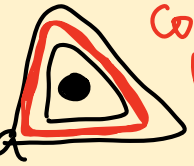
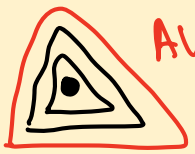
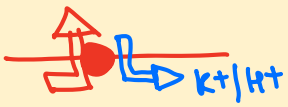
Disease of Adrenal glands	
Condition	**Investigation of choice**
ACTH independent Cushing syndrome Adrenal adenoma	 CORTISOL ↑ ACTH ↓ : CT Abdomen
Primary aldosteronism CONN HTN ± Hypokalemic M. alkalosis	 ALDOSTERONE ↑ : ENaC : CD Salt + H_2O +  K+/H+ Saline infusion Test / salt loading Test
Pheochromocytoma Screening → IOC:	24-hour urinary Fractionated Metanephrine levels PLASMA FREE Metanephrine levels
Adrenal insufficiency Addison = →	ACTH stimulation test = Autoimmune TB : AIDS 

↑ 24 hr urinary VMA : NEUROBLASTOMA n-myc
* ← pheochromocytome

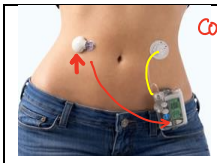
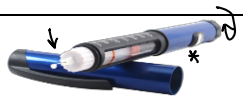
Metformin, sepsis

HYPERGLYCEMIC HYPEROSMOLAR

Unconscious unresponsive diabetic patient

	lactic acidosis	D.K.A	HHS	? CVA
pH ↓	7.3	7.3	7.40	7.4
pCO2 ↓ (35-45 mmHg)	30	30	38	38
HCO3 ↓ 22-26	15	15	24	24
Urine ketones	⊖	4+	2+	—
RBS	250 mg/dL	300 mg/dL	800 mg	150
Any special investigation ordered →	plasma β OH Butyrate = ⓝ S. lactate ↑	plasma β OH Butyrate levels: ↑	plasma Osmolality ↓ 310 mosm	NCCT HEAD

Methods of Insulin administration

 CONTINOUS GLUCOSE MONITOR * CONTINOUS INFUSION	C.S.I.I SC INSULIN
 INSULIN SC ⇒	PENS : 32G needle 90° angle To skin
	INHALED insulin (Rapid acting)
 MULTI DOSE * 1ml insulin Storage Temp: Shelf life:	VIAL 100U/mL Syringe 10 ml +2 To 8°C ~ 4 weeks

Long-acting weekly insulin: once a week ICODEC

Start insulin if

1. Asymptomatic t2DM with HbA1c> 10% ✓
2. Symptomatic t2DM with weight loss and HbA1c > 9%
3. D.K.A, HYPEROSMOLAR COMA, K↑
   REGULAR SC/IV

10pm 150mg

Somogyi phenomenon (extra amount of bed time insulin)

* Nocturnal HYPOGLYCAEMIA
  * GLUCAGON, CORTISOL, Catecholamines, GH
* Pre breakfast HYPERGLYCEMIA

10pm 150 GLUT4

Dawn phenomenon (GH peak between 4 am to 7 am)

T2DM

Nocturnal EUGLYCEMIA/ mild HYPERGLYCEMIA

Pre-breakfast HYPERGLYCEMIA

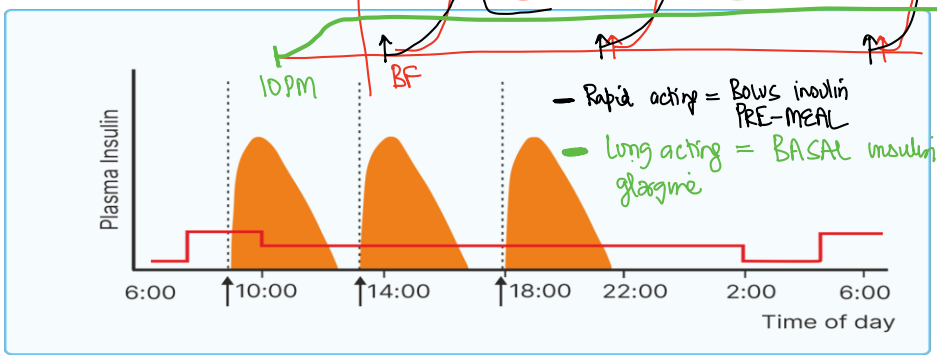
Empagliflozin

* T2 DM: HbA1c: 8-10% : (No) comorbities : Metformin + SGLT2i
  " " " : ASCVD : Metformin + SGLT2i + GLP1RA
  " " " : HF : Metformin + SGLT2i
  " " " : CKD : Metformin + SGLT2i
  eGFR: <20 : DPP-4i

* metformin Cl: eGFR < 30 → INSULIN : 80% Calculated dose

Basal Bolus regimen

Type 1 DM



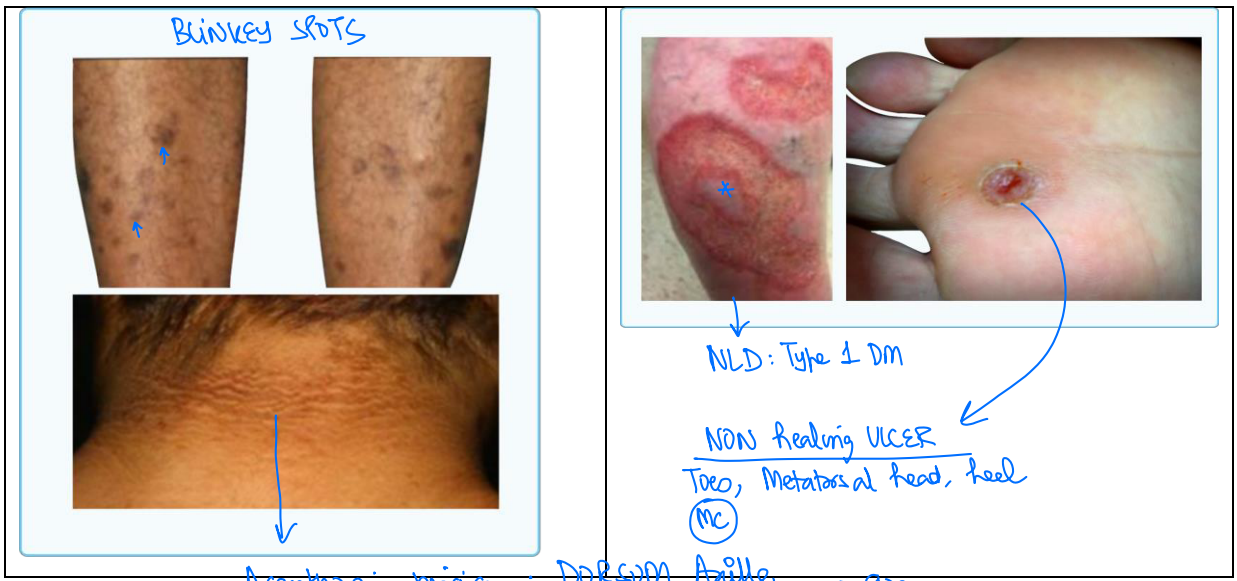
Skin involvement in DM

MC skin lesion in type 2 DM — DIABETIC DERMOPATHY (BLINKEY SPOTS)

MC skin lesion in type 1 DM — NECROBIOSIS LIPOIDA DIABETICORUM

MC skin lesion in glucagonoma — NECROLYTIC MIGRATORY ERYTHEMA : DM, DEPRESSION, DVT : PNET = DERMATITIS

Causes of Acanthosis nigricans — TYPE II DM, PCOD, METABOLIC SYNDROME (IR) / Ca PANCREAS, Ca stomach



Syndrome-X / metabolic syn — 3+/5 — Pg. 96

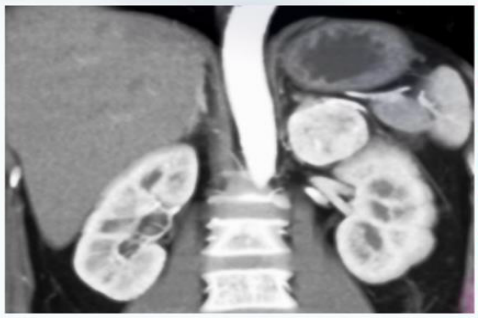
1. 2. 3. 4. 5.

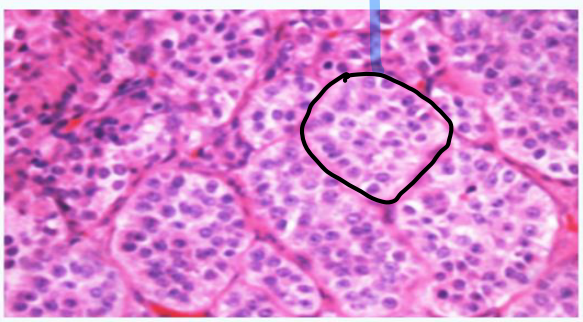
Syndrome-2 / Syndrome X + DSA

* NESTS of ZELLBALLEN

Pheochromocytoma

Fight or flight phenomenon





Leading catecholamine produced by normal adrenal medulla

↳ EPINEPHRINE *

Leading catecholamine produced by pheochromocytoma

↳ NOREPINEPHRINE

Leading catecholamine produced by pheochromocytoma in MEN-2 is SIPPLE

↳ EPINEPHRINE

Extra adrenal pheochromocytoma is called

↳ PARAGANGLIOMA
(location: sym. ganglie)

* **NF-1 is associated with Pheochromocytoma**

Clinical Buzz words

PHD — PAROXYSMAL HTN / EPISODIC HTN : Early phase
Palpitations, headache, diaphoresis

It can mimic Anxiety neurosis/ Panic attacks — B2D: ETILOZAM, SSRI: PAROTEXINE

POSTURAL HYPOTENSION : late phase illness
IGT, wt loss

Screening test — 24 HOUR Urinary fractionated Metanephrine

IOC → PLASMA FREE Metanephrine level

→ LAP. U/L ADRENALECTOMY

Rx of benign pheochromocytoma

PRE-OP : PHENOXYBENZAMINE : 7AM

PROPRANOLOL : Post B.F

α+β 🙂

β+α 🙁 → α=VC HTN ~~β=VD~~

Unopposed

RX of malignant pheochromocytoma

SURGERY Ci ↑

Use MIBG containing iodine-125 and Chemotherapy

methy-iodo-benzyl-guanidine scan

* benign vs malignant theo
* location medulla : sym. chain

gallium-68 DOTATATE-PET|CT > MRI Abdomen

1. PNET
2. pheochromocytome

↓

Ga-68, DOTATATE-PET|CT

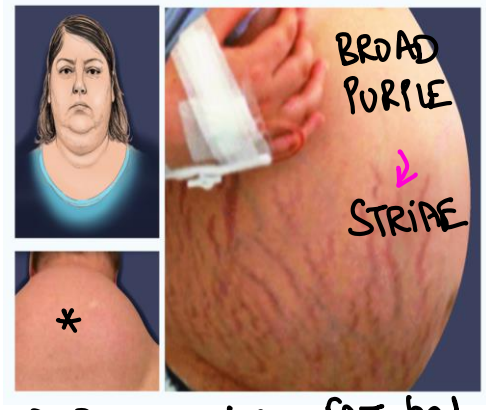
* 18-F-FDG, distant Mets → fluorodeoxyglucose
  ↳ FLUORIDE

* INTRA-OP HTN, PRE-OP HTN
  ↑ both ↑ drugs works in : Nicardipine / labetalol

* INTRA-OP HTN d/t Tumor manipulation
  SOD NITROPRUSSIDE

* Pseudocushing app = alcohol intake

Cushing Syndrome



MOON FACIES

DORSOCERVICAL FAT pad

CORTISOL ↑ : ENaC ++

↑ ACTH : partial MSH like action

Clinical features

1. weight gain
2. Lemon on sticks appearance
3. Dorsocervical fat pad
4. Purple striae
5. Thin skin with increasing bruising
6. Hypokalaemic alkalosis
7. Hirsutism and oligomenorrhea
8. Hyperpigmentation of knuckles and IP joints

Causes

S: STEROIDS : (iatrogenic) CORTISOL ↑ ACTH ↓

O: Oat cell Ca lung — (Ectopic) ACTH ↑ CORTISOL ↑

A: Adrenal Adenoma — (autonomous) CORTISOL ↑ ACTH ↓

P: PITUITARY Adenoma (endogenous) — ACTH ↑ CORTISOL ↑

Screening test

24 hr urinary CORTISOL ↑↑

IOC

MIDNIGHT Salivary CORTISOL ↑

PIT — Oat cell Ca lung, Carcinoid syn

Endogenous vs ectopic source

ACTH ↑↑ — ACTH ↑↑ = PRE

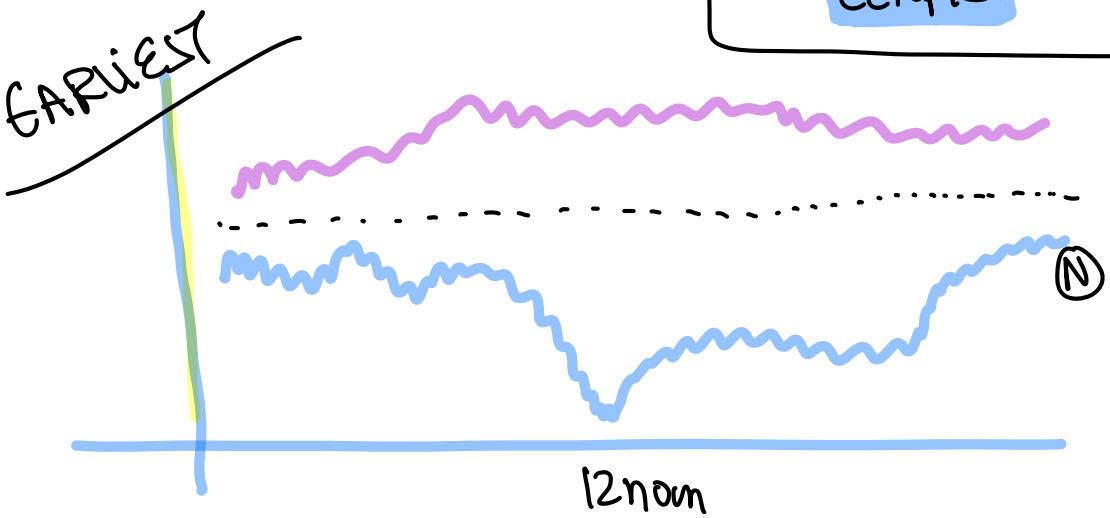
High dose dexa. supp Test

ACTH independant Cushing syn

ACTH ↑ — ACTH ↑↑ = POS

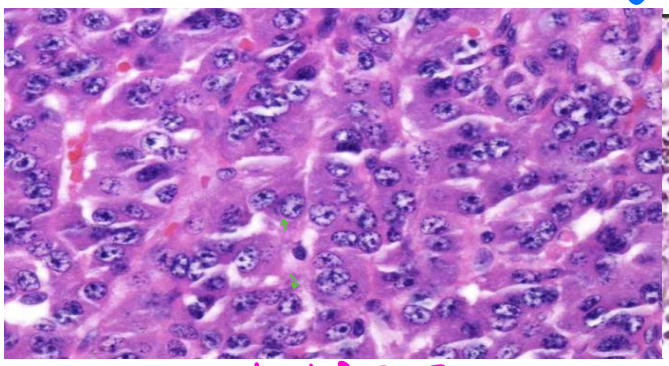
Partial supp of ACTH : PIT. Adenoma = Cushing disease

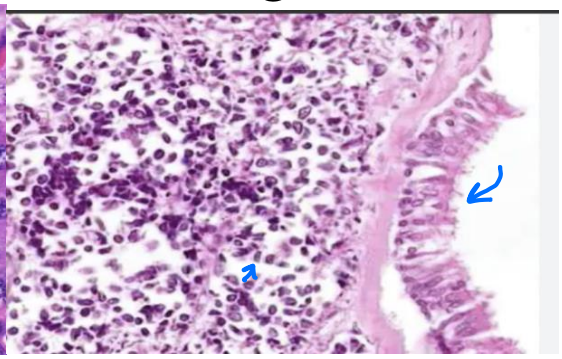
Non supp of ACTH: Oat cell Ca lung = Ectopic



Loss of DIURNAL variation of CORTISOL production

(A) ECTOPIC CAUSES (B)



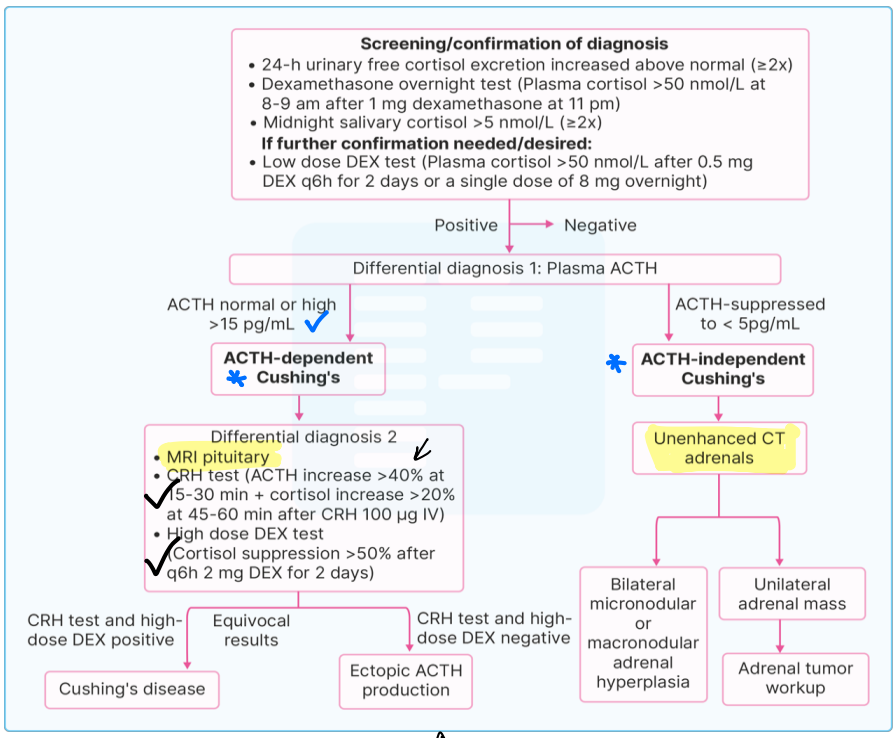


Salt & PEPPER

Carcinoid Tumor

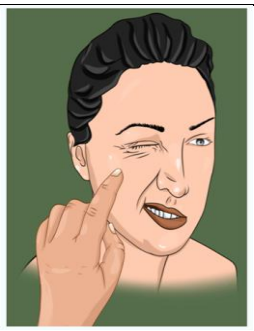
CRUSHED nuclei

Oat cell Ca lung



CRH TEST: ACTH ↑↑

PIT. CORTICOTROPH Adenoma



CHVOSTEK
facial N irritability
Twitching

DOC for tetany IV 10% Calcium gluconate

Leading cause of Hypocalcaemia

1. Inadvertent removal of parathyroid gland during total thyroidectomy
2. AUTOIMMUNE

DOC for management of surgically induced hypoparathyroidism TERIPARATIDE SC

Calcium ∝ 1/PO4 CKD: vit D3 ↓ PTH ↓ PTH levels ↑

	Primary Hyper PTH	Secondary Hyper PTH	Hypoparathyroidism AUTOIMMUNE	PHP PTH receptor #
Calcium	↑	↓	↓	↓
Phosphate	↓	↑	↑	↑
SAP	↑	↑	NORMAL	NORMAL

Bone Resorption

Pseudo

Tc99 – SESTAMIBI SPECT/CT

Calcium vit D3 CINACALCET

↓ TERIPARATIDE

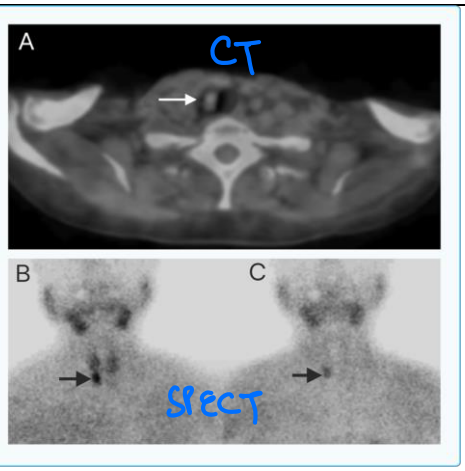
?

Tc99 PERTECHNATE scan = MECKEL DIVERTICULUM

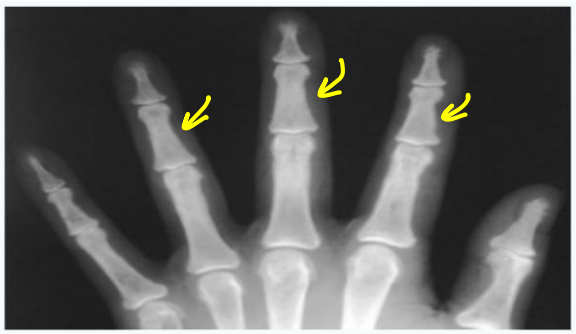
Tc99 STRESS SESTAMIBI = CHRONIC STABLE Angina

Primary hyperparathyroidism

Renal colic
OSTEITIS CYSTICA FIBROSA
BROWN TUMOR, CONSTIPATION
(CT↓)



Stones – bones – moans and psychic moans



SUB-PERIOSTEAL Resorbtion of phalanges

Leading cause of hypercalcemia in hospitalized patients

↳ Malignancy: Squamous cell ca lung, Ca breast
PTH-rp

Management of hypercalcaemic crisis

Kclo lung cancer: clo CONFUSION, ALTERED MENTATION
O/E: dehydration +
ECG ⇒ QT shortening
Na↓ K↓ Ca↑ = 12.5 mg/dL
(Risk of systolic cardiac arrest)

1. NS + FUROSEMIDE (loose Ca+)
2. iv Ibandronate (DOC)
3. nasal calcitonin spray
   - ↳ OSTEOCLAST Activity↓
   - ↳ Tachyphylaxis
4. DENOSUMAB
5. ORAL PHOSPHATE
6. (Refractory) Hemodialysis

* SARCOIDOSIS: vit D_3 production: non caseating granuloma
  : STEROIDS
* vitamin D_3 intoxication → STEROIDS
* M. Myeloma: CRAB
  ↳ Calcium↑: STEROIDS

STEROIDS Response ↑Ca

Additional Notes

Q. 8yr child: admitted c pneumonia, iv levofloxacin x 2days

day3: vomiting, abdo pain, drowsy

O/E: THREADY pulse BP = 70/50 mm Hg
cold clammy extremities

RBS = 300 mg/dL
pH ↓ pCO2 ↓ HCO3 ↓
URINE KETOSTIX: 4+

---

1. NS Bolus
2. NS infusion — 1hr → insulin infusion
3. NS " + KCl — " → " "
4. insulin infusion → NS

Q/ 60yr k/c/o Hashimoto's : levothyroxine poor compliance
c/o DYSURIA, FEVER
midstream urine culture
Rx: NORFLOX

↓

>48 HOURS: UNCONCIOUS, UNResponsive state
pulse: 60/min BP: 130/110 mm Hg Temp: 35°C

---

1. MYXEDEMA COMA, Hashimoto encephalopathy
↓ ↓
IV T_4, T_3 2 ↓ Temp (N), seizures (+)
IV methylprednisolone

Q:

GRAVE : non compliant ⊂ Medication

during Sx: HR ↑ BP ↑ Temp ↑ > 40.5°C

? THYROID STORM

Additional Notes

Additional Notes

Additional Notes

Additional Notes

Additional Notes

Pulmonology

7.35-7.45

ABG analysis Hacks 35-45 mm 22-26 meq

pH 1.	pCO2 2	HCO3 3		Interpretation
↓	↓	↓	PC:	Metabolic acidosis
↑	↑	↑	PC:	Metabolic alkalosis
↓ =	↑	↑	PC:	Respiratory acidosis
↑ =	↓	↓	PC:	Respiratory alkalosis

1° change

ROME

Respi opposite pH pCO2
Metabolic equivalent ↑ ↑

Extra mile

Aldosterone has inverse relation with potassium
pH has inverse relation with Potassium

10 mm Hg CO_2 ↑ + H_2O ⇌ H_2CO_3 ↑ ⇌ $2H^+$ ↑ + HCO_3^- ⇡ 1 meq/L

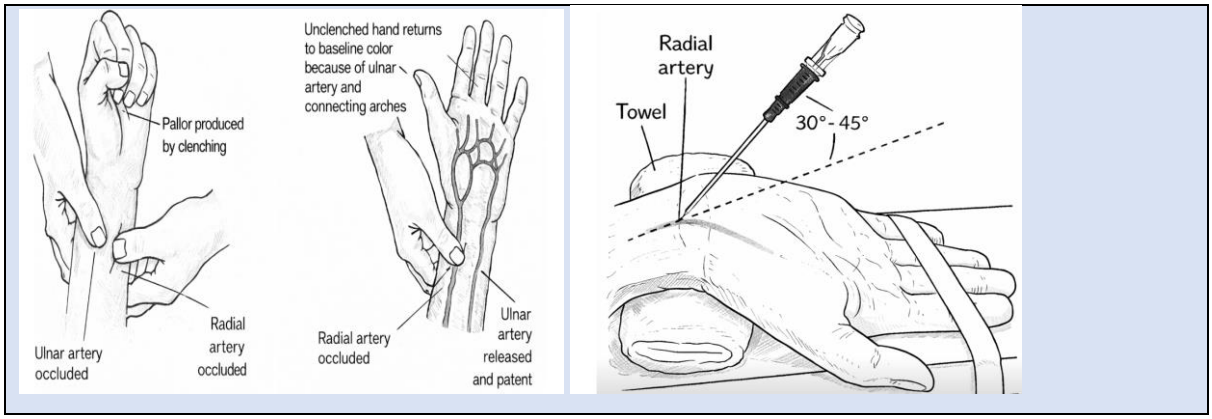
pH = ↓

(STATUS Asthmaticus) Respi Acidosis

COMPENSATION: KIDNEY: PCT: ULTRAFILTRATE HCO_3 Reabsorption ++

Metabolic alkalosis

Modified Allen test is done for integrity of palmar arch before doing ABG



P02, pCO2 values are by default in mm Hg

How to interpret in 30 seconds

- Acute exacerbation of COPD
- Stable acclimatization

	Resp acidosis H+ UNCOMPENSATED	Resp acidosis H+ PARTIALLY COMPENSATED	Resp acidosis Fully Compensated
1. pH ↓	7.2	7.22 ↓	7.36 NORMAL
2. pCO2 ↑	60 ← 40 (↑20)	58 ↑	50 ↑
3. HCO3 (N)	26 (→ 2)	28 ↑↑	32 ↑↑↑↑

* Acute Exac^N of COPD ⇒ NIV (Bi-PAP)

NIV 1. A — Acute pulm edema: AHF

2. B — Acute exa^N of ch. bronchitis

3. C — COVID-19 SEVERE pneumonia

Scenario 1:

	Parameters	Values	Interpretation
1.	pH	7.25 ↓	Metabolic acidosis PC COMPENSATION vs MIXED Expected pCO_2 = HCO_3 + 15 = 10 + 15 = 25 mm Hg Expected pCO_2 = actual pCO_2
2.	PCO2 actual	25 ↓	
3	HCO3	10 ↓	

Expected PCO2= HCO3 plus 15 = 10 + 15 = 25 mm Hg

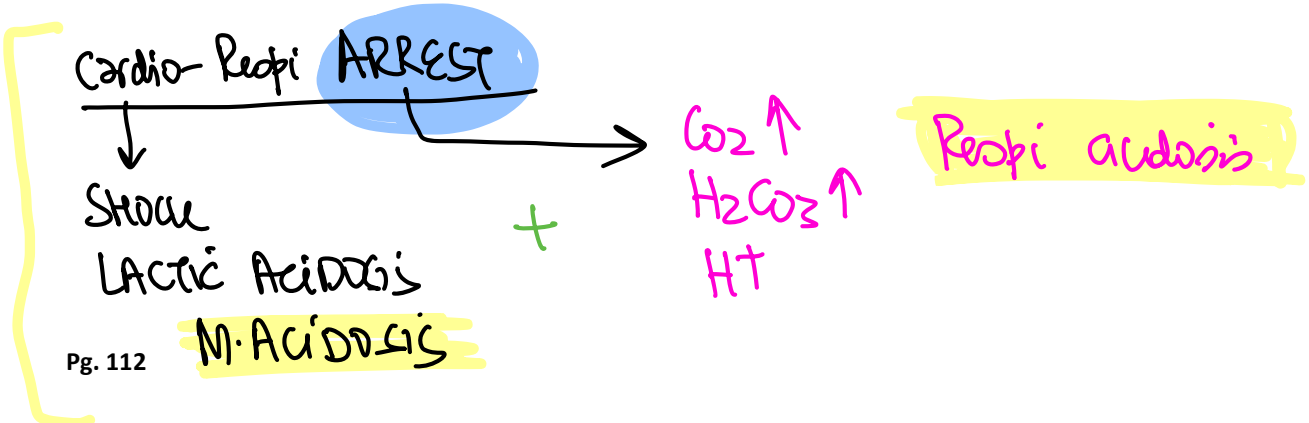
Optional for FMGE

Scenario 1.1

Parameters	Values	Interpretation
pH	7.25 ↓	M·ACIDOSIS * expected pCO_2 = HCO_3 + 15 = 10 + 15 = 25mmHg Actual pCO_2 > expected pCO_2 Mixed disorder : Respi acidosis
PCO2 actual →	30 ↓	
HCO3	10 ↓	

Hypoventilation causing decreased CO2 washout

Expected PCO2= HCO3 plus 15 = 10 + 15 = 25 mm Hg and actual PCO2=



Scenario 1.2

Parameters	Values	Interpretation
pH	**7.1** ↓	M. Acidosis PC Compensation vs mixed
PC02 actual	**16** ↓	expected pCO_2 = HCO_3 + 15 = 6 + 15 = 21 mm Hg expected pCO_2 > actual pCO_2
HCO3	**6** ↓	PC M. Acidosis = M. Acidosis + compensatory R. alkalosis
pO2	**90**	

$(1.5 \times HCO_3) + 8 \pm 2$

Modified winter formula

$HCO_3 + 15$ = expected pCO_2

* expected pCO_2 = actual pCO_2
* " > actual pCO_2

Compensation (PC)

actual pCO_2 > expected pCO_2

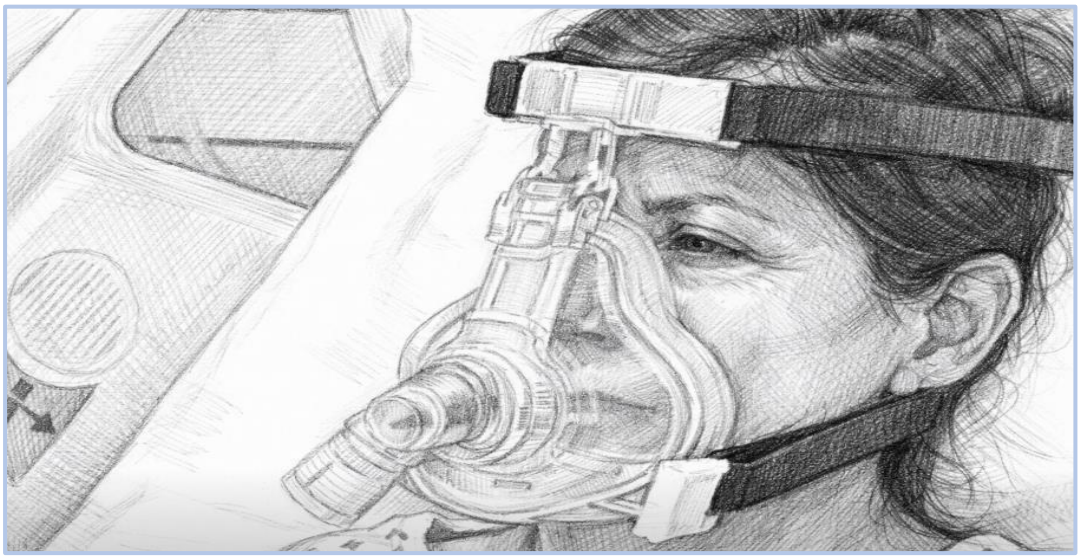
Mixed

Scenario 2: Acute exacerbation of chronic bronchitis

Parameters	Values	Interpretation
pH	**7.2** ↓	R. acidosis Partially compensated CO_2 narcosis – Asterixis – Metabolic encephalopathy
PC02 *	**60** ↑	
HCO3	**28** ↑↑	
pO2	**90**	

Longst acting β_2 agonist
INDACATEROL + ICS budesonide
LAMA
TIOTROPIUM

Management =



NIV

CI NIV
1. UNCONCIOUS, UNRESPONSIVE
2. SBP ↓↓: CS, Post-MI, enteroic GI bleeding
3. MAXIOFACIAL Trauma
UPPER Airway burn

Scenario 3: COVID Moderate/ Severe case R.Rate: ↑ Co_2 ↓

Parameters	Values	Interpretation
pH ↑	7.5 =	Respiratory alkalosis Partially compensated
PCO2 ↓	30	
HCO3 ↓	20 (24)	

Uncompensated R. alkalosis

R. alkalosis kich OUT HCO_3 HCO_3 ↓

R. Acidosis / alkalosis — HCO_3 = n UC; HCO_3 = change PC

Scenario 4: Chronic Vomiting in case of CHPS neonate

Parameters	Values	Interpretation
pH ↑	7.5	ALKALOSIS Metabolic
PCO2 (n)	45 (48)	Uncompensated partially compensated
HCO3 ↑	30 (22-26) 33	

Loss of Acid
loss of K+
loss of Cl^-

dehydration: aldosterone ↑

ENac

salt/H2o

K+/H+

PARADOXICAL ACIDURIA

M. ALKALOSIS: kich OUT HCO_3^-

Optional for FMG

inability To k+/H+ → Loss of ACID

Scenario 5

CKD patient with multiple episodes of vomiting

Parameters	Values	Interpretation
pH (n)	**7.4**	M.ACIDOSIS + M.ALKALOSIS = mixed disorder
PCO2 (n)	**40**	
HCO3 (n)	**24**	26 = 130 − (80 + 24)
Na ✓	**130**	Anion gap = (Na+) − (Cl− + HCO3−)
Chloride ✓	**80**	(N) (140) − (106 + 24)
		6-12 meq (140) − (130)

Must know facts

Fluid of choice for metabolic alkalosis → Normal saline

Metabolic acidosis: RL : lactate : LIVER → HCO3 generation

H+ excess

Side of Excess normal saline is → M.ACIDOSIS ,

0.9% NaCl Cl− excess To maintain electroneutrality HCO3− : go inside cells.

Fluid of choice for Metabolic acidosis

RL

Best for management of Acute exacerbation of chronic bronchitis

NIV/ Bi-PAP

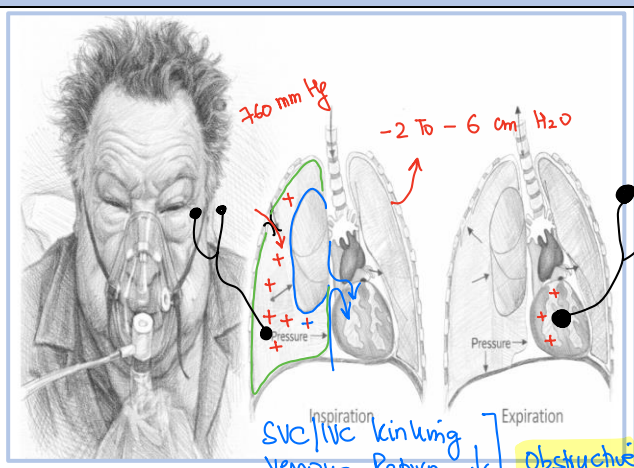
* Best for management of Respiratory alkalosis → Paper bag Rebreathing

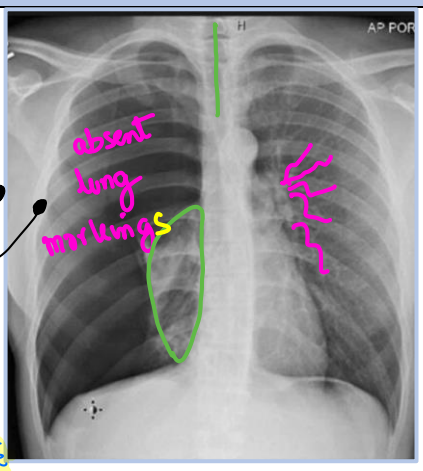
Panic attacks, Pneumonia

ARDS : RRate ↑ CO2 ↓ H2CO3 ↓ pH ↑

HAPE

Pneumothorax





SVC/IVC kinking
Venous Return ↓
BP ↓↓

Obstructive SHOCK
heart is beating !
pulse ⊖
P.E.A
NON SHOCKABLE rythm

HAMMAN CRUNCH SIGN = pneumo mediastinum
walking on snow ē leather boots

When to say Tension Pneumothorax

Key words

any 1 findings

1. **- Hypotension** ✓
2. **-Mediastinal shift/ Apex beat displaced away** ✓
3. **-Elevated JVP** ✓
4. **- Absent air entry**
5. **- Absent Breath sounds**
6. **- Hyper-resonant percussion note**

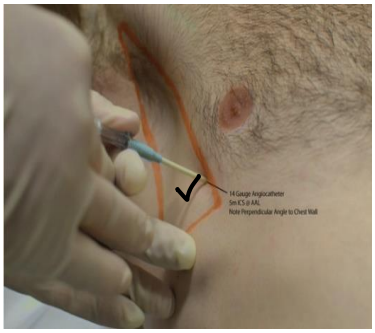
Rx: 1. WIDE BORE Needle THORACOSTOMY — 1st line
* 5ICS, Ant To MID-Axillary line
adult
Child/adult → * 2 ICS, lateral To MCL
36-40ff

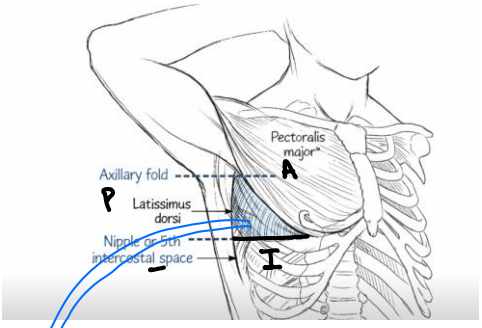
2. I.C.D intercostal drainage Tube — TOC
5ICS, Δ of safety

3. UNDER WATER SEAL DRAINAGE

OBSTRUCTIVE SHOCK	DISTRIBUTIVE SHOCK (SVR ↓)
1. Cardiac Tamponade	S Septic shock
2. Tension pneumothorax	A Anaphylaxis, addisonian CRISIS
3. MASSIVE PE	N Neurogenic shock

First line intervention





Air collection chamber

blood collection chamber

Air collection chamber should exhibit intermittent bubbling

-Continuous bubbling in air collection chamber indicates

→ AIR LEAK / POOR CONNECTION
→ BRONCHOPLEURAL FISTULA

-Intermittent bubbling stops

>1 HOUR → TUBE KINKING
→ DISLODGEMENT OF TUBE

☺ ~7day → GRADUAL Re expansion

Hemothorax

EMEGENCY THORACOTOMY ∈ HEMOSTASIS

When to inform surgeon

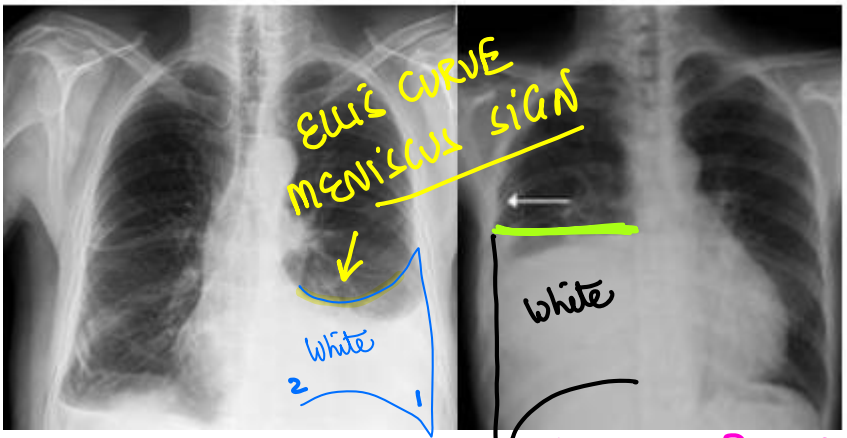
1. Drain amount > 200 ml per hour for 2 hours

2. Drain amount > 1.5L single reading

EMEGENCY THORACOTOMY

1. Cardiac Tamponade due to Hemopericardium
2. Traumatic pneumothorax : 200 x 2 , > 1.5L

Pleural effusion

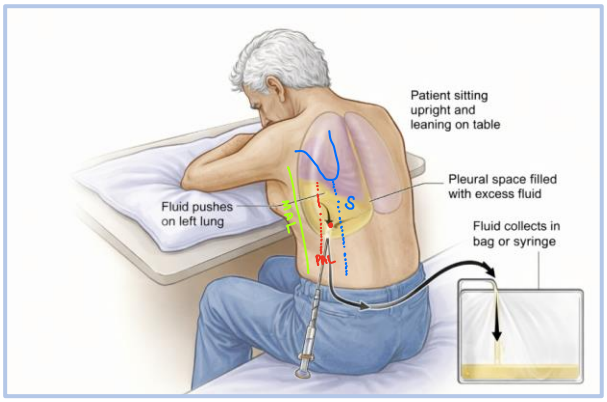


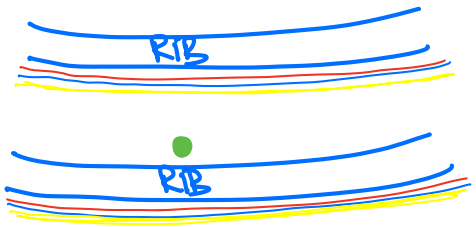
HYDROTHORAX ↓ * ↓ HYDRO-PNEUMO-THORAX

COSTOPHRENIC angle : 1st To obliterated in hydrothorax

Site for thoracocentesis

= 8th ICS midway between PAL & scapular line





✓

Maximum amount removed per sitting < 1.5 LITRES/ sitting

= Risk of Reexpansion pulm oedema

Site from perspective of avoiding injury to Neurovascular bundle

✓ SUPERIOR BORDER of INF RIB *

✓ Transudative : PRESSURE ISSUES : always BIL

↑ Hydrostatic → +⊖ → PLEURAL space (N): 5-15ml

* HF : MC

Oncotic presure : albumin ↓

* CIRRHOSIS
* Nephrotic syn
* Peritoneal dialysis

✓ Exudative: FIBRIN Rich fluid : Clots on standing
TB, Ca lung

Above the upper border of lower rib

Lights criteria

CIRRHOSIS, Nephrotic syn

* ***Transudative:*** ***CHAP: CHF, Hypoalbuminemia, Ascites and peritoneal dialysis***

PF protein H : < 0.5 of S. Protein > 0.5 Exudate

PF LDH H : < 0.6 of S. PROTEIN > 0.6

PF Adenosine deaminase levels elevated are seen in
↳ TB pleural effussion (CBNAAT)
s/o

Right sided pleural effusion is seen in MEIG SYNDROME
FIBROMA/ THECOMA + ASCITES + Rt sided pleural effussion

Bloody pleural effusion is seen in
Trauma/ warfarin/ TB/ Ca lung

Low sugar with cholesterol crystals are seen in
↳ Rheumatoid A

Mesothelioma
PLEURAL PLAQUE – Calcification

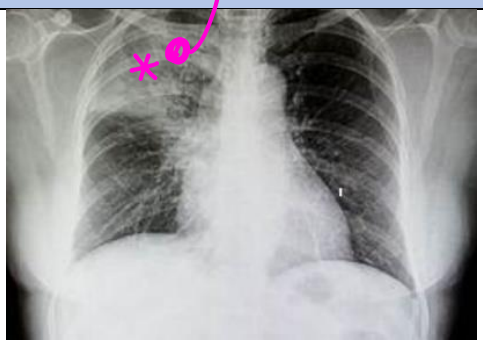
Low sugar in Pleural fluid
↳ ? malignancy : CYTOLOGY/ IHC of PF

Left sided effussion
BOERHAAVE
esophageal malignancy
Acute pancreatitis (Tail)

* Ca OVARY
SEROUS CYSTADENOCARCINOMA
↓
malignant Ascites

* Adenocarcinoma lung → malignant pleural effusion
Rx: PLEURODESIS (doxycycline)
↳ obliteration of pleural surface

Pneumonia



Most reliable auscultatory finding of lobar pneumonia

Organism that can cause both typical and atypical pneumonia

CAP

VAP

Leading cause in children with Cystic Fibrosis/ Mucoviscidosis (F508 mutation, del phenylalanine, Chromosome 7), AR

< 10 years

>10 years

CURB 65 Score or CRB-65 score

The CURB-65 criteria include five variables: confusion (C); urea >7 mmol/L (U); respiratory rate ≥30/min (R); blood pressure—systolic ≤90 mmHg or diastolic ≤60 mmHg (B); and an age of ≥65 years. Patients with a score of 0 (a 30-day mortality rate of 1.5%) can be treated as outpatients. With a score of 1 or 2, the patient should be hospitalized unless the score is entirely or in part attributable to an age of ≥65 years; in such cases, hospitalization may not be necessary. Among patients with scores of ≥3, mortality rates are 22% overall; these patients may require ICU admission. The PSI has greater efficacy than CURB-65 but is more difficult to calculate.

ICU: Nurse bed Ratio = 1:1, VENTILATOR CARE

RX: SCORE 0-1

Outpatients oral Amoxicillin + Azithromycin

comorbidities, previous Hospitalization

Stents, CKD, CLD

oral amoxicillin + (Clavulanic acid) + Azithromycin

SCORE 1-2-3

↓

Inpatient / ICU

IV CEFTRIAXONE + Azithromycin

or iv Ampicillin + Sulbactam + Azithromycin

or iv Respiratory FQ L levofloxacin

M Moxifloxacin

G gemifloxacin

Add coverage for S. Aureus VRSA iv Linezolid

* Central line

iv MEROPENEM

* Add coverage for Pseudomonas Aeruginosa

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