Mr
SIADH:

(DDX) Vopans : V₂ block : Conivopans
Tolvopans
demeclocycline

Atypical Pneumonia:

• Klebsiella	→ Cefotaxime	
• Legionella		→ SIADH
• Mycoplasma	Azithromycin	→ PCP [O-LA/S > IgG]
Chlamydia		

Lobar Pneumonia:



Paediatric



- ① parapneumonic effusion
- ② empyema

Cardiophrenic

Pleural tab: 7 ICS posterior

Back → scapular line

Thoracocentesis: 5 ICS

(for pus) mid axillary line

Pneumococcus

CXR: consolidation

(clinical term for solidification into a firm dense mass)

Indication for admission in pneumonia cases:

Confusion

R.R. > 30/min

SBP < 90/60

age > 65 yrs

Staph. Aureus → Pneumatocele

Lung Abscess

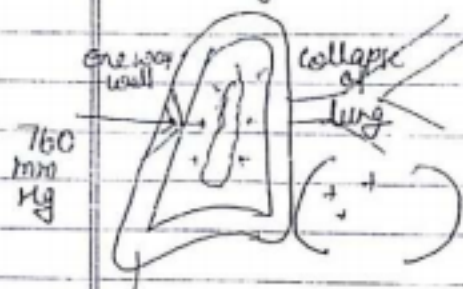
iv @ cloxacillin
② vancomycin
③ linezolid
④ daptomycin

Rupture

Pneumothorax

Tension Pneumothorax:

- Bullet injury



Pneumo:
2cm - 6cm H₂O

on auscultation = Hamman CRUNCH

* walking in snow leather boots

- Central cyanosis

venous return

Kinking of SVC

IVC

SBP ↓

Obstructive shock

Tracheal shift c/L

apex beat c/L

displaced

Diagnostic "Pneumomediastinum" *

- Pneumothorax

* AIR entry → absent breath sound →

* R 2 I/c space = U needle (Tension Pneumothorax) MCL

• J.C.D 5 I/c space MAL

• M.B.T (massive blood transfusion) O-ve

> 5L/24HR

≥ 2.5L/4hr over 4hr

* 4 unit PRBC

* 4 FFP

* 3 platelets

* new guideline

Sx Tx

emergency thoracotomy

* Hemostasis

* Lobectomy

* Bullet removal

* Hyperbaric O₂ therapy

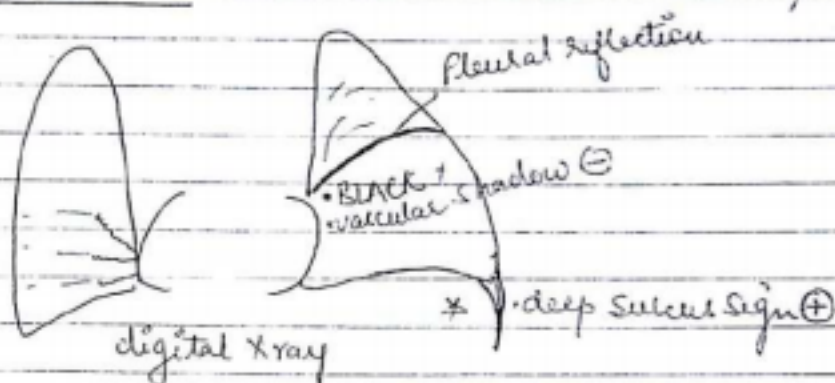
: gas gangrene

incidence ↓

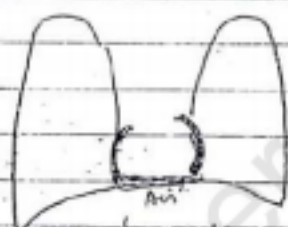
Pneumothorax XRC

DR _____
REP _____

Any companion _____



Pneumomediastinum



X-ray → continuous diaphragm sign **
→ obstructive shock

i.v. fluid
is not
recommended

1. Cardiac Tamponade
2. Tension pneumothorax
3. Budd-chiari syndrome

CARDIAC TAMPONADE

CAR crash, Seat belt of
Head on collision

HR = 100/min, BP = ↓↓, i.v.f

death on spot, cause of death

1. Hemopericardium

2. Hemothorax B/L

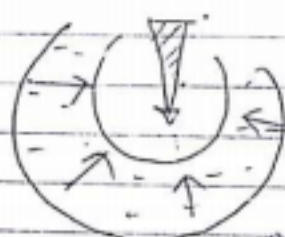
3. Hemoperitoneum

4. Vx A dissection ; Brain stroke

① pericardial fluid = 20-Soml

Pericardial effusion > 50ml

IOC = Echo



Interpericardial Pressure >> LVEDP

Cardiac Tamponade

• pulse disappear

* pulsus paradoxus

• muffled S₁, S₂

• Hypotension

• JVP ↑↑

• Non pulsation of SVO*

Beck's
Triad

* Echo guided urgent pericardiocentesis

ECG - ST elevation (injury to heart)

* If seat belt on = Hemoperitoneum

(Seat belt syndrome)

• abdominal distension

• SBP ↓↓ pulse; Thready/⊖

• abd. bruising

① FAST - focused assessment Sonographic evaluation of Trauma

• epigastrium - Cardiac Tamponade

• L. hypochondrium - spleen +

• R. hypochondrium - liver +

• suprapubic - bladder +

cul-de-sac +

e FAST - manubrium to xiphisternum
 extended - sternum
 I/A - Hemithorax

(B)
 inspection

if not able to detect mousty rupture
 for this

- (2) CT abdomen : vital stable
- (3) DPL : Hemodynamic compromise (4)

* JOC Hemoperitoneum = CT also

Rx - massive blood Trans
 - urgent explorative laparotomy

* MC complication of BT

(while non Hemolytic Tx reaction (FNHTR))

MC complication of BT leading to death
 = TRALI (transfusion related acute lung injury)

Body Trauma

cardiac Tamponade

- BP ↓↓
- intrapericardial P >> LVEDP
- HR ↑
- Pulse weak
- disappear on inspiration
- Pulsus paradoxus
- lung: B/L air venting @

Tension pneumothorax

- BP ↓↓
- obstructive shock
- shifting SVC/IVC
- HR ↑
- pulse weak

* most reliable signs

- breath sound
- Air entry

Cardiac Tamponade

• myxedema : 2nd / 3rd

lymphadenoma 2nd

Varicella

Q9

• massive pericardial effusion (cavity effusion)

• P. paradoxus paradoxus : absent

• fast reaccumulation

fluid

• Cardiac Tamponade : fluid + + , have, dangerous

↳ out cell eating, Trauma → not in 100%

• low pressure Cardiac Tamponade (early part of CT)

↳ collapse of Atria

30% ↓ in R ventricular filling

↳ 30% ↓ BP

• Hypotension

ECG guided

Cardiac Tamponade

• High Pressure CT

↳ Both atria + ventricle collapsed

Tamponade : P. paradoxus

Compensate

EC of CT - Echo

• [Pericardial effusion]

ECG = Echo

ECG = low voltage ECG

ECM

Hypotension

• Electrical alternans

Cardiac Tamponade

Beats

• pulsus paradoxus

• muffled S₁ S₂

• hypotension

• JVP ↑ : non pulsatile

• Kussmaul SIGN is absent

ECG - Echo

ECG - electrical alternans

ECG - money bag / water bottle

ECG Cardiac Tamponade

ARDS = damage at level of alveoli

- ① Septicemia (m.c.c.)
- ② H_2N_2 | H_2N_2
- ③ Mendelson syndrome (aspiration of stomach acid)
- ④ Pulmonary Contusion
- ⑤ multiple blood transfusion : cytokines
TRALI : FFP > whole blood
< 6 hrs of infusion

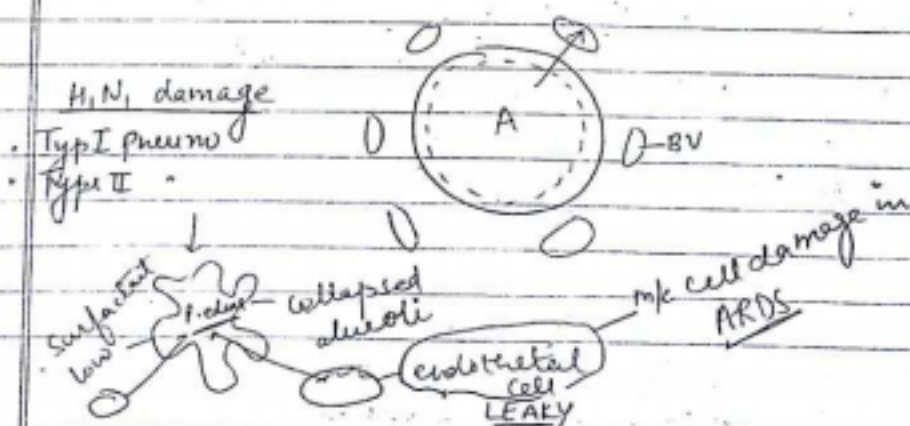
- ⑥ acute pancreatitis
(mcc. gallstone)
- ↑ TG, ↑ Ca^{++}

- ⑦ Toxic gas inhalation

* Asthma is never a cause of ARDS

$PCWP = 8-12 \text{ mmHg}$
 $LVF : PCWP \uparrow$
 Hydrostatic pressure
 Transudation $\rightarrow$ alveoli
 pulm. edema $\oplus$
 Cardiogenic pulm. edema $\oplus$
 H_2N $\rightarrow$ lung $\#$
 Pulm. edema $\oplus$
 • Non cardiogenic pulm. edema
 • $PCWP = (n)$

- H_2N_1 damage
- Type I pneumo
- Type II "



Surface area ↓

Hypoxia

↳ pulm A constrict V/Q imbalance

Viral infection

Exudative : pulm edema ⊕

(High protein pulm edema) in ARDS ✕

ARDS

1. Non cardiogenic pul edema

2. PCWP = (N)

3. Refractory Hypoxia

4. INTRA - pulmonary shunting

5. High protein - pul edema

6. $\frac{P_{O_2}}{F_{I_{O_2}}} = \frac{100 \text{ mmHg}}{0.2} = 500 \text{ mmHg}$

$F_{I_{O_2}} \rightarrow$ fraction of inspired O_2
room air 21% $O_2 = \frac{20}{100} = 0.2$

$$\boxed{\text{ARDS} \Rightarrow \frac{P_{O_2}}{F_{I_{O_2}}} < 200 \text{ mmHg} \text{ ✕}}$$

$$\text{ALI} \Rightarrow \frac{P_{O_2}}{F_{I_{O_2}}} < 300 \text{ mmHg}$$



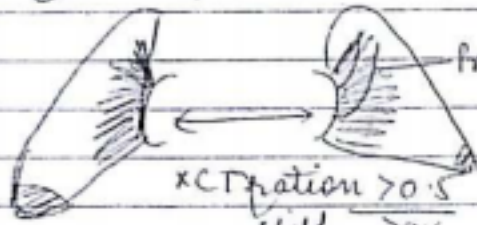
white

ARDS = Photographic negative ✕

CT ratio = (N)

Paracardiac = (N)

CP angle = (N)



Prominent upper lobe vein

↳ 1st sign of pulmonary

* CT ratio > 0.5
child > 0.6

* CP angle blunting B/L

* Silhouette sign

Bat wing pul edema ⊕

* * cardiogenic pul edema

Rx ARDS

Ventilator
modality

→ C.P.A.P

(I.P.A.V.P = C/P)

- Low volume ventilation
- Positive end expiratory pressure (P.E.E.P)
- !° expiratory collapse of alveoli

not given

- High frequency jet
- Synchronized
- Surfactant
- NO₂ therapy

A.C.M.V : initiate Assisted controlled mechanical ventilation

RR = 4/min

- GBS
- M. orsin
- K₂
- Cerebral

SIMV : "meaning off"

"Synchronised intermittent mandatory Ventilation"

Respiratory failure:

① type: 4

- Hypoperfusion of Res. muscles
- Shock (distributive shock)
- (septic / obstructive / cardiogenic ⓑ)

Rx:

O₂ + treat the causetype: 3

- Post-op Atelectasis
- Rx: Chest physiotherapy + O₂
- Prophylaxis & early ambulation

Type 2

- ↓ PO_2 ↑ PCO_2
- 1) Status epilepticus
 - 2) Obstructive Sleep Apnea (OSA) episodes
 - 3) Foreign Body Glottis
 - 4) Tension pneumothorax
Spontaneous (bullae rupture in emphysema)
 - 5) Neuromuscular paralysis
GBS/transverse myelitis
Polio/Botulism/Myasthenia Gravis
decreased

Rx:
ACMV

Type 1

- m.c. type

↓ PO_2 ↓ PCO_2 / P_{50}
Hyperventilation

- 1) ARDS
- 2) acute asthma
- 3) Emphysema
- 4) pneumonia
- 5) Pleural effusion

Rx:
C.P.A.P.

(N)
 $PO_2 = 60-100$ mmHg
 $SpO_2 = 95-98\%$
 $PCO_2 = 35-45$ mmHg
 $HCO_3^- = 22-26$ meq/L
 $pH = 7.35-7.45$

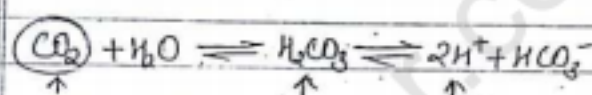
ABC Analysis

Radial (A) : Modified Allen's test

(check integrity of palmar arch)

Heparinised needle syringe

1	2	3	
pH	pCO ₂	HCO ₃ ⁻	
↓	↓	↓	metabolic acidosis
↑	↑	↑	metabolic alkalosis
↓	↑	↑ (met. comp)	Respiratory acidosis
↑	↓	↓	Respiratory alkalosis



(a) Status asthmaticus

(Silent chest) = Deafness

(CO₂ narcosis)

bounding pulse

Respiratory Acidosis

H⁺ → BBB → cerebral edema

Compensatory Rm

HCO₃⁻ ↑

Metabolic Alkalosis

Kidney +

P.C.T

HCO₃⁻ reabsorption

↑

(b) Silent chest

pH = 7.2 ↓

pCO₂ = 60 ↑

HCO₃ = 26 (A)

Respiratory acidosis

Uncompensated

① Nebulized & salbutamol

→ 1 hr → 4 hr

↓ 7.18 ↓ 7.35

↑ 58 55

↑ 28 36 ↑

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

partially compensated R-Acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

R-acidosis

fully compensated

CO_2 : $10 \text{ mmHg} \uparrow$
 HCO_3^- : $1 \text{ mEq} \uparrow$

CO₂ : $10 \text{ mmHg} \uparrow$
HCO₃⁻ : $1 \text{ mEq} \uparrow$

no compensation

① Neb. $\bar{c}$ salbutamol
spO₂ ①
Vp mismatch
(tr. O₂ driven)

② parenteral bronchodilation

Terbutaline sc/
adrenaline sc/

③ iv. hydrocortisone
④ PLH₂ - for keto-acidosis

④ ipratropium bromide
inhaler (anticholinergic)

⑤ iv. aminophylline
(separate drip line
due to interaction)
• $\uparrow \text{Ca}^{2+}$ conc. in diaphragm
• bronchodilator

Cardio - Respi. ARREST

Cardiac Arrest

Perfusion $\downarrow = 0$

Lactic acid production

$\downarrow$ slow

metabolic acidosis

Respi arrest $\leftarrow$ (no compensation)

$\text{CO}_2 \uparrow$

$\text{H}^+ \uparrow$

Respi acidosis

$\downarrow$
mixed Acidotic disorder

COPD: Compulmonale : RVF

Pedal edema: diuretics

dehydration ①

RR $\uparrow$: Hyperventilation

CO_2 washout

$\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons 2\text{H}^+ + \text{HCO}_3^-$

$\downarrow$

Resp. alkalosis

$\downarrow$ not 100%
mixed disorder

GFR $\downarrow$
aldosterone ①

$\uparrow$ salt + water

$\uparrow \text{H}_2\text{O}$

metabolic Alkalosis

mixed disorder $\cdot$ $\frac{CO_2}{HCO_3}$ 10:1 equation not satisfied

Sur: $pH = 7.2 \downarrow$
 $pCO_2 = 60 \uparrow$
 $HCO_3 = 10 \downarrow$

R-acidosis mixed M-acidosis
eg: Cardio-Respi arrest

Sur: **D.K.A.**

fruity odour breath

① Acetone $\rightarrow$ excreted in breath

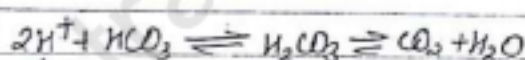
② Aceto-acetate

③ β -hydroxybutyrate: most acidic ketone body

urine dipstick test: detect acetoacetate

So it is not reliable test b/c Acetate can be $\uparrow$ in DKA

IOC DKA = plasma β -hydroxybutyrate level



$\uparrow$ (consumption)

- metabolic acidosis

$\uparrow$ Resp. centre

hyperventilation

Kussmaul breathing = life saving compensatory mechanism in case of D.K.A.

Compensatory $\downarrow$

Respiratory alkalosis

$pH = 7.18 \downarrow$

$pCO_2 = 30 \downarrow \rightarrow$ hyperventilates

$HCO_3 = 10$

metabolic acidosis

compensation

hyperventilates

uncompensated

①	PH	PCO_2	PHCO_3
---	-------------	----------------	-----------------

(a) p_n, p_{C_n}, d_n

if
Same

$$dH =$$

then see

MS
247

$$\text{HCO}_3^-$$

74

(-mɛlɔb)

— (Peng-

(b) 10 : 1 rule

Statistik = Compu

not sat'sfy = mixed.

6 month child $\rightarrow$ vomiting | diarrhoea

dehydration

Shock

④ GER

④ RAAS

⬆ Aldosterone

↓
Molecular

M. guidoti's

$P(1) = 1$ (Grundwert)

M. acidosis :

K. U. L. T.

(Y) Kolangidosis - Starvation

D.K.A.

① *umma* AKTJAKO

- H₂O / CKD
- 1/alter of excretion of H⁺

① North-south Type A: Stock

type B : drug induced
(phenformin)

①

For the

- Methyl alcohol

Amidok
Compirol

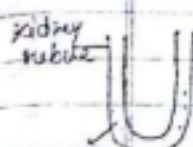
toxic to
fish

blindness

alcohol
dehydrogenase
Formaldehyde

formic acid = $\text{pH} = 1 \rightarrow \text{H}^+$ BBB = encephalopathy

Ethylene glycol poisoning: Antidote = Fomepizole



Ca oxalate crystals
blockage

Acute Tubular
necrosis

inability to
excrete H^+

Px Metabolic acidosis:

= R-L

⇒ H⁺ DKA = Normal saline

↳ Insulin deficiency

if pH < 7.15

K^+ Ngn. (R-L: Δ K^+ elms)

inspite of fluid (intravenous fluid Rx)

donor gives [R-L = K^+ 4mg/L]

$NaHCO_3$

Causes
metabolic acidosis

Metabolic Alkalosis:

① Aldosterone

Vomiting: dehydration

↓ GFR

↑ aldosterone

neonate

= Cong. Hypertrophic

Pyloric stenosis

[C.O.D.]

adult 20yr = P.U.D. leading

boys → gastric

adenomatous

Gastric
outlet
obstruction

ex of chloride
responsive

M. Alkalosis

endocrinal causes

Rx: spironolactone

Conn's syndrome - adrenal
adenoma

2^o Hyperaldosteronism

pregnancy induced HTN

diets - CHF, nephrotic

crisis

pts. losing enteropathy

↳ Ascites

② Aldosterone

ex of chloride - non
responsive

M. Alkalosis

Rx: Normal saline

if pH = 7.6

• NH_4Cl (ammonium chloride) (iv)

• HCl (iv)

Respiratory Acidosis :

$CO_2 \uparrow$

(Hypoventilation) = Neuromuscular ff

GBS/polio

Status Asthmaticus

type 2 Resp. failure ex.

Rx:

I.P.P.V. / A.C.M.V.

Respiratory Alkalosis :

$CO_2 \downarrow$

(Hyperventilation)

= type 1 Resp. failure

ARDS

Pneumonia

Pleural effusion

Rx:

Paper bag Rebreathing

in c. ABC derangement

① M. acidosis $\rightarrow$ K.U.L.T.

② M. alkalosis $\rightarrow$ CT Response $\approx$ 100

③ R. acidosis $\rightarrow$ type 2 RF

④ R. alkalosis $\rightarrow$ type 1 RF

(Hyperventilation)

$\rightarrow$ fever +

$\cdot$ Inadequate Analgesia

RL $\rightarrow$ SB carbonate

NS $\rightarrow$ NH₄Cl

ACMV

Paper bag
rebreathing

M. Alkalosis :

$HCO_3^- \uparrow$

$\rightarrow$ alkali $\uparrow$

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

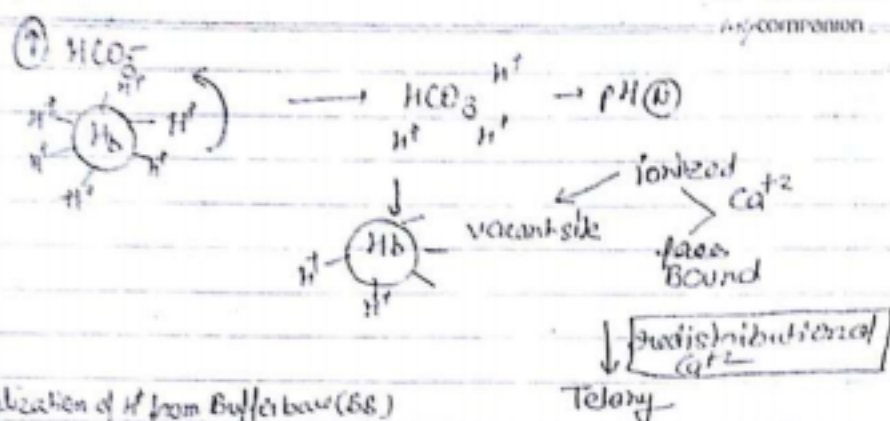
H^+ $\uparrow$ H^+

H^+ $\uparrow$ H^+

known come from

buffer base

ex HB



- ① mobilization of H^+ from Buffer base (BB)
 - ② vacant site on BB
 - ③ ionized Ca^{+2} occupy those site
 - ④ Ca^{+2} $\downarrow$ Tetany
- $\downarrow$
- $\text{N.S.} \rightarrow \text{In pt of N-alkalosis}$

Ques: 2 wk old neonate, 2 case of CHPS scheduled from Romulett Sr tomorrow

PAC = fitness $\rightarrow$ electrolytes
 $\downarrow$ $\text{Ca}^{+2} = 6 \text{ meq}$
next Best Step

- ① postpone tx
- ② i.v. R-L $\rightarrow$ C/I b/c lactate $\rightarrow$ alkali $\rightarrow$ Alkalosis
- ③ i.v. Ca gluconate
- ④ i.v. NS

R Alkalosis:

To yz Q: Sitting in plane (afraid 2 hr)

Get off hyperventilation

$\text{CO}_2 \downarrow \rightarrow$ R Alkalosis

ionized $\text{Ca}^{+2} \downarrow \rightarrow$ Perimargal / perioral paraesthesia

Stridor $\rightarrow$ Rx: Rebreathing in paper bag

Anxiety of any kind
Hyperventilation

Anion gap:

$$\begin{aligned} & \text{---} \oplus \quad \text{---} \ominus \\ & (\text{Na}^+) - (\text{Cl}^- + \text{HCO}_3^-) \\ & \textcircled{n} = \underline{8 - 16 \text{ meq/L}} \approx 8 \end{aligned}$$

* cholera $\downarrow$
 $\text{Na}^+ \downarrow - (\text{Cl}^- + \text{HCO}_3^-) = 8$ (normal anion gap)

* DKA $\uparrow$ $= \uparrow$ (anion gap)

* (multiple myeloma) $\uparrow$ = $\uparrow$ (anion gap)
Protein

* Normal anion Gap blood

DR. FUSE

- D • Diarrhea
- R • Renal Tubular acidosis 1,2,4
- F • Fistula
- U } ureterosigmoidostomy
- S }
- E }

($\uparrow$ anion gap)

$\downarrow$ Anion gap

• Multiple myeloma

K - ketoacidosis

U - uremia

L - lactic acidosis

T - Toxin

urinary anion gap = 0

$$(\text{Na}^+ + \text{K}^+) - (\text{HCO}_3^-) = 0$$

negative = NEGATIVE = diarrhea

positive = R.T.A 1,2,4

diarrhea

① anion gap ✓

② UAG (urinary anion gap) ✓

Severe dehydration: SHOCK; M. acidosis → RL ✓

RL

Rotavirus - ROTATEQ ✓

PVS

oral

(2, 4, 6m) ✓

upper limit 15 weeks

If > 6m = intussusception ↑

O.S.A Obstructive Sleep Apnea : exp. of type 2 R-Failure

• morbid Obesity (adult)

• Craniofacial dysmorphism

(Pierre Robin syn: mandibular hypoplasia)

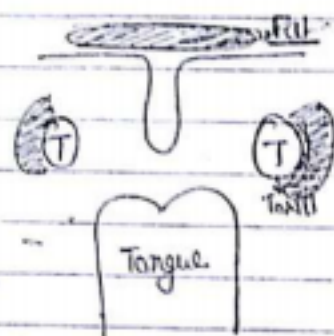
Treacher Collins syn.

cut off 10 sec

cut off

OSA
① Apnea : 10 sec

② Apnea : 20 sec



Snoring ↑↑ → Apnea

• Sleep interaction interruption

• Position change

Recurrent Hypoxia

Pulm. (A) HTN

RV compliance (↓) (exercise intolerance)

Pedal edema (↑)

C/F ① ↑ excessive day-time sleepiness

② daily headache

③ pedal edema

④ exercise intolerance

⑤ Snoring : loud

Tx: polysomnography

SpO₂ : 85% 95%

ECG : HR (↑) → R-R interval ↓

EEG : NREM 3 : delta (0-4 Hz) → α-wave (8-13 Hz)

EMG : chin : ⊖

leg : ⊕

Poly somnography

1) 5-15 apnea episodes/HR

Rx: TCC $\Rightarrow$ C.P.A.P.

(Positive end expiratory pressure)

[to prevent expiratory collapse of upper airway]

2. Stop smoking

3. loose wt

ORLISTAT (Pancreatic lipase)

SE: steatorrhea (not used > 6mth)

Vit A/D/E/K deficiency

Angiopathy

D. bone pain (low)

R. bleeding (purpura)

E. sensory ataxia

spiky RBC

(Acanthocytes)

Sibutramine : CAD

Fenfluramine : PAH

} withdraw

early satiety

Topiramate-phenelzine

• Lorcaserin

if BMI > 40

Bariatric Sx

ghrelin $\downarrow$

hunger $\downarrow$

• all antiepileptic drug causes wt gain

Exception: Topiramate

② Epworth Sleepiness Score : (ESS)

- used for evaluation of O.S.A.

(not narcolepsy)

Narcolepsy

Catalepsy $\Rightarrow$ Sudden $\downarrow$ tone
eye-lid fluttering $\oplus$

① Reticular Activating System (RAS)

Rx: Modafinil

(alert/awake)

b/c $\downarrow$ sudden loss

Emphysema:

50yr ♂ tall thin smoker
pulling on cigarette
watching T.V.

Wigorous coughing ⊕
Sudden onset Resp. depression

Bulla



Spontaneous Pneumothorax

no companion

Marfan Syndrome

Ehler Danlos syndrome

ultra flexible skin
(Rubberman syndrome)
(flexible joints)

O/E

accessory muscle ⊕

R. Rate ⊕

SCR ⊕

Breath sounds ⊖

Air entry ⊖

Breath sounds - vesicular ⊕

I:E = 1:2

Pneumonia - Bronchial ⊕

I:E = 1:1

(bulla rupture)
Spontaneous
Pneumothorax

CXR: deep sulcus sign ⊕

Rx: <25% lung
collapse

O₂

25-50% lung
collapse

needle aspiration

>50% lung collapse/
cyanosis

5 ICS at MCL
(ICD drainage)

Pneumothorax

Tension

Trauma

Go ← Resp depression

Air entry ⊖

⊖ Breath sound

CXR

always
5 ICS

Rx: Lumbar puncture needle
(LP needle)

ICD

Spontaneous

bulla Rupture

needle aspiration


 Date _____
Page _____

 Date _____
Page _____

Ques: 6 month child c pneumonia is on Vancomycin X 48 hrs.

Sudden onset of R.O. ++

SpO₂ ↓, central cyanosis

CXR: Black ++

Vascularity ⊖

Cause

1) Rupture of pneumatocele

2) failure of AB therapy

3) Aspiration

4) collapse of lung

pneumothorax
(ICD)

5th ICS in MAL

Asthma

Extrinsic
paediatric onset

IgE ⊕

eosinophil ⊕

Severity ⊕ c ↑ age

Intrinsic = nasal polyp incident
adult onset

IgE ⊖

eosinophil ⊖

[Leukotrienes]

exercise induced
induced ⊕

• Cold Air: Bronchospasm

Rx: Inhaled corticosteroids

Montelukast

ipratropium
bromide

drug induced ⊕

① Cox-1 ⊖

ibuprofen

Ankle sprain + DTA

Etoricoxib

Cox-2 ⊖

② Propranolol

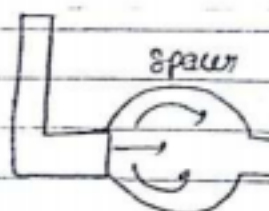
③ Timolol eyedrops

Acute exacerbation Asthma: type 1 RF

Allergen, Histamine

Rx: M.D.I. salbutamol

< 74%



terbutaline inhaler (S.C.M.)

Prophylaxis Asthma: ① frequency attack
2 nocturnal attack / week

① Fluticasone

Budesonide

(inh steroids)

S/E: Sore throat - Candida

1/2 (rinsing of mouth & the inhaler)

② Montelukast

Leukotriene

↓ C/I in Acute Asthma

Contraindication for prophylaxis:

Chronic persistent Asthma:

Inj. Omalizumab (S.C.)

[Anti IgE]

Status Asthmaticus: Severe Acute Asthma = Type 2 R.F.

① Drowsy

② Bounding pulse

③ Accessory muscles (+) : S.C.M.

④ Rhonchi - silent chest

⑤ tachycardia

Rx:

O₂ + salbutamol

terbutaline/adm

Hydrocortisone

Aminophylline

> 1hr [impending Resp failure] = Resp Acidosis

① Can't speak

② Shallow rapid breath

③ Central cyanosis

①

②

③

④

⑤

(1 min gap b/w puff)

↓
Rinsing of mouth after taking puff.
(inhaler)
Candida growth
Puff



④ pulse paradoxus

↳ Bradycardia

Rx:

ACMV

+CST

(Continue 30ms H/I)

Brittle Asthma

• extreme variation P.E.F.R

(Peak exp. flow rate meter)

① green ② orange ③ red
 ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
 emergency

diurnal PEFR > 40%

K/o brittle Asthma

Rx:

Epi-Pen epinephrine (sc)
(high/ant)

Acute exa. Asthma

Severe acute (A)

Prophylaxis

impending R.F.

Brittle (A)

Exercise Induced (A)
EIA

Neb Salbutamol

Neb. Salbutamol

Inh. corticosteroid (ICS)

ACMV

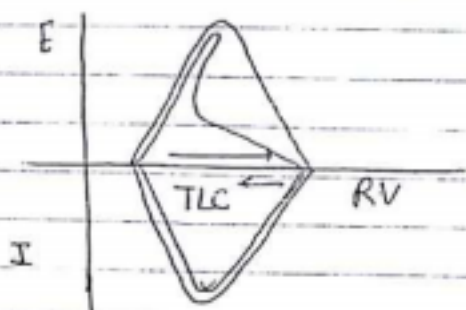
epinephrine (sc)

ICS

- ② in snakes m.c. Restrictive ds = Desquamative interstitial pneumonitis
 ③ in ♀ (m.c. Restrictive ds) = non-specific interstitial pneumonitis (NSIP)
 ④ Rheumatoid Arthritis = UIP (universal interstitial pneumonitis)

Pulmonary Function Test:

(Flow volume curve)



PARENCHYMAL OBSTRUCTION

Asthma / COPD

Concavity prolonged Expiration



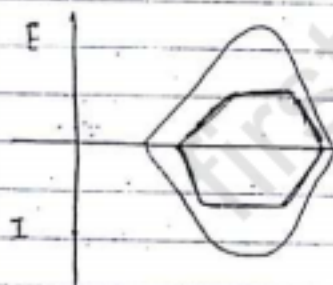
extrathoracic obstruction

Retrosternal goitre

I = ↑ pressure
downward movement of goitre

Prex airway

E = goitre go to its original position
airway = (N)



Tracheal Stenosis

I = ↓ entry

E = ↓ exit

Constructive
shrinkage



Restrictive Lung Disease

Pulmonary Fibrosis

① m.c.c. I.p.f.

(Idiopathic pul. fibrosis)

⑤ Bronchiolitis obliterans pneumonia (BOOP)

Adenovirus

⑥ Cryptogenic organizing pneumonia

- muscle of expiration = internal intercostal muscles

☞ *for companion*

IRV = 3.3L

$$TV = 0.5L$$
$$E_{AV} = 1.0 \text{ L}$$

RVL-2L

$$TLC = IRV + TV + CRV + \textcircled{RV} \quad 6L$$

$$VC = IRV + TV + ERV \quad 4.8L$$

$$IC = IRV + TV \quad 3.8L$$

$$FRC = ERV + (RV) \quad 2.2 L$$

Asthma = Air trapping

- ① RV ↑
- ② FRC ↑
- ③ TLC ↑
- ④ Timed vital capacity $\frac{FEV_1}{FVC/TLC/PVC}$ ↓

(N) $\checkmark$

$FEV_1 \geq 80\%$
 $FEV_2 \geq 95\%$
 $FEV_3 \geq 97\%$

Objective

Asthma

FEV, ④

FEV₁ ↓
TLC ↑

Restrictive

TL0/800P

FEV₁ (L)
$$\frac{FEV_1}{TLC} = \text{N/T}$$

- mild Asthma FEV_1 - 50-80% → mild
30-50% → mod
≤ 30% → severe
Cannonball
honeycombs

⑨ time unit = $N/\uparrow$
capacity

Heel pain : (Entropathy) commonest pain (3)

(lumbosacral kyphosis)

Residual volume ↑
(RV)

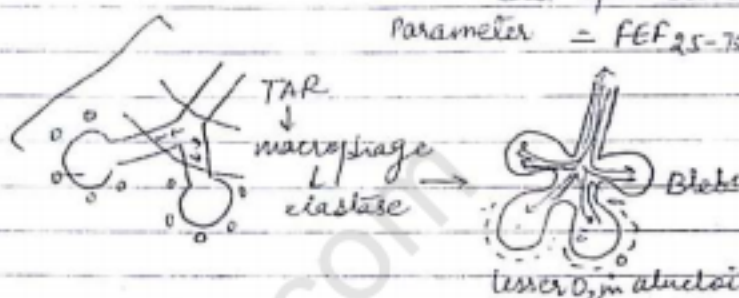
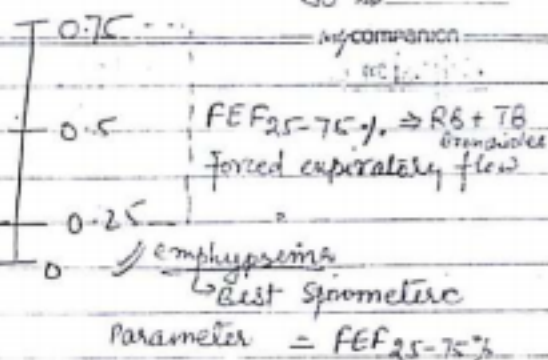
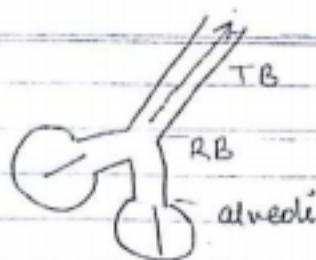
extra pulmonary
Restrictive lung dis.

Residual Volume.

extraparasitoid
RLD.

① I.T.D. (Paracetamol R.L.D.)

2

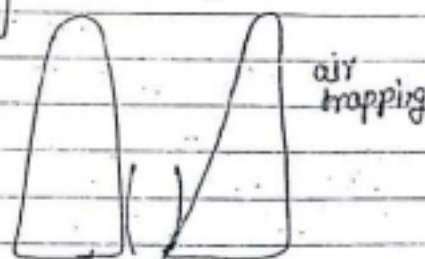


FEV₁ ↓ Salbutamol → FEV₁ ↑
asthma = RAD

FEF_{25-75%} ↓
FEV₁ ↓

% of change of FEV₁ before & after salbutamol > 12%
to call it asthma (RAD)
Reversible airway disorders

Emphysema



Flattening diaphragm (+)

Tubular heart (+)

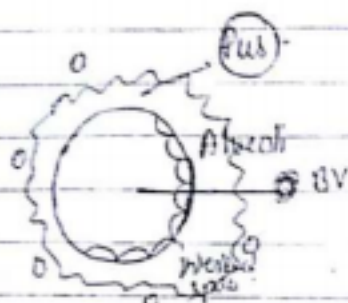
Hyperinflation

(wheezes > 8000)

Vascular flow always (+)

Shallow

Diffusion capacity of lung for CO: (DLco)



DLco ↓

① interstitial pneumonia

Psittacosis
P. Tyroci
mycoplasma

② interstitial lung ds

Asbestosis
DIP
BOOP

③ Emphysema

DLco ↑

① Good-pasture syndrome (type II R.F.)

Anti BM AB

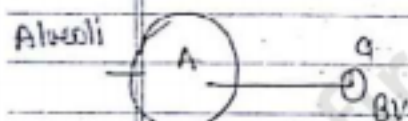
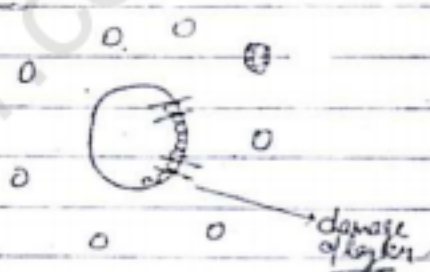
Hematuria

Hemoptysis

Rx: STEROIDS

alveoli

Pulmonary
hemorrhage
syndrome

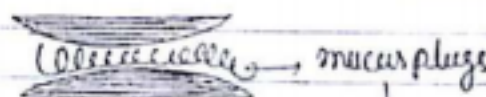


$PAO_2 - PaO_2$

Alveolar-Arteriolar gradient

$= 5-15 \text{ mmHg}$

Severe Acute Asthma



Curschmann spirals

m/e Charcot-Leyden crystals

$PAO_2 - PaO_2$

③ ③

Type 2 R.F

A-a gradient (N)

↓ PO_2

↑ PCO_2

Pulmonary function test (PFT)

- ① Flow volume curve
- ② Spirometry :
 - timed vital capacity asthma $\frac{FEV_1}{FVC}$ ①
- ③ DLCO → ① Good perfusion
- ④ A-a gradient
 - ⑤ = type II R.F.

SLE

- Type III immune-complex
- ♀ > ♂ = 9:1
- 46XX 46XY

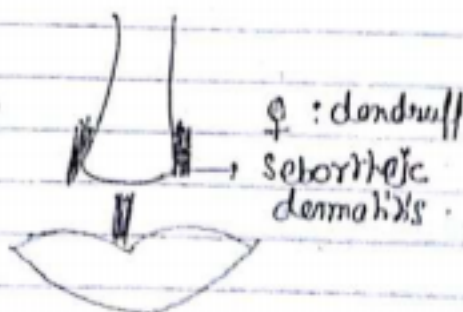
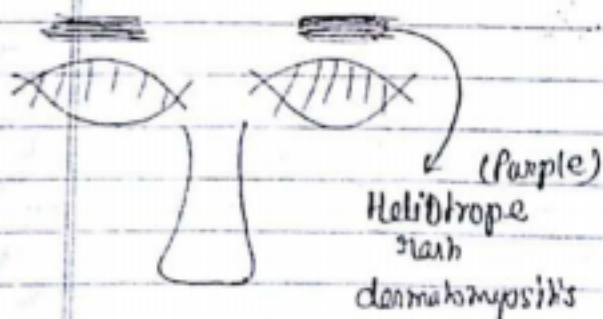
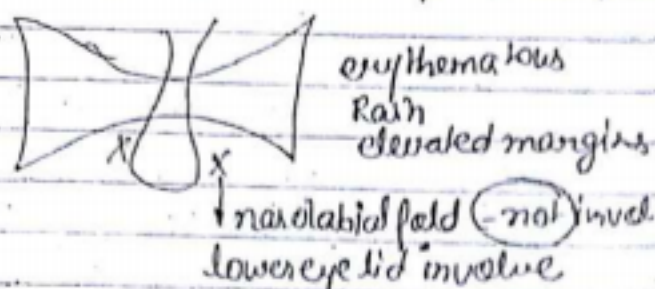
no. of X chro. $\propto$ severity SLE

MD SOAP BRAIN

M: malar Rash

Klinefelter & SLE : ♂ (47XXY)
Turner & SLE : ♀ (45XO)

malar flush → mitral stenosis (MS)



Date: / /
Page: /

D: Discoid Rash

hypopigmented macules

S: Serousitis

lung
pleuritis
Shrinking lung syndrome
pleural effusion

heart
pericarditis, ST ↑
Libman Sacks
endocarditis (MR)
Rx: Valvuloplasty &
steroid not given

Doc (USQ chart)

for cases of minimum pl. effusion > 50ml
X-ray → lateral decubitus

(N) 5-15ml

Aphthous D: Oral ulcer

① (N): Shred/compaction
Bum: Painful (+)
Spicy food: Irritation
Rx: Benzocaine Jelly
Self Resolving

② BLE: multiple crops of ulcers
Painless
Soft palate ulcer
Rx: Topical steroids

③ I.B.D. = Crohn's dx > UC
pseudo polyps
antibacterial
Cervical A/B
[A-S-C-A]

p.ANCA

Stricture = colicky pain

Painless bloody diarrhoea
(10-15 times/day)
Orchid
pr loose
fetal edema (+)

Doc

Rx: infliximab

Rx: sulfasalazine (proctog)
↓ bacteria
3-ASA

⑤ Arthritis:

Homog: Synovitis

Joints: knee

Hands: PIP, MCP

non-erosive Arthritis (SLE) →

(no deformity)

S · SLE → A.S.

I · IED → migratory Polyarthralgia

R · Rheumatic

→ migratory Polyarthralgia

→ GpA pseudotubercle Strep (GAEH)

Symmetrical involvement

Rheumatoid Arthritis

inflamed, Tender

Que 2049 Q, PIP, MCP, wrists (B/L)

morning stiffness > 30 min

2049 Q, PIP = 2/3rd finger - Rt

MCP = 3/4th finger - Lt

knee = (L)

ANA +/B ket -

Asymmetrical involvement

SLE

(RA)

erosive deformity

Swan neck

Ulnar deviation hand

Boutannere's

IOC =

① Anti C.C.P.

Anti-cyclic citrulline

Phospholipid

② Anti-mutated

citrullinated

vitamin ④

RA factor

IgM linked to IgG

Biological (BPF)

factor ④

↓ ④ in 5% ④ popult

Screening test

⑥ Photosensitivity: (Sunlight - UV-B)

• skin burn - 1st degree burn (sunexposed part)

Redness, pain ④

Rx:

• Sun-screen lotion

DOC - Hydroxychloroquine

• steroids not given

name SLG

Date ____/____/____
Page ____

my companion

explanation

Acute intermittent

Porphyria ✖ ✖

where

Photosensitivity

Ont.

Porphyria

1) Heme biosynthesis ⊖

2) Porphyria ⊕

3) m.c. type : Porphyria Cutanea tarda (PCT)

4) photosensitivity

5) Red-wine

6) Red-teeth

7) depression/psychosis

Dracula
Vampire

Rx:

Blood → Naem

⊖ feedback : porphyria

i.v. Naem

(DNA Recombinant technology)

⑦

BRAIN

CNS involvement

ms - cognition defect

Headache

Lupus cerebritis : cerebral edema ⊕

• seizures

→ Anti-neuronal Ab. ✖ ✖

psychiatric manifestation

↓
Psychosis

→ Anti-Ribosomal-P Ab ✖ ✖

⑧

Renal : lupus nephritis

Hematuria : "Cola colour urine"

GFR ↓ : Renin ↑ ; HTN

inv. →

① RBC

② = < 3 RBC

(HPF)

< 5 RBC

(μL) ✖

dysmorphic RBC

glomerular bleed ✖

Red urine
• Clofazimine
• Beet root
• Porphyria
• Rhabdomyolysis
• myoglobinuria

* $> 5000 / \text{HPF}$

* Asc. LOH - loop of Henle = Tam Housefall protein

glomerulonephritis
No one
companion

urine m/e

Hyalin cast

WBC cast

RBC cast

Broad cast

RBC cast = AGN, RPGN, lupus nephritis

WBC cast = A-PN, A-Interstitial nephritis (AIN)

Broad cast = CRF

granular waxy cast

⑦ / CRF C.GN

② $C_3 \downarrow$

③ KFT

Cockcroft gault formula

④ kidney biopsy - table from Robbins

wire loop lesion

stage = 6; lupus nephritis

m/e stage: IV

most severe = IV

Rx SLE

• STEROIDS

GFR $< 15 \text{ ml/min}$: ESRD

allogenic kidney Tx

• first degree relative

• HLA matching = chr = 6

• Bld group matching = Bld gp. chr-9

• BORDR = HIV/HBV / Renal angiography : LEPT renal
nein: longer

• Recipient : $\rightarrow$ right iliac fossa
entrap peritoneal

• Rejection episode

$\rightarrow$ cyclosporine

• azithromycin

• Prednisolone

Sirolimus
Tacrolimus

		HSTRm
Hyperacute Rejection	minute	type 2
Acute "	<6mth	222/20%
Chronic "	>6mth	type 4

St-E → does occur in transplanted kidney

(Autoimmune disorders)

New kidney does not occur

ADPKD: kidney Tx

Alport's: COLA #
type 4 collagen

Medullary spongy kidney

Infection after kidney Tx

<1mth: wound infection
Herpes virus

1-6mth:

>6mth

① P. foveol

Aspergillus

② CMV virus

BK virus / polyoma

③ Hep B

m.c. viral

④ Hep C

infection occurring after solid organ Tx = CMV

• m.c. virus

related to Tx an. = EBV
lymphoma

(monozygotic twin)
DNA 1 = DNA 2

Rejection

0%

Transplantation

isograft / syngeneic

across species

Xenograft

Lupus Nephritis : mortality ①

m.c.c. of death in SLE

- ① Mort-19 $\Rightarrow$ Infection : Steroids ① CMI
- ② Mort-18 $\Rightarrow$ Kidney involvement
- ③ accelerated atherosclerosis

④ Autoimmune Hemolytic Anemia: Pancytopenia

2-○ RBC $\rightarrow$ Pallor

3-● Lymphocyte $\rightarrow$ infections

2-⦿ Platelets $\rightarrow$ Petechiae
 onk. non
 blanching
 Purpura
 epistaxis

inv.

① Hb ↓

② Peripheral smear
 Hemolysis ④

③ Reticulocyte count - (↑)

④ WBC ↓

⑤ platelet ↓

⑥ ITC AHA
 = direct coombs test

Rx:

Steroids

⑩ Immunological

- low C_3 / C_4
- C.R.P.

Capsular polysaccharide of pneumococcus

• anti smith

• anti cardiolipin

⑪ Antinuclear anti body (ANA)

40 Δ of SLE = +4/11

Malar Rash = Butterfly Rash
 discoid Rash

Serositis $\leftarrow$ lung = Pleuritis
 heart = Pericarditis

Accelerated Atherosclerosis

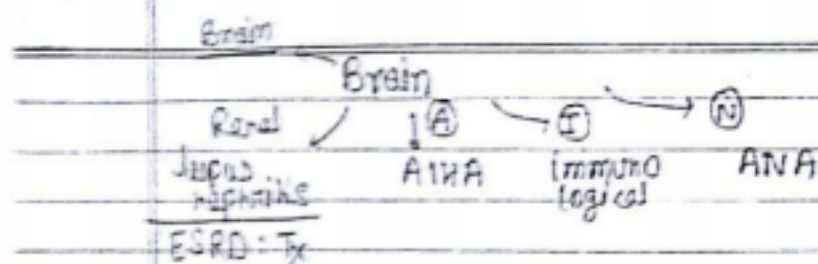
Oral ulcers : crops / patches soft palate

Arthritis : knee > PIP, MCP (any metatarsal)

Photosensitivity

CNS : cognition / seizure = Anti neuronal A/B

Psychosis = Anti-subosomal A/B



Date ____/____/____
Page ____
Any companion

Tx

- ① ANA = most sensitive
 - ② Anti-Smith = most specific
 - ③ ds-DNA = ds severity
 - ④ Anti-Histone Ab: drug induced LE
waxing & waning course
SHIP
S- Sulpha
H- Hydralazine
I- INH
P- Procainamide (m-c drug causes DLE)
- good prognosis ← Lupus nephritis not ⊕
Lupus cerebritis not ⊕

- ⑤ Anti-Ro
= IgG₁ = neonatal Lupus (AV node B)
complete heart block: HR = 40bpm
Rx: pacemaker

- ⑥ Anti-neuronal Ab ⇒ seizure ⊕
↑ test for Lupus cerebritis
- ⑦ Anti-Ribosomal-P Ab
↳ neuropsychiatric
- ⑧ Anti-p₂-glycoprotein
Anti-phospholipid Ab
Anti-cardiolipin Ab
Lupus anticoagulant = (20) ⇒ APLAS

APLAS syndrome :

- SLE association
- Recurrent Abortions (>3 consecutive Abortion)
(late 1st trimester 10-12 wks)
- I.U.D. → 84 wks

2nd Aplas
means AN
SLE

Ix:

- ① VDRL ⊕ → false ⊕ } False ⊕
② FTA-ABS ⊖ } no syphilis

⑤ Coagulogram

Bleeding time	2-9 min	⊕
PT	11-16 sec	⊖
APTT	30-45 sec	⊕

④ anti β₂ glycoprotein A/B = TOC

↓ ⊕
Intrinsic system of (activate)
clotting

Clots ⊕ : uterine (fi) / vein → Abortion
Coronary A/V → MI
Cerebral A/V → Stroke

U.P.T. ⊕
Rx: next pregnancy

Steroids
C/I

Tab. Aspirin 75 mg
+ inj heparin (s.c.) } 1st trimester

Tab. Aspirin 75 mg + oral warfarin 2nd trimester

Screening test for APLAS

• dilute Russell Viper venom Time test (dr VVT)

Steroids C/I in SLE when

- ① photosensitivity → Hydroxychloroquine
- ② A.P.L.A.S → Aspirin 75mg
- ③ Libman Sacks endocarditis = Valvulopathy
- ④ Psychosis = CPZ
- ⑤ ESRD = Transplant

Hydroxychloroquine
Aspirin 75mg
Chlorpromazine
Transplant

SCLERODERMA

Q: ESR ↑

fibrosis around the blood vessel: tip of fingers

• cold exposure

• Finger Tip: abn VE: white

decreased Hb ↑ blue

> 4.0 gms/dl

abn Vasodilation: red

Raynaud's phenomenon
"RP"

Seclusione
isolated & mc
involvement in
RP

RP

R

⇒ CCB: amlodipine

2.

white band

scar in tip of fingers

= sclerodactyly

*(pitting scar on palmar aspect)

3. FLEXION CONTRACTURE

4. LEATHER like skin

5. MICROSTOMIA - (Pinched app of face) =

minor salivary glands #

Saliva in ↓: dysphagia: chips & keratin

: dental caries: deep pustules

6. Esophageal dysmotility:

7. LES tone: 25mmHg (n) is ↓

Heart Burn] reflux esophagus
 Sour Brash

- ⑧ Heart : RCM : Kussmaul sign
[CP, RCM, inf wall MI, scleroderma]
not in C Tamponade
- ⑨ LUNGS : Pulmonary Fibrosis
Timed Vital Capacity (N) ↑
✓ Pul. A : PAH (DLCO ↓) **
- ⑩ Kidney size ↓
• GFR ↓ ↓
• Renin ↑ ↑
• BP ↑ ↑ → malignant HTN } scleroderma crisis
DCC : ACEI **
• Aiskiren
- ACEI + ARB → X ↑ K
- X Metoprolol + Verapamil = LHR
SA node AV node delay prolong
- IOC : anti topoisomerase Ab
Rx scleroderma
d-penicillamine * (C/I - steroid) *
BPT
- CREST
↳ limited scleroderma
1. Calcinosis
2. Raynaud's Ph
3. Esophageal dysmotility
4. Sclerodactyl (not syndactyl)
5. Telangiectasia
- Inv - anti CENTROMERE A/B
Rx : d-penicillamine
• generalised scleroderma = 10
• limited scleroderma = 5
• localised scleroderma = morphea
idiopathic Scar : dysfigurant

Mixed connective tissue disorders: MCTD

♀ → ESR ↑

SLE : II Butterfly Rash

SCL : IO Raynaud's pheno. /

RA = PIP, MCP, wrist
morning stiffness↓
MCTD

IOC: anti U RNP A/B

Ribonucleoprotein A/B

Rx: d-penicillamine
Levomisole.
Hydroxychloroquine.Sjogren / sicca syndrome :

♀ → Dry eyes - mouth

Lacrimal #

↓
tear ⊕

Schirmer's test

exposure keratitis

Corneal ulcer

fluorescein dye

→ Rose bengal dye test

Salivary #

dry dysphagia -
dental hygiene
halitosis
dental caries ⊕

dry vagina

↓
Bartholin's gland
dyspareunia

Ix: Anti-SSA & SSB A/B (IOC)

Rx:

Symptomatic t/t

Poor hygiene → mouth washes

saliva ↑ → Cevimeline (cholinergic)

eye → methylcellulose eye drops

05/03/17
7th day
companion

Bechet : ORO- Oculo- Genital Syndrome

HLA B5 > HLA B51

♀ : Turkish
China
Mongolia
Egypt } Central Asian
ascend

Recurrent Aphthous ulcer (>3/yr)

Painful

Oral cavity, vulva (genitalia)

Red eye B/L

(Ocular exam) → Hypopyon (uveitis)

Large vessel Vasculitis

↳ pulmonary (B) invasive : PAH
hemorrhage → hemoptysis

Ix :

Major Diet

PATHERGY TEST

Hypodermic needle : Prick forearm

48-72 hr → Sterile Pustule

HLA B5 (+)

ESR ↑

Large vessel vascul

① Giant cell Arteritis

ESR ↑ ≈ 100mm

temporal headache

Bx : granulomatous
vasculitis

Rx : Steroids

Rx :

Topical steroids :

Oral cavity Aphthous ulcer
genitalia

② Takayasu Arteritis

• mc blood vessels involve

aortic subclavian (B)

• Arm claudication

activity (B) → pain (B)

✓/o neurogenic claudication

MRI spine : ✓/o P.I.V.D.
(Prolapse of intervertebral disc)

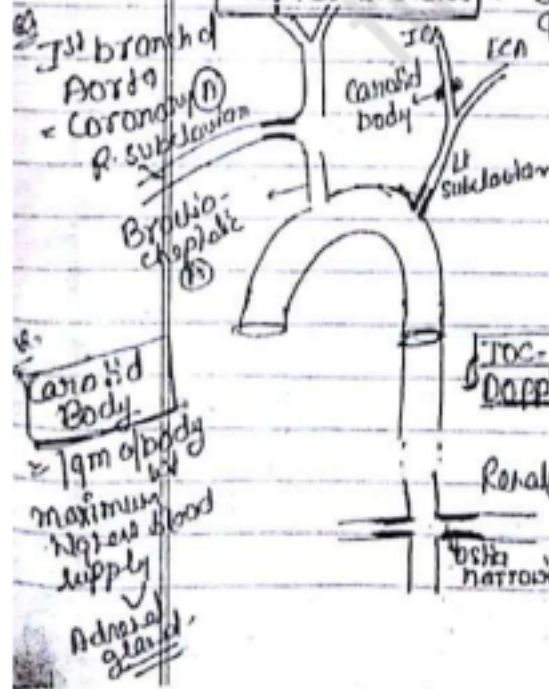
• BP left arm (B) < Arm Rt

unequal BP b/w 2 arms

• Radio-Radial delay

• Pulsus ds

• B/L Renal (B) stenosis → HTN → dilated



TOC-RAS

Doppler : MRA

gadolinium

Renal (B) contrast

nephropathy

Hydration is imp.

Artery narrowing

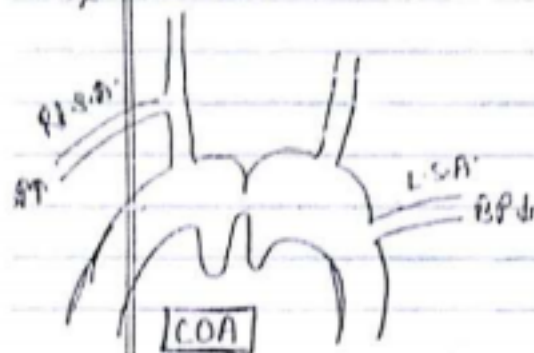
Contrast nephropathy

• Hydralazine

Rx: N-acetylcysteine

✓ IOC for Takayasu: Angiography

✓ Rx: Steroids



preductal variety

Unequal BP: Lt > Rt arm

- ① Takayasu (A)
- ② COA (preductal)
- ③ atherosclerotic aorto-arteritis

Unequal BP: U-limb ↑, lower limb ↓

- ① post ductal COA
- continuous murmur
- inferior notching ribs (intercostobrachial A)

Kawasaki dx:

- ECG finding of MI in 4 yr child
- large vessel vasculitis

4 yr. fever > 5 days (PCM, amoxycillin)

Cervical lymphadenopathy

Oral Exam:

Strawberry Tongue

General physical Ex (APE)

RASH: Trunk → genitals

Perioral peeling of skin

Periungal peeling of skin

eye: B/L subconjunctival congestion (non-purulent)

Criteria

AMH criteria for K d:

multifaceted

lymph node syndrome

(desquamation - rashes)

cells

desquama non

• Bulbar
• Tongue

Thrombocytopenia (not include in D criteria) - my complication
Echo : Coronary (A) aneurysm

Rx: Aspirin + IVIG X 7 days

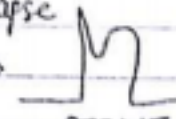
[K.O.]

(1) m.l. valvular lesion = MR

(2) max. damage in myocardium

day 14: MI : Large (A) vasculitis

499: collapse

Ix ECG $\Rightarrow$ 
STEMI

Rx: Thrombolysis + IVIG TOC

4 yr child ; fever (4 days)

Rash : Scarlet (Red) $\rightarrow$ SAND PAPER feel

ext extremities $\rightarrow$ trunk

Strawberry tongue

Cervical lymphadenopathy

Scarlet fever

Streptococcus
Pyogenus

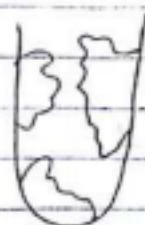
Rx: Ampicillin

Strawberry Tongue :

• papillae (A) (hypertrophy)

White : white papillae projection $\rightarrow$ K.O.
(tongue Red)

RED : Red $\rightarrow$ Scarlet fever



Papillae Atrophy
geographic tongue.
* Bp deficiency
megaloblastic
Anemia

complete papillae Atrophy

large, beefy tongue.

Iron deficiency anemia

Magenta tongue : Purple.

Riboflavin (B₂) deficiency



Median
rhomboid
glossitis

Candida infection

Black Hairy tongue

- ① HIV ⊕ : EBV
- ② Smokers
- ③ Bismuth

AIDS defining cancer

- ① Kaposi sarcoma : HIV 8
- ② PCNS Lymphoma : NHL
- ③ Invasive Cervical Cancer : HPV 16, 18

Malignoma : H. pylori

EBV :

- Burkitt
- HL
- NHL
- Nasopharyngeal Ca

HTLV-1

- Acute leukemia AIL-L
- Tropical spastic paraplegia

Px: Radiation & α-interferon (immunity)

HIV 8

Site: Legs (skin), oral cavity, all visceral organs except brain

Kaposi Sarcoma

vascular tumor

reverses from in paediatric AIDS

- Lymphocytic interstitial pneumonitis +nt in paediatric AIDS - (never +nt in adult AIDS)

Date: _____
Page: _____

My companion

In AIDS

- m.c. NHL in AIDS : Diffuse large B cell lymphoma (DLBCL)
- m.c. C. of pleural effusion : Kaposi Sarcoma > DLBCL
- vaccine preventable cancer

① Hep. B : HCC

② HPV 16, 18 : Cervical Cancer

Gardasil / Cervarix (9-26 yrs)

- Cancer preventable by Antibiotics

① MALToma : H. pylori

classmate
Date _____
Page _____

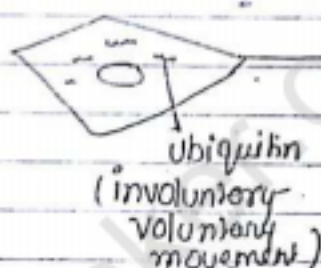
KIDNEY

AD polycystic kidney ds:
cyst origin: entire nephron

ARPKD $\Rightarrow$ cyst origin
(Collecting duct > DCT)

(AD): complete penetrance & variable expression

Anticipation: severity $\uparrow$ & successive generation



Huntington Chorea

: Chr-4 #

: Huntington gene

: trinucleotide repeats

: CAG > 40

$\rightarrow$ Atypical parkinsonism
b/ Dopamine $\uparrow$

Polycystic

ADPKD

mc inherited kidney disorder: ADPKD

incidence: 1-400-1000

familial hypercholesterolemia: type II A

Rx: tetra benzazine

PKD 1: 85% more severe - chr-16

PKD 2: 15% less severe - chr-4

(1:500 p)

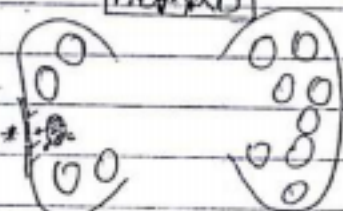
ADPKD

CF

- ① Flank pain
- ② Hematuria
- ③ GFR $\downarrow$ $\rightarrow$ renin $\uparrow$
HTN: headache
- ④ Subendo Cardial ischaemia
- ⑤ Infection $\uparrow$
Pyelonephritis

medullary sponge
Cystic medullary differential

IVP
Paint Brush appearance



medulla diff. $\oplus$
not AD

IVP Blunting of calyx
Hydronephrosis
communicating way

Acute pyelonephritis

culture: $>10^4$ CFU/ml
 ⊕ WBC cast

⑥ Kidney stones ⊕

Struvite stone (due to infection)
 (MC stone in ADPKD)

⑦ RCC: ⊕ incidence, aggressive

⑧ death

(MC cause of death in PKD: Coronary ⊕ disease (CAD))

Ix:

→ IFT: S. creatinine ↑
 • USG: >2 cysts / kidney ⊕
 20-59 years of age
 >60 yrs → >4 cysts / kidney

Rx

ACE ⊖ control HTN

Slow - progression to ESRD

CRF: management

* $GFR < 15 \text{ mL/min/1.73 m}^2$

allogenic kidney Tx

1st rejection drug: C A P

MoTR ⊖

↳ Tacrolimus

SIROLIMUS ⊕ - non nephrotoxic

• Barrier nursing

• CMV >> BK Virus

• Mc Cancer seen after administration of anti cancer rejection drug in kidney Tx. = SKIN Ca

classmate
Date _____
Page _____

ADPKD

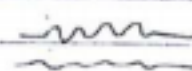
1. Liver : polycystic
2. Pancreas "
3. Spleen "
- Lung - unlikely seen
- * never seen in Brain *

me
* Extra renal manifestations of ADPKD

• Liver cyst
CNS → Berry aneurysm
(endarterial coiling)

CVS → Mitral valve prolapse
mid systolic clicks

GIT → • Late Systolic murmur
• Colonic diverticulosis

Ba enema →  Saw-tooth

ARPKD

<20 yrs

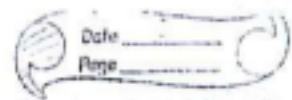
- | | |
|--------------|---|
| • Flank pain | 1 |
| • Hematuria | 2 |
| • HTN | 3 |

me
* Extra-renal manifestation

Congenital Hepatic fibrosis

- Portal HTN
- Esophageal Varices
- Hematemesis (R)

R ACE ⊖, GFR <15ml : Transplant



TUBEROUS SCLEROSIS

- AD
- TSC 1 gene = ch 9
- TSC 2 gene = ch 16
- Ash leaf macule
- infantile spasm → seizure

Q Kidney : angiomyolipoma
* angiomyolipoma : Bleeding spontaneous *
WUNDERLICH synd
conservative Mx

CVS : Rhabdomyoma *

CNS : Subependymal Nodules

Asiocyoma

CKD

Q calculate GFR of 40yr. ♀, Type 1.5 DM

weight = 40 kg

S. creatin = 1 mg (N) = 0.8 - 1.5 mg *

$$eGFR = \frac{(140 - \text{Age}) \times \text{wt}}{72 \times \text{S. creatine}}$$

Cockcroft
formula

* for female x 0.8

$$= \frac{(140 - 40) \times 40}{72 \times 1} = \frac{4000}{72} = 55 \times 0.8 = 40 \text{ ml/min}$$

1.73m²
↓
require dialysis

- KFT.
1. Creatinin-C (Aims)
 2. Cockcroft formula *
 3. Creatine clearance
 4. BUN : creatine clearance
 5. S. Creatinin

CKD

Stage I

 I GFR $< 90 \text{ ml/min/1.73m}^2$ + Protein ura

 II GFR $< 60-89 \text{ ml/min}$ " + "

 Hemodialysis $\leftarrow$ III GFR 30-59 " " "

CRO IV 15-29 " " "

 ESRD V $< 15 \text{ ml}$ " " "

Transplant

 destination $\rightarrow < \frac{60 \text{ ml/min}}{1.73 \text{ m}^2} + \text{Proteinuria} \times 3 \text{ months (week)}$
Cause

1. diabetic Nephropathy $\rightarrow$ diffuse glomerular sclerosis (Kimmelstein Wilson) (m.c)
2. Analgesic " nodular glomerulosclerosis (Charney's Hc)
3. Polycystic kidney ds.
4. medullary sponge kid.
5. C. GN - (chronic) BURNT OUT

Rx: CKD = ABCDE

 (A) HbA_{1c} $< 7\%$

stop metformin

Start insulin : Kidney excretion

 $0.8 \times \text{calculate dose}$

 i.e. 80% of calculated dose
 [low dose of insulin at calculated
 b/c kidney dysfunction]

 (B) BP $\uparrow$: ACE $\ominus$: K $\uparrow$ = stage I, II, III

stage IV

 V : K $\uparrow$ = CCB

 $\rightarrow$ ESRD $\rightarrow$ CCB (preferred b/c ACE $\ominus$ cause $\uparrow$ K $^+$)

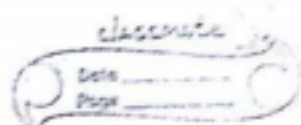
 (C) Cholesterol $\uparrow$: accelerated atherosclerosis

*

 Target cholesterol $< 100 \text{ mg\%}$

"STATIN" : Best time

 DM
 syndrome x
 SLE
 Nephrotic
 CKD



(Target cholesterol $< 70 \text{ mg/dL}$)

D. nephropathy

4. Vit D/calcium = RDA

Vit D₃ ↓ = PTH ↑ : Riba #
↓ ⊖ Vx #

CINACALCET

(manage 2° PTH effects)

Doping

- Epo → Blood Tx
- insulin
- GH

5. Erythropoietin ↓ = inj Epo sc

CRF : Hb : 7 gm/dL

Rx → inj Epo s.c S/E → HTN

6. K⁺ ↑ (chronic)

K⁺ binding resin oral (t-bind) / enema

7. P₀₄ ↑ (2° PTH) ↓ Ca²⁺

↓ Ca²⁺ / ↑ P₀₄
Ca × P₀₄ ≥ 55
Kidney stones

Calcium acetate ✗

✓ SEVALEMER

✓ LANATHUM carbonate

C.K.D.

QF urea ①

① Nausea/vomiting

② Chest pain (pericarditis)

③ GFR ④ : HTN

(HTNive encephalopathy) →

loss of consciousness

papilloedema

no deficit : hemiplegia ⊕

Nifedipine = regain consciousness

- ④ $\text{urea} \uparrow \rightarrow$ uremic encephalopathy
urea cross BBB
cerebral edema $\oplus$
- ⑤ Uremic fetor
- ⑥ Uremic melena
(bleeding)
- ⑦ $\text{K} \uparrow$: dialytic arrest
 1° = Reim edema
- ⑧ oliguria
- ⑨ input > output
 - (Periorbital edema) $\oplus$
 - scrotal edema / vulva
 - Pedal edema
 - volume expansion
 - pulmonary edema (dyspnea on exertion)
- ⑩ Uremic Frost (more sweating)
~~forehead~~ ^{head} | armpit | axilla

Absolute indication for dialysis

✓ Pericarditis

$\text{K} \uparrow$
uremic encephalopathy
uremic melena

① pericarditis

② $\text{K} \uparrow$ refractory to medical t/t

③ acidosis

④ Uremic encephalopathy " " "

Dialysis :

• 3/week, session = 4hr.

• permanent access

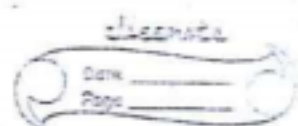
Radial (A) $\longleftrightarrow$ cephalic vein

(anatomical Snuff box)

Harvest : 4 weeks

Arterialization of vein

(thrombophlebitis incidence $\downarrow$)

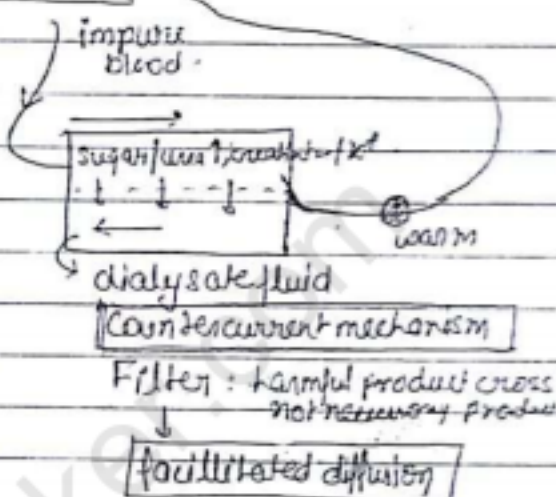


[Central vein - thrombophlebitis Risk
not used as a conduit for dialysis.]

↓
Peripheral vein used

Cimino Brescia fistula

(double lumen catheter)



Complication of hemodialysis:

② bleeding

① hypotension (mc. complication) early come.

③ dialysis disequilibrium

↓
Osmolality ↓ = seizure

④ dialysis dementia: $A\beta_2$ amyloid

↳ β_2 microglobulin (size small → not filtered)

accumulate

deposited in brain

↓
 $A\beta_2$ Amyloid

③

Carpal

Tunnel syndrome

Alzheimer's
disease

$A\beta$ amyloid

Vit. deficiency

⑥ Peripheral neuropathy

⑦ myopathy

⑧ Adynamic osteomalacia

Recurrent hemodialysis.

CVS: accelerated atherosclerosis

H.D. complication
= HTN

$GFR < 15 \text{ ml/min} \rightarrow \text{Transplant}$

Cholera: $\rightarrow$ A.K.I.

Urea output = 0

S-creatinine = $10 \text{ mg\%}$

K⁺ : follow to excrete K⁺

No ↓ (dilutional)

encephalopathy

↓
furosemide drip = wrobag empty
wrobag output = 0/L

↓
double lumen catheter

⚡ Jugular vein = preferred site for H.D. in A.K.I.

RIFLE criteria $\leftrightarrow$ AKI

(N) urine output = 1 ml/kg/hr

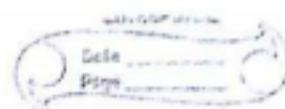
	S-creatinine	U.O.	HR
R: Risk	1.5x	$< 0.5 \text{ ml/kg/hr}$	6hr

I: injured	2x	$< 0.5 \text{ ml/kg/hr}$	12hr
------------	----	--------------------------	------

F: failure	3x	$< 0.3 \text{ ml/kg/hr}$	24hr
------------	----	--------------------------	------

L: loss of function = $GFR < 60 \text{ ml/min/1.73m}^2$ X 4 week

E: End stage renal dx $GFR < 15 \text{ ml/min/1.73m}^2$



m.e.c. of ICU admission $\rightarrow$ AKI (30%)

C/F:

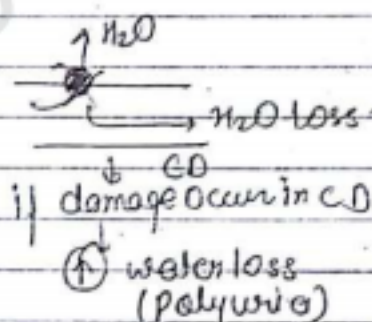
- urine output $\downarrow$
- Oliguria $< 400\text{ml/day}$, $< 0.3\text{ml/kg/hr}$
- Anuria $< 100\text{ml/day}$:
- Periorbital edema / Sacral edema
- Pulmonary edema $\rightarrow$ grade III/IV dyspnoea.

(Polyuria)

non-oliguric ~~AKI~~ Renal failure :

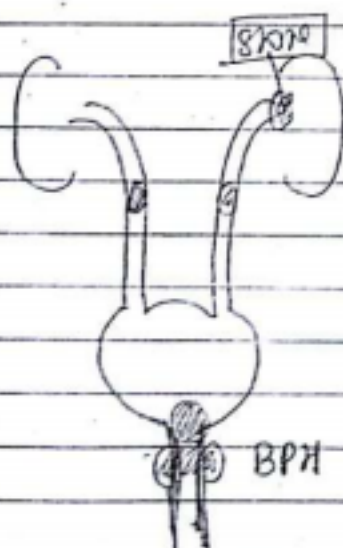
Seen

Aminoglycoside



- AKI:
- ① pre-renal
 - ② Renal
 - ③ Post-renal

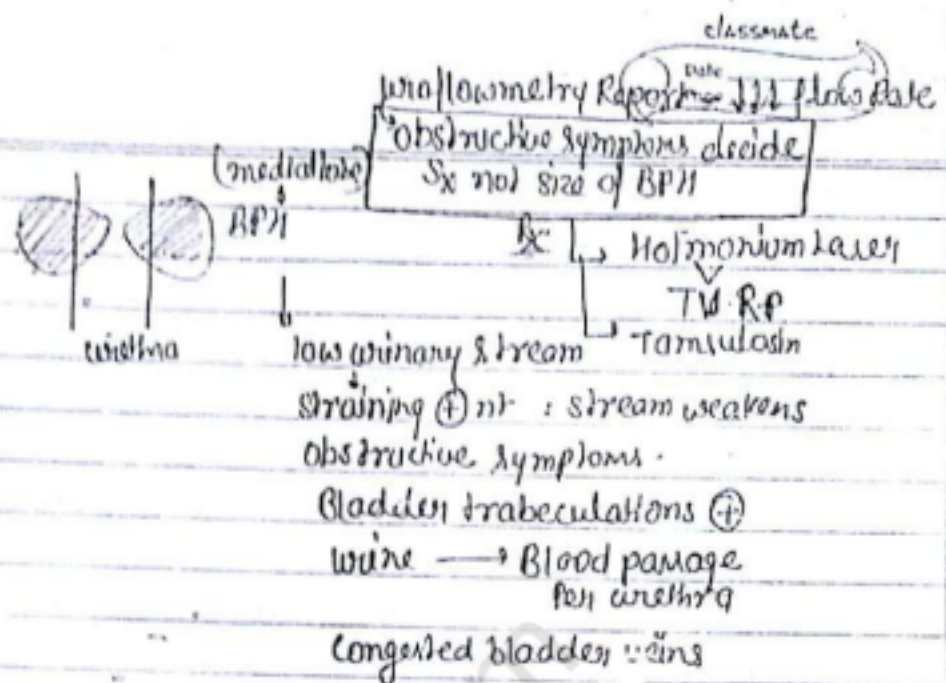
Post-renal AKI :



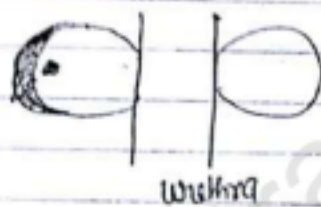
B/L Urinary fibrosis
scleroderma, Bleomycin

Bilateral Outlet Obstruction
• (vesical Calculus)
• Tumor (TCC)

BPH



Carcinoma prostate
(Peripheral enlargement)
lobe



urethra

Paraurethral veins

↓
Lumbosacral low back ache
Spine

PRx : Stony hard prostate (+)
PSA velocity ↑↑↑

variety
(2) Renal AKI :

• Acute tubular necrosis (ATN)

Ischemia

1) • prolonged anesthesia
(drug : Vasodilation)

2) Cardiogenic shock

(Post-MI)

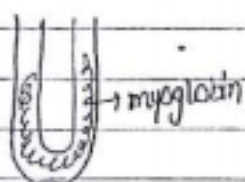
→ NE/dopamine Refractory Cardiogenic shock

Toxins

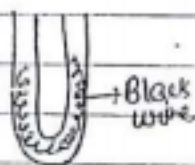
1) Rhabdomyolysis
(Crush Injury)

detumescence X

classmate
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① Rhabdomyolysis
(crush injury)

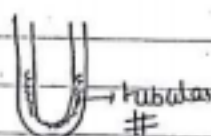


② Recurrent falciparum malaria
Black water fever
massive hemolysis
Hemoglobinuria

③ multiple myeloma

① M κ -chain ds

• Bence-Jones protein



③ multiple myeloma

• incomplete light-chains production ①

① viscosity of blood

sluggish circulation

• lytic bone lesion $\rightarrow$ hypercalcemia

$Ca^{2+} \uparrow \rightarrow PO_4$

nephrotoxicity

• tubular damage

m.c.c.g
Renal damage
Interm

Rx:

① dexamethasone

lenalidomide

$\downarrow$

add Bortezomib

④ Ethylene glycol poisoning

Ca oxalate crystals : ppt.

⑤ Tumor lysis syndrome

⑥ Hemolytic uremic syndrome

⑦ CIN

(contrast induced nephropathy)

Anaplasia • N:C Ratio ↑



Tumor lysis synd^m (TLS)

1. $\text{Po}_4^{3-} \uparrow$
2. $\text{Ca}^{2+} \downarrow$ ✗ ✗
3. $\text{K}^+ \uparrow$ (cell death)
4. DNA turn over ↑ = uric acid ↑

URATE Nephropathy ✗

A.T.N

1° TLS = adequate hydration : Normal Saline
 $\text{U.O} > 1 \text{ ml/kg/hr}$

TLS Rx : IV fluid
 RASBURICASE i.v
 i.v allopurinol
 watch for $\text{K}^+ \uparrow$ ecg : M/M
 Sigmoid wave

m/c Cancer causing TLS

• Burkitt lymphoma
 • A.L.L

Burkitt : $t(8;14)$, $t(8;22)$, $t(2;8)$] C-myc
 ↓
 Apoptosis

Pre Renal AKI

- Blood supply ↓↓
- BURNS, septic shock
- distributive shock
- Massive ascites : 3rd space loss
- dengue S.S : Capillaritis
- acute pancreatitis : Multi Organ dysfunction

✗ ✗ B/L RAS
 blood supply ↓
 • nephrotoxic drug = Cyclosporin A
 • Hepato-renal Syndrome

MODS : > 2 organ malfunction

- 1st : Lungs : ARDS
- Liver : Jaundice SGPT ↑
- Pancreas : Bld sugar ↑
- Kidney : anuria

moribund
Pt.

S.I.R.S (systemic inflammatory response syn^d)

- Fever / Hypothermia
- R. Rate
- Tachycardia
- T.L.C ↑ / T.C ↓

2+ / 4

S.I.R.S + blood culture : ⊕ ⇒ sepsis

Sepsis ⊕ → B.P ↓ > 1hr persist

inspite of vasopressor agent

MODS

septic shock

Pre renal AKI

- low urinary Na⁺
- FeNa < 1%

Renal AKI

- High urinary Na⁺
- FeNa > 1%

*
est

Prerenal AKI

Renal AKI

- * U.Osm > 500
- * Urinary Na⁺ < 10mg/L
- * FeNa < 1%

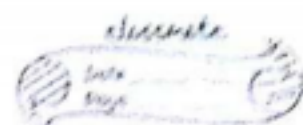
- * U.Osm = 300
- * U.Na⁺ > 40meq
- * FeNa > 1%

INV

1. S. cystatin
2. KIM-1

3. NGAL (Neutrophil associated gelatinase upocain)
Biomarker of kidney injury

4. S. Creatinine - most specific * test



dehydration : BUN ↑

① BUN ↑

② imaging : USG - Kidney size
UROPATHY

③ Na ↓, K ↑

④ Urine Specific Gravity / Na⁺

Rx

A.K.I

fluid : Input = output + insensible losses (400-800 ml/day)

• Sweat
• Water vapor - breathing
• Stool

Maintenance fluid : adult

4 ml/kg/hr = 0-10 kg

2 ml/kg/hr = 10-20 kg

1 ml/kg/hr = >20 kg

$$\begin{aligned} & \frac{50}{10+20+30} \\ & \frac{50}{60} = 0.83 \\ & 0.83 \times 400 = 332 \text{ ml} \\ & = 216 \text{ ml} \end{aligned}$$

AKI

1. fluid 10% dextrose, output + 800 ml

2. Furosemide drip

3. B.P ↑ - CCB, clonidine

4. Na < 120 meq/l : seizure

Rx ↓
3% saline

Correction = 4-8 meq/l/day

fast correction : Osmotic demyelination Syndrome (ODS)

• Central pontine myelinolysis

• Quadriplegia

• Paresthesia

Correction $\left(\frac{\text{desired value} - \text{actual value}}{\text{Na}^+} \right) \times \text{TBW} \times \text{water}$

TBW = ♂ : wt × 0.6

♀ : wt × 0.5

Q. Calculate Na^+ correction: 70 kg , Q

$$\text{Na}^+ = 110 \text{ mEq/l}$$

$$= (118 - 110) \times 70 \times 0.5$$

$$= (8) \times 70 \times 0.5$$

$$= 8 \times 35 = 280 \text{ mEq } \text{Na}^+ / 24 \text{ hr} \approx 300 \text{ mEq}$$

3% saline = 514 mEq in 1000 ml

3% saline = 600 ml infusion pump
24 hr

(4) K^+ : insulin drip
salbutamol neb

7.5:0 : Cal gluconate

[Sine urine pattern] Donly then

metabolic

(5) acidosis : Sodium bicarbonate

(6) UREA ↑ encephalopathy

→ Hemodialysis : Jugular vein

$\text{Na} > 145$ hypernatremia

double lumen catheter

(7) $\text{Na} > 160 \text{ mEq}$: Seizure ↑

$\text{Na} = 155$

Reduction = 4-8 mEq/day

R. Free-water intake

Obtunded:

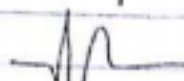
Obtunded: IVF = 5% dextrose

acute - cal. gluconate
chronic - iont resin, caemr.

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• Tall tented T wave

• ST ↑



$K^+ \downarrow$ (2) (3.5-5.5)

(3.0-3.5) meq/dl = no iv

but oral potassium chloride

if $< 3.0 \text{ meq/dl}$ =

iv correction required.

200 meq KCl = blood level (↑)
by 1 meq/dl
target $K^+ = 3 \text{ meq}$

pt. on Ampho. B, muscle cramps

Respiratory insufficiency, Serum $K^+ = 2.3 \text{ meq}$

Calculate 24 hr requirements of K^+ ?

target $K^+ = 3.0 \text{ meq/dl}$

Current $K^+ = 2.3 \text{ meq/dl}$

0.7 meq/dl required

∴ 1 meq/dl (↑) = 200 meq KCl

0.7 " " = 200 × 0.7

= 140 meq KCl

first 24 hr d/t

> 24 hr ⇒ oral KCl

Na ↓

seizure

Na < 130 = 3% saline

Na ↑

> 160 [serum + = 5 dis
seizure ⊖ = water intake

$K^+ \downarrow$

Resp insufficiency

KCl + NF

$K^+ \uparrow$

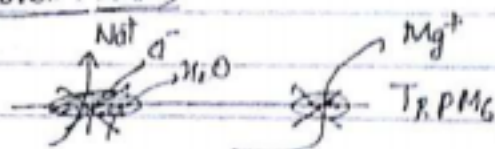
diabetic acidosis

Cal. gluconate

Causes of 2° Hyperaldosteronism

GITELMAN Syndrome (AR)

(DCT #)



- Salt wasting $\rightarrow$ fetus
- Polyuria
- obstetric H/O: polyhydramnios

C/F:

- ① Salt wasting $\rightarrow$ dehydration
Polyuria
• Shrunken Ant. frontotestis/eyeballs
• skin pinch delayed
- ② Diaper/nappy change frequency $\uparrow$
- ③ Salt $\downarrow$: aldosterone $\uparrow$
Hypokalemic M. alkalosis
• flaccid : tone $\downarrow$
• lethargic
• New-natal Reflex sluggish
- ④ Hypomagnesemia
Hypocalcemia
• tetany: carpopedal spasm
• stridor

Ix:

- ① Na $\downarrow$ K $\downarrow$
- ② 24 hr urinary Chloride ①
- ③ S. Mg $\downarrow$
④ S. Mg = 1.7 mg - 2.5 mg/l.

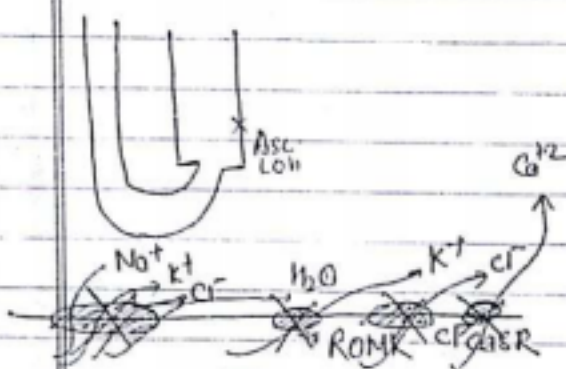
Rx:

- Salt / K⁺ supplement
- DOC = ?? (none)

- 2° aldosteronism

BARTTER Syndrome (AR)

Ascending LOH
defect



abnormal

- Cl^- channel = organ of Corti
- sodefected here also

Sensory neuronal deafness

- Salt wasting } fetus
- Polyuria
- obstetric H/O = polyhydramnios

CF ① Salt wasting } dehydration: Shrunken AF/eyeball
Polyuria } delayed skin pinch

② Nappy / diaper change frequency ↑

③ ↑ aldosterone

Hypokalemic M. alkalosis

④ ROMK channel defect = K^+ wasting

(more severe b/c K^+ loss by 2 method
aldosterone
ROMK channel)

⑤ hypercalciuria / nephrocalcinosis /
nephrocalcinosis = CaPO_4

⑥ Calcium wasting: Renal Rickets

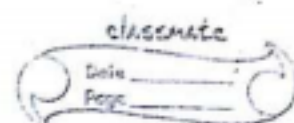
- Short stature
- delayed dentition
- wide open AF
- adult → osteomalacia

Ix: ① Na^+ ↓
 K^+ ↓

② 24 hr urinary chloride: ↑

③ 24 hr urinary Ca: ↑

Stones	
Ca Oxalate	envelop shape
triple PO_4	coffin lid
cystine	hexagonal
CaPO_4	rosette
wic	needle



④ pH = alkalosis

Rx:

Doc: indomethacin

Na⁺/K⁺ supplement

indomethacin

- ① PDA
- ② acute migraine
- ③ acute gout
- ④ Bartter's syndrome

Citellman

Bartter

• DCT #

Asc. LOH #

• AR

AR

• Obs w/o polyhydramnios

polyhydramnios
deafness (SN)

— failure to thrive

— dehydration

— ↑ urine frequency

• tetany

nephrocalcinosis
Rickets Renal

X:

24hr urine chloride

24hr urine chloride

S. Mg ↓

24hr urinary calcium ↑

— M. alkalosis

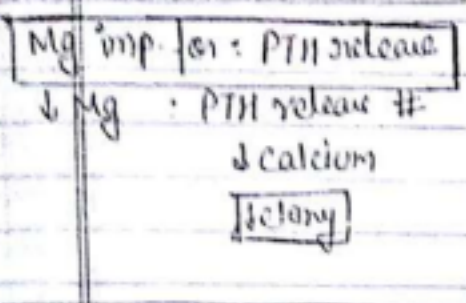
— Na⁺ ↓, K⁺ ↓

Doc

⊖

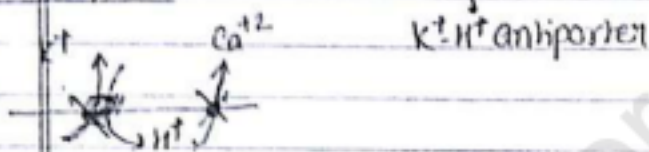
indomethacin

Renal tubular Acidosis :



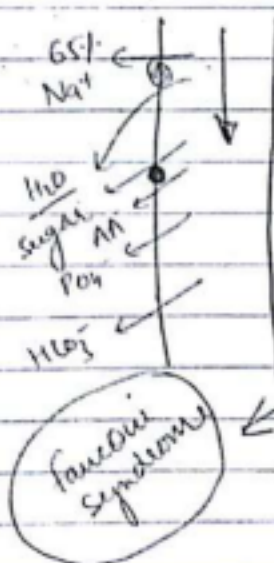
- ①
- ②
- ③
- ④

RTA type 1 : DCT # : intercalated cell



- ① K^+ wasting : muscle cramps (hypokalemia) ✗
- ② inability to excrete H^+ : H^+ ↑
- ③ urinary Ca^{2+} ↑ : nephrocalcinosis
- ④ Renal Rickets / osteomalacia

RTA type 2 : PCT



urinary copper ↑

WILSON DS.

• Salt wasting : Tubular #
 (Hallmark) of glomerular damage

- Polyuria
- glycosuria Renal
- aminoaciduria
- phosphaturia
- ✗ Bicarbonaturia (Hallmark)
- metabolic acidosis
- Hypokalemia ✗

RTA 4

- DCT #
- ENaC resistance
- Aldosterone ⊕
- Salt/water
- K^+/H^+

• Hypokalaemia ⊕

1. Salt wasting / Polyuria
2. K^+ ↓
3. Inability to excrete H^+ (M. acidosis)

Summary

RTA 1	2	4
Intercalated cells: DCT	Bicarbonate absorption #	ENaC resistance
K^+ - H^+ antiporter #	PCT	
K^+ ↓	K^+ ↓	K^+ ↑
acidosis	acidosis	acidosis
Kidney stones	amino-aciduria	pseudo-addition
⊕ Normal anion gap ⊕ urinary anion gap ⊕ in RTA ⊕ " " " ⊖ in diarrhoea		

nephrocalcinosis

Barter / RTA₁ / ↑PTH / ↓PTH

Idiopathic Hypercalcaemia

Ca oxalate stone

Stone farmer

Inv • 24hr urinary calcium ↑
 PH ⊖ [r/o Barter's] alk
 Anion Gap ⊕ ATN - Acidosis

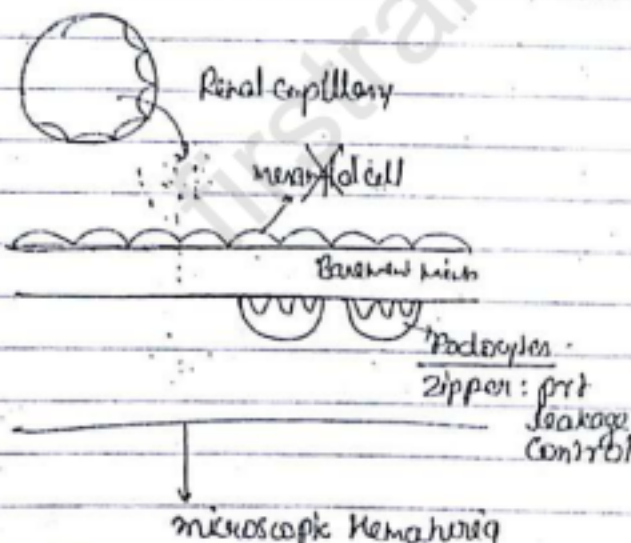
R THIAZIDE (w/ Ca excretion ↓)

Proton Pump Inhibitor (C/I)

Hematuria

- Berger ✓ m/c cause - microscopic / macroscopic (gross Hematuria)
- AGN / PSGN 2
- Stone Kidney 3
- ALPORT 4

IgA nephropathy



URT infection IgA ↑ Complement ⊕
 mesangial cell ⊕

Spontaneous resolution

- Gross Hematuria
- Cola colored urine
- BP ⊕

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Ix: Urine M/E : $>3\text{RBC/HPF}$

- ① dysmorphic RBC
RBC casts
- ② $C_3 \downarrow$ / $\uparrow$
- ③ KFT = $\textcircled{N}$ good prognosis.

$<30\%$ cases : Vasculitis

GFR $\downarrow$: CKD

Renin $\uparrow$ = HTN

Rx: ?? (steroids)

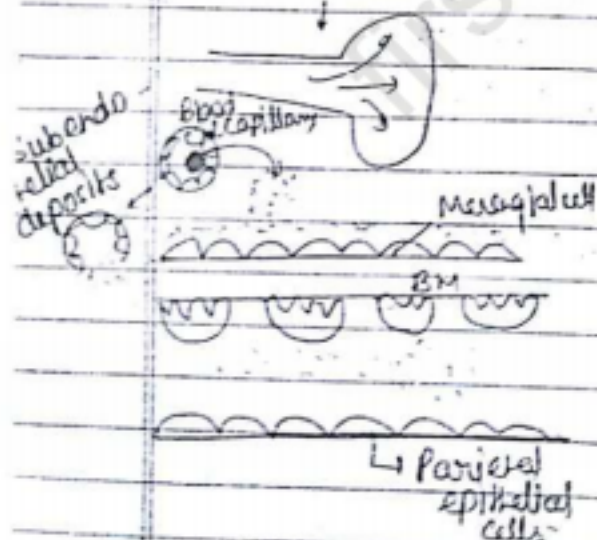
CKD = ABCDE, $PO_4 \uparrow$ Mg , $K^+ \uparrow$ Mg .

P.S.G.N:

: GABHS (group A β hemolytic streptococcus)

pyoderma $\rightarrow$ pusules $\oplus$

immune complexes
deposited in kidney parenchyma.



Kidney Bx
STARRY SKY Kidney.

Manifestation of Ix
3 weeks

- ① Hematuria
Cola Colour urine
- ② GFR $\downarrow$: renin $\uparrow$
HTN (BP $\uparrow$) (acute)
LUF $\rightarrow$ pul edema $\oplus$
- ③ difficulty in breathing
- ④ periorbital edema +
- ⑤ oliguria $\rightarrow$ anuria

CLASSMATE

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Ix: Urine M/G

> 3 RBC
RBC Cast
dysmorphic RBC

 (2) $C_3 \downarrow$: complement consumption

(3) ASO titre

Anti DNAase B Antibody (1)

(4) KFT

: S creatinine (1)

(5) Renal variety AKI

glomerulitis #

Urinary sodium (1)

Rx:

AKI : Hemodialysis

 BP $\uparrow$: CCB

ACEI

 inj. Benzathine penicilline (i.m.) = not given
b/c not useful
kidney symptoms comes after
3 wks 1st.

Hematuria

URTI

48 hrs

adult

Cola colour urine

BP (N)

Recurrent h/o/sepsis

Burger's

 $C_3 \downarrow / \uparrow$

Rx : Steroids

Pyoderma : GABHS

Sore throat

3 wks

child

Cola colour urine

 BP $\uparrow$

LUF : edema +

deranged KFT

P.S.G.N

 $C_3 \downarrow$

Anti DNAase-B A/B (1)

BP : Anti HTN drug

CKD : RRTG / Hemodialysis

mesangioproliferative GNType 1: MC $\rightarrow$ HcpC + cryoglobulinemia

Ca lung

Type 2 $\rightarrow$ dense deposit ds. of

Type 3: partial lipodystrophy

Rare

- HcpC $\rightarrow$ chr hepatitis C; cirrhosis
- Hematuria + HTN + subnephrotic proteinuria
- progression to CKD proteinuria
- INV $\rightarrow$ Biopsy: Trans. Fract. appⁿ
- Rx = cyclophosphamide + ACI @

• Protein intake = (n)

• Liver/Kidney disease

Kidney H. GFR $\downarrow$ = 0.8 gm/kgNephrotic Syndrome

- ① Proteinuria ≥ 3.5 gm/day adult
child ≥ 40 mg/m²/day

- ② Hypoalbuminemia < 2.5 gm%

- ③ edema: periorbital $\rightarrow$ visceral
 $\rightarrow$ pedal

essential
features
for NS

- ④ lipiduria: fat globule +

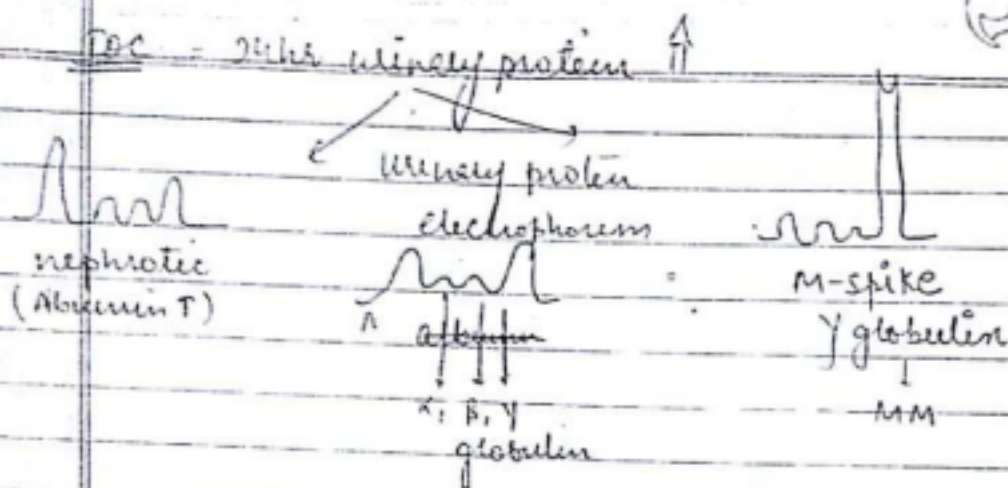
- ⑤ cholesterol: accelerated atheroⁿ

- ⑥ loss of protein C, S and antithrombin III

fibrinogen: (+)

• Hypercoagulable state

• Ferritin $\downarrow$ = IDA• Ceruloplasmin $\downarrow$ = Cu $\downarrow$



Congenital nephrotic syndrome

NPHS 1 gene # → nephrin ↓

Zipper mechanism

NPHS 2 gene # → podocin ↓

[Finnish variety] (severe)

C/F : neonate : Hydrops fetalis
foamy urine (+) Proteinuria

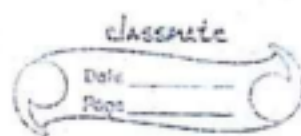
inv UROBAG
24hr urine > 40mg/m²
C3 levels = (n)

Rx STEROIDS : CMI ↓

2-8yr : Periorbital edema (+)
genital edema (+)
pedal edema (+)
weight gain ++
Anasarca
Pleural effusion } Transudate

- 24 hr protein > 4
- U dip stick
- U sulfosalicylic acid spot
- KFT = (n)

Rx - Prednisolone X 8 weeks
4mg daily
alternate



• STERIODS Response NS
minimal change ds.

• Relapse : ≥ 72 hr : recurrence of symptoms
stopping
steroid

Bx : STERIODS

• STERIOD dependant nephrotic Syndrome : SDNS: steroid

Steroid Resistant
nephrotic Syndrome

SDNS

→ Cyclosporine
Tacrolimus

SDNS : Cataract

Q → muscle wasting @
Cushingoid facies
steroid toxicity *

Bx → cyclophosphamide
Mevamisole

lipid nephrosis (minimal change ds)

LM = @

E-M = foot processes effacement

IgM

Rx : Steroids : excellent prognosis

* Ascites massive variety

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Ascites massive = Salt free albumin + Large Volume
abdominal paracentesis
Ascites: Salt low diet
spironolactone
paracentesis (LVP)

DEHYDRATION
NH₃⁺: ASTERIXIS

Salt free albumin i-v

Oncotic pressure ↑

Third space fluid = intravascular compartment

adult: nephrotic

m/c → P.S.G.S : HIVANephropathy
: Reflux nephropathy
: Heroin (drugs)

non selective proteinuria
(LMW + HMW protein loss)

Rx : cyclophosphamide

Congenital NS → Prednisolone

MCD / lipoid nephrosis

SRNS → cyclosporin / tacrolimus } spironolactone

SDNS → Prednisolone

SDNS + Toxicity steroid

PSGS

cyclophospho

> 6 yrs → NS = MGN * HBV
(genetic) * RVT

[painful enlarge kidney]

→ cyclophosphamide

HPGN	→	HCV
MGN	→	HBV
PSGS	→	HIV

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Hemolytic Uremic Syndrome

E. coli O157 : acute dysentery
fever + blood / mucus stool

firstRanker.com

Base Deficit

$$0.4 \times \text{wt} \times (24 - \text{HCO}_3^- \text{ value})$$

TSF wt, $\text{HCO}_3^- = 6$

Metabolic: calculate

Base deficit

$$= 75 \times 0.4 \times (24 - 6)$$

$$= 180 \text{ meq.}$$

Hepatitis:

- A. Parenteral
- B. Sexual contact
- C. Blood transfusion
- D. Parenteral
- E. feco-oral

• m.c.c of viral hepatitis = Hep. B

• m.c.c of chronic hepatitis = Hep. C

• m.c.c of viral hepatitis in India = Hep. A

Not

not transmitted by breast feeding: Hep. C

not transmitted by sexual contact: Hep. E

fulminant hepatic failure = < 8 weeks

subfulminant hepatic failure = 8-26 wks

Superinfection: Hep. D

Fulminant h. failure m.c.c. = toxin

PCM

halothane

ATF

Amanita poisoning

(mushroom)

>> Hep. D

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fulminant H failure + in = Hep A, B, C, D, E

Ch. Hepatitis / Carriers + in = B, C, D

" - in = A, E

Hep B

• pathol ds DNA

• IP : 30-180 days

• Route of spread : ① sexual contact

② B Transfusion : HBV, HCV, HIV, syphilis, malaria

③ Vertical transmission

 HBsAg + $\xrightarrow{90\%}$ baby

 Time 3 pregnancy
Commercial sex worker

Rx:

elective C.S.

HBIG im (passive immunity)

 <24hr
(reduces transfer to baby & ch)

Breast feeding

• HBV + active immunity

Hep B vaccine = day 0

recombinant vaccine

Paediatric

 Antigenic - 10 μ g

 adult " - 20 μ g

 Hep B = 0, 6 wks, 10wk
14wk.

(3 doses)

 HBsAg • anti HCV Ab
• PCR HCV RNA

S-ELISA

Window Period

6-8 wks

P-24 Antigen

Feature

RT-PCR HIV DNA

for viral load

PCR-HIV RNA

FTA-ABS

VDRL

neuro-syphilis

Response to tre Ht

CSF-VDRL

Cony. Syphilis

IgM-FTA-ABS

Stuffles

 malaria
P. malariae
P. oval, P. vivax
P. falciparum
P. knowlesi = Vietnam.

P. falciparum

HRP-2 dipstick

(Histidine Rich protein)

• P. smear

• 2DH cord lat.

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HBsAg (+) : pt

④ accidental needle stick injury
chance = 30%

Rx:

HBsAg iv. (< 6 hr of exposure)

(anti HBsAg titre)

Ig < 10 IU/ml → HbIg

≥ 10 IU/ml → not given HbIg

adult vaccine = 0, 1, 6 months
- 0, 1, 2

Protection = 15 year

HIV:

Vertical transmission ⇒ 30% → CART (2nd time) = mother

breast feeding ⇒ 45% → oral zidovudine (if
no baby
still breast feeding
continue)

accidental needle stick injury
chance = 0.3 %

Rx:

Post exposure Rx : (new guideline)

Zidovudine
Raltegravir > Zidovudine
Emtricitabine Indinavir

↓

X 6 weeks

India = HIV - 1 $\xrightarrow{10-12\%}$ AIDS
Africa = HIV - 2 $\xrightarrow{15\%}$ AIDS

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	HIV	HBV	HCV
Venereal	30%	90%	5%

needle stick injury	0.3%	30%	3%
---------------------	------	-----	----

↓
URTIN:

Persistent generalised lymphadenopathy

(PAL) LN >1cm >2sites

Inguinal site not considered in (PAL)

ARC: w/ loss Chr. diam. oral thrush

AIDS related complication

CD4(N)

AIDS: P. Jiroveci

CD4

HBs Ag: Ist to appears in blood

HBc Ag: never appears in blood

HBe Ag: Replication/highly infectious

HBx Ag: HCC (Hep B > HCV)

PCR: HBV DNA

> 10⁵ viral copies DNA + SGPT X2 ml

Rx: $\text{Harr.} \geq 2 \times 10^4 \text{ IU/ml} + \text{SGPT X2}$
DGC

① Tab. Entecavir/Tinofavir

② α -interferon i.m./sc

(Booster for immunity)

Tinofavir active against both HIV & Hep B

Anti Body:

anti HBs Ag = Seroconversion

anti HBc Ag $\left\{ \begin{array}{l} \text{IgM} = \text{acute Hep B / window period} \\ \text{IgG} = \text{Chr. hepatitis B} \end{array} \right.$

anti HBe Ag = Replication ①

Infectivity ②

HBs Ag ⊕ HBe Ag + : T₃ $\xrightarrow{\text{baby}} 90\%$

HBs Ag ⊕ HBe Ag - : T₃ $\rightarrow 20\%$

classmate

Date _____

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Pre-core mutant : Europe



HBsAg = not expressed



Subst

HBV-DNA : replication

(PCR)

↳ marker in pre core mutant.

28 yrs young ♂ : nausea X 7 days

Sight/smell food

: Vomiting episodes (↑) X 1 day

Ph

✓ Icterus int

✓ S. bilirubin $> 2 \text{ mg\%}$

✓ Tender Rt. upper quadrant

✓ Hepatomegaly

(liver span (N) = 12-15 cm)

✓ Sexual contact (⊕)

✓ Iv drugs (⊕)

?? viral Hepatitis

Ix

LFT :

S. bilirubin : ↑ unconjugated

S. GOT : ↑ (mitochondria : alcoholic liver ds)

S. GPT ↑ (cytosol) : viral hepatitis

S. Alkaline phosphatase (N)

if SAP ↑ : Obstructive Jaundice/
cholestasis

Cont. bilirubin ↑

 $> 15\%$ total S. bilirubin

[liver span ↓↓ / Fulminant hepatic failure]

Date _____
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② USG Liver: Sluggish appearance.

liver span ①

① Burkitt lymphoma - LN Bx

② Neurocysticercosis - CT/MRI

③ PSGN: Kidney Bx

④ viral hepatitis - USG

③

HBsAg	anti HBsAg	anti HBeAg	HBeAg
+	-	IgM	-+

acute Hep B

(Highly infectious)
Recent injection

↓
IVF: NS, 10% dextrose
domperidone / metoprolol / drug
Carbohydrate rich diet

⊖	-	(IgM)	⊖
---	---	-------	---

Window Period

⊕	⊕	IgG	⊕
---	---	-----	---

chr. active hepatitis

⊖	⊕	IgG	⊖
---	---	-----	---

Recovery

-	⊕	⊖	⊖
---	---	---	---

Vaccine

HBsAg
IgM anti HBeAg

(come 1st) } acute Hep B

Carrier
HBsAg+ > 6 months

anti HBsAg ⊕
HBsAg ⊖
HBeAg ⊖
Spontaneous Recovery

anti HBsAg ⊕
HBsAg +
HBeAg +
IgG anti HBeAg
α-Interferon

anti HBsAg = 0
Fulminant hepatic failure

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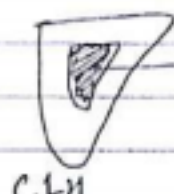
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Chr Hepatitis

Chronic active Hepatitis → Chr. persistent Hepatitis → Chr. lobular Hepatitis
(piecemeal (CI necrosis) bridging necrosis)



bridging necrosis



Hepatic Stellate Cell
⊕
↓
Fibrosis
↓
Cirrhosis

Fulminant Hepatic failure (FHF)

- Jaundice ↑
- Liver span ↓
- clotting factor ↓ : bleeding

all clotting factor produced in liver
except = Calcium (factor 4)

Intestinal GI bleed

GI Tract

Blood

anaemobes
NH₃ +

++
↑↑

ppt. hepatic encephalopathy
C/F

Rx: FFP

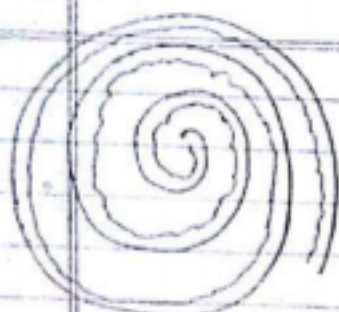
- altered sleep pattern
- euphoria
- slurring speech
- Asterixis : flapping tremor
- metabolic encephalopathy
- ② uremic
- ③ CO narcosis

Tx: Psychiatric Abnormality
EEG (awake) ⇒ delta wave

S. ammonia: ↑
LFT: S. bilirubin ↑, S. ALT ↑↑

Longest half life overall : factor (3)
(2,4,7,9) = factor 2 (classmate)

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Parkinsonism : Resting tremors

micrographia

low frequency tremor

(< 8 Hz)

- ① Parkinsonism
- ② Intentional tremor (cerebellar) (5 Hz)



Anxiety neurosis

: Sympathetic stimuli

high frequency tremor

- ① thyrotoxicosis
- ② pheochromocytoma
- ③ Anxiety neurosis

Ix : encephalopathy

- LFT : S. bilirubin ↑, SGPT ↑
- PT ↑ : factor 7, (shorter $T_{1/2}$)
- aPTT ↑ : factor 8

Coagulogram

- K.F.T : hepato-renal syndrome

$\text{NH}_3 \uparrow$ - Renal circulation ↓
(Pre-renal AKI)

DOC : Midodrine

- Blood sugar ↓

classmate

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MELD score : Model for End stage Liver ds : FHF

- ① S. bilirubin
- ② S. creatinine
- ③ INR (PT)

↓
i) MELD score > 14.

liver transplant indicated

• HLA matching not mandatory

- ① Corneal Tx
- ② Heart Tx
- ③ Liver Tx

ii) 2 pt → MELD score = 20 (more severe)
→ MELD score = 30

↓
given liver to
high score MELD
y b/c less complication.

medical Rx : FHF

- ① Lactulose : ammonia binder
(NG tube)

- ② Rifaximin (Bacterostatic)
neomycin A/B
→ catonic perforation.

- ③ FFP = PT (11-15 sec.) ⑤

- ④ L-Ornithine → ⑥ O.T.C. → clearance of ammonia
L-Aspartic Acid

- (5) I.V.F. = 10% dextrose
(6) " Bed sore / DVT / PE / UTI
Prevention

Self Regeneration
(so give conservative H/d)
↓
if deteriorate then give
Orthopic Liver Tx
(same side)

Hep C :

- Chr. Hepatitis : Cirrhosis
ESLD
- Anti HCV Ab : Enzyme Immuno Assay (ETA)
PCR HCV RNA (gold standard)

• **DOC HCV : Sofosbuvir** (new)

Sofosbuvir : 750mg x 27 days (19100)
(expensive)

Pegylated interferon + Ribavirin

M.C. genotype HCV = (1)

duration : 24 week +/-

extralepatic manifestation of

HBV

HCV

- (1) membranous glomerulo
nephropathy (MGN)

MPGN type 1

- (2) Aplastic Anemia

Aplastic (H)

- (3) Polyarteritis Nodosa (PAN)

○

- (4) Serum sickness rash, fever
myalgia

essential cryoglobulinemia → rash, fever
myalgia
(stroke ischemic)

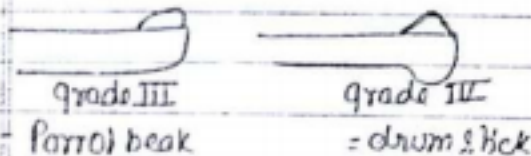
- (5) GBS

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Cirrhosis / chr. liver ds (compensated)

① Dupuytren's contracture

②



③ Palmar erythema

④ ♂: testicular atrophy
gynecomastia

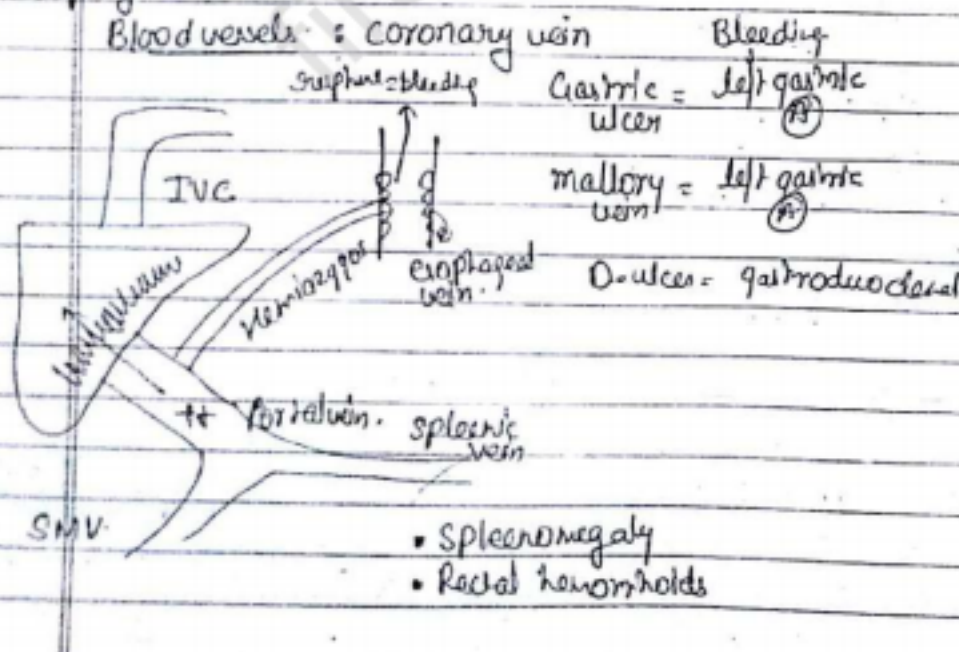
Compensated Cirrhosis:

portal HTN

• m.c.c of portal HTN: N.C.P.F
(non-cirrhotic portal fibrosis)

• " " paediatric = extrahepatic portal vein obstruction
(EHPVO)

↓
esophageal varices

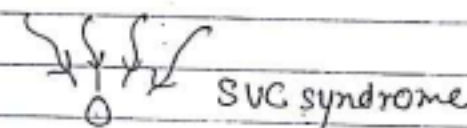
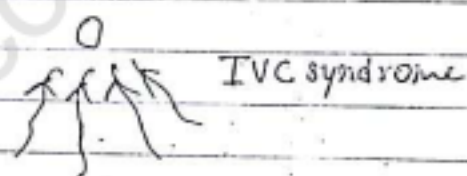
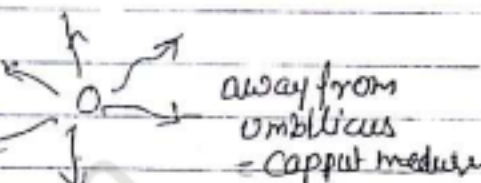


- Splenomegaly
- Rectal hemorrhoids

non-bleeding esophageal varices = Propranolol
Bleeding " " = Octreotide

↓
Porto systemic collaterals

- ① esophageal varices (most vulnerable for rupture)
- ② Rectal hemorrhoids
- ③ Bare area of liver
- ④ Caput medusae
- ⑤ Retroperitoneal vein
- ⑥ Lumbar vein
- ⑦ Omental vein



Ix: IOC for PHT : Doppler (portal HTN)

Rx:

✓ Hematemesis

m.c.c. = peptic ulcer

✓ Hematemesis + splenomegaly
↓
portal HTN