

UROLOGY

3

KIDNEY

ANATOMY

Retroperitoneal Organ

② Kidney to lower w.r.t. ① Kidney

① Kidney is slightly midline

Flexed @ angle of 30°
anteriorly

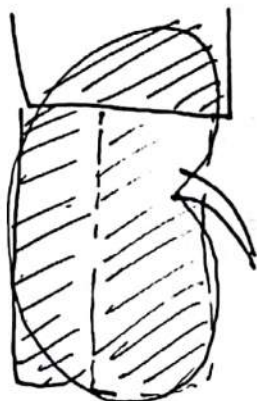
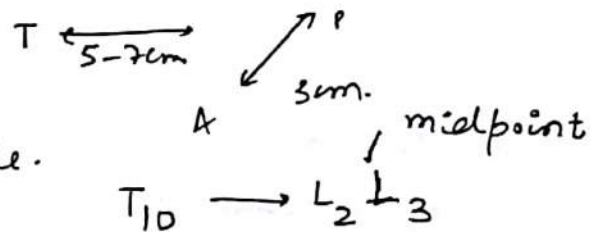
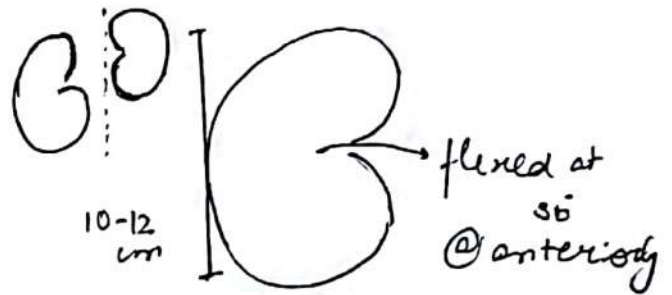
DROMEDARY'S HUMP -

Persistent fetal lobulations

Physiological,

Hence no Rx required.

More common ① side > ② side.



1/3 Diaphragm

Lat 1/3 Medial 2/3 → Psoas

Quadratus

Lumborum / Transverse abdominis.

4

Outer $\rightarrow$ Pseudocapsule

Posterior $\rightarrow$ ZUCKERKANDL'S FASCIA



gerota's is deficient on lower side
↓
helps in avoiding pressure necrosis

→ Site of fusion of collecting system & vascular system.

- Imp. Landmark for S_x

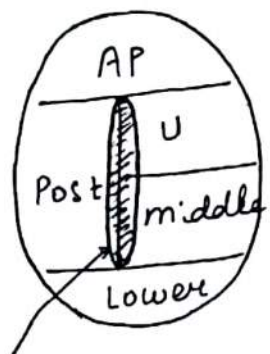
→ Renal Sinus coalesces to form Renal Hilum.

→ Involvement of Renal sinus in RCC = T₃ Stage

- axes from Aorta ($L_1 \rightarrow L_2$)

- R. artery $\rightarrow$ segmental arteries

Post (Most consistent) Ant: apical SA
upper SA
Middle
Lower



upper SA

Interlobar

Arteriole A

Interlobular A

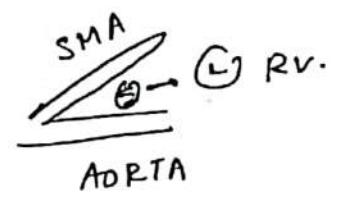
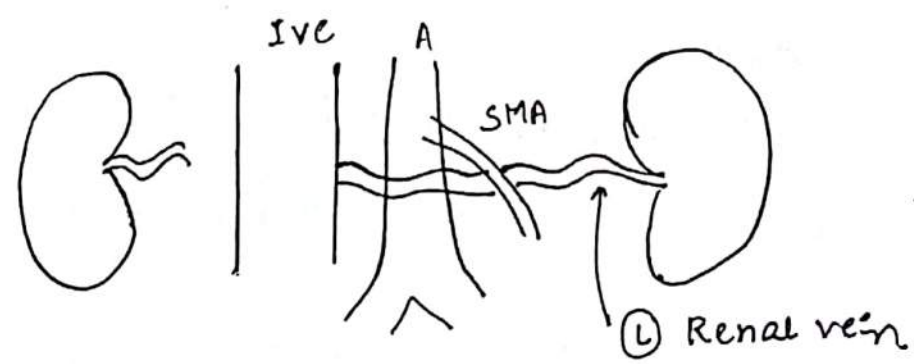
Afferent arteriole

Avascular = BRODEL'S ZONE

(associated - least blood loss)

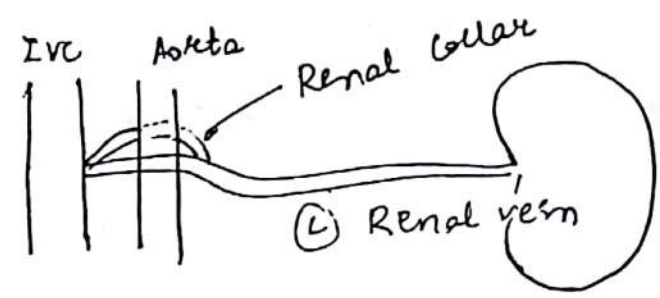
ANATROPHIC $S_x = S_x$ done via Brodel's zone
or
BOYCE PROCEDURE

② Renal vein < ① Renal vein [Length]
2-4cm 8-10cm. L → L



* NUTCRACKER PHENOMENA

Compression of ① Renal vein due to narrowing of angle b/w SMA / AORTA.



RENAL COLLAR- Bifurcation of ① Renal vein around aorta. may cause constriction of aorta

UROLITHIASIS

6

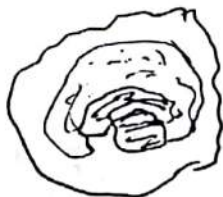
NEPHROLITHIASIS

→ 90% - radio-opaque

PATHOPHYSIOLOGY-

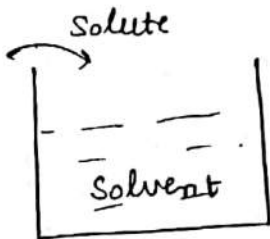
RANDALL'S PLAQUE → Precursor of stone

↳ Subendothelial deposition of cal. apatite.



EPITAXY

growth of stone by deposition of one stone over other.



SOLUTION

[CONCⁿ PRODUCT - CONCⁿ of solute in solution

SOLUBILITY PRODUCT - Threshold saturation CONCⁿ.

$CP \gg SP \Rightarrow$ STONE ~~formation~~

Inhibitors

At

FORMATION PRODUCT - CONCⁿ at which effect of inhibitors is neutralised.

If $CP > FP \Rightarrow$ STONE FORMATION

EQUIL-2 } Stone Probability Calculation score⁷
JESS }

* INHIBITORS OF STONE FORMATION

- 1> Citrate (Most Potent)
- 2> Magnesium
- 3> Polyanions (mucopolysaccharides, glycosaminoglycans)
- 4> Tamm Horsfall Protein.
- 5> Nephrocalcin
- 6> Uroponin
- 7> Osteopontin.

MISC.

♂ > ♀

White > Black

Geog :- Extreme
 → Cold
 → Dry
 → Hot / acid.

RARE In children.

RISK FACTORS-

- 1) Dehydration
- 2) Infection
- 3) Hypercalciuria
- 4) ↓ Citrate
- 5) Vit A Deficiency
- 6) Gout / Pseudogout
- 7) Renal Tubular Acidosis
- 8) Cystinuria

TYPES

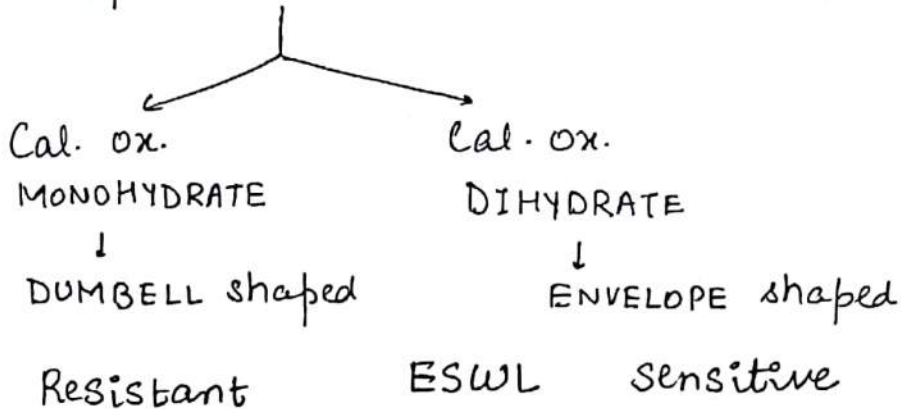
17 CALCIUM OXALATE (75-80%) / MULL BERRY / JACK. STONE.

Radio-opaque

Reddish Brown (? Hematuria)
(? hemosiderin)

↓
due to hard
appearance

Spiculated



⇒ MULLBERRY STONES

⇒ a/e HYPERCALCAIURIA.

> 7 mmol / day in ♂

> 5 mmol / day in ♀

on calcium in urine

> 200 mg / day → urine Ca^{2+}

2) PHOSPHATE STONES. (10-15%)

RADIO-OPAQUE

WHITE

Shape = COFFIN LID / RECTANGULAR

a/e INFECTION [Phosphate stones are H/c type].

COMPⁿ - Cal. Phosphate

a/e ALKALINE URINE.

a/e ↓ UREASE splitting organism
(Protease → H/c Infect)
not E. Coli

Variants of Phosphate

1) TRIPLE PHOSPHATE

Ca Amm. Mag. Phosphate

2) STRUVITE = Am. Mag - Phosphate +

Ca. oxalate Hydroxyapatite.

INFECTION STONES = 'STRUVITE'

STAGHORN CALCULUS = STRUVITE occupying
Pelvis + calyceal system



Types

COMPLETE

INCOMPLETE

Occupancy of >80% of
pelvi-calyceal system

Occupancy of atleast
2 Pelvicalyceal
system.

3) URIC ACID STONES

Radio-lucent

Orangeish colour

Shape = AMORPHOUS SHARDS (plate like)

a/e ACIDIC URINE.
(pH < 5.0)

a/e GOUT/ Pseudo GOUT.

a/e URICOSURIA
Urine uric acid > 600 mg/day

4) CYSTEINE STONES

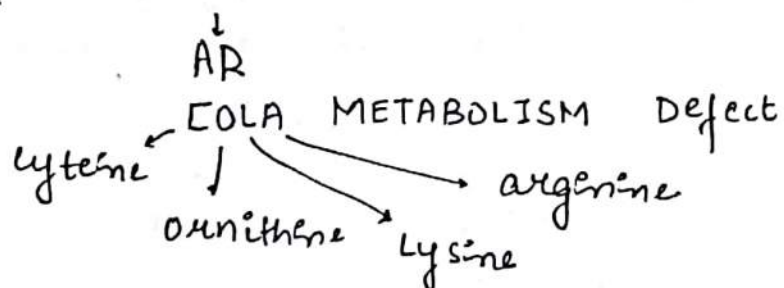
HARDEST

Radio - OPAQUE.

Bluish-green (? Sulphydryl group @ Tail)

HEXAGONAL

a/e HOMOCYSTINURIA.



Cystinuria > 200-250 µg/day. Urine cysteine

5) BRUSHITE STONES

Radio- OPAQUE

Yellowish

PRISMATIC/ NEEDLE like

Calcium Phosphate Hydroxyapatite

6) XANTHINE

a/c Xanthine Metabolism Defect

Radio - LUCENT

BRICK - RED

7) ~~AMMONIUM~~ AMMONIUM URATE

Radio - LUCENT

a/c LAXATIVE ABUSE ($\uparrow$ Na^+ loss; metabolic acidosis)

IBS

a/c acidosis, $\downarrow$ Na^+

8) MATRIX STONE

STONE - Inorganic component

Protein Rich Stone 65%

Organic sugars

Polyanions

BROWN COLOUR

SPONGY STONE $\bar{c}$ cystic spaces

ESWL Resistant





Soft spongy
Brown

~~ESW~~ ESWR RESISTANT STONES

Cal. ox. monohydrate

Bruwhite

Mathea stone

Toc - Renoscopy Removal

DRUG RELATED-

- 1) Indinavir
- 2) Thiazole
- 3) Guanterene
- 4) Ephedrine
- 5) Silicates.

COMMERCIAL NAMES

- 1) Ca oxalate Monohydrate = WHEWETITE
- 2) " " Dihydrate = WHEDDELITE
- 3) Triple Calcium Phosphate = WHITLOKITE

FEATURES

1) Pain @ Flanks.

@ Renal Angle Tenderness



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MURPHY'S PUNCH - demonstration of Renal angle tenderness.

2) Hematuria

3) Urosepsis

4) Hydronephrosis

NCCT → IOC

(Helical CT)

1st Line Inv. for FLANK PAIN = USG.

1st Line Inv. for RENAL STONE = X-RAY KUB

X-RAY KUB
+
USG
→ 97% sensitivity

M_x

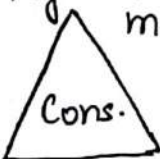


INDICATION -

1) Size < 5-6mm

2) ⑥
+

Hydration to maintain urine output 2L



Antibiotics

NSAIDs

→ ESWL

→ PLNL

→ Renoscopic Removal
(" lithotripsy)

→ Lap. surgical stone Removal

Dissolution Therapy

↳ Cystine^{ooo}
↳ Uric Acid stones

Principle :-

- ① Hydration
- ② alkalisation of urine
- ③ Uric acid $\rightarrow$ allopurinol
- ④ Cystine $\rightarrow$ d-Penicillamine
or
Propionyl-Glycine

Precautions :-

1) Water $\rightarrow$ Hard is protective

2) Beverage -

Carbonated Beverage - protective
except [Phosphate Rich Carb]

3) Citrate Juice $\downarrow \downarrow$ risk.

3) Protein Restriction diet

$\uparrow \uparrow$

4) Na^+ Restriction

5) Adequate Ca^{2+} Intake.

$\uparrow \uparrow \text{Ca}^{2+} \rightarrow \uparrow \uparrow \text{Abs} \rightarrow \uparrow \uparrow \text{stone}$

$\downarrow \downarrow \text{Ca}^{2+} \rightarrow \uparrow \uparrow \text{ox. absorption.}$

$\uparrow \uparrow \text{stones}$

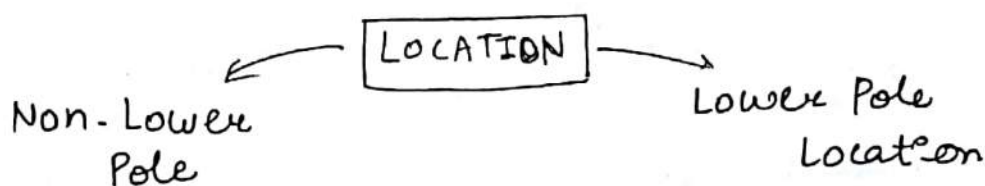
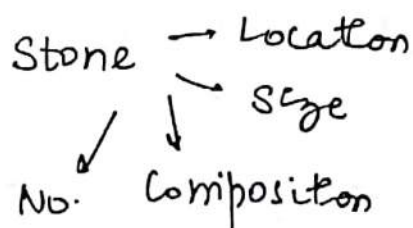
So, adequate Ca^{2+} intake
reqd.

6) ↑ BM1 → ↑↑ stone

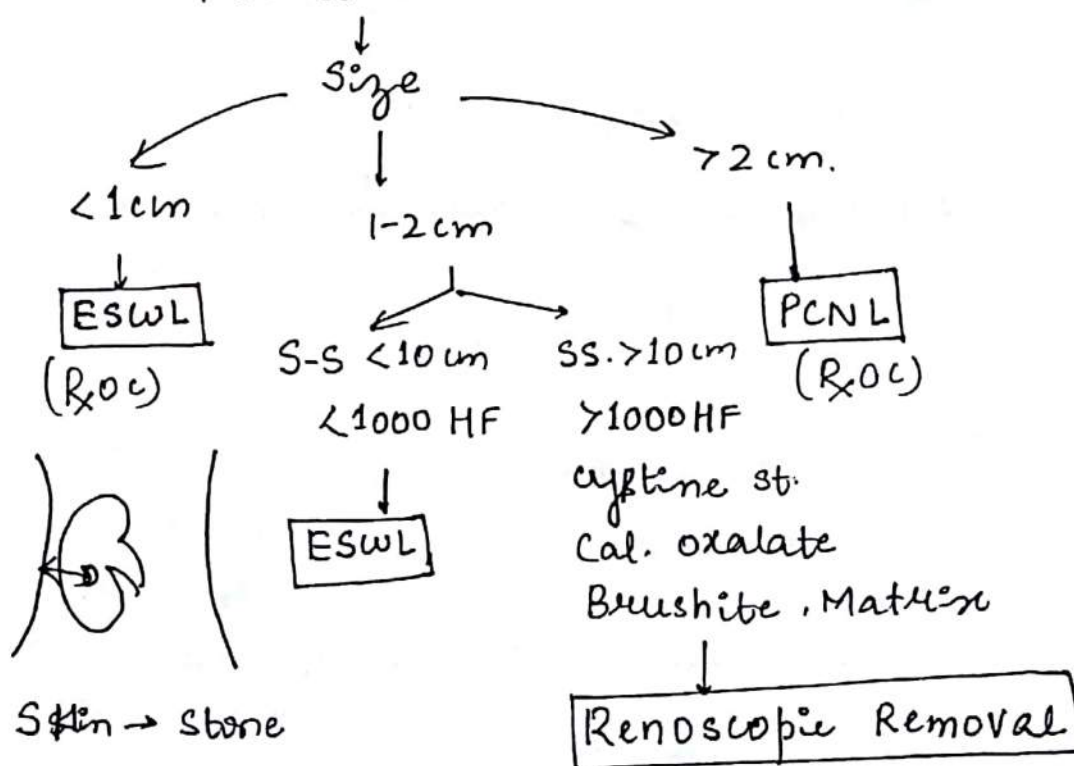
7) orthophosphate → ↓↓ stone

8) Rice Bran → ↓↓ stone

INTERVENTION



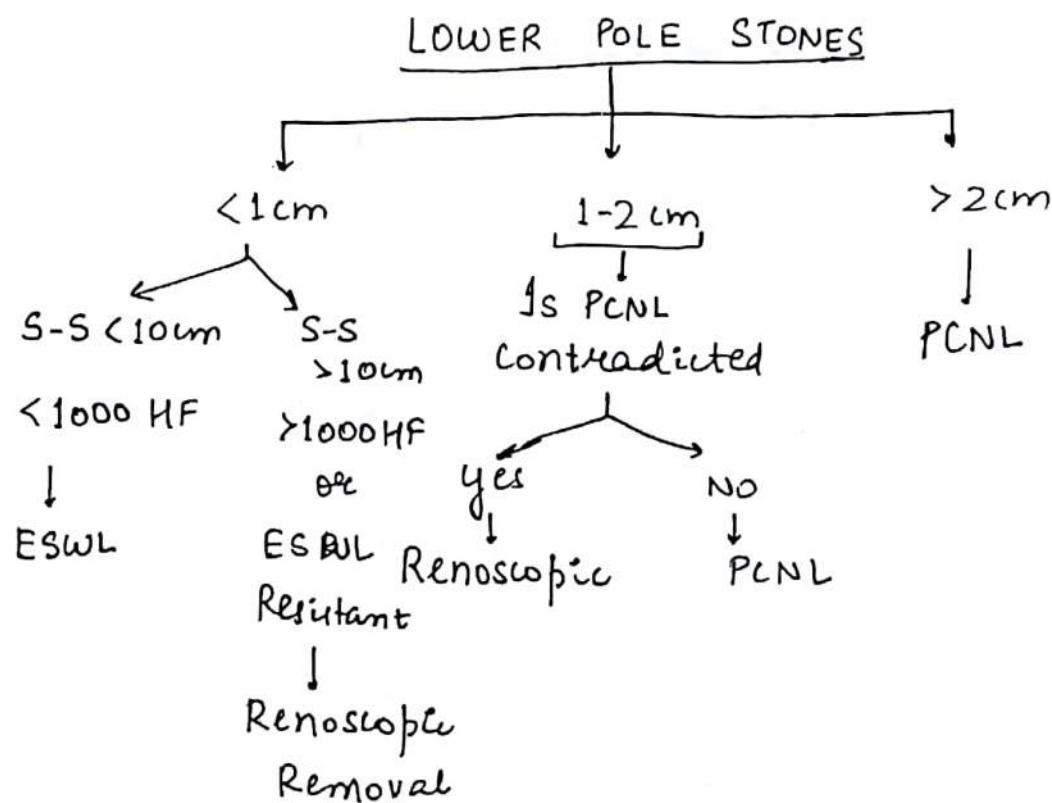
Non-Lower Pole



< 1cm → ESWL

> 2cm → PCNL

1-2cm → 1st line ESWL $\xrightarrow{\text{fail}}$ Renoscopic Removal



< 1cm → ESWL

1-2cm → 1st ESWL $\xrightarrow{\ominus}$ Renoscopy (Roc)

> 2cm → PCNL

* STONES IN ⑥

+ conservative - Hydration
NSAIDs

In case of obstruction → DJ stenting (double J)
Antibiotics

* Stones In Horse-shoe Kidney

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PCNL $\rightarrow$ Roc

* Stones In Calyceal Diverticula

PCNL $\rightarrow$ Roc

* Pediatric Stones-

$< 1\text{cm}$ $\rightarrow$ TOL $\rightarrow$ ESWL

$> 1\text{cm}$ $\rightarrow$ PCNL

ESWL

Extra-corporeal shock wave Lithotripsy.

TECH:-



1st genⁿ - Electrohydraulic Generator.

$\downarrow$
used SPARK Plugs
 $\downarrow$
spherical waves

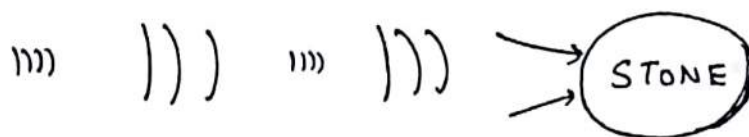
2nd genⁿ - Electromagnetic Generator

$\downarrow$
Use - Acoustic Lens
 $\downarrow$
cylindrical ~~to~~ shock waves



3rd genⁿ - Piezoelectric Generator

$\downarrow$
Plane shock waves $\Rightarrow$ Exact + Precise



SPALL # - 1st Dent in the Stone

C/I to ESWL

ABSOLUTE

1> Thrombocytopenia

2> ♂
+

3> Coagulopathy

RELATIVE C/I

4> CRF

5> Diabetic Nephropathy

↳ already fibrosis & scarring + into

ESWL may worsen nephropathy

6> Elderly

7> Aortic Disease

8> Larger stones

COMPLICATION

1> Hematuria → MCC

2> Hematoma

3> Organ Injury

4> Chronic Sclerosing Fibrosis

5> STEINSTRASSE → Street of stones

Ureteroscopic
↑ Removal

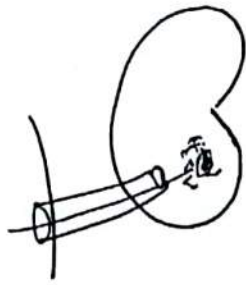


Blockage of
ureter by
fragments of
stones

PCNL

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→ Percutaneous Nephro ~~Lithotripsy~~ Lithotomy



Access to kidney = via Inf. CALYX

(? access via Sup. Pole + ↑↑ of Pleural Injury)

exception - Horse-shoe kidney

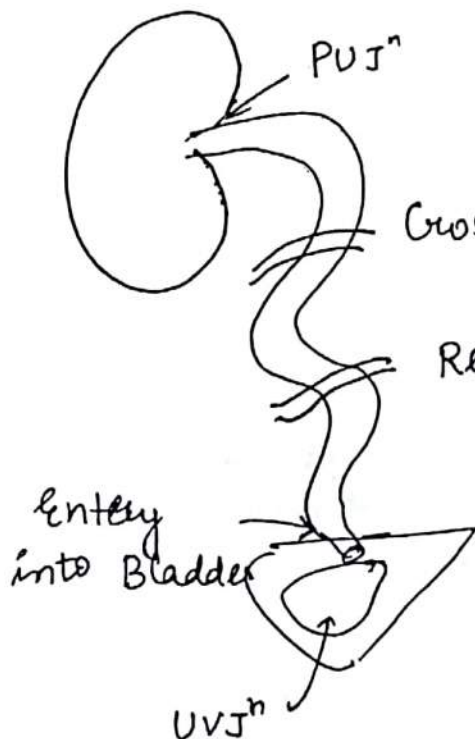
↓
Access → sup. Pole

COMPLICATION-

- 1) Hematoma
- 2) Hematuria
- 3) Colonic Perforation

URETERIC STONE

SITES OF IMPACTION



Crossing of Iliac vessels

Relation : ductus deferens / Round lig.

Gonadal vessels

Ureter

Iliac vessel

FEATURES -

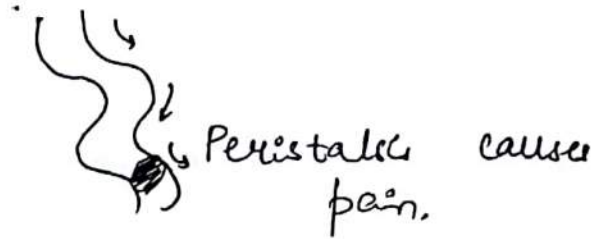
20

1) Pain → Loin along Genitofemoral N/V
groin T₁₀-L₂

2) Hematuria

3) obstruction.

4) Urosepsis



M_x -

1) Conservative M_x is preferred

* MEDICAL EXPULSION THERAPY (MET)

1) α -BLOCKERS



TAMSULOSIN

2) STEROID



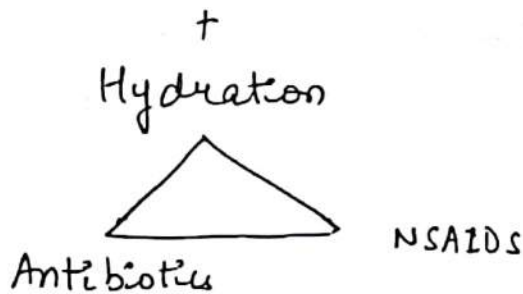
DEFLAZACORT

3) CCB



NIFEDIPINE

(Least preferred)



INDICATIONS FOR INTERVENTION

1) >5mm

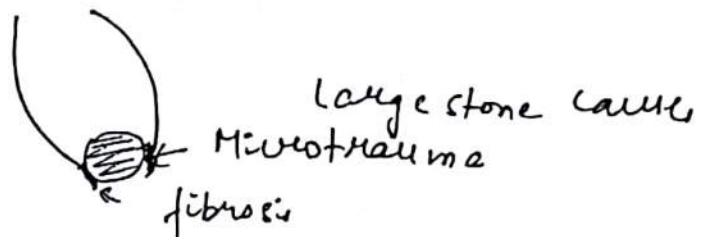
2) Symptoms >3-4 wks

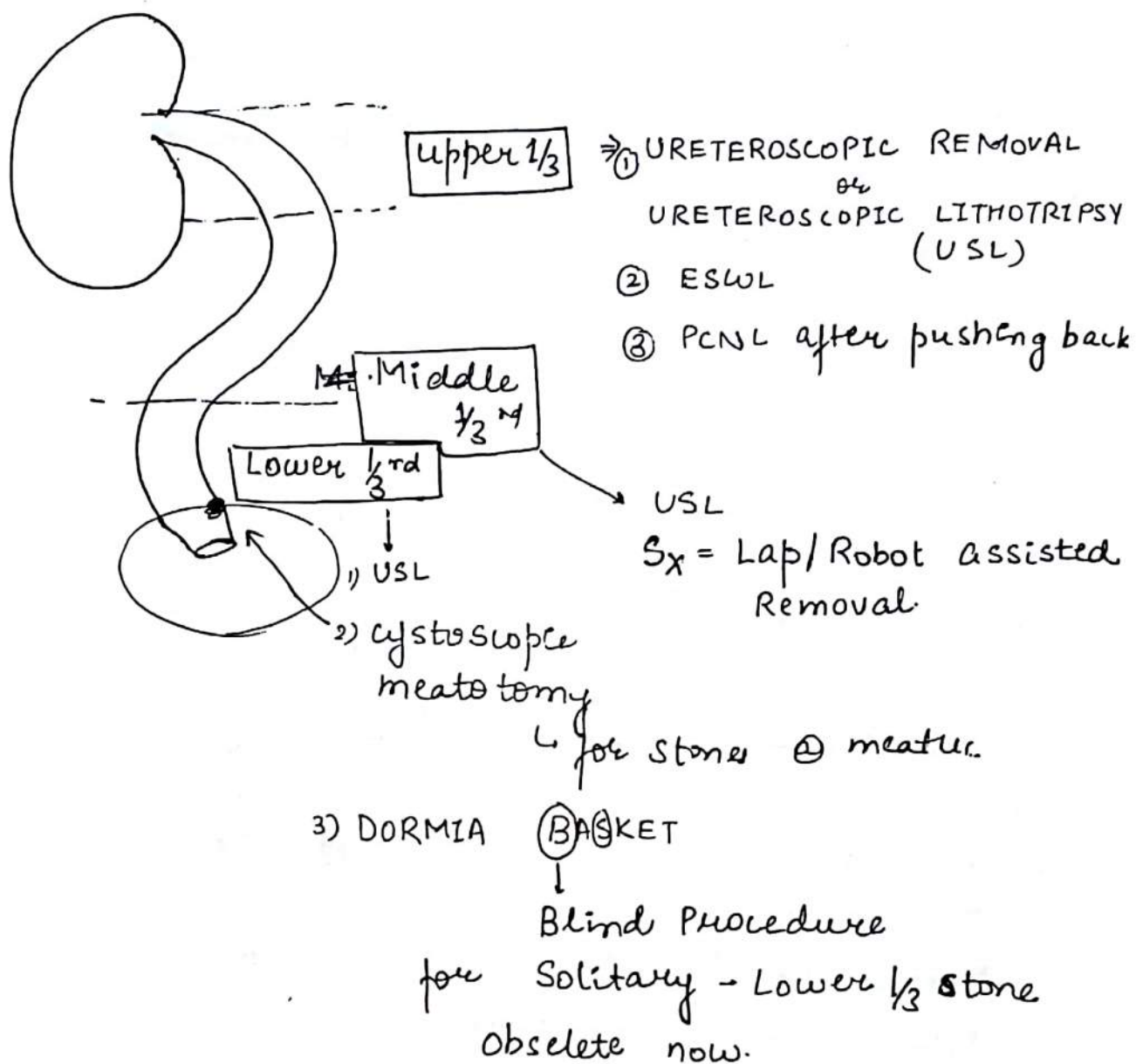
3) young age

4) Severe symptoms

5) not responding to medication

6) obstructⁿ





BLADDER STONES

→ Age = ↑↑ children B- Blader
 ↑↑ elderly B- Bache, Buddha

RISK

→ a/c Low Phosphate Diet

Infection

Schistosomiasis

Drainage - Foley's Catheter
 Foreign Bodies

↑ uric acid

TYPES

1°

Developed in
 STERILE URINE

M/c- MIXED URIC ACID >>

Mix. URATE



Radio- OPAQUE >> R. lucent

JACK STONE / MULBERRY

2°

a/c INFECTION

M/c- PHOSPHATE Stones

FEATURE

1) Pain @ tip of genitalia

↑↑ ambulation.

↓↓ micturition



2) Terminal Hematuria⁹⁹

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Mx -

CYSTOSCOPIC REMOVAL

Lithotripters



cystoscopic
litholapexy

↓
Lap. Removal

PROSTATIC CALCULUS

↓
ENDOGENEOUS P.C.

Calcified CORPORA
AMYLAcea.

Do not need Rx

If symptomatic ⇒ TURP

↓
EXOGENEOUS P.C.

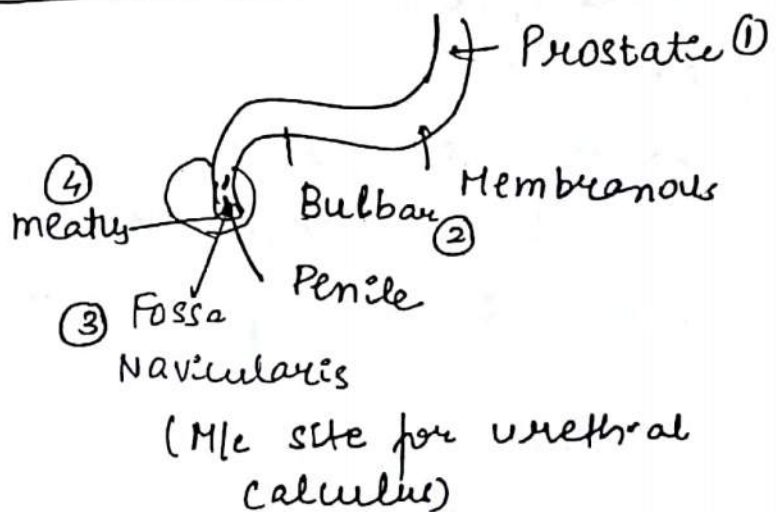
Calculus in PROSTATIC
URETHRA

URETHRAL CALCULUS

→ Exclusive to ♂

→ Pain @ tip of
genitalia =
Reduced stream
of urine

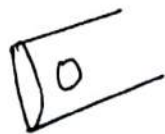
→ FORKING OF URINE



Rx- CYSTOSCOPIC REMOVAL

Proximal

Impacted stones



(eg. Meatus/
Fossa navicularis) → Meatotomy & Stone Removal

MALIGNANCY

RENAL

BENIGN

M/c Benign Lesion = SIMPLE RENAL CYST

M/c Benign Tumour = ONCOCYTOMA

ONCOCYTOMA

Pseudocapsule

♂:♀ = 3:2

TAN MAHOAGANY Colour

Central STELLATE scar

GENETICS :- Loss of chromosome 1
Loss 14
Loss Y

ORIGIN:- Intercalated cells

ONCOCYTOMA

Benign

-- HALE colloidal/
IRON STAIN

- Parvalbumin

- Claudin

REC [chromophobe]

Malignant

+++

+++

+++

IOC :- CECT → Central stellate scar

CT Angiography → SPOKE WHEEL ARRANGE

R_x :- Partial nephrectomy (Nephron sparing sx)

ANGIO MYOLIPOMA (AML)

<10%

♀ >> ♂

↑↑ c age

5th - 6th decade

Sporadic >> Familial

↳ 3rd decade

a/c TUBEROUS SCLEROSIS

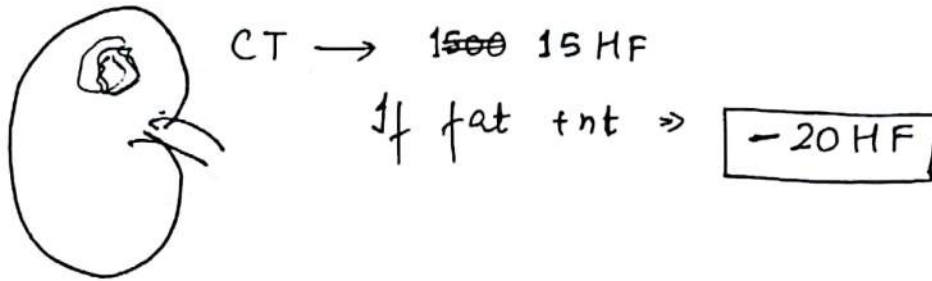
ORIGIN :- Neural crest

QQ PEC² (Perivascular epithelioid cells)

It consist of tortuous aneurysmal blood vessel

+ M/s (smooth)

+ FAT



+++ HMB-45 (Human Melanocyte Black)

$\downarrow$
 marker for Malignant Melanoma

$\downarrow$
 S-100

Tyrosinase

HMB-45

LDH

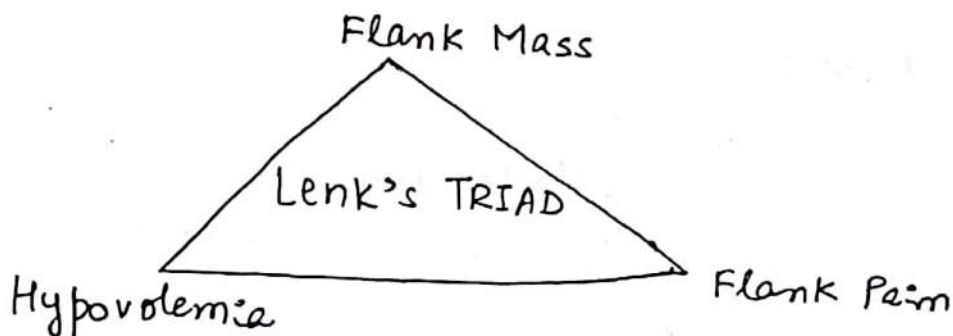
Melan-A

FEATURES:-

1) Spontaneous Retroperitoneal Haemorrhage

WUNDERLICH SYNDROME

$\downarrow$
 H/c C = Angiomyolipoma $\gg$ RCC



Rx of C = Angio-EMBOLISATION.

Mx OF AML :-

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<4cm $\Rightarrow$ Asymptomatic $\Rightarrow$ observation.
Symptomatic $\rightarrow$ Wunderlich's

$\downarrow$
Angio-embolisation.

>4cm $\Rightarrow$

1st Line $\Rightarrow$ Angio embolisation

2nd $\Rightarrow$ Partial Nephrectomy

RENAL CYST

IOC $\Rightarrow$ CECT

BOSNAIK CLASSIFICATION

TYPE	REMARK	RISK OF Malignancy	Rx
I	clear, water cyst	0%	observation
II	I + Fine Calcific + Fine septation	<10%	observation
II _F	II + Perceived enhancement		Closed Follow-up Ind ⁿ for Renal Mass Biopsy
III	II + Well defined calcification + Irregular Borders + Thick septations	60%	Sx

IV III + soft
tissue enhancement

90%

Sx AIIMS²⁸

RCC

M/c Tumour of Kidney.

♂ >> ♀ (3:2)

65 yrs (Avg. age)

White > Black

Incidence = 12 in 100,000

Radio - RESISTANT TUMOUR.

↑↑ Predisposition for vascular spread.

(Ive extension → is seen in 10%)

U/L [B/L in <2%]

[TRICK - Rule of 2.
any 2 organs 2 in no. in G.U. Tract
Risk of B/L Ca is <2%]

PATHOLOGICAL STAGE → most imp. prognostic factor

OTHER PROG. FACTORS -

① Histological. (nuclear grade)

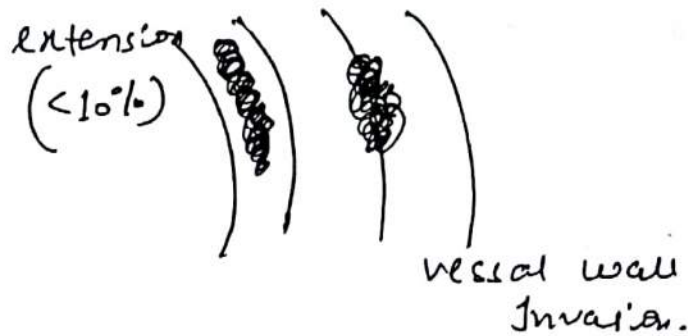
FUHRMAN'S grading

②

Tumour size

29

③ Vessel wall invasion



RISK FACTORS

1) TOBACCO

2) OBESITY

3) HTN

Other R/F -

1) Radiation

2) aromatic Hydrocarbons

3) Heavy metals

4) Thorotrast →

5) Diet

It is a dye.
Angiosarcoma (Most common Ca)
Cholangio Ca
RCC
Hepatocellular Ca

FEATURES

① Related to Kidney :-

1) Flank mass

2) Flank pain

3) Hematuria

INTERNIST TUMOUR.

GRAVITZ TUMOUR

HYPERNEPHROMA

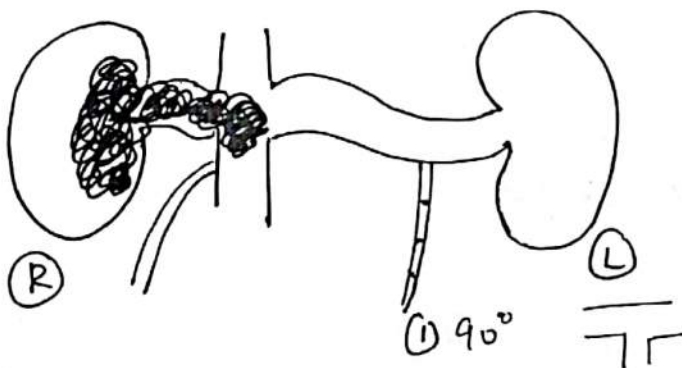
4> Perirenal Hematoma.

② Related to ^{mass} effect of RCC. -



1) ↑ B/L edema → lower extremity

2) varicocele → due to Block of IVC.
B/L or Rt >> Lt



[varicocele usually
is L > R but
that due to RCC
R > L]

② incompetent valve of
gonadal veins

↓
∴ L > R usually

③ Paraneoplastic Syndromes -

1) ↑↑ ESR

2) 2nd Anaemia

3) Hypercalcaemia

4) HTN

5) Polycythemia

6) STAUFFER SYNDROME -

non-metastatic Hepatic failure due to RCC.

7) Other.

8) Cushing's

9) Hyperglycemia

FAMILIAL RCC

* **VHL** → gene - VHL gene
chromosome - 3

VHL gene codes for **HIF** (Hypoxia Inducible Factor)

Mutation

↑ HIF₁ ↓ ↑ HIF₂

↑↑ EGFR

↑↑ VEGF



Tumour

Neovascularization

TUMOURS A/c VHL

1) BRAIN → Cerebral Haemangioblastoma

2) EYE → Retinal Angiomas

3) Renal → clear cell RCC
Renal cyst

3) ADRENALS → Pheochromocytoma

- 4) PANCREAS → Islet cell Tumour
Pancreatic cyst
- 5) EAR → Endolymphatic Sac Tumour
- 6) Epididymis → Cystadenoma

II) HEREDITARY PAPILLARY RCC

a/e C-MET Proto-oncogene Mutⁿ
 ↓
 7q

a/e Type I Papillary RCC

III) HERE. LEIOMYOMATOSIS PAPILLARY RCC

→ Fumarate Hydratase mutation.

↓
 1st → chromosome 1

→ a/e uterine/ cut Leiomyomas.

→ Type II Papillary RCC

IV) BIRT HOGG DUBE SYNDROME

→ a/e 17q mutⁿ

→ a/e Chromophobe RCC >> Oncocytoma

→ a/e Spontaneous Pneumothorax

Pulmonary cyst

Cutaneous Fibrofolliculomas

MAINZ CLASSIFICATION (PATHOLOGICAL)

① CLEAR CELL RCC (75-70%)

Origin → PCT

Genetics → Loss of 3p⁰⁰
8p
9p
Gain of 5q

Features → yellow
well circumscribed
lobulated
Highly vascular Tumour
↑ Tendency of venous extension.
Respond to Immunotherapy

Tumour Markers-

1> cytokeratin

2> CA-IX⁰⁰⁰ → carbonic anhydrase IX

3> EPC → epithelial Presenting Catenogen

Progn- POOR.

② PAPILLARY RCC (10-15%)

Origin → PCT

Genetics → a/e TRISOMY OF 7, 17, Y

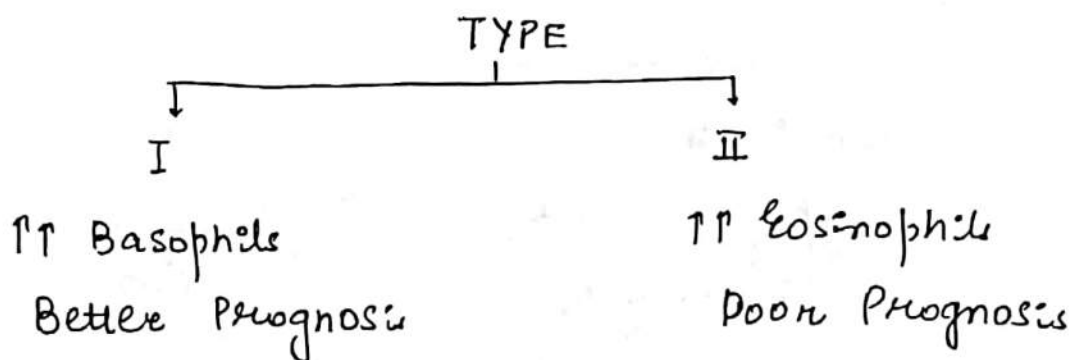
Features → hypovascular

Pseudocapsule

H₂ Fleshy Tumour

a/e CKD

Polycystic Kidney



TUMOUR MARKERS-

1) Cytokeratin-7

2) LMW-CK-7

3) AMCAR (α -mercapto CoA Racemase)

↓
also ↑ in Ca Prostate

Overall Good Prognosis

③ CHROMOPHOBE RCC (<10%)

- a/e Mutⁿ in 1) Fumarate Hydratase
- 2) multiple gene mutⁿ.

- Tan/Brown colour
- well circumscribed
- arise from intercalated cells

→ FEATURE :-

- 1) PLANT cells
- 2) Resin nucleus
- 3) Perinuclear clearing
- 4) ↑↑ Eosinophils

+++ HALE colloidal Iron stain

Prog → good except sarcomatoid variety

④ COLLECTING DUCT

Orogen → DCT

FEATURE - Grayish-white
Central in Location
↑↑ Infiltration

PROG → POOR

⑤ MEDULLARY RCC

36

a/c Sickle cell Trait

LACY Pattern

WORST Prog.

Δ sis :- IOC $\Rightarrow$ CECT

IOC $\rightarrow$ RCC $\bar{c}$ venous extension $\Rightarrow$ MRI

Best $\rightarrow$ Venocavography

$\rightarrow$ done if MRI is -ve.

$\rightarrow$ Invasive nature

STAGING OF RCC

WHO

Older $\Rightarrow$ ROBSON

T₁ ≤ 7 cm

○ T_{1a} ≤ 4 cm $\Rightarrow$ PARTIAL NEPHRECTOMY

○ T_{1b} > 4 cm ≤ 7 cm $\Rightarrow$ RADICAL

T₂ > 7 cm

T_{2a} $> 7 \leq 10$ cm

T_{2b} (> 10 cm) $\Rightarrow$ LAP. NEPHRECTOMY

T₃ Into Renal vein / IVC / Perinephric Fat

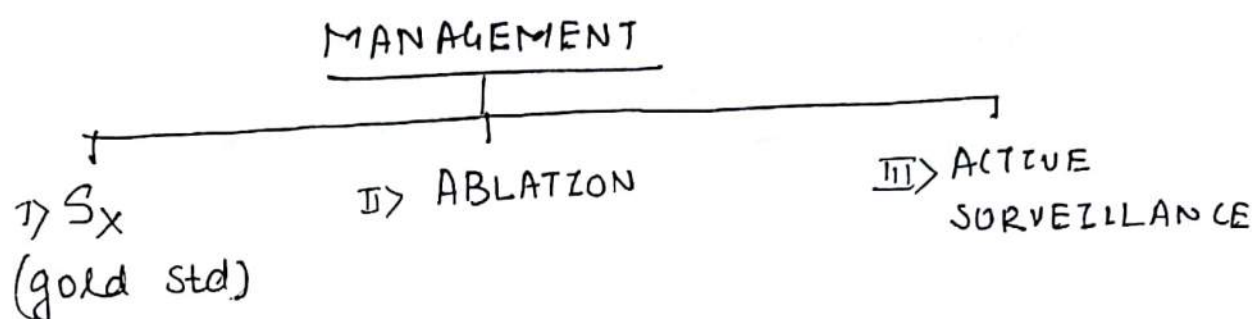
T₄ I/L Adrenal

Gerota's Fascia

Mets $\rightarrow$ C/L. Adrenal

$$N_1 = ++LN$$

$$N_0 = N_0 LN$$



Partial nephrectomy

Radical Nephrectomy

INDICATION

T1b onwards.

T1a $\leq 4cm$

Solitary Kidney irrespective
of size

C/L Diseased.

Pre-existing CRF
(overloaded kidney)

PARTS REMOVED

Preserve atleast 20%
functional Kidney

Kidney
+ Perinephric fat
+ Gerota's fascia
+ Lymph node from
cerv to bifurcation of
aorta on the same
side

ORGAN MINIMUM FUNCTIONAL
RESERVE

Kidney 20%

Liver 30% (25 - 30%)

Spleen 50%

Adrenal $\Rightarrow$ routine
removal is C/I.

Indication for removal
 $\rightarrow$ if adrenal involved
 $\rightarrow$ upper pole Tm.

PARTIALCOMPLICATIONSRADICAL

Hyperfiltration
Syndrome

(↑↑ urine protein loss)

4L CRF

<II> ABLATIONINDICATIONS :-

- 1> Elderly not fit for Sx
- 2> advanced RCC
- 3> Post-Sx relapse
- v.i. 4> multifocal familial RCC

ABSOLUTE C/I :-

Any Tm > 4cm size

3 TECHNOLOGY

① CRYO

② RADIO FREQUENCY

③ HIFU

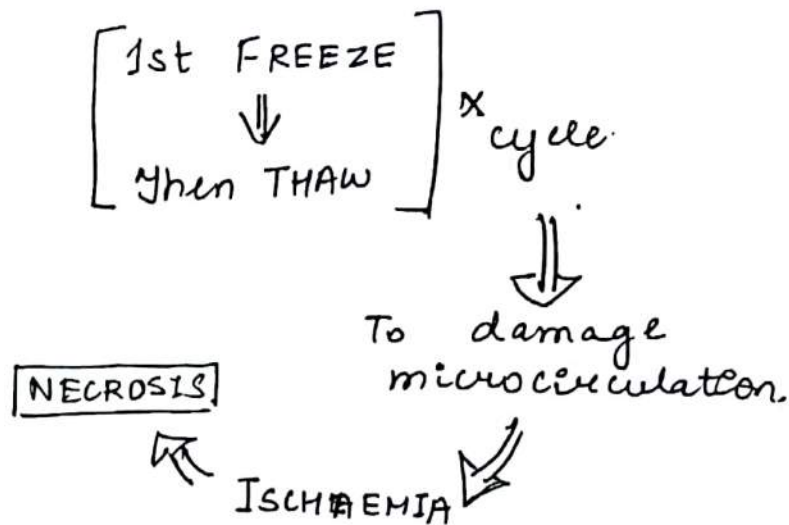
CRYO


cryoprobe
generate ICE
BALL


tip
3mm proximal
tip.

Temp = -20°C

we use liquid N_2 Helium



<III> ACTIVE SURVEILLANCE

INDICATIONS

- 1> Elderly; not fit for sx
- 2> Young pt. $\bar{c}$ features s/o BENIGN LESION
 - BOSNAIR → $2F/2/I$ $II_F/II/I$
 - ↓
 - F/U 6 monthly
 - CECT/MRI
 - ↓
 - ↑/↓ Lesion decide
 - B/M lesion.

✓ C/I:-

- 1> $> 4cm$
- 2> young pt $\bar{c}$ Solid/Dense Tm
- 3> Radiological features $\Rightarrow$ s/o malignancy

LOCALLY ADVANCED RCC

TOC = ENBLOC NEPHRECTOMY

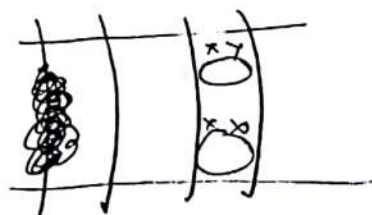
- Kidney
- + G. Fascia
- + Adrenals
- + L.N.
- + all local Str. Involved

RCC ± VENOUS EXTENSION

10%

STAGE [T₃]RADICAL NEPHRECTOMY + THROMBECTOMY
(RN)

RCC ± VENOUS WALL EXTENSION



RN + VENO-VENOUS GRAFTING

Post S_xchemotherapy
+/-

immunotherapy

1> sorolimus

item sorolimus
levkolimus

mTOR inhibitors

2> Sorefinib / Sunitenib Multi-Kinase inhibitors

3> Bevacizumab

4> Cetuximab etc.

RT → RC → Radioresistant

FOLLOW-UP OF RCC

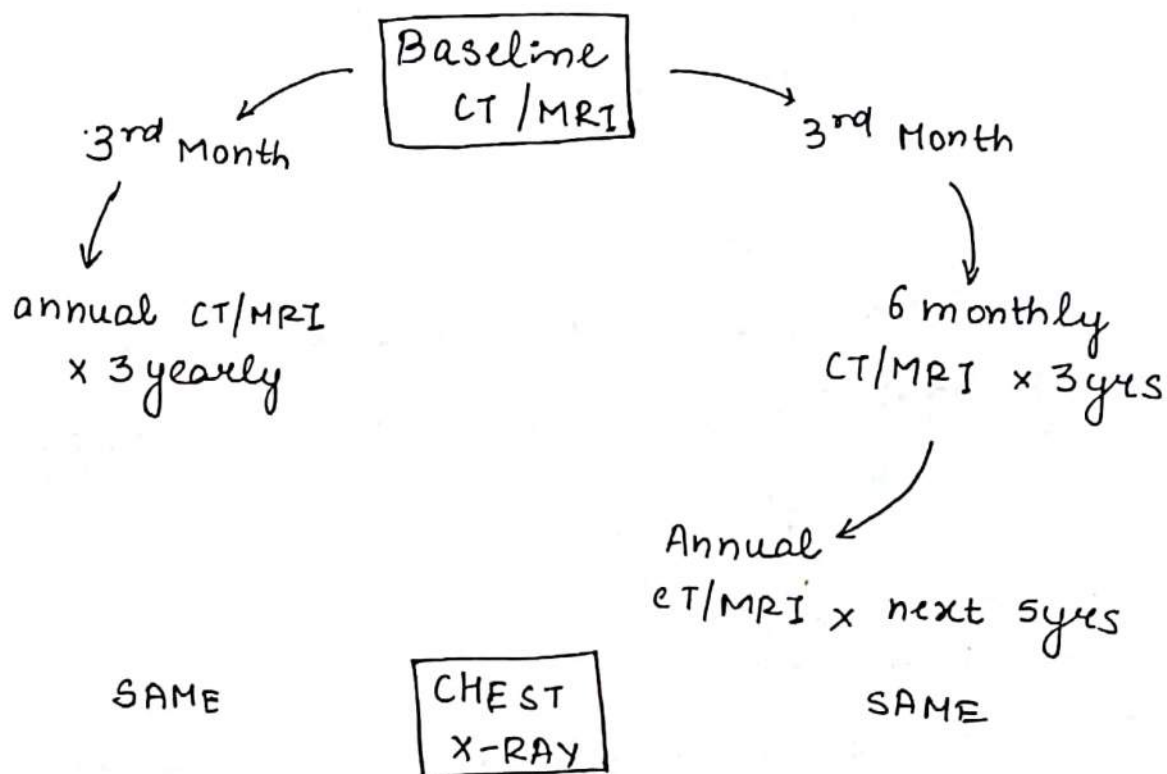
LOW GRADE RCC

$T_1 N_0 M_0$

HIGH GRADE RCC

$T_2 \rightarrow T_4; N_0; M_0$

any $T; N_1 M_0$



BLADDER CARCINOMA

42

TYPES

<1> UROTHELIAL CA (M/c Type) 90%

OR

TRANSITIONAL CELL CARCINOMA

<2> SCC (2-7%) 2nd M/c

- └ 2nd M/c
- └ Schistosomiasis
- └ Stones

<3> ADENOCARCINOMA (<2%)

- └ Dome of bladder - M/c SITE
- └ Drainage procedure [a/e ureterosigmoidostomy]
- └ Discharge @ umbilicus [a/e URACHAL CA]

R/F FOR BLADDER CA

- 1> Cigarette (component of tobacco $\Rightarrow$ 4-aminobiphenyl)
- 2> Cyclophosphamide
(Phenacetin also)
- 3> Chemical
(Aromatic Hydrocarbon $\rightarrow$ Anniline)
- 4> Schistosomiasis
- 5> Stones
- 6> Radiation
- 7> F.B. [Catheter].

C/F

1) PAINLESS HEMATURIA

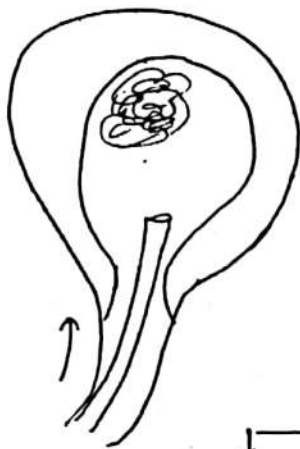
2) umbilical D/C (serous/sanguinous)

↳ seen in URACHAL CA

Δ :-

IOC for Hematuria ⇒ CT UROGRAPHY

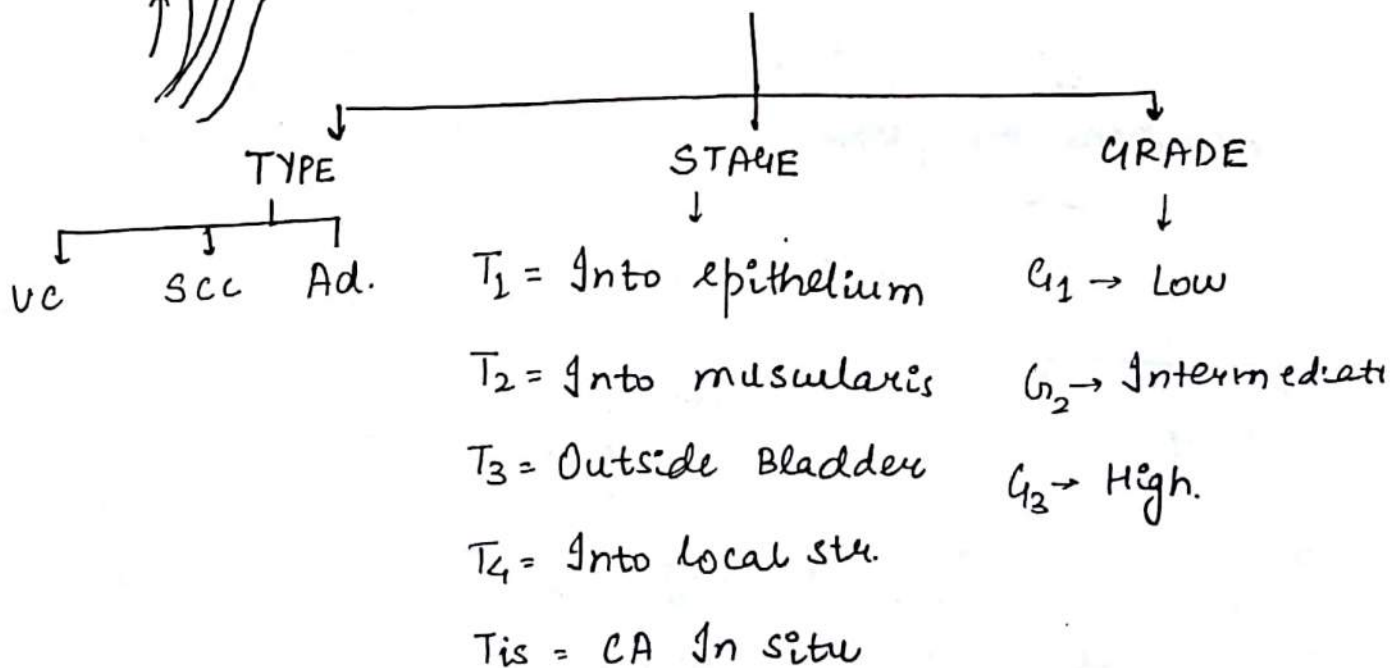
Gold STD ⇒ CYSTOSCOPY

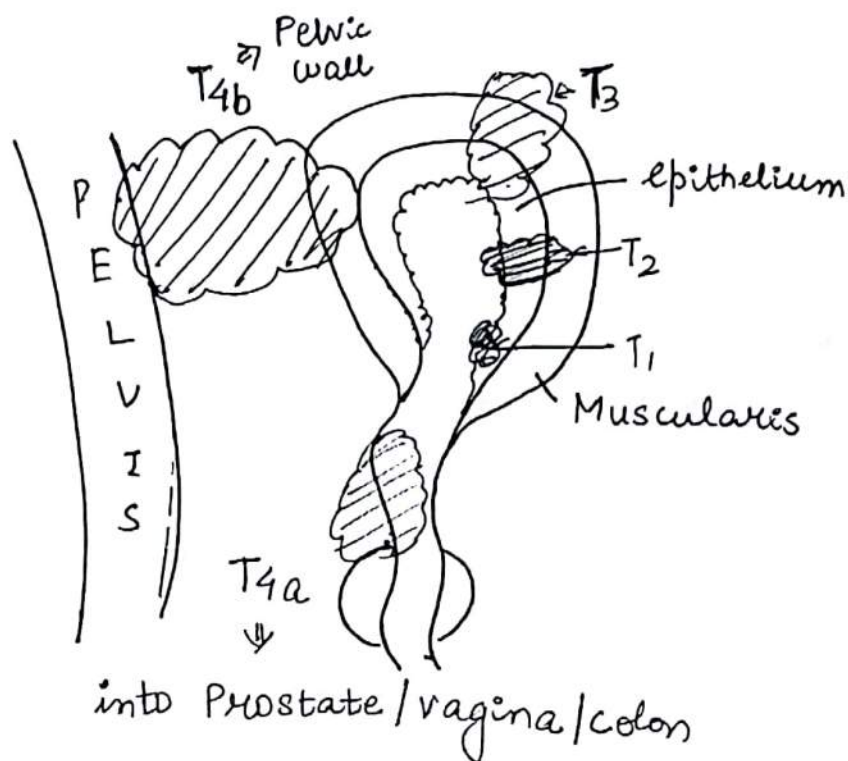


TRANS URETHRAL RESECTION OF BLADDER T_x (TURBT)

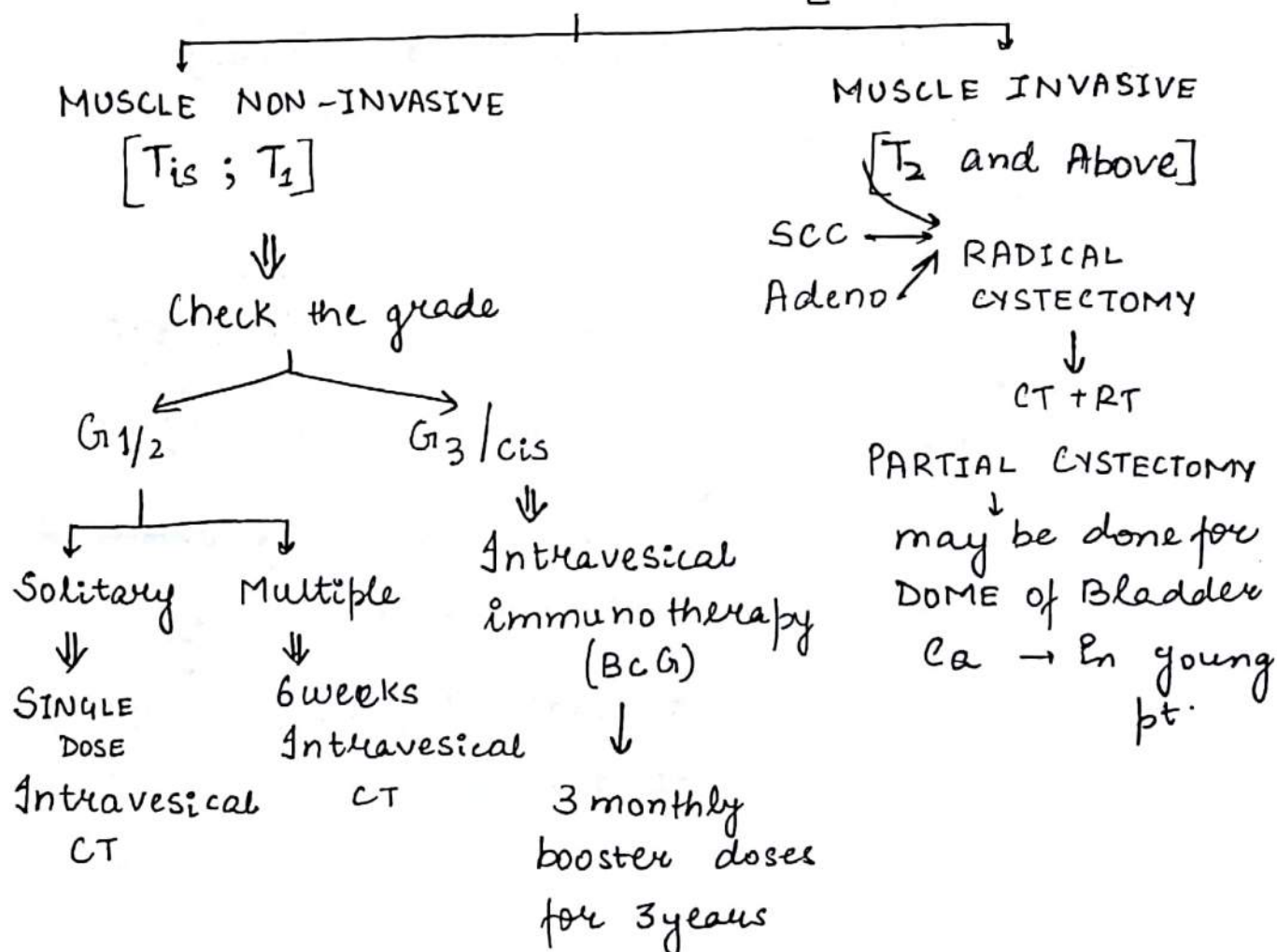
↳ cystoscopic Excision Biopsy

↳ Adv :- Tells About




$$M_x$$

UROTHELIAL CA [UC]



For Non-Invasive



3 MONTHLY FOLLOW UP
(Cystoscopic)

Intravesical CT

- Mitomycin
- Gemcitabin
- Doxorubicin
- Thiotepa (not used now)

Intravesical Immunotherapy

Doc $\Rightarrow$ BCG

Started 2 week post
TURBT



So that wound gets
healed in 2 week

c/I for BCG

① ⑥
+

② HIV

③ in 10 days of TURBT

④ Traumatic catheterisation

S/E -

BCGosis $\Rightarrow$ Rx $\Rightarrow$ ~~Prostate~~
~~CAT~~



6 monthly ATT

FOR ADVANCED BL CA $\Rightarrow$ Palliative CT + RT



after that

DIVERSION OF URINE

DIVERSION OF URINE

46

URETEROSTOMY



Opening ureters directly into the skin.

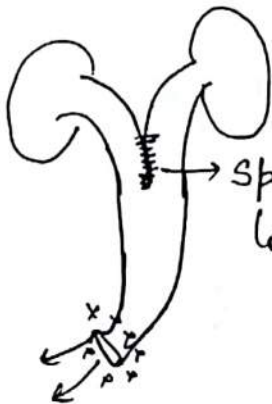
URETERO SIGMOIDOSTOMY



• Ureters directly opens into sigmoid colon.

ILEAL CONDUIT

CONTINENT DIVERⁿ

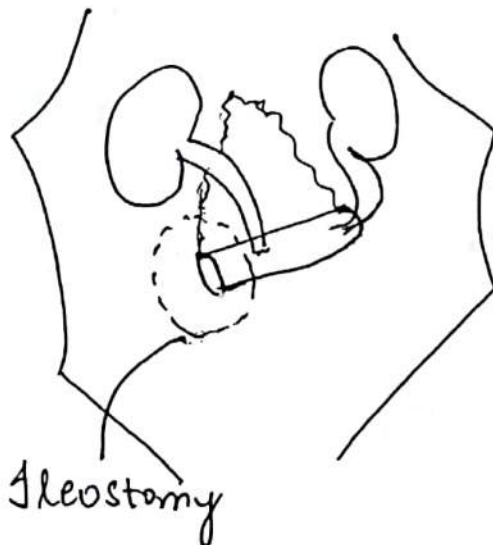
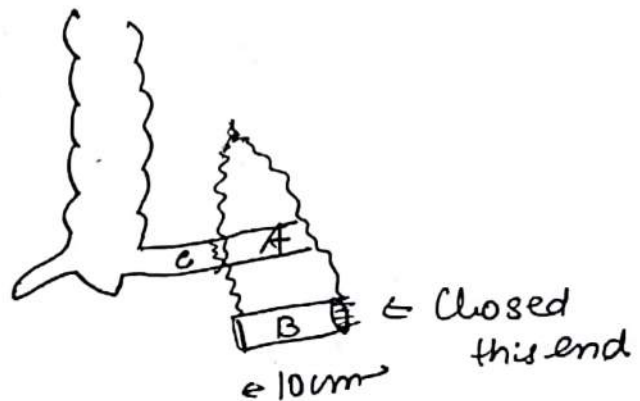
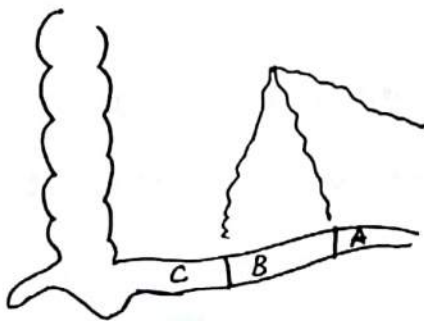


Spatulation (used)

• Hypo^akalemia
Hyperchloremic
Met. acidosis

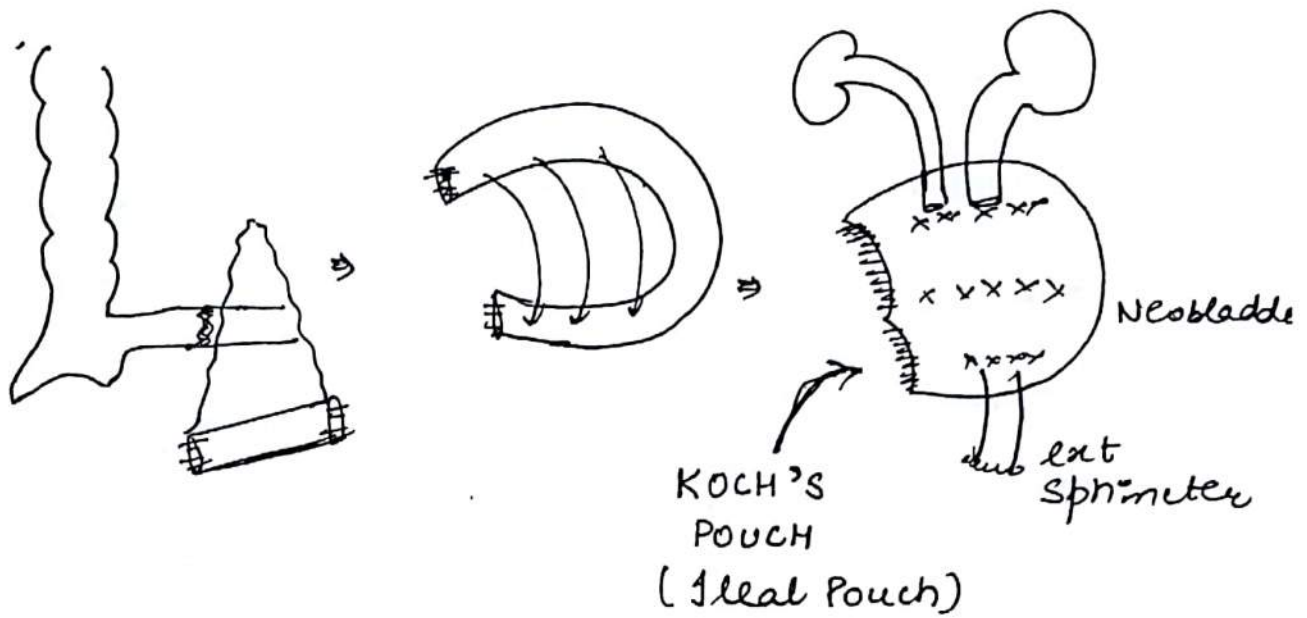
• ↑ MUK of Adeno (c to colon (200 times))

ILEAL CONDUIT



MOST POPULAR

④ CONTINENT DIVERSION (Neo Bladder)



If ascending colon is used $\Rightarrow$ INDIANA POUCH.

CA PROSTATE

48

M/C SITE = Peripheral zone Post. LOBE

M/C TYPE = AdenoCa (mixed type >> small cell type)

BLACK >> White

M/C visceral malignancy in GUT In ♂

Avg. Age > 68 yrs (6th - 7th Decade)

GENETICS:-

RNA SEL (HPC-1) on chr. 1

ELAC₂ (HPC-2) on chr. 17q

MSR-1 (chr. 8)

R/F :-

1) Testosterone → DHEA

↑↑

2) Estrogen ↑↑

3) Insulin like Growth Factor

4) Leptin ↑↑

5) Infection ↑↑

6) Vasectomy

7) Vit D Deficiency

8) Alcohol

9) Smoking

PROTECTIVE :-

49

- 1> 5 α Reductase inhibitors
- 2> Green Tea
- 3> Soy protein
- 4> Vit E
- 5> Lycopene
- 6> Statins

PIN $\Rightarrow$ PROSTATIC INTRAEPITHELIAL LESION

PIN $\neq$ CIS

Benign prostate acini surrounded by atypical cells

<u>GLEASON'S</u>	<u>SCORE (GS)</u>
GRADING	OF CA PROSTATE
<u>GS</u>	<u>GRADE</u>
2, 3, 4	LOW
5, 6, 7	INTERMEDIATE
8, 9, 10	HIGH

STEPS IN CALCULATION OF GS

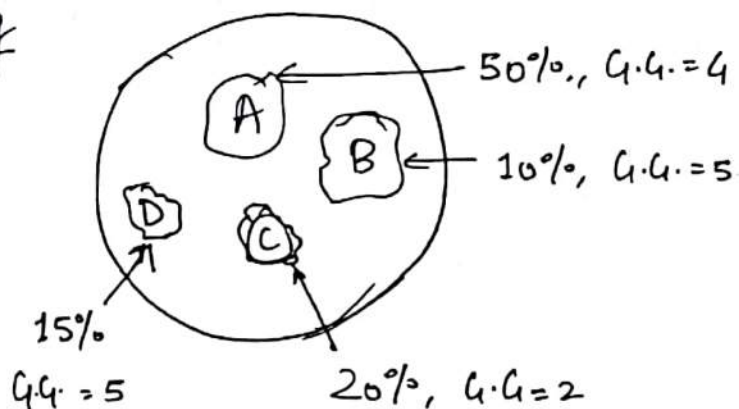
50

- 1> Selected In 2 most common pathologies
- 2> Grade the selected pathologies on scale of 1 to 5

1 to 5
↓
Most
Differentiated

1 to 5
→
Most
Undifferentiated
- 3> Add the two scores to get final score out of 10.

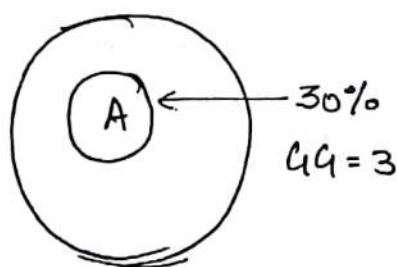
Eg



STEPS

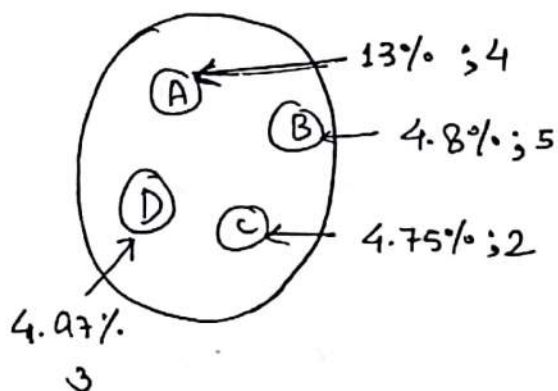
$$\begin{array}{rcl}
 & A + C & \\
 50\% & 20\% & \\
 4 & 2 & \\
 \Rightarrow & \frac{6}{10} &
 \end{array}$$

In case of
Single
Pathology



STEPS

$$\begin{array}{rcl}
 & A + A & \\
 3 + 3 & = & \frac{6}{10}
 \end{array}$$



In calculation of GS;
any pathology $< 5\%$ is not
counted

$$\begin{array}{rcl}
 & A + A & \\
 0\% & GS \Rightarrow 4 + 4 & = \frac{8}{10}
 \end{array}$$

PARTIN'S TABLE
JEWITT - WHITTMORE staging] for ca. Prostate⁵¹

STAGING OF CA PROSTATE

EARLY
CA
PROSTATE { T_1 = Non Palpable ; incidentally detected
 T_2 = Palpable ; but confined to prostate

ADVANCED
CA
PROSTATE { T_3 = outside prostate
 T_4 = Into Local structures

Δ sis

TRUS + Guided Biopsy
+
↑↑ Tm Marker

SCREENING

M/c used method $\Rightarrow$ SM. PSA + DRE

Most effective $\Rightarrow$ SM. PSA + DRE + TRUS

Ages started 50 yrs onwards. (By WANTANBE 1st)

>40 yrs (40-45 yrs) $\Rightarrow$ Africans.

INDICATION FOR TRUS GUIDED BIOPSY :-

52

- 1) Malignancy
- 2) Evaluation of prostate nodule
- 3) Before Intervention for Benign Disease
- 4) PSA.

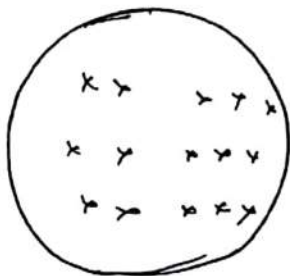
$>4 \text{ ng/mL}$ @ any age

$>2.5 \text{ ng/mL}$ @ $>60 \text{ yrs}$

$>0.6 \text{ ng/mL}$ @ $>40 \text{ yrs}$

MOST SENSITIVE $>0.75 \text{ ng/mL/yr}$ PSA VELOCITY

FREE PSA $<10-15\%$ of Total



12 QUADRANT $\xrightarrow{\text{to}}$ 16 QUADRANT Bx.

1> PSA

glycoproteins

Mol. wt. - 32 KD

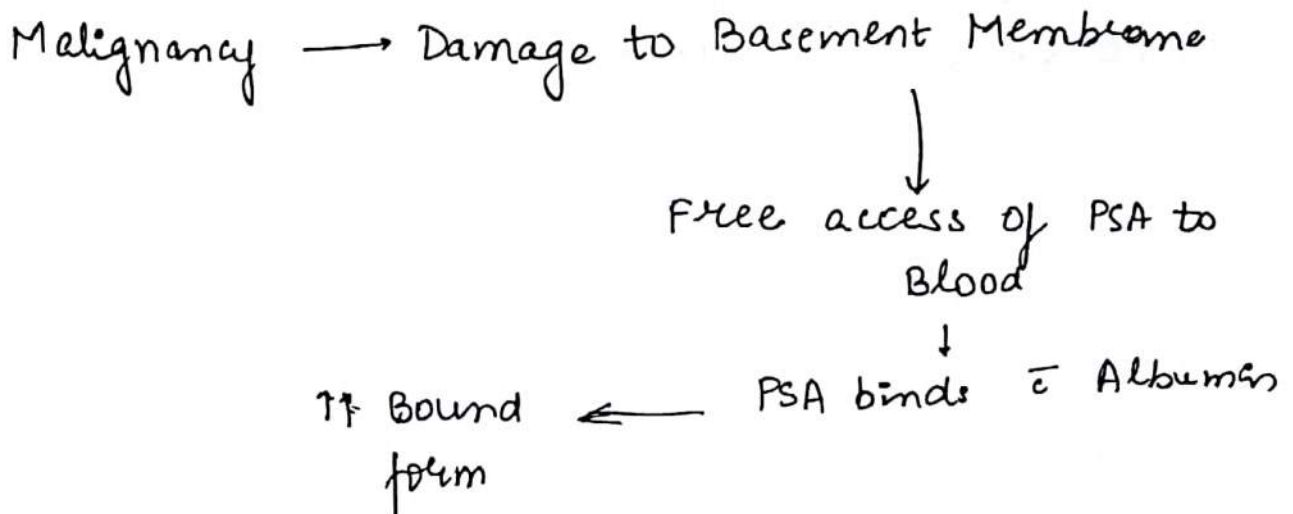
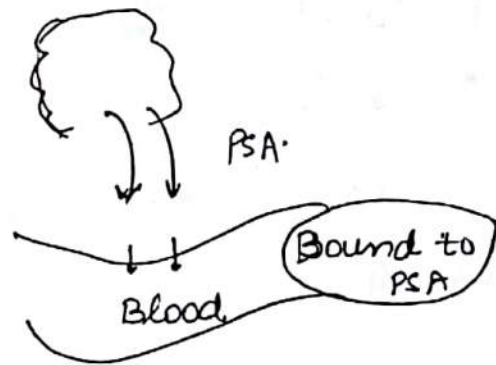
7% carbohydrate

Liquification of semen

Serine proteinase

Lysine arginase

It can exist in 2 forms



2> PSMA [Prostate specific Membrane Ag]

54

3> PCA₃ / DD₃

most sensitive marker for Ca

it is urine based marker

it is also k/n as EPCA-2 (Early Prostate Ca Ag)

4> AMCLAR

also ~~also~~ elevated in Papillary Rec

5> Endoglin [CD₁₀₅]

6> TRM PSS [Trans membrane prostate serinase]

7> PBOV₁ [↑ Prostate + Breast over expression]

8> UROC - 28

↑↑ Ca Pk. ; ~~Ca~~

↑↑ Ca Bk.

↑↑ Ca Bladder

9> ANNEXIN - A₃

10> GSTP-1 [glutathione S transferase protein-1]

11> RASSF1A.

PIRADS - 2 [MRI Based]

55

↳ 2nd version Now

1 to 5

1 ⇒ very Less chance

2 ⇒ Benign

3 ⇒ Probably Benign

4 ⇒ s/o Malignancy

5 ⇒ highly s/o Malignancy

Mx -

Sx

RT

ACTIVE
SURVEILLANCE

WATCHFUL
WATCHING

<1> Sx

GOLD STD

Radical Prostatectomy

LAP

Open

RALRP (Radical Laparoscopic Radical
prostatectomy)

CRITERIA FOR Sx

1) <75 yrs or

>10 yrs life expectancy

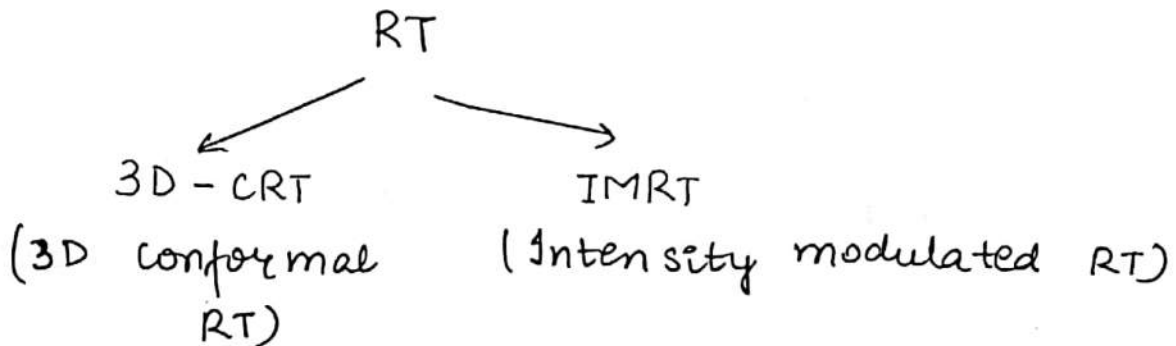
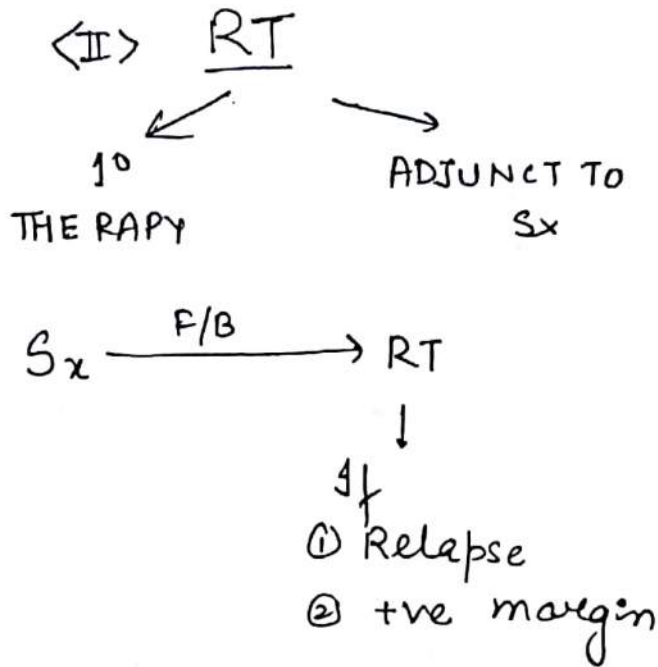
2) T₁ + T₂

3) PSA < 20 ng/mL.

COMPLICATIONS

56

- 1) Rectile Dysfunction
- 2) Urine Incontinence

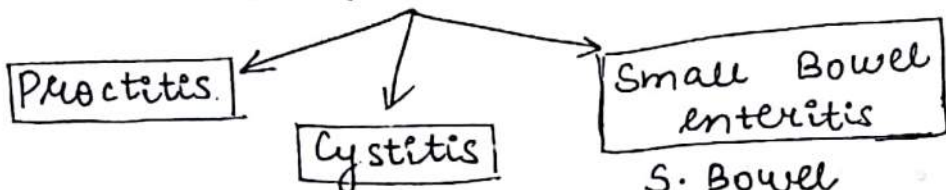


6 7 8

70-80 Gy (avg 76-78 Gy)
for 6 weeks

COMPLICATIONS OF RT -

Radiation Induced



S. Bowel

↳ 45 Gy is threshold

III) ACTIVE SURVEILLANCE

57

↓
3 MONTHLY - 6

During the monitor

PSA

TRUS

DRE

INDICATIONS

- Low Risk
 - Moderate Risk
- } Ca Prostate

AMMIACIO'S CLASSIFICATION

LOW RISK

T₁

T_{2a}

PSA < 10 ng/mL

G.S. ≤ 6

INTERMEDIATE RISK

T₁

T_{2a-b}

PSA < 20 ng/mL

G.S. = 7

HIGH RISK

T_{2c} + above

PSA > 20 ng/mL

G.S. ≥ 8

ACTIVE SURVILLANCE -

3-6 monthly PSA
TRUS
DRE

INDICATIONS -

Low Risk

Mod. Risk
D'AMICIO'S- Ca Prostate
CLASSIFICATION

LOW RISK -

 T_1, T_{2a} PSA $< 10 \text{ ng/mL}$ Gleason's score ≤ 6

INTERMEDIATE RISK

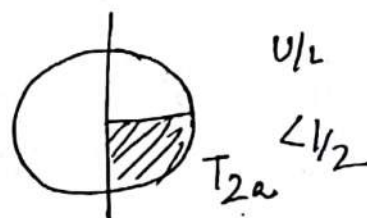
 $T_1, T_{2a \rightarrow b}$ PSA $< 20 \text{ ng/mL}$

GS = 7

HIGH RISK

 T_{2c} and abovePSA $> 20 \text{ ng/mL}$ GS ≥ 8 WAITFUL WATCHING > 75 years

Simple observation



Mx of ADV. PROSTATE CANCER

64

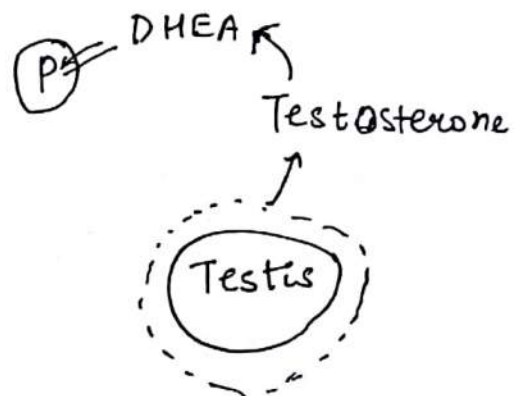
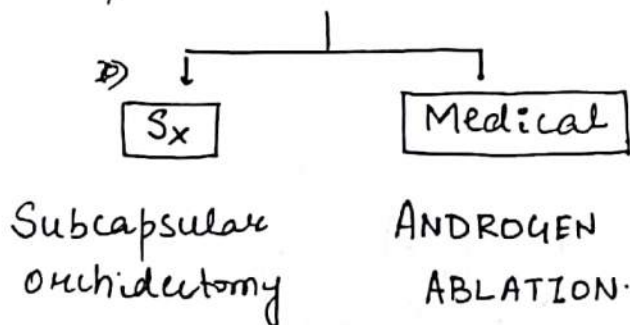
M/c site - Metastasis $\Rightarrow$ BONE $\gg$ LUNGS

Bones $\Rightarrow$ Lumbar V. $\gg$ Head of Femur $\gg$ Pelvis

2° to Bone $\Rightarrow$ Ca Prostate $>$ Ca Breast $\gg$ RCC $>$
Ca Thyroid $>$ Ca Lung.

METASTATIC CA PROSTATE

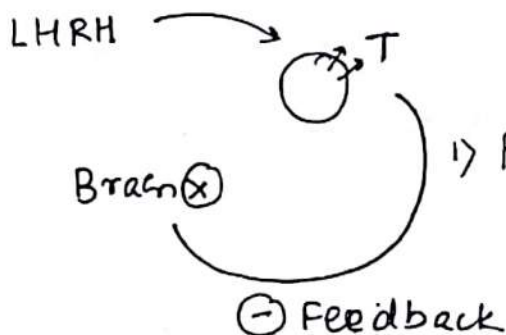
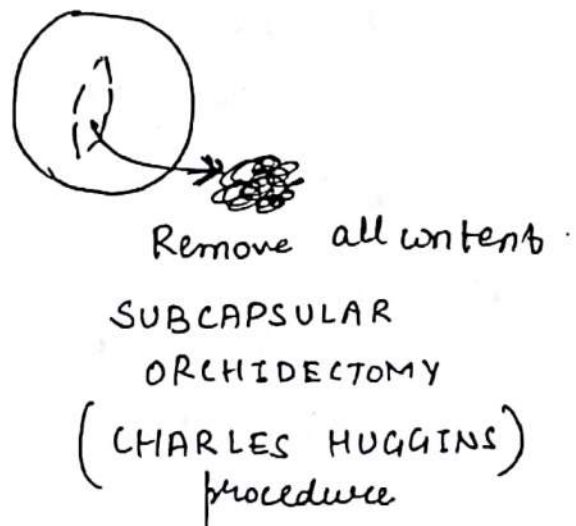
$\Rightarrow$ CASTRATION



1) LHRH Agonist (Preferred)

2) LHRH Antagonist

3) Androgen Blocker



COMPLICATIONS-

1) PROSTATIC FLARE (16-18 day)
Surge in Testosterone Levels
due to LHRH

So, we add Androgen Blocker for 3 weeks

2) CVS events

65

3) osteoporosis.

⇒ MCRPC (Metastatic Castration Resistant Prostate Ca)

DRUGS

1) ~~ABIRATERONE~~ ABIRATERONE

anti CYP17

Block 17α hydroxylase

2) DOCETAXEL

3) IPLIMUMAB

also used for Malignant Melanoma

SIPULEUCAL T ⇒ CD54 extract

Anti Prostate Cancer vaccine

PROST-VAC - Pox virus based.

Anti Prostate cancer drug.

TESTICULAR CARCINOMA

66

GERM CELL

NON GERM CELL

SEMINOMA

NON-SEMINOMA

- 1) Classic
- 2) Spermatocytic
- 3) Anaplastic

- 1) Embryonal cell Carcinoma
- 2) Choriocarcinoma
- 3) Yolk sac Carcinoma
- 4) Teratoma

- 1) Leydig cell carcinoma
(M/c non germ cell
Reinke's crystal)

- 2) Sertoli cell Tumour

- 3) Granulosa cell Tumour
(Call exner Bodies)

- 4) Androblastoma

M/c type of germ cell Tumour

Overall = Seminoma

>60yr = Lymphoma

20-60yr = Seminoma

15-19yr = Leukemia >> Seminoma

<15yr = Yolk sac Tumour
(children
pre pubertal)

EXTRA TESTICULAR = TERATOMA

SITE = Mediastinum >> Retroperitoneum
Ant. (L > R)

Most malignant Germ cell Tmou. = Embryonal
cell carcinoma

̄ hematogenous spread = CHORIO CA 67

̄ Brain metastasis ↗

̄ spontaneous Haemorrhage ↗

CHEMO RESISTANT = TERATOMA

PARA TESTICULAR MASS = Adenomatoid Tumour
of Epididymis

M/c site for soft tissue sarcoma in Testis
= Epididymis

M/c soft tissue sarcoma = Liposarcoma
↓
In children
Rhabdomyosarcoma
↘ M/c In adults

M/c chromosomal Ab (N) = $\pm 12p$
(EXTRA COPY)

M/c tumour of Tunica vaginalis = MESOTHELIOMA

ITGN (Intra Tubular Germ cell Neoplasm)

ITGN = CIS of Testes

ass $\pm 12p$ (extra copy)

genes rise to ALL GCT
except spermatocytic
seminoma

RISK FACTORS FOR CA TESTIS

68

- 1> CRYPTORCHIDISM
4-6 times.
- 2> PERSONAL R/F
Radiation
Heavy metals.
Smoking
- 3> FAMILIAL R/F
- 4> ITGN

SEMINOMA

Grayish white

Nodular

Scaly

~~not~~ firm

Sheets of cell separated by Trabeculations

↑ Lymphocyte Infiltration.

V/L (<2% - B/L)

ass ± SARCOIDOSIS

TUMOUR MARKERS-

++ CD117

- CD30

++ LDH

- AFP

+ β HCG (in 16-20% only)

SPERMATOCYTIC SEMINOMA -

69

Type of seminoma

Not ass. $\bar{c}$ $\bar{c}$ 12p
ITGN
BIL

also -CD117

EMBRYONAL CELL CARCINOMA

Contains Pluripotent malignant cells

Diffuse areas of H⁹ge + Necrosis

TUMOUR MARKER

↑↑ LDH

↑↑ α FP

↑↑ β HCG

-CD117

++CD30

AE₁ + / AE₃ +

OCT₃ + / OCT₄ +

CHORIO CARCINOMA

Tumour ass $\bar{c}$ Syncytiotrophoblast

↑↑ Hematogenous spread

H/C TUMOUR FOR ~~BONE~~ BRAIN METS

ass $\bar{c}$ Spontaneous H⁹ge

TUMOUR MARKER

++LDH

++ β HCG

-+/- AFP

YOLK SAC TUMOUR

or

ENDODERMAL SINUS TUMOUR

70

M/c type in Infancy

SCHILLER DUVAL BODIES +

HYALINE GLOBULES +

TUMOUR MARKER -

++ LDH

++ AFP

- β HCG

TERATOMA

MONSTER TUMOUR

They contain elements of ≥ 2 germ cell lineage

Chemo - Resistant

Neg. for most Tumour Markers

(may be +ve for AFP)

⇒ GROWING TERATOMA SYNDROME -

rapidly growing Teratoma $\pm$ infiltrates into local structures

ir-resectable

⇒ ⁸⁰ TERATOMA CONVERSION TO SOMATIC MALIGNANCY.

Adeno Ca

Neuro Ectodermal

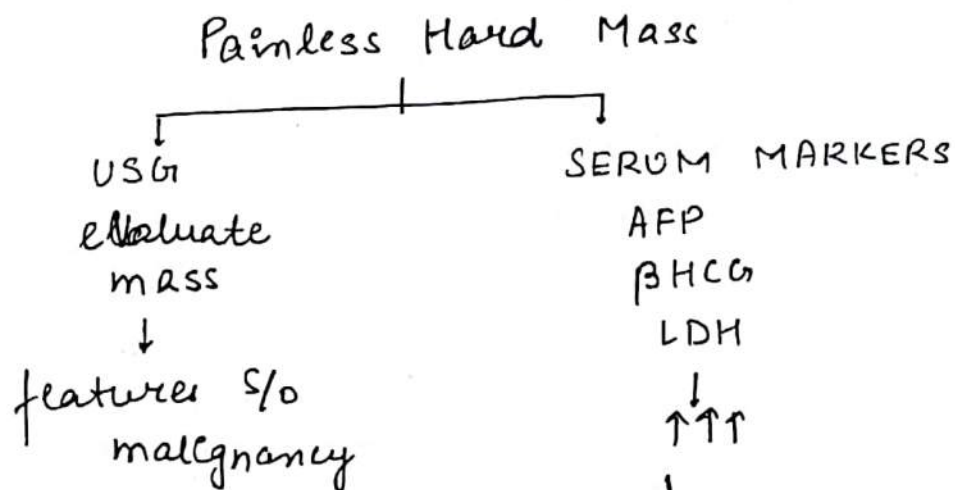
Rhabdomyosarcoma

FEATURE OF TEST. CA :-

71

- 1) PAINLESS HARD TESTICULAR MASS
- 2) Dull aching sensation/heaviness
- 3) Infertility
- 4) Gynaecomastia

Mx :-



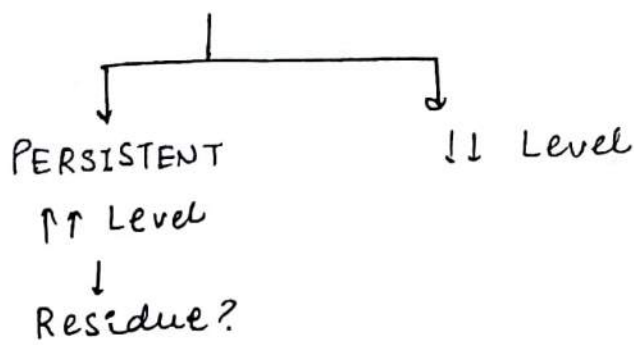
Δsis = TESTICULAR CA

[FNAC / BIOPSY is C/I due to risk of spillage]

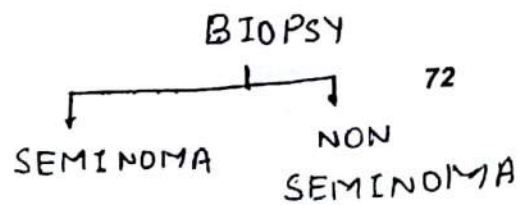


HIGH INGUINAL RADICAL ORCHIDECTOMY

Repeat 5 3
Ser. AFP / βHCG
1 - LDH-1 after 7 days



INDUCTION
chemotherapy
3 cycles of BEP
Bleomycin
Etoposide
Cisplatin.



STAGE 1

Brachytherapy
2 DOG leg
hockey stick.
Inverted Y
regimen.

STAGE -2

CT + RT
↓
3x BEP
(no role of
Retroperitoneal
L.N. Dissecⁿ)
25 Gy
5-6 weeks

INVERTED Y



HOCKEY STICK



STAGE - 1

CT + RT

STAGE -2

Induction CT
3 cycles of BEP

CECT Abd

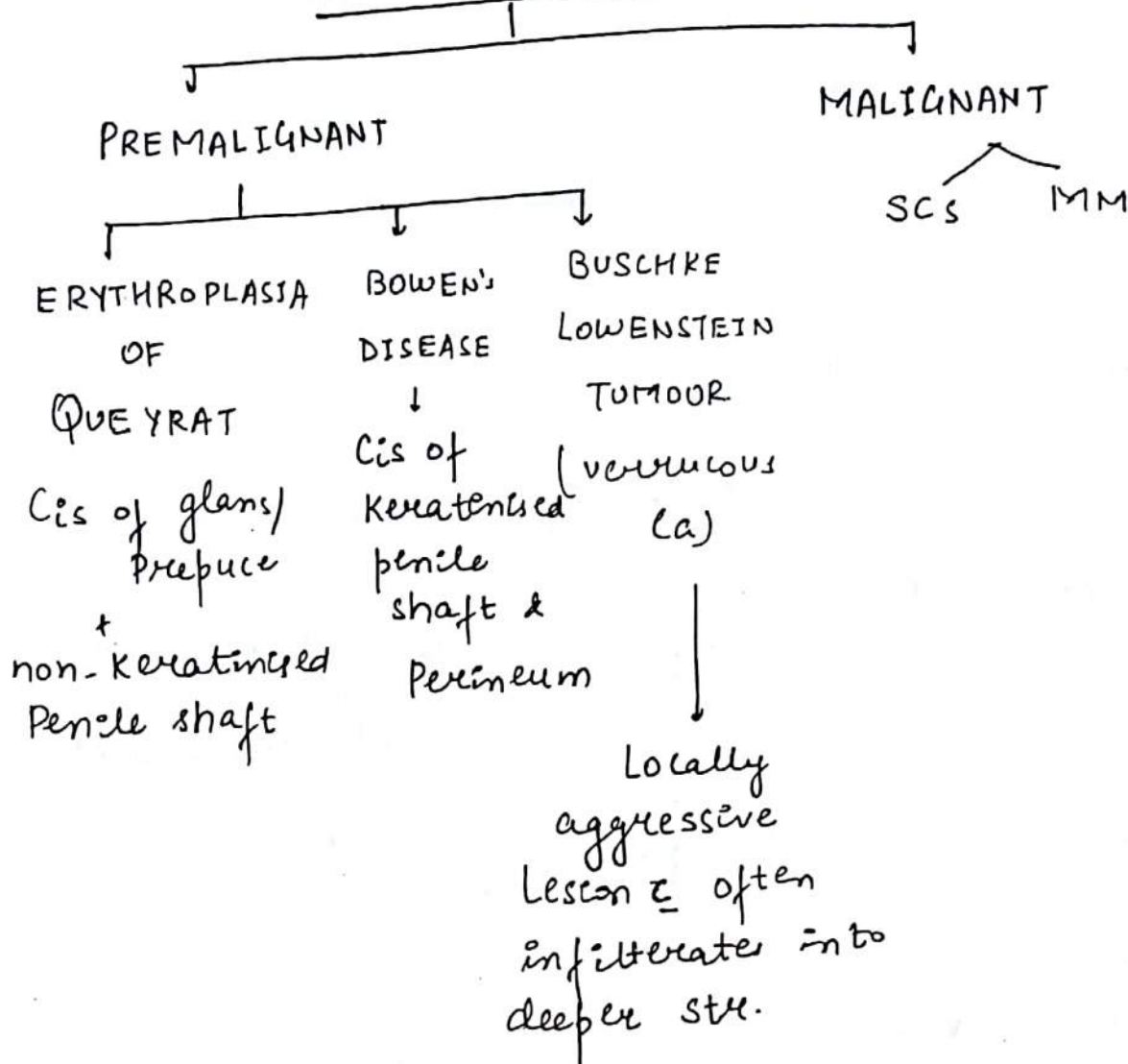
If NO LN seen
↓
RT

If LN seen
↓
Retro Peritoneal
LN Dissecⁿ

Stage-3 = RPLND → CT + RT.

CA PENIS

73



seen in Penis & Anus

BXO - Balanitis Xerotica Obliterans

→ also k/n Lichen sclerosus et atrophicus

→ chr. sclerosing Inflammatory Lesion affecting glans/prepuce

- may involve any age group.

FEATURE -

1) Phimosis - non retractile fore skin.

2) Collagenisation of Dermis

3) Loss of Rete pegs in Dermis M/C

Mx = Long term (3-4 wk) Antibiotic course

74

↓ F/B
Circumcision.

PEDIATRIC PHIMOSIS

upto 5yr observation

After 5yr → if persists → go for Circumcision

PENILE CARCINOMA

M/c type - SCC

M/c site - Glans >> Prepuce >> Glans + Prepuce >>
(21%) (9%)
Penile shaft

RISK FACTOR -

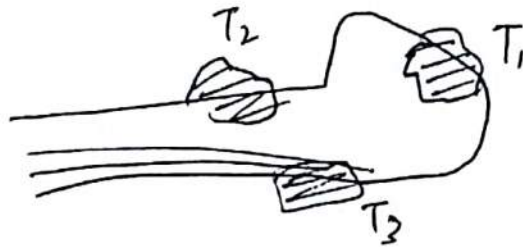
- 1) STD
- 2) HPV 16, 18, 21
- 3) Immunosuppression
- 4) Smegma [Circumcision is protective]
- 5) Geography BRAZIL → MAX.
ISRAEL → Least

FEATURES -

- Painless
- Ulceroproliferative Lesion
- may bleed to touch

STAGING

75

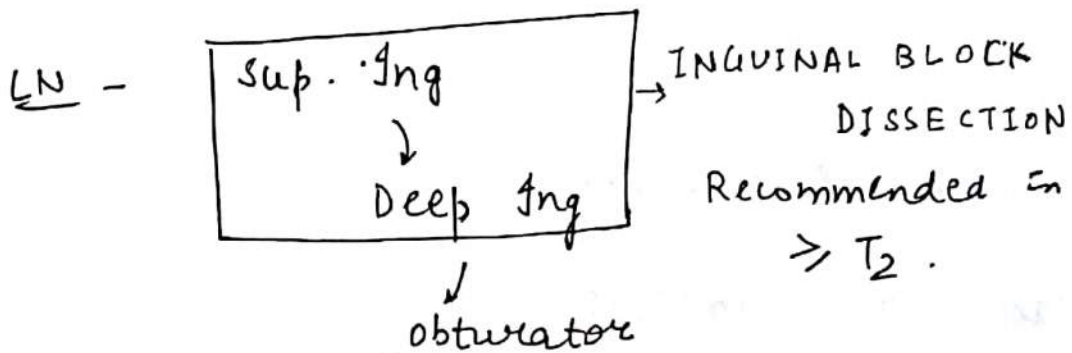


T₁ → Subepithelial

T₂ → Into corporeal bodies

T₃ → Into urethra

T₄ → Local structure



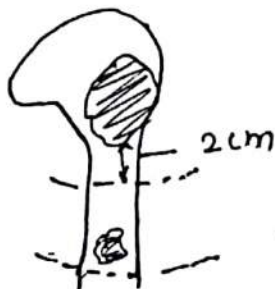
Para Aortic
Ileac

M_x

Wide Local Excision ± 2cm Margins.

+/-

Inguinal Block Dissection.



Total Penile Amputation.

↳ proximal penile growth

WILM'S TUMOUR

76

NEPHROBLASTOMA

M/c type of tumour in children. (w.r.t Genito urinary Tract)

AGE → 3 yrs ← Max. Incidence
2 → 5 yrs.

FEATURES -

- 1) FLANK MASS - M/c clinical Presentⁿ
- 2) Hematuria
- 3) HTN
- 4) Wt. Loss
- 5) Pain is least common.

Spontaneous >> Familial
U/L

FAMILIAL WT

ass τ WT₁ / WT₂

Chromosome 11

1) DENNIS DRASH

Nephropathy

Gonadal Dysgenesis

WT₁

2) BECKWITH-WIEDMANN Sy.

Midline abdominal wall defect

Macro-glossia, visceromegaly,

Hypoglycemia

3) WAGR [Wilm's Tm, Aniridia, GU Abn, Retardation]
77

4) Li - FRAUMENI

Ch 17q.

p53.

IOC = CT SCAN (CECT)

C-XRY → Lung Mets

TYPES

FAVOURABLE
PROG

all

epithelial cells

stromal cells

→ Blastemal cells

UNFAVOURABLE
PROG

WT

SARCOMATOUS

changes

ANAPLASTIC
(WORST PROG)

WT (unfavourable
type)

+
Chemo Resistant

STAGING

I - Confined to Kidney

II - Outside Kidney But Completely Resectable
PRE-OPERATIVE BIOPSY done ooo

III - Incompletely Resectable Tumour
or
Lymphatic extension.

IV - Hematogeneous spread

V - B/L WT

INDICATIONS FOR Neo-Adjuvant CT

- 1) Large WT
- 2) Extra capsular
- 3) Lympho-vascular Invasion
- 4) B/L WT
- 5) Solitary Kidney

CT → DACTINOMYCIN
↓
VINCRIStINE

Rx Sx = RADICAL NEPHRO-URETERECTOMY

↓
Ureter removed as
much as possible

INDICATIONS FOR PARTIAL NEPHRECTOMY

If all the condⁿ are satisfied,

- 1) Tumour confined to Pole
- 2) No capsular
- 3) No Lymphatics
- 4) No vascular
- 5) No collecting Duct Invasion

BPH (Benign Prostatic Hyperplasia)

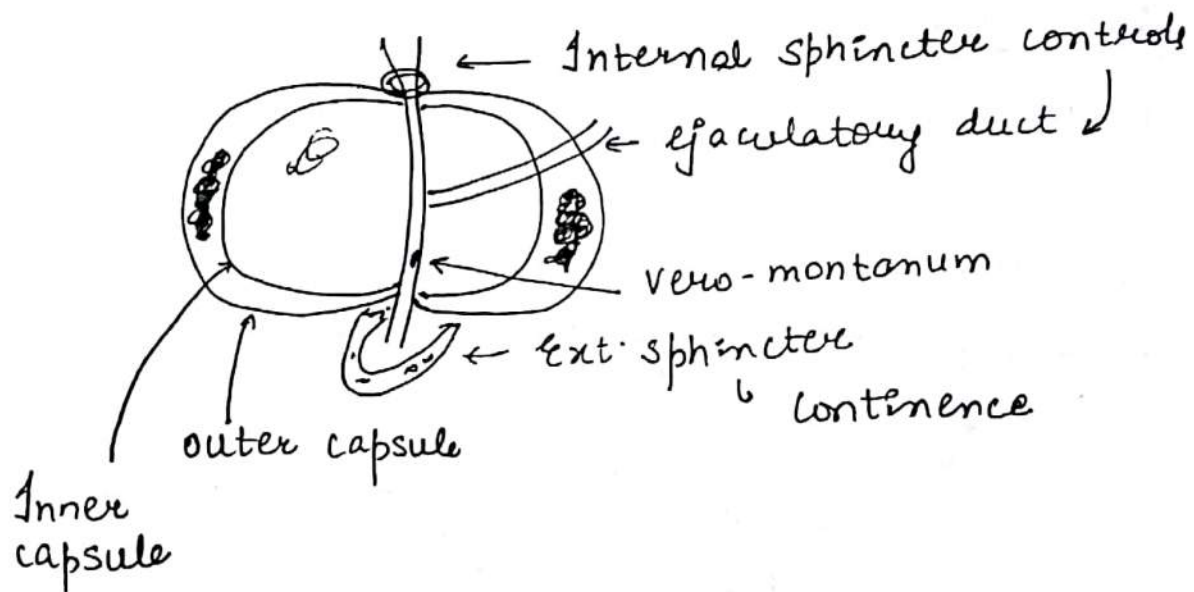
M/c site -

Median Lobe ; Lateral Lobe

M/c zone - Central / Peri urethral zone

STROMA - GLANDULAR DISEASE

Starts @ glands → Involves Epithelium



PATHOPHYSIOLOGY-

Hyperplasia of prostate

Growth is untarried by
Prostatic Capsule

∴ Prostatic urethra gets compressed

↓
↑↑ Back Pressure

↓
Bladder wall changes

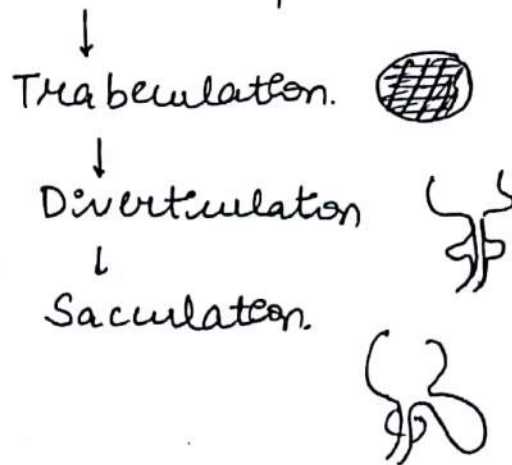
↑ compliance

By Detrusor Hypertrophy



Bladder Decompression

80



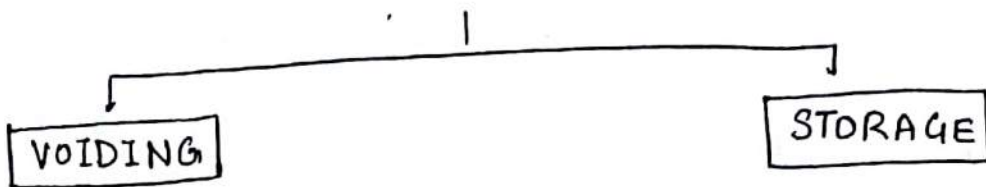
COMPLICATIONS

- 1) Obstruction
- 2) Urinosepsis
- 3) Urine retention
- 4) Incontinence → Urge Incontinence
↓
Overflow Incontinence
- 5) Bladder outlet obstruction ⇒ STONE
- 6) Infertility (Rare)
- 7) Hematuria (DECOY PROSTATE)
↑ Rupture of peri-prostatic venous plexus

SYMPTOMS

LUTS (Lower Urinary Tract Symptoms)

By Paul Abraham



- Hesitancy
- Poor stream
- Stuttered micturition
(Intermittent flow)
- Post Void Dribbling
- Sense of incomplete
evacuation
(near Retention)

- Urgency
- Frequency
- Nocturia ≥ 3 episodes of
voiding during
sleep.
- Nocturnal Incontinence
Urge Incontinence.

D/D OF LUTS

- 1) BPH
- 2) Enlarged Prostate
- 3) Bladder outlet obstruction
- 4) Stricture urethrae.

MARRION'S DISEASE $\Rightarrow$ Idiopathic hypertrophy of
Bladder neck + Internal
Sphincter $\downarrow$

Bladder outlet
obstruction.

- 5) Neurogenic Bladder.
a/c $\uparrow$ age
Parkinsonism
DM
Tabes Dorsalis

Δ 's

82

1) TRUS + PSA + DRE.



5 α ~~Reductase~~ Reductase
Inhibitors cause

$\downarrow$ PSA by $>50\%$ after
6 months of therapy

FOR LUTS

1) UROFLOWMETRY

Urine flow rate

$>15-22$ mL/sec - (N)

<10 mL/sec $\rightarrow$ (A) (b) (N)

$10-15$ mL/sec $\rightarrow$ equivocal

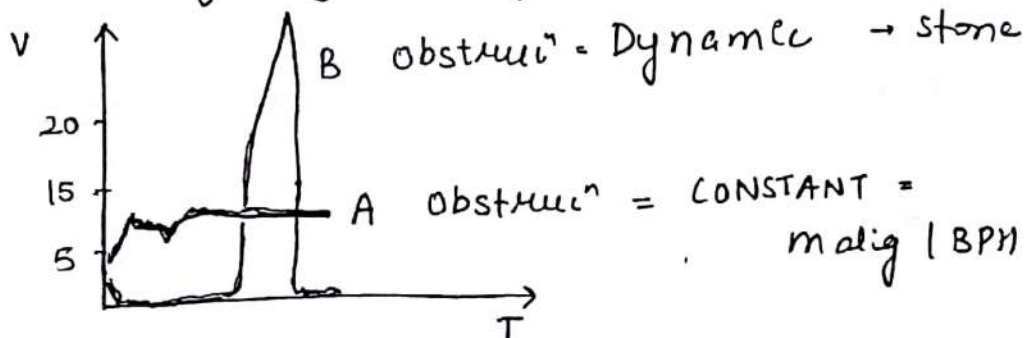
Best Inv. for LUTS

Min 150 mL of urine output must be voided

No age correction is reqd.

Q_{max} = Max. vel. $\Rightarrow$ MORE IMP.

Q_{avg} = 'Avg. velocity'



2) PRESSURE STUDY-

83

(N) voiding pressure $< 60 \text{ cm H}_2\text{O}$
 equivocal $60-80 \text{ cm H}_2\text{O}$
 Ab (N) $> 80 \text{ cm H}_2\text{O}$

3) PRESSURE FLOW STUDY -

a) Low vel. High pressure $\Rightarrow$ obstructive
 b) Low vel. Low pressure $\Rightarrow$ Neurogenic

Mx

MEDICAL

1st Line

1) α BLOCKERS (1st Line)

PRAZOSIN } $\downarrow$ Libido
 TAMSULOSIN } Orthostatic Hypo
 UROSELECTIN α -Blocker tension

$\downarrow$
 [ALFUZOCIN]
 [SILDOSIN]

2) 5 α REDUCTASE INHIBITORS (DOC)

FINASTERIDE $\rightarrow$ Type II Blocker

DUTASTERIDE

(Type I & II Blocked)

$\downarrow$ PSA $> 50\%$ in 6 months

INTERVENTION

ENDOSCOPY	Sx
TURP	Prostatectomy
TUVP	1) Suprapubic [FRAYER'S]
TUIP	
TUMIT	2) Retropubic [MILLIN'S]
TUNA	
LASERS	3) Perineal Sx [YOUNG'S] $\uparrow$ 1st
PUL	
STENTS	

INDICATIONS FOR INTERVENTION

84

1) Acute Urine Retention. - Most Imp.

Rxoc = Foley's Catheterisation

/ fail

SPC (supra pubic catheterise)

2) Recurrent UTI

3) Recurrent/ severe Hematuria

4) Recurrent chronic Urine Retention

5) Bladder outlet obstruction

6) Stones

7) Diverticulation/ sacculaton

TURP

Resection of Prostate via electric Loop

Anaesth $\Rightarrow$ SPINAL

K/n Resectoscope

Platinum: Iridium Alloy
(80:20)

TYPE

M-TURP
(monopolar)

1.5% glycine
or
Mannitol

Irrigant
Used

B-TURP

(Bipolar)

0.9% NaCl
(TURIS) - Tx. urethral
Resection in saline

M-TURP

More

Complication

B-TURP

Less

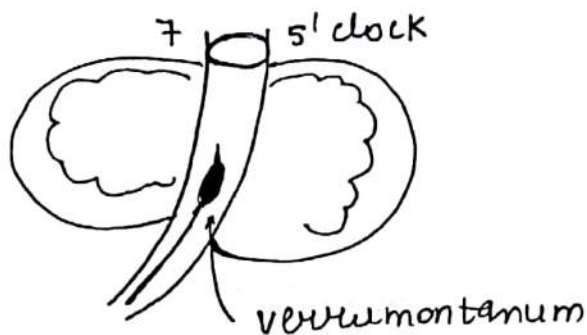
85

Longer

Hospital
stay

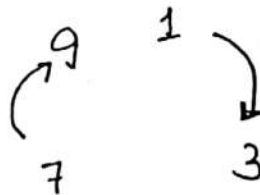
Shorter

Tech :- TURP → started @ Median (Middle Lobe)
(@ Level of Bladder Neck)



NESBIT

Approach



Min. Flow Rate of fluid req. for adequate vision
= 300 mL/min

Min. Rate of fluid absorption = 20 mL/min.

Avg. Duration of TURP = 50 min. 00

Adequate height of water column = 60 cm above the
operating site



COMPLICATION-

α - operating Time

86

M/c overall $\rightarrow$ Retrograde Ejaculation.

$\downarrow$
early $\rightarrow$ Dilutional Hyponatremia.

$\downarrow$
Intra-operative $\rightarrow$ Bleeding

OTHER:-

1) Perforation

2) Intra-operative PRIAPISM

Roc = 1mg Phenylephrine (3%) in 100ml NS

3) Structure

4) TURP SYNDROME / WATER INTOXICATION

$\rightarrow$ 1.5% glycine

Causes Dilutional
Hyponatremia.

20ml/min $\xrightarrow{\text{avg. dur}}$ 50min

$\rightarrow$ 1000ml



BG
L
90
0
D

Na⁺ 140 meq/L $\rightarrow$ 6L

NOW 140 meq/L $\rightarrow$ 7L = Dilutional
hyponatremia

If Na⁺ < 120 meq/L $\rightarrow$ TURP Syndr.
(Water Intoxication Syndr)

- $R_x = (3N) \text{ NaCl} \rightarrow \text{slow infusion (100 mL} \rightarrow 2-3 \text{ hrs)}$
 $\downarrow$
 Rapid Infusion

(Trans $\frac{TUVP}{urethral}$ vapourisation of prostate)

ADVANTAGE - No risk of Retrograde Ejaculation

(Trans TUIP Urethral Incision of Prostate)

→ COLLING'S KNIFE - Infertility /

↳ extend it upto Vermontanum

TUMP

[Trans Urethral Microwave Therapy]

Thermal Ablation of Prostate

Temp $> 65^{\circ}\text{C}$ Used

$< 65^{\circ}\text{C} \rightarrow$ Thermotherapy

DISAD -

can't be used for

$> 80\text{g}$ or $< 20\text{gm}$ Gland

TUNA

(Trans. Urethral Needle Ablation)

Thermoablation.

LASERS

1) KTP $\rightarrow \text{K}^+ \text{Titanyl } \text{PO}_4^{3-}$
 $\lambda = 532\text{nm}$

2) Nd:YAG $\rightarrow \lambda = 1064.$

3) Thulium $\lambda = 2013\text{nm}$
ass $\bar{e}$ Peeling of Prostate

4) Holmium 2130nm .
continuous LASER

BEST

Safe in pts. on Anti-coagulation

TULIP

(Trans. Urethral USG guided Laser induced Prostatectomy)

HOLEP → Hol. Laser Enucleation of Prostate

BEST

> TURP → ↓↓ complication
↓↓ Hospital stay
costly

PVP → Photoselective Vapourisation of Prostate
Use Green Lasers (KTP)

VAP → Visual Ablation of Prostate
use holmium

Pts of Anti-coagulation.

DANGEROUS

Cornea

↓

Holmium

Yttrium

Retina

Nd YAG

Carbon

KTP

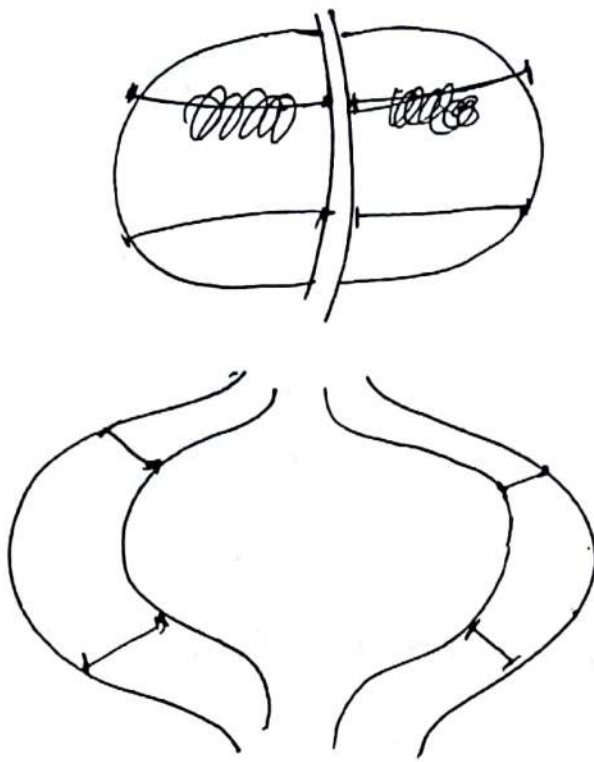
Lithium Borate

PUL

(Prostatic Urethral Lift)

→ Non-surgical correct of LUTS in BPH by
Trans prostatic Placement Spring Loaded T shaped
sutures

→ Spring Recoil + causes opening of Prostate
Urethra



GENITOURINARY TB

M/c SITE = KIDNEY >> Epididymis
(Testis → never involved)

M/c Route of spread = Hematogenous

M/c clinical Presentation = Sterile Pyuria >>
Hematuria

RENAL TB

Renal Pyramid → INDEX SITE

↳ RP Granuloma

↓
Caseous Necrosis

↓
Abscess formation

PUTTY KIDNEY - Grossly necrosed Putrified Kidney



cement kidney

Shrunken

Calcified

fibrosed

non-functional

[AUTO-NEPHRECTOMY]

PUTTY kidney

CEMENT KIDNEY

↓
Cased
Cavernous type

↓
FIBROUS TYPE

MILLIARY TB → Numerous small (<3mm)
granulomas representing seeds of
millets



BLADDER TB

↓
Spared.
TRIGONE
↓
Bladder neck.
M/c site → DOME



THIMBLE BLADDER

Contracted, non-functional

EPIDIDYMAL TB

92

2nd M/c site of TB

M/c site → GLOBUS MAJOR

PENILE TB

Rare type

a/c DIRECT spread

(by contact w infected stool)

TYPE

1°

OROFACIAL Penile TB

- Painless
- Keratotic Patch over glans / Prepuce

- Severe necrotising ulcerative lesions over penis
- Painful
- Surrounded by pseudo membrane

PNT

[Papulo Necrotic Tuberculid]

- Hypersensitivity rxn for Tuberculin skin Test
- Painless ulceration over glans + penis f/b VARIOLIFORM SCARRING + Keratotic ~~patch~~ patch.
- culture negative
- Respond to ATT.

Asu → Ioc = Culture

93

NAAT

Screening → Tuberculin Skin Test

→ IGRA (Interferon γ Release Assay)

↙ ↘
TB-gold TB-spot

RADIOLOGY -

Ioc @ Radiology - CT Urography

X-RAY

Calification

↓
Stone
↓
TB

→ Ring (A)
↓
Renal Pyramid Granuloma

IVP - Ioc for early GUTB

MOTH EATEN CALYCES

Phantom Calyx → Invisible calyx

Oncocalyx

URETER → Rigid, Pipe stem,
narrow, Beaded

KERR'S KINK - Sharp, Acute UPJ.



← hiked up Pelvis

GOLF HOLE URETER

Rx = ATT 6 months

URO TRAUMA

94

1) RENAL TRAUMA

GRADE

I → Microscopic Hematuria
Subcapsular Hematoma

II → <1cm Laceration
Non-Expanding Peri-Renal Hematoma

III → >1cm Laceration (no urine Leak)

IV → Any Laceration + collecting duct injury

↓
urine Leak.

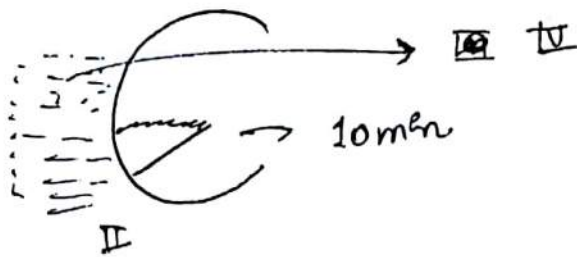
+
Renal vessel injury
(expanding, hematoma)
peri-renal

V → Shattered Kidney
Hilum Injury

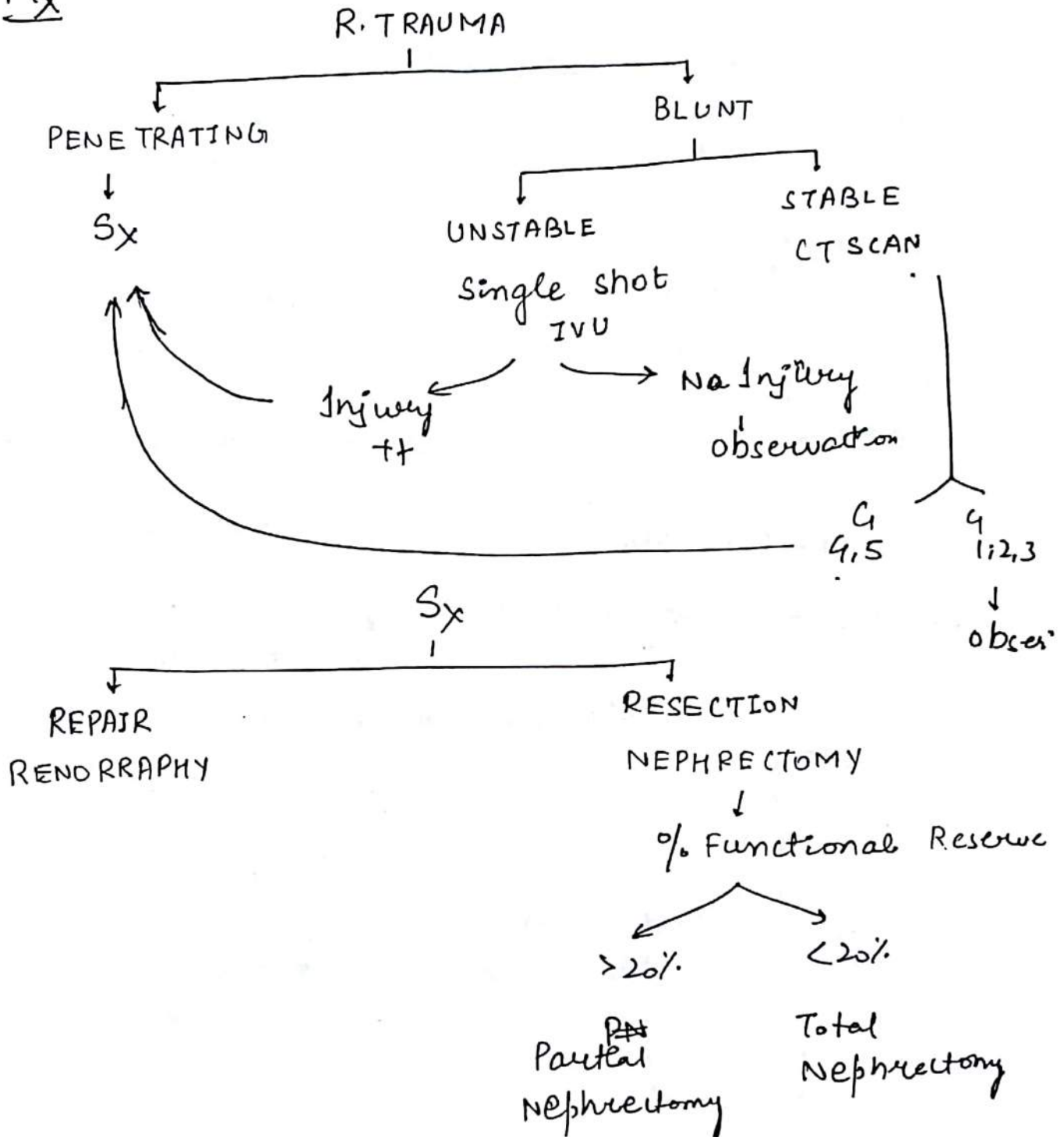
(In spleen → Hilum Injury → Grade 4)

IOC → NCCT + 10 min delayed Film.

↳ Unstable Pt → IVU (single shot) → 8 minutes
delayed film



Mx



URETERIC TRAUMA

96

H/ci → Iatrogenic

TOC → Retrograde Pyelogram

Mx

SITE
Upper 1/3

TOC

End to end
uretero-ureterostomy

Middle 1/3

- Same -
>> end-to-side
uretero-ureterostomy

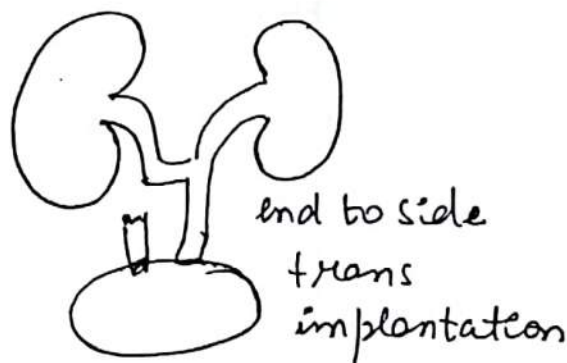
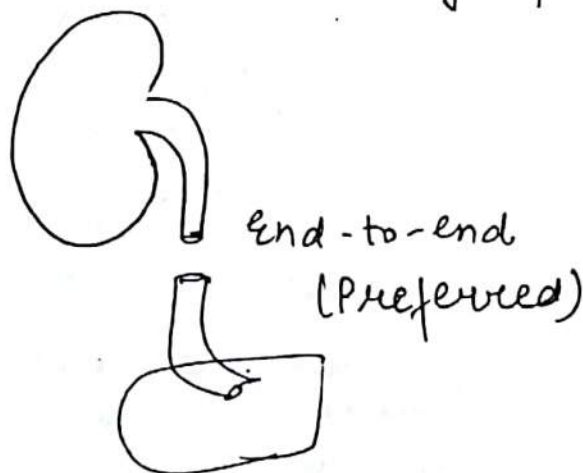
Lower 1/3

Ureteric Reimplantation

All repairs are done over Plastic Stents

In case of Length Discrepancy → BOARI'S FLAP

→ PSOAS HITCH
← RENAL HITCH
Kidney to psoas

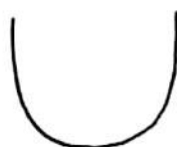




Re-Implantation

BOART'S
FLAP

U shaped Incision of Bladder.



→ lifting up

rest bladder
approximated



Tubularisation of Bladder
wall $\leq$ was
lifted up.



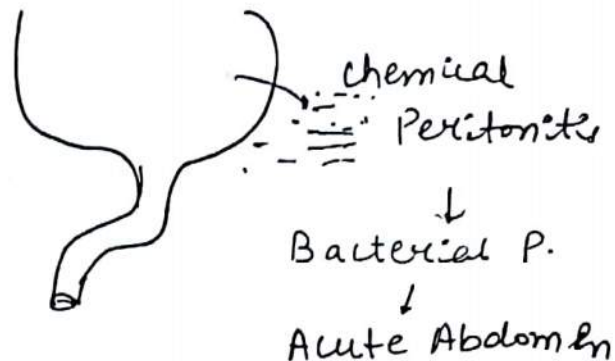
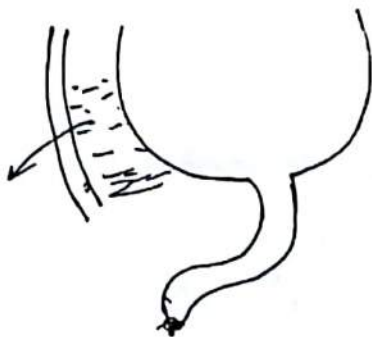
BLADDER TRAUMA (M/C → # Pelvis)

98

IOC = CYSTOGRAM

EXTRA PERITONEAL

INTRA - PERITONEAL



ROC = FOLEY'S CATHETERISATION
for 10-12 days

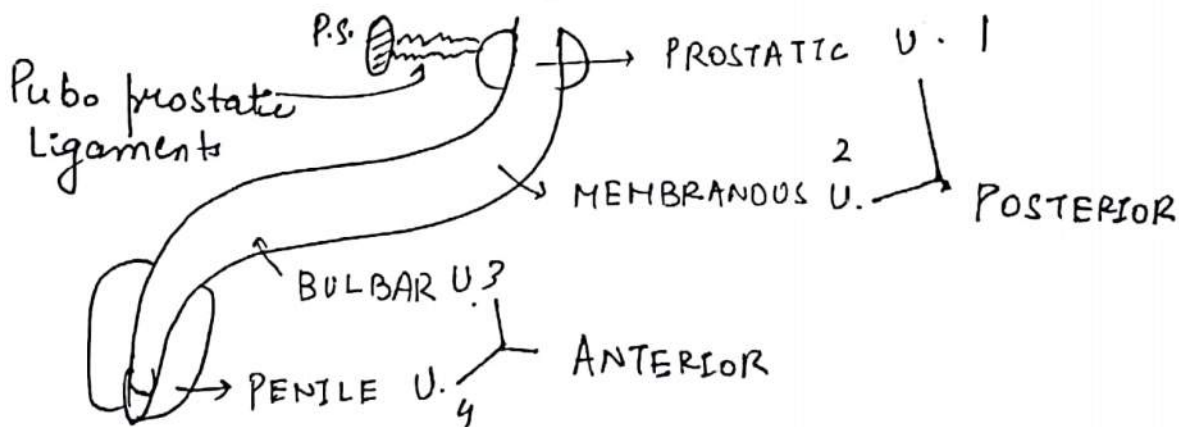
Chemical Peritonitis

Bacterial P.

Acute Abdomen
Sx

Urgent surgical
exploration
F/B repair ± 2-0
vicyl.

URETHRAL INJURY



ANT. U. INT.

POS U. INT.

3,4

PART INT.

1,2

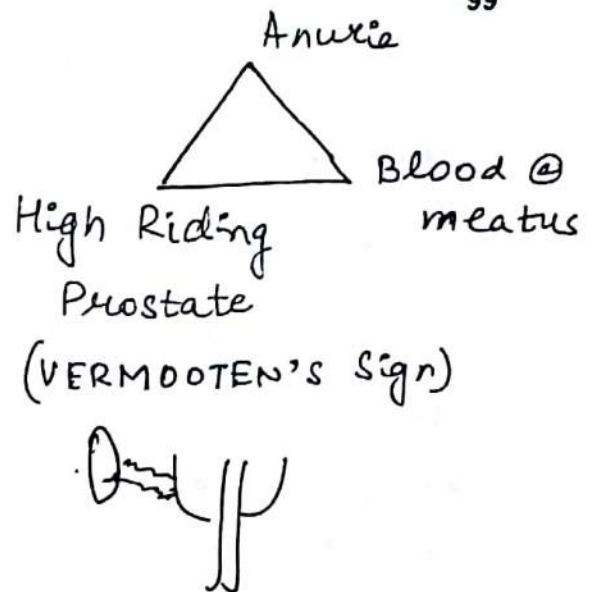
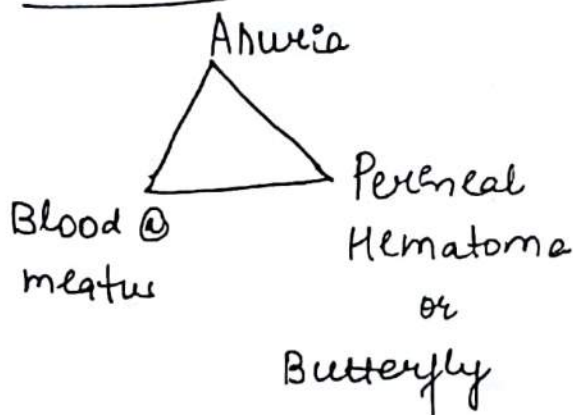
Straddle
Fence Inj.
Gymnastic Inj.

CAUSE

Pelvic #

FEATURES

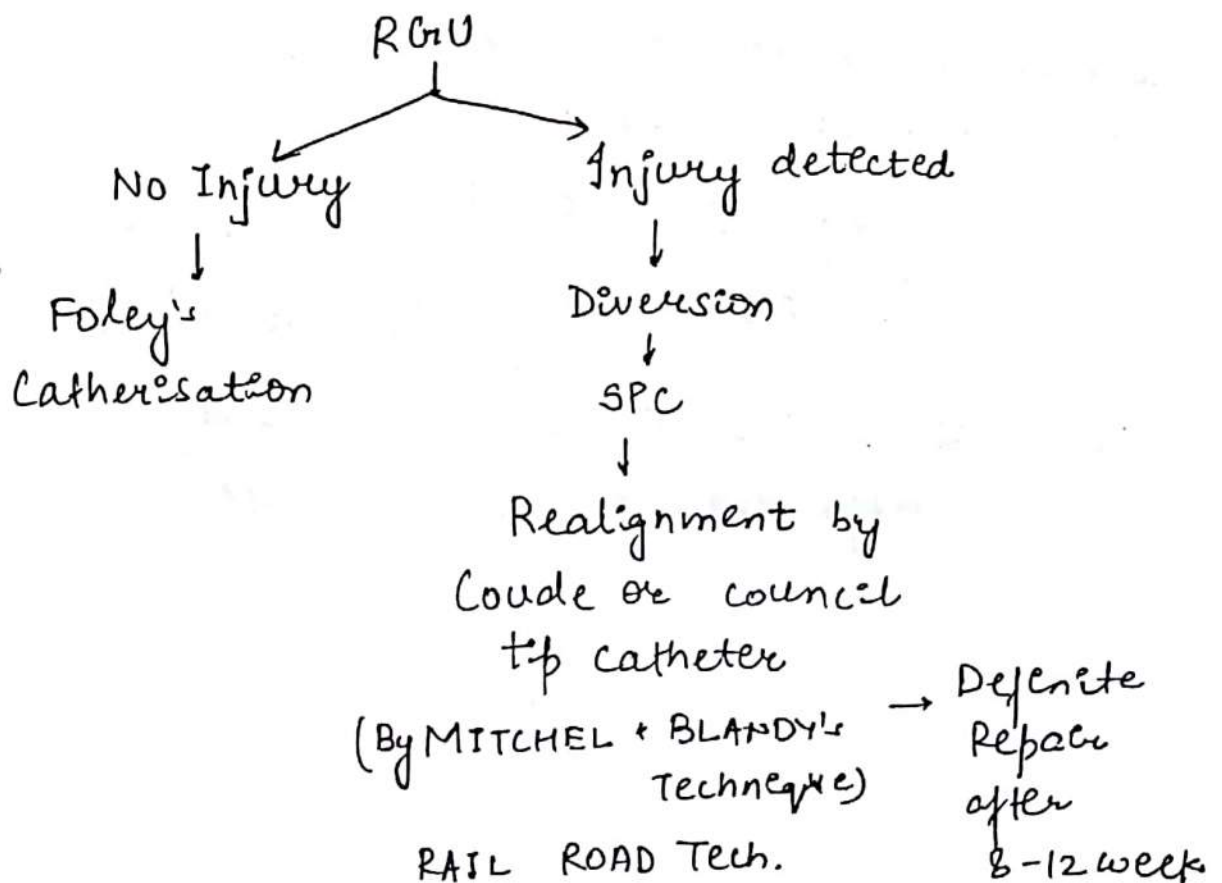
99



MC CALLUM COLAPINTO CLASSIFICATION

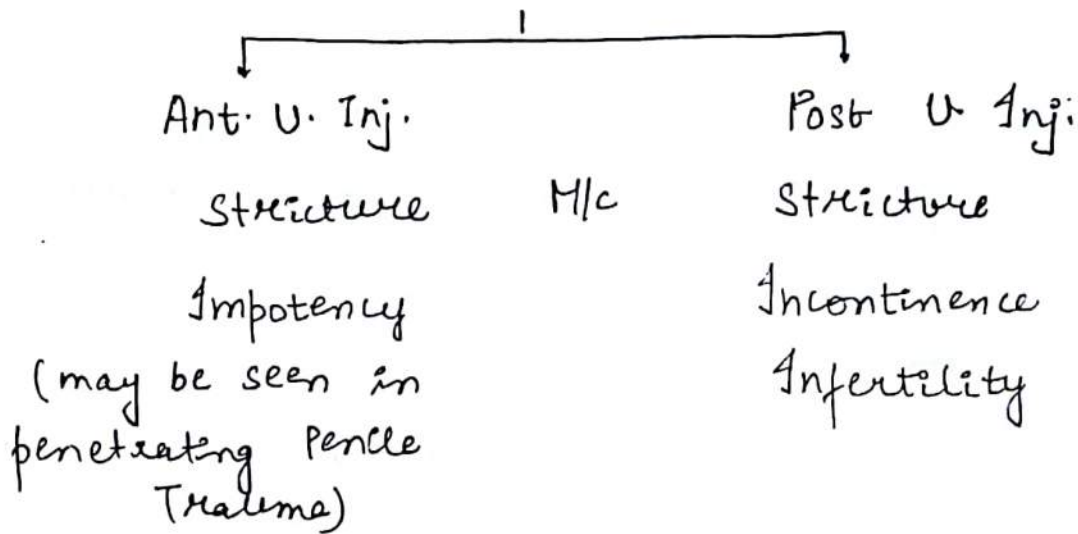
↳ Urethral injury (Posterior)

IOC - Retrograde Urethrogram (RGU)
(or flexible cystoscopy)



COMPLICATIONS

100



PENILE TRAUMA (#)

M/C → Violent Sexual Activity

← Tunica albuginea
→ 2mm

→ 0.5m
on erection

Sudden loss of erection. (Detumescence)

⊖ POP/ SNAP sound

⊖ swelling @ base of penis

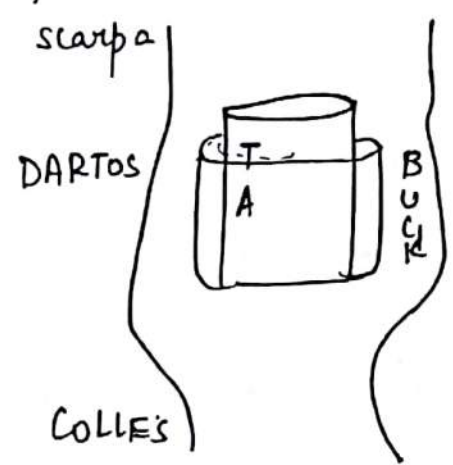
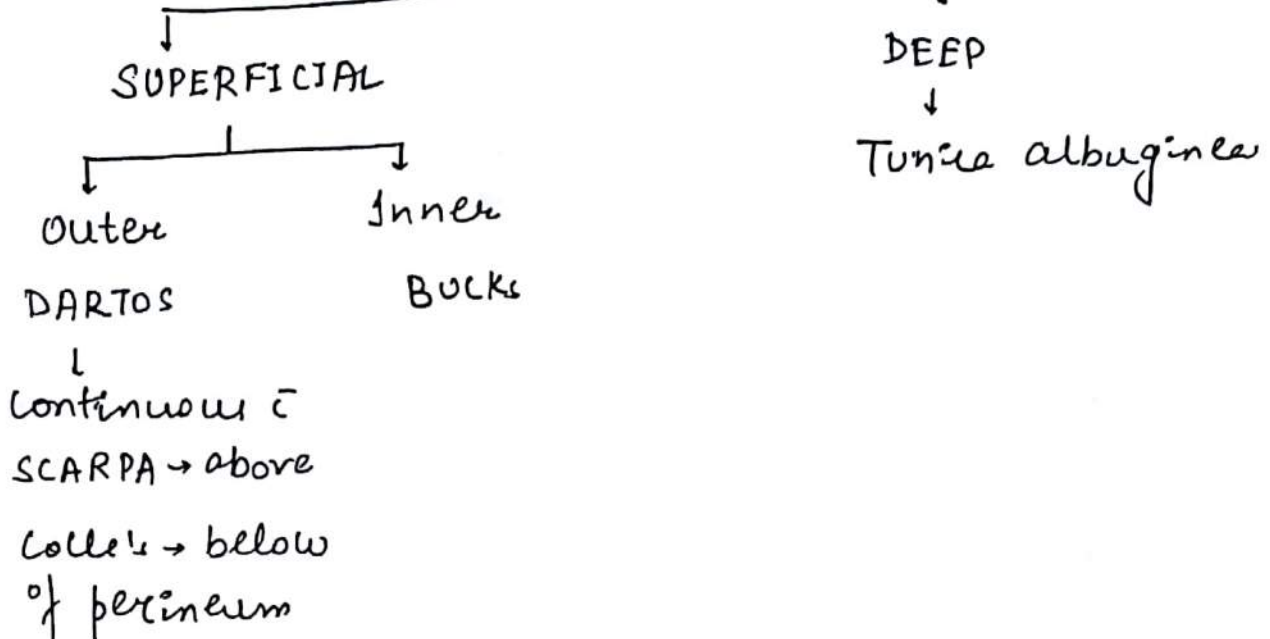
[EGGPLANT DEFORMITY]



Mx → all penile # are immediately
repaired by 2-0 vicryl

FASCIAL LAYERS OF PENIS

101



① T. A. Rupture
 Buck's F → Intact } SLEEVE
 or
 CYLINDRICAL
 hematoma

② T.A. Rupture
 Buck's F " } BUTTERFLY/
 PERINEAL
 hematoma

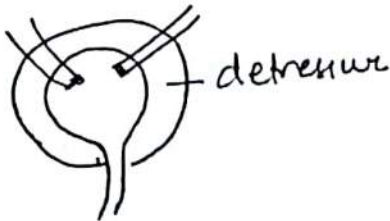
VESICO URETERIC REFLEX

102

1°

2°

due to obstruct to bladder outlet



$$L : w = 5 : 1 \text{ (N)}$$

$$L : w < 5 : 1 \rightarrow 1^{\circ} \text{ VUR}$$

Intramural ureteric length

100% VCU (Voiding cysto ureterogram) ② MCU

STAGING

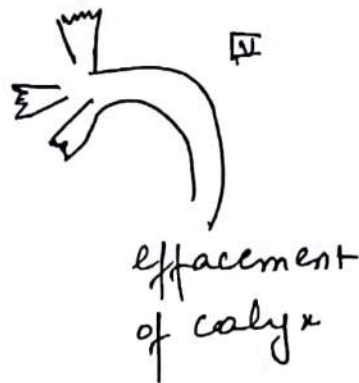
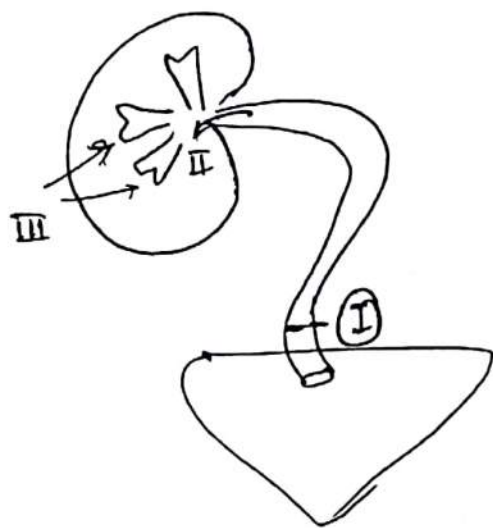
I Reflux into Ureter

II Reflux into ureter + kidney

III " + " + Mild Blunting of Calyx

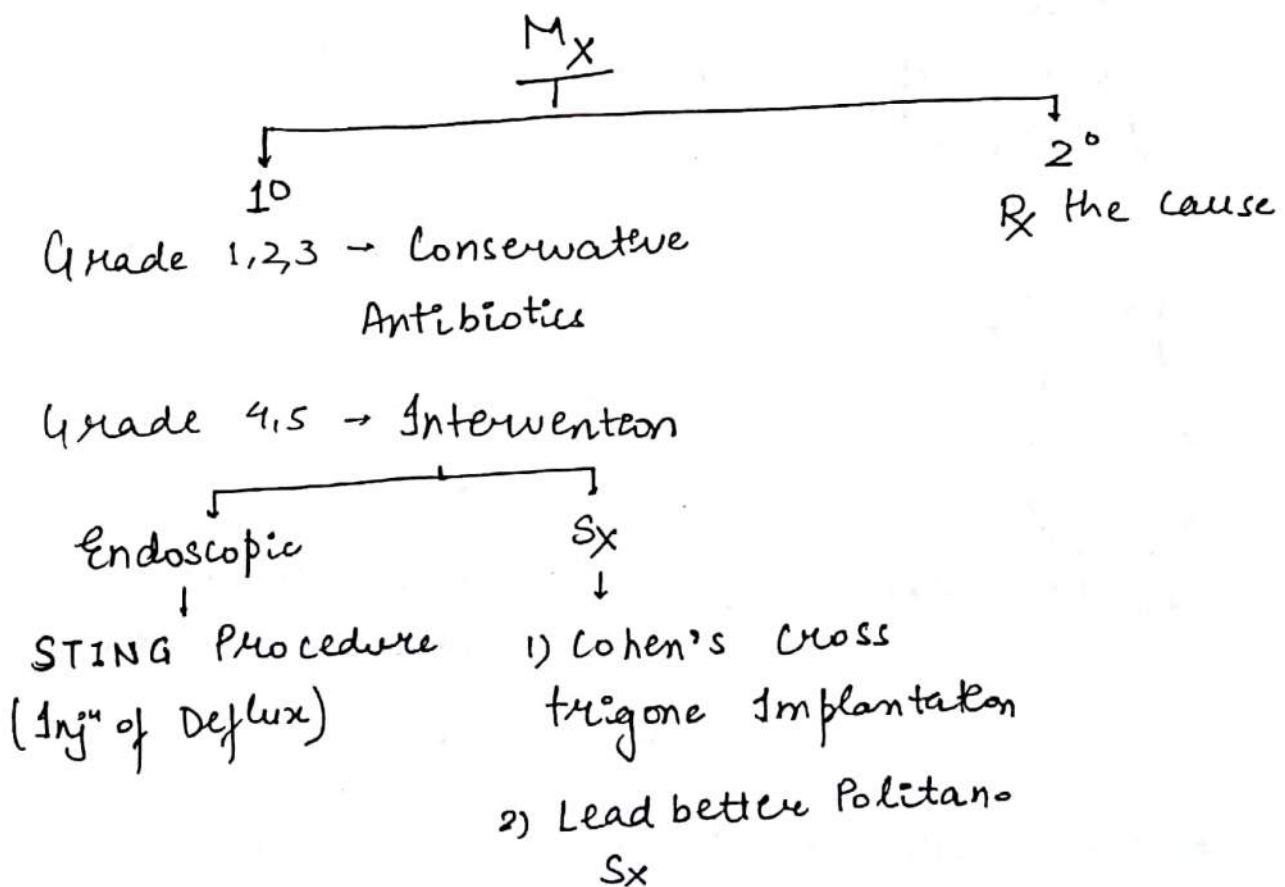
IV III + Dilatation of ureter + Effacement of Calyx

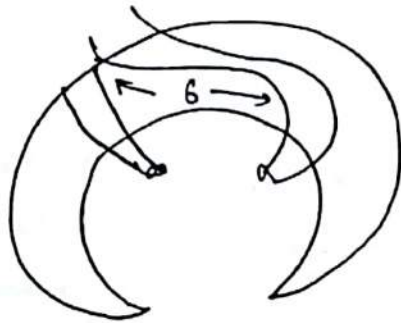
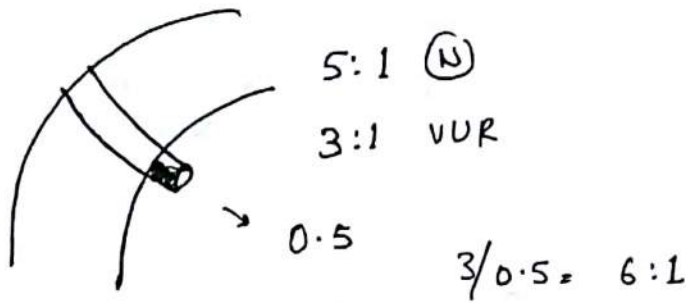
IV - Gross Dilatation of ureter +
Distortion of Pelvic-Calycal system ¹⁰³



Gross
Dilatation of
ureter
+
Distortion.

Recurrent UTI → M/C presentation

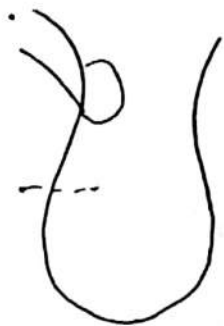




COHEN'S cross trigone
implantation

CRYPTORCHIDISM

- Undescended TESTIS
- Non descent of Mid-point of Testes below midpoint of scrotum



Stable Descended Testis → Intra scrotal Testis
but midpoint of Testis is above
the mid of scrotum

RETRACTILE TESTIS - (N) descended Testis but
move up due to Cremasteric
Reflex hyperactive

VANISHING TESTIS - Testis $\pm$ was present in ¹⁰⁵ embryological phase but absent on BIRTH

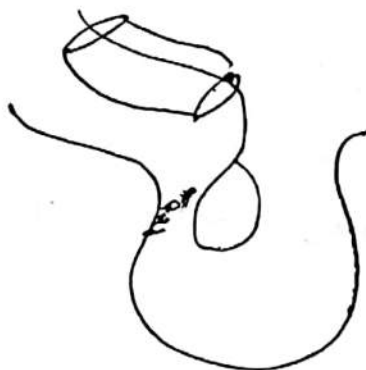
Time of (N) DESCENT $\rightarrow$ 5 months
Spontaneous descent occurs upto 5th month.

R_x -

Time of S_x = 6-12 months.

6th > 12th month.

S_x = ORCHIDOPEXY $\longrightarrow$ Bring down & fix testis in subdartos space



STEPHEN FOWLER B_x

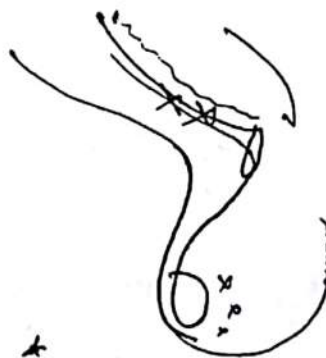
2 staged

STEP-1

Ligate Testicular artery

AIM $\rightarrow$ Lengthening of cord

Stretch the cord to max & fix it



STEP-2 $\rightarrow$ wait for 6 months $\rightarrow$ Orchiopexy

TESTICULAR TORSION

106

CAUSE -

1) Inversion of Testis (H/c cause)
↓
Horizontal position of Testis

2) High investment of Tunica vaginalis

3) Cord betⁿ Epididymis + Testis



BELL CLAPPER

MAx → 10-20 yrs

Peak → 13-14 yrs

Golden hour → 1st 6 hrs

Only 20% salvage after 24 hours

CF.

1) Excruciating pain tenderness over hemiscrotum

2) PREHN'S SIGN

No relief of pain on elevation of Testicle

D/D- epidymo-orchitis

Pain ↓ on elevation

Blue-dot sign

↳ infarction of appendix of testis

COMPⁿ -

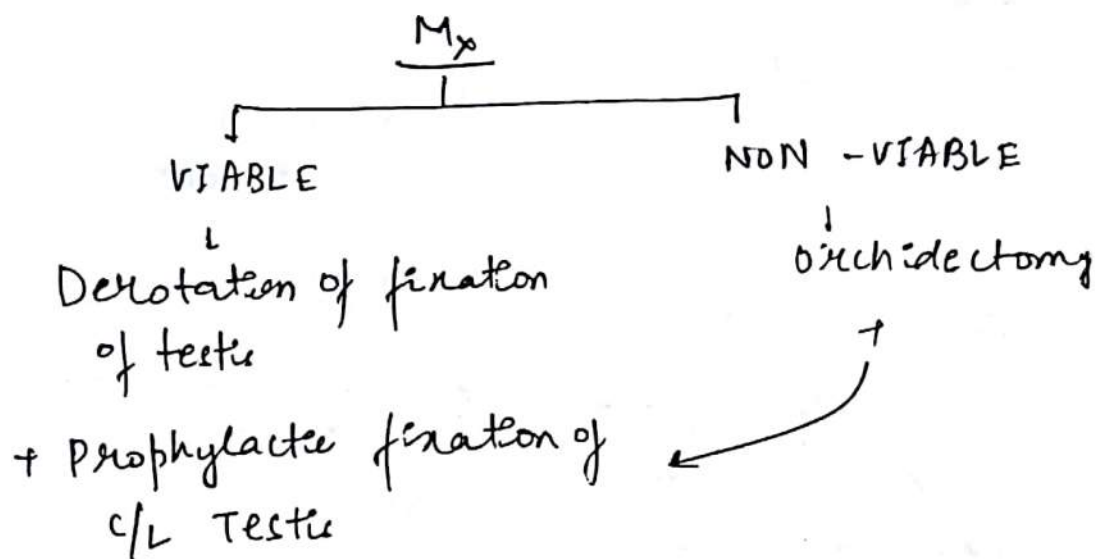
107

- 1) Loss of viability
- 2) Complete necrosis
- 3) Sympathetic orchidopathy

↓
[Destruction of c/L (N) Testis]

IOC - USG

Doppler study (for viability)



CLEFTS

108

Cleft Lip + Palate >> Cl. Palate >> Cl. Lip
 alone
 $\sigma > \phi$
 Left
 U/L
 Leps $\rightarrow$ B/L cleft

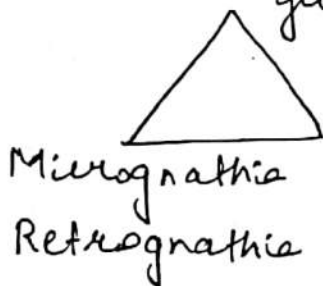
M/c Chromosomal Ab(N) = Chr. 22p

M/c Syndrome a/c $\rightarrow$ VANDER WOODS SYNDROME
 (Velo cardio facial Defect)

$\downarrow$
 Clefts + Leps / Facial Pct.
 sinus / Fistula

PIERRE ROBIN'S SYND -

glossoptosis $\rightarrow$ falling back of tongue



Cleft Palate
(alone)

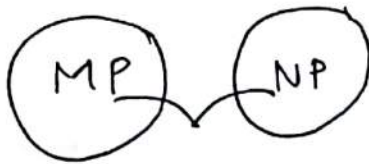
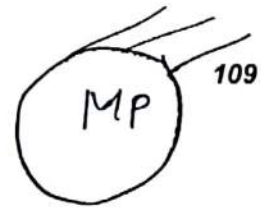
CLEFT LIP

INCOMPLETE

any cl. Lip $\bar{c}$ intact
nasal cavity

COMPLETE

Cl. Lip extending into
nasal cavity



CENTRAL Cleft

More Lip Defect (rare)



LATERAL Cleft Lip

CLEFT PALATE

INCOMPLETE

any cleft palate =
intact fusion of
palatine shelves =
nasal septum & vomer

Type II

COMPLETE

Non-fusion of palatine shelves
= ~~nasal~~ nasal septum /
vomer Bone

Type I

1°

ant

PALATE

Incisive
Foramen

Parts

upper lip
alveolar ridge

2°

Post

Hard Palate
Soft Palate

Complete

Cleft

Incomplete

110

IIa. cleft of uvula

IIb. cl. of uvula + soft palate

~~IIc~~

IIc. cl. of U + soft Palate + hard Palate

Alphabets damaged in speech

D K Bose P GI.

<u>CLEFT</u>	<u>LIP</u>	<u>Mx</u>
Tennison's	Z plasty	
Millard	Rotation flap	

<u>CL. PALATE</u>
1) Farlow Sx
2) Teisser's Sx
Single step Repair
3) Wardill Killner
2 step Repair.

Timing of Repair

Cl. Lip alone → 3-6 months

Cl. Soft Palate → 6-9 months

Cl. Lip + Soft Palate → 6 months → 6-9m

Cl. Hard Palate → 9-12 → 9 months

Cl. SP + HP single stage → 9m

2 stage

6m → SP

12-15m → HP.

RULE OF 10 (Millard's)CL. LIP

> 10 weeks old

> 10 pounds

> 10 gm Hb

CL. PALATE

> 10 months

> 10 kg ③

> 10 gm Hb%

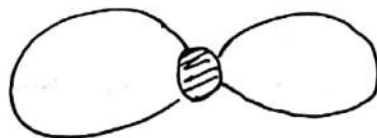
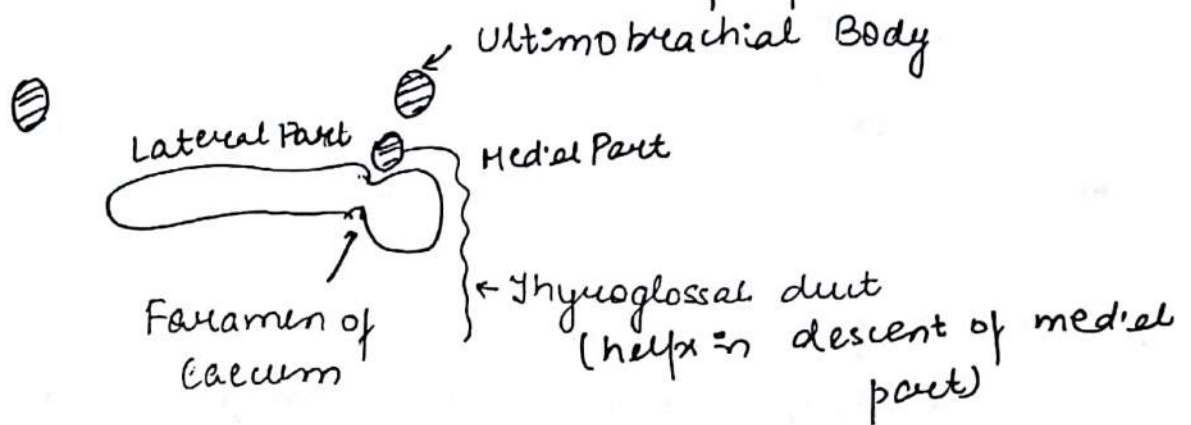


THYROID

113

EMBRYOLOGY -

Development starts at 3rd week of Life



Fusion = 5th week.

Follicle = $5 + 3 = 8^{\text{th}}$ week.

Colloid formation occurs in $8 + 3 = 11^{\text{th}}$ week of life.



Regression of Thyroglossal duct → starts @ 5th week
completed @ 8th weeks

DEVELOPMENTAL ANOMALY -

1) THYROGLOSSAL DUCT CYST / FISTULA QQ.

→ Persistent Thyroglossal Duct due to failure of Regression by 8th week of Life.

→ Midlife swelling & moves w deglutition & protrusion of tongue

→ Epithelium = pseudostratified Columnar Epithelium. (ciliated)

114



mucin secretion $\Rightarrow$ cyst formation

M/C location = SUBHYOID/

Infrathyoid ~~infrathyoid~~

M/C cong. anomaly of thyroid.

#

→ <1% Risk of malignancy

↳ Papillary Ca. (Medullary Ca is never seen)

↓
parafollicular cells.

Seen on Lateral side

FISTULA

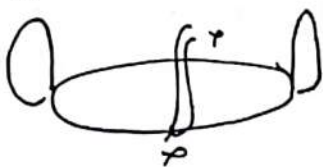
- It is acquired. [cyst is always congenital]
- It occurs due to [spontaneous or iatrogenic] rupture of cyst.

$R_x = \text{TGD} / \text{Fistula} = \text{SISTRUNK } S_x$

[Excision of cyst + Central Part of Hyoid]

↓
this S_x is also done for chronic lymphoedema

wedge Resection excision of subcutaneous tissue

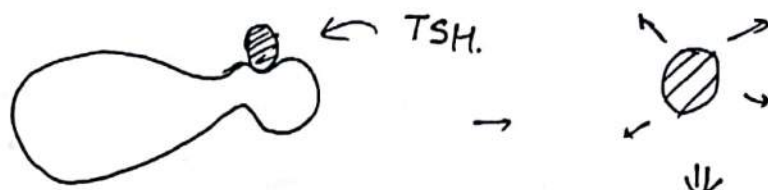


2> LINGUAL THYROID

115

→ Not Ectopic Thyroid

* Persistent Thyroid Tissue @ base of tongue
(foramen of caecum)



Dysphagia

Dysphonia

Dyspnoea

Hypothyroidism → Hypothalamus

↓
TRH

↓

pituitary

↓

TSH

Rx = Thyroid suppression by T₄ supplementation.

Preferred Mx = Radioactive Iodine ~~sup~~ Ablation.

Sx not done due to technical difficulty

3> ECTOPIC THYROID

H/C Site = Central Part of Neck

Trachea

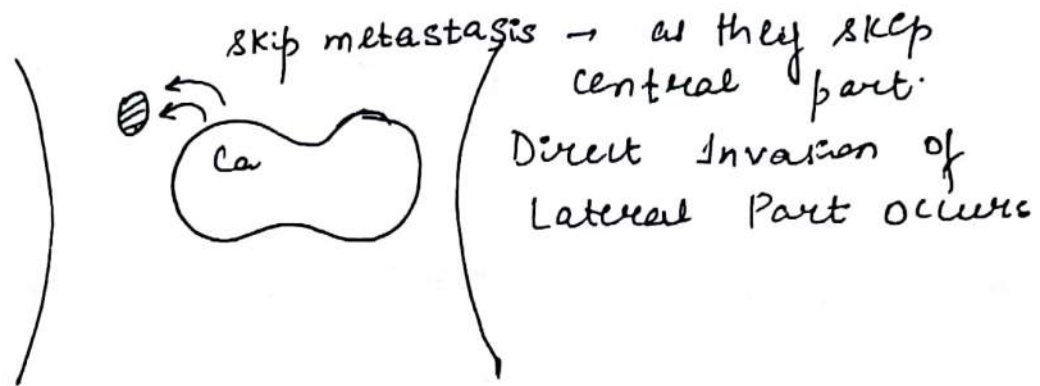
Esophagus

Aorto-Pulmonary window (mediastinum)

4) LAT (LATERAL ABERRANT THYROID)

116

- Thyroid tissue located in Lateral Part of Neck
- considered as SKIP METASTASIS from Suprolateral Pole Papillary Carcinoma



NECK MASS

↓
FNAC

↓
(N) Thyroid Tissue

Lateral Part = ? Location = Central Part of Neck
↓

LAT (Skip metastasis)

check thyroid gland

R_x = Total

Thyroidectomy

+

(Level Central Neck

6) Dissection

+

Modified

Radical Neck

Dissecⁿ.

(Level 1 → 5 removed)

(N)

↓

ECTOPIC

THYROID

↓

R_x = observation

Ab (N)

↓

MALIGNANCY

↓

Total Thyroidectomy

+

Central Neck

Dissection.

5> PYRAMIDAL LOBE

→ Persistent fibrous attachment of thyroglossal¹¹⁷ duct = Thyroid.

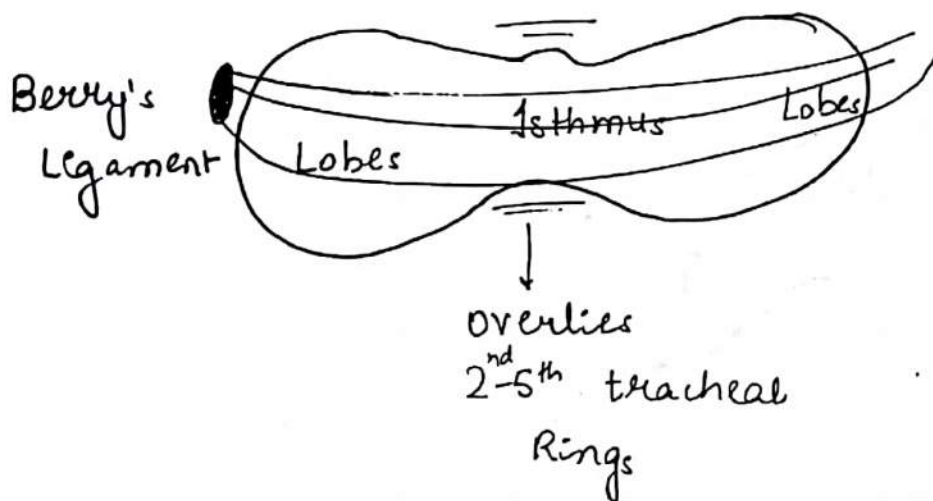


→ usually not palpable.

ANATOMY

wt = 18-20gm

Colour = Brown



Capsule = Inner → True

outer → condensation of Pretracheal Fascia
(Deep Fascia)

Berry's Lig - Condensation of Pretracheal Fascia
@ posterolateral Part of thyroid
before its insertion into Cricoid
Cartilage.

It is a/c RLN anatomically.

118

M/c site for RLN Injury → Berry's Leg

Functional type of Injury

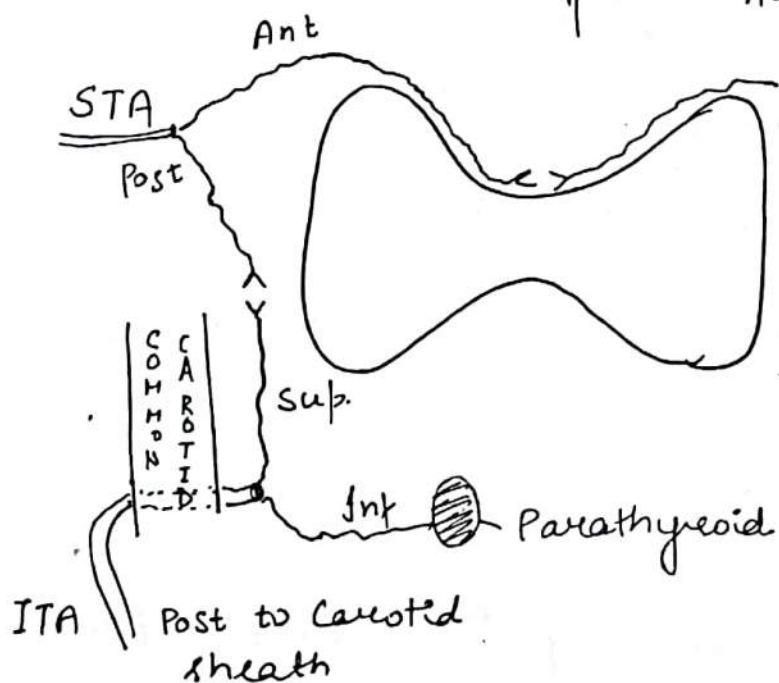
ARTERIAL SUPPLY

1> Sup Thyroid Artery - 1st Br. of Ext. Carotid Artery

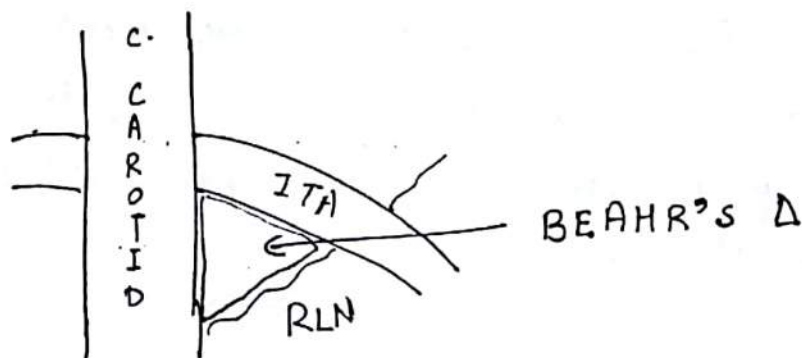
AIIMs

2> Inf. Thyroid Artery - Br. of Thyrocervical Trunk

THYROID IMA - Direct arterial Br. to thyroid from Aorta. (5-10%)



Divides into sup. inf

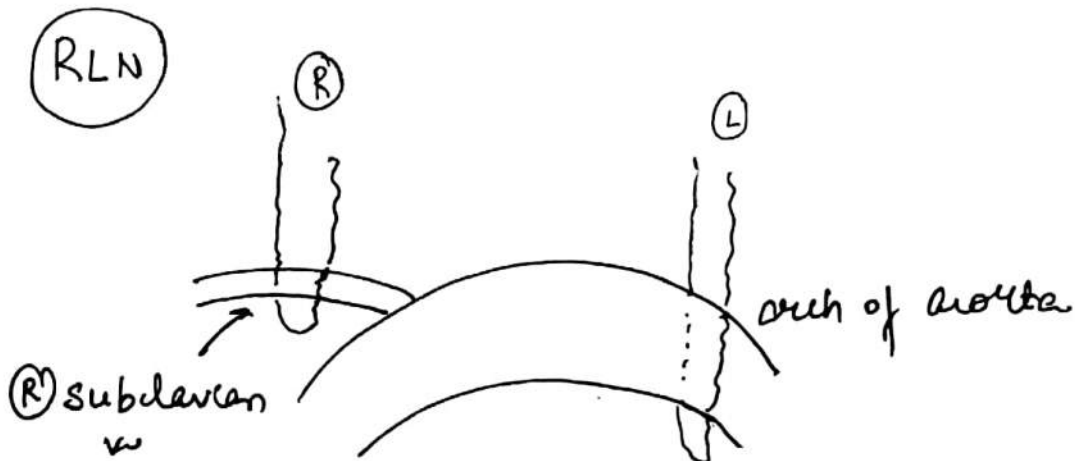


Inf. Thyroid artery } Ligated ~~close~~¹¹⁹ as close
 Sup. " " } to the gland as possible
 otherwise

VENOUS

Sup. Thyroid vein } Int. Jugular vein
 Middle " " }

Inf. Thyroid vein → Innominate vein.



Non- (R) recurrent Laryngeal N/v → 0.5-1.5%

(R) side > (L) side

(aberrant)
 ARTERIA LUSORIA → origin of (R) subclavian. from
 distal to (L) subclavian artery curving post. to
 esophagus to reach (R) side

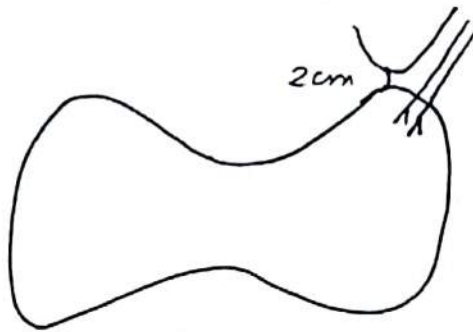
DYSPHAGIA LUSORIA

↳ Dysphagia due to ~~R~~ aberrant (R) subclavian
 due to post-indentation on esophagus.

Ext. Laryngeal N/v
related $\bar{c}$ sup. pedicle

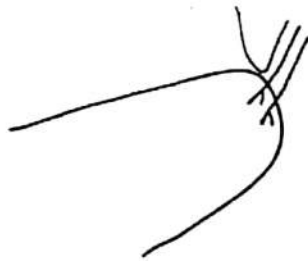
120

TYPE-1



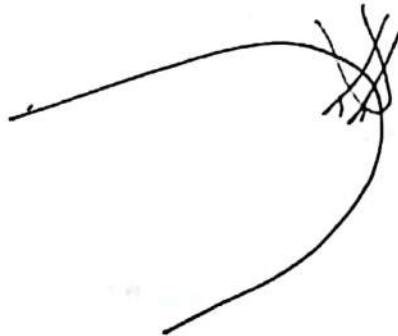
SLN $> 1-2$ cm
from
S. Thyroid Pedicle

TYPE-2



SLN < 1 cm gap b/w
SLN $\times$ ST. pedicle

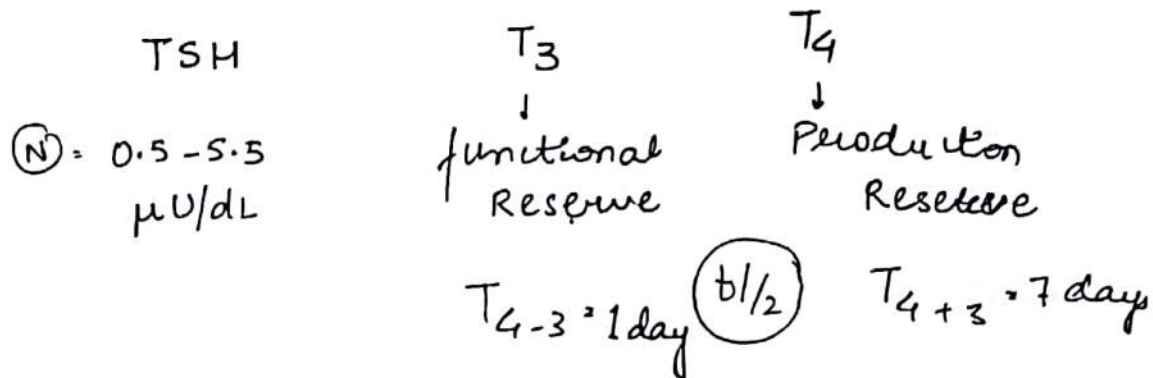
Type 2b



Below the Pedicle

MISC.

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HYPOTHYROIDISM ↑↑ TSH ↓ T₃ ↓ T₄

HYPERTHYROIDISM ↓↓ TSH, ↑ T₃, ↑ T₄

SUBCLINICAL HYPO → Marginal elevation of TSH
(N) T₃, T₄.

SUBCLINICAL HYPER - Marginal decrease of TSH
(N) T₃, T₄.

* EUTHYROID SICK SYNDROME

TSH → (N)
T₃ T₄ ↓ (marginal)
a/c Chronic Illness

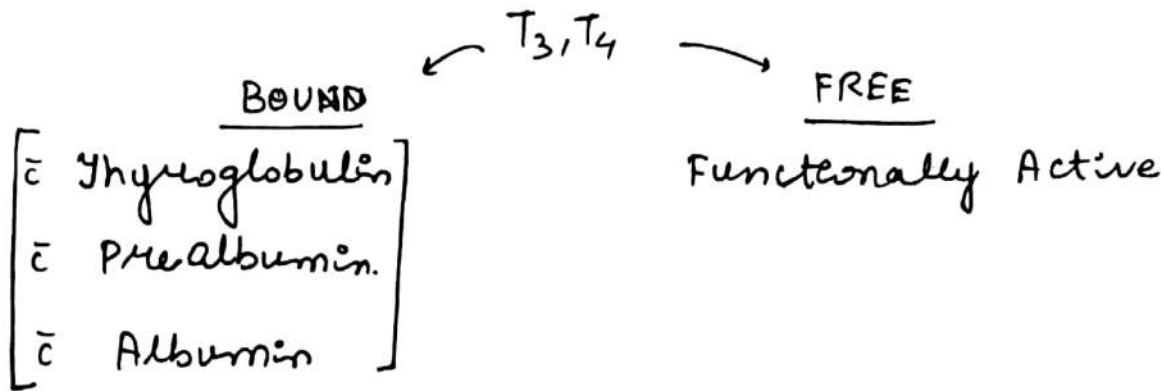
* REFETOFF SYNDROME

end organ Resistance to T₄.

TSH - (N)
T₄ ↑↑↑
T₃ may be (N)

FREE $T_3, T_4 \rightarrow$

122



FREE $T_4 \propto$ Negative log TSH.

Eg. $\uparrow\uparrow T_4 \rightarrow \downarrow\downarrow\downarrow TSH$

HYPERTHYROIDISM

$\uparrow\uparrow$ RAI uptake

where gland is taking excess of Iodine.

CAUSES

- 1) Graves Disease
- 2) Plummer's D
- 3) Toxic adenoma
- 4) Drug Induced (JOD BASEDOW effect)
- 5) Malignancy
- 6) Struma ovarii

$\downarrow\downarrow$ RAI uptake

No uptake of Iodine

CAUSES

- 1) Thyroiditis (subacute/chronic)
- 2) Factitious Thyrotoxicosis ($\uparrow\uparrow$ exogenous uptake)
- 3) HAMBURGER'S Thyrotoxicosis

GRAVE'S DISEASE

123

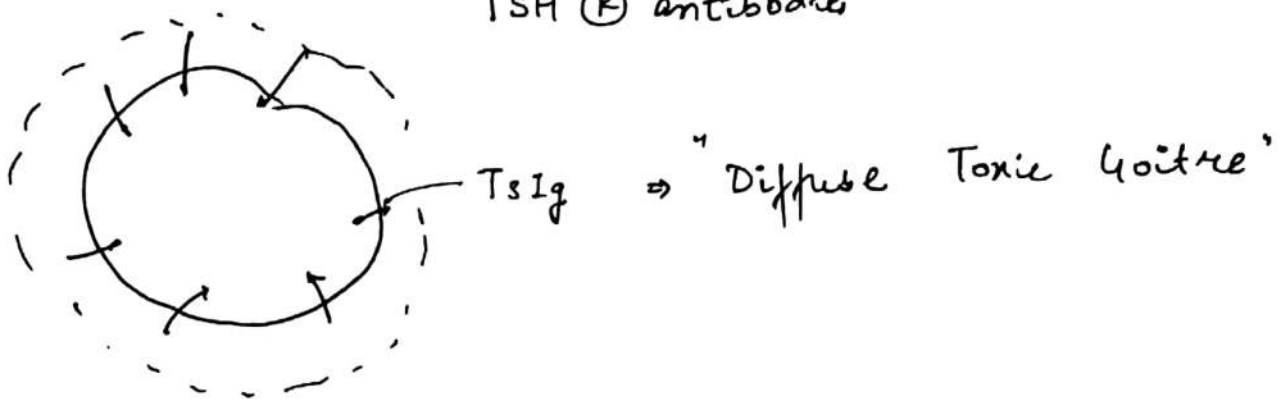
- Diffusely enlarged
 - WARM
 - SMOOTH
 - Palpable thrill
- } Key word
- ̄ Features of Toxicity

CAUSES

1) AUTOIMMUNE.

al̄ CTLA₄ [Cytotoxic T-lymphocyte Antigen 4]

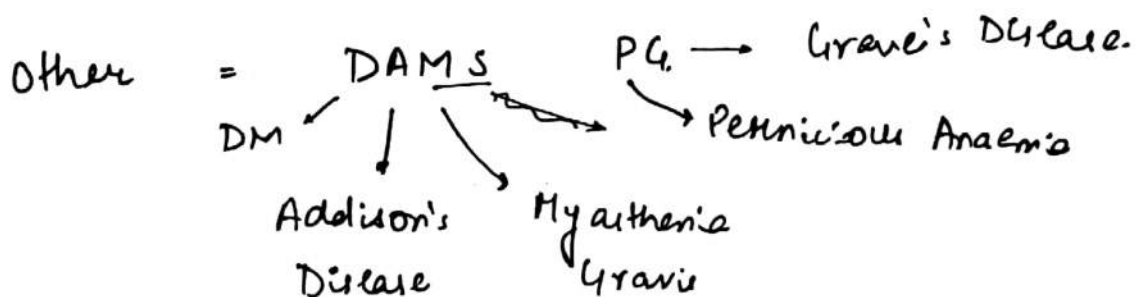
TSIg [Thyroid stimulating Antibodies] or
TSH (R) antibodies



⇒ ass. ̄ DR3, HLA B8

HLA DQA1 *501.

[HLA DR B₁ *701 → Protective for Graves]



2) Lithium Rx

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3) ♀

4) Infection.

FEATURES

THYROIDAL

- 1) Heat Intolerance
- 2) Wt. loss
- 3) Tachycardia
Water hammer pulse
- 4) Palpitations
- 5) Arrhythmias
- 6) Diarrhoea
- 7) Menorrhagia.
- 8) Exaggerated Knee Jerk

EXTRATHYROIDAL

1) GRAVES OPTHALMOPATHY

- Proptosis
- Eye Signs
 - 1) Von Graeffe's Lid Lag (upper)
 - 2) Dalrymple Sign
visible upper sclera
 - 3) Stellwag's Infrequent Stare
 - 4) Mobius Sign - Loss of near accommodation
 - 5) Jellink Sign - ↑ periorbital pigmentation.
 - 7) Griffith Sign - Lower lid lag.
 - 8) Kocher's Sign
Eye Globe Lag

9) BALLET SIGN

loss of upward & outward accommodation ¹²⁵

10) BOSTON SIGN

Jerky Eye Movement

11) Vigorous sign - chemosis

12) Gifford sign - Lack of eversion of upper lid ^{down}

13) Groove sign - Inability to retract ~~the~~ ^{down} upper eyelid.

2) SKELETAL CHANGES

→ Subperiosteal Bone formation.

→ Thyroid acropachy → swelling of metacarpals.

→ Gt

3) GRAVE'S DERMOPATHY

↑↑ Glycosaminoglycan Deposition



Pretibial myxoedema.

4) Gynaecomastia

5) Thrill → Felt at Superior Pole

DIAGNOSIS

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1. Hyperthyroidism

2. Antibodies $\rightarrow$ anti TG
TSig (↑↑↑) [HALLMARK]

3. THYROID SCAN

metabolically active thyroid takes up
radioactive iodine elements used for purpose of
scan

Active thyroid $\rightarrow$ HOT

Inactive " $\rightarrow$ COLD

Elements $\rightarrow$ I^{123} , Tech 99 $\rightarrow$ $t_{1/2} = 6 \text{ hrs}$

$\downarrow$

$t_{1/2} = 12-13 \text{ hrs}$

$\downarrow$

ADV: $\rightarrow$ short $t_{1/2}$

$\rightarrow$ Not organified in
mitochondria

$\rightarrow \therefore$ Lesser radiation
exposure

$\rightarrow$ γ RAYS

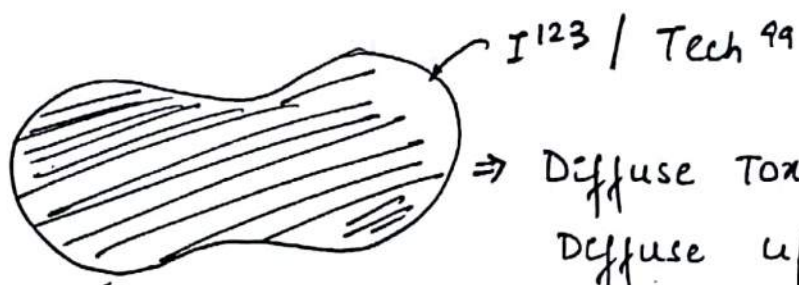
captured by γ cameras.

$\rightarrow$ I^{131} $\rightarrow$ $t_{1/2} = 7-8 \text{ days}$

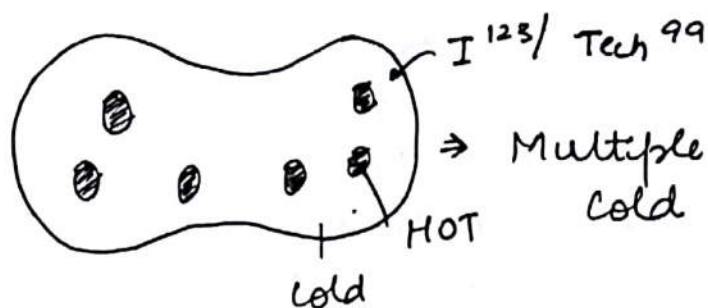
$\downarrow$

$\gamma + (\beta^-)$ - used for destrucⁿ.

so, therapeutic use

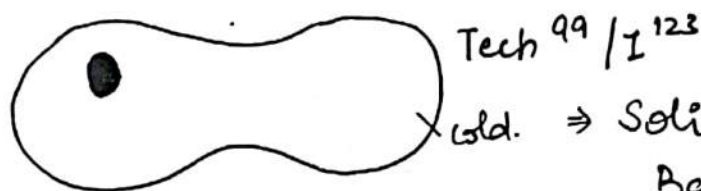


$I^{123} / \text{Tech } 99$
 $\Rightarrow$ Diffuse Toxic Goitre
 Diffuse uptake.



$I^{123} / \text{Tech } 99$
 $\Rightarrow$ Multiple HOT nodules on
 Cold Background

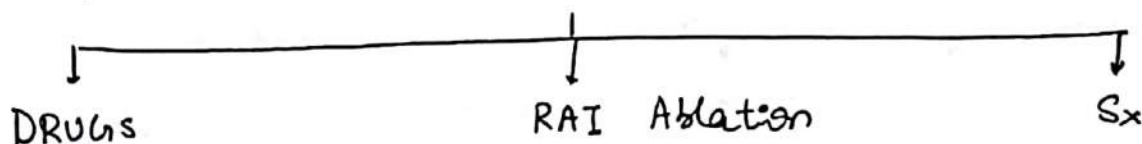
$\Downarrow$
 TOXIC MULTINODULAR GOITRE
 [PLUMMER'S DISEASE].



$\text{Tech } 99 / I^{123}$
 $\Rightarrow$ Solitary Hot Nodule on Cold
 Background

$\Downarrow$
 TOXIC SOLITARY NODULE
 (TOXIC ADENOMA)

R_x



DRUGS

AIM $\Rightarrow$ to achieve euthyroid states.

- $\rightarrow$ Methimazole $\rightarrow$ C/I in ♀ / Lactation
- $\rightarrow$ Propylthiouracil $\rightarrow$ safe in ♀ / Lactation.
- $\rightarrow$ β -Blockers $\rightarrow$ avoided in sinus bradycardia
- $\rightarrow$ Steroids

Carbimazole $\rightarrow$ "CUTIS APLASIA"

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$\Rightarrow$ DRUGS can be used as 1^o Therapy if
FOLLOWING CONDITIONS R FULFILLED

- 1) Small size gl. ($< 40\text{gm}$)
- 2) Negative Antibody titre
- 3) Moderate elevation of T_3, T_4
- 4) Quick response to Drug.

REGIMENS

BLOCK + Replace $\swarrow$ $\searrow$ Step Ladder Regimen

II) RAI Ablation

$I^{131} \rightarrow \beta$ property

Indication :-

- 1) moderate size ($< 80\text{gm}$)
- 2) Elderly
- 3) Not responding to drug
- 4) Remote Location residents

CI :-

- 1) young pt.
- 2) $\textcircled{G}$
+
3) Lactation
- 4) smokers
- 5) Graves ophthalmopathy

Smoker $\xrightarrow{\text{RAI}}$ Graves $\xrightarrow{\text{RAI}}$ Worsening
ophthalmopathy

III) Sx

SxOc = Total Thyroidectomy/
Near Total / SUB TOTAL

↓
Preserve 1gm of
thyroid @ Berry's
Ligament

↓
Leave 4-7gm of Thyroid.

U/L B/L

HARTLEY
DUNHILL Sx

Leave 4-4gm
on (B) side

7-8gm on 1
side

INDICATIONS FOR Sx :-

- 1) young pt
- 2) Gland > 80gms (Large)
- 3) ♂ (Sx → 2nd Trimester)
♀
- 4) Lactation.
- 5) Desire to conceive in 6 months.
- 6) Smokers
- 7) Graves Ophthalmopathy

TOXIC MULTINODULAR GOITRE

130

ELDERLY

MN Goitre

Long standing

Long term

Amiodarone

I₂ supplementation.

Keyword

2 features of toxicity.

Long standing suppression generates autoactivation of the thyroid nodules

FEATURES

only features of Hyperthyroidism seen

No extra thyroidal feature

M/c → arrhythmia / Palpitation

Rx ① Sx

② Preferred

② RAI Ablation

DISADV -

Dose of radiation reqd is too high.

At this dose there is risk of development of radiation thyroiditis.



TOXIC ADENOMA (SOL. TOXIC NODULES)

131

Young pt.

Solitary nodule

Long standing nodule turning autonomous
= toxicity

Avg size = $> 3\text{cm}$

a/e gsp mutation - G $\rightarrow$ g coupled protein.
s $\rightarrow$ stimulation.
p $\rightarrow$ protein

Rx = Sx (Hemithyroidectomy) is preferred.

[young age, avg. size $> 3\text{cm}$]

Other $\rightarrow$ RAI Abl. $\rightarrow$ Small nodules

Middle aged $\rightarrow$ elderly

(TRIAL) $\rightarrow$ PEI (percutaneous ethanol Injecⁿ)

APATHETIC THYROTOXICOSIS

$\rightarrow$ Rare type

$\rightarrow$ Seen in elderly

$\rightarrow$ overt c/f of Hyperthyroidism. are not seen.

$\rightarrow$ Rather few subtle features may be seen.

FEATURE

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- 1) Rate & Rhythm Disturbance
- 2) Myalgia
- 3) Depression
- 4) Anxiety

Rx

1st Line → Antithyroid Drugs

↓ fail.

RAI Ablation (TOC)

Sx is C/I.

~~THYI~~

THYROIDITIS

133

	SUPPURATIVE/ ↓ ACUTE	SUBACUTE ↓ DE-QUERVAIN	CHRONIC LYMPHOCYTIC ↓ HASHIMOTO'S	CHRONIC SCLEROSING ↓ REIDEL'S
1) BACTERIAL				
2) CAUSE	Bacterial Infect ⁿ	Viral Post - Partum	Autoimmune	Autoimmune
3) PAIN ++		Viral +++ PP (-)	Initially ++ Later (-)	Painless woody mass
4) Thyroid Func ⁿ Euth		Euth.	Hypo >> Hyper Initially	Euth >> Hypo
5) Leucocytosis +++		(-)	(-)	(-)
6) ESR ↑↑		viral ↑ PP (N)	(N)	(N)
7) Δscs FNAC		FNAC	FNAC	BIOPSY
8) Mx Conservative		Conservative	T ₄ supplement ⁿ Sx → malignancy Lymphoma >> Papillary	Corticosteroids or Tamoxifene

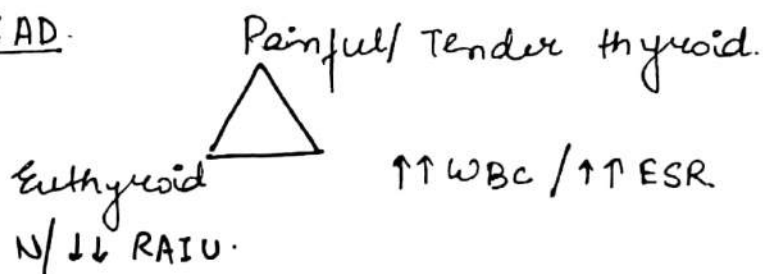
Sx for ¹³⁴I
compressive
features
wedge ex or
Isthmusectomy

ACUTE/SUPPURATIVE THYROIDITIS

M/c In children.

M/c org. - Staph. aureus >> strepto

TRIAD:

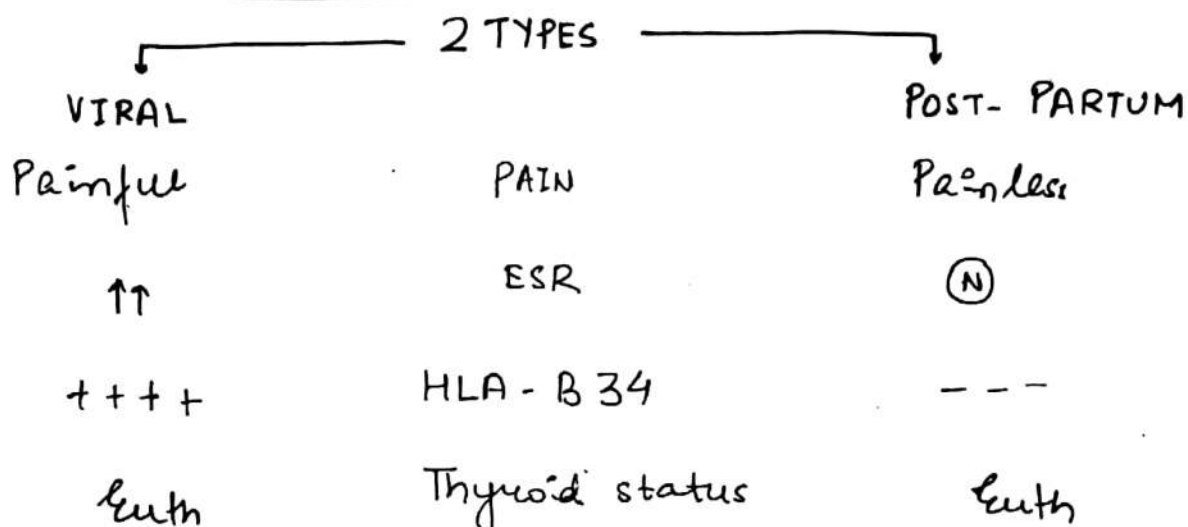


R_x - conservative

S_x - Done for recurrent acute thyroiditis.

↓
Because of Infected Pyogenic
sinus/fistula.

DE-QUERVAIN THYROIDITIS



Phases of Hyper

→ Euth.

↓
Phase of Hypo

↓
Euth.

135

Rx - symptomatic care

HASHIMOTO'S THYROIDITIS

also known as STRUMA LYMPHOMATOSIS

♀ : ♂ : 10:1 → 20:1.

> 2/3 → Perimenopausal Age.

Autoimmune → HLA DR3 / DR5 / D8

SYNDROME → 1) DOWN syndrome

2) TURNER syndrome

FEATURE

1) Painless gland (Pain may be seen in early gland)

2) Hypothyroidism

3) Firm, granular, Bosselated Gland
→ Pseudo-Tx

4) Microscopy (↑↑) oxyphil cells.
Askenazi cells

(↑↑) Lymphocyte

(↑↑) Plasma cell

(↑↑) Eosinophils

$\Delta Si \rightarrow \uparrow\uparrow$ Antibodies (antimicrosomal)

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anti TPO

anti Tg

anti NA-I Symporter

$M_x -$

1) T_4 Supplementation

2) $TSH > 10 \rightarrow$ start T_4

$\downarrow$

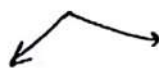
5-10 $\mu U/L$

$\downarrow$

check Antibodies

$\uparrow\uparrow$

Start T_4



Not Elevated

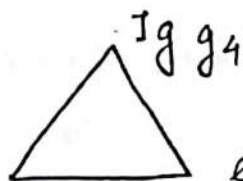
$\downarrow$
observation

$S_x \rightarrow$ Malignancy

Lymphoma > Papillary

$\downarrow$
Diffuse B cell Lymphoma

REIDEL'S THYROIDITIS



Hard
woody
gland.

Euthy >> Hypo

LI RAIU

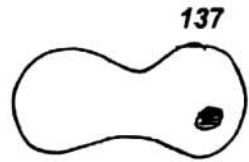
Biopsy $\rightarrow$ Loc.

$M_x \rightarrow$ C. steroid / Tamoxifene

$S_x \rightarrow$ compression [Isthemectomy]

SOLITARY THYROID NODULE

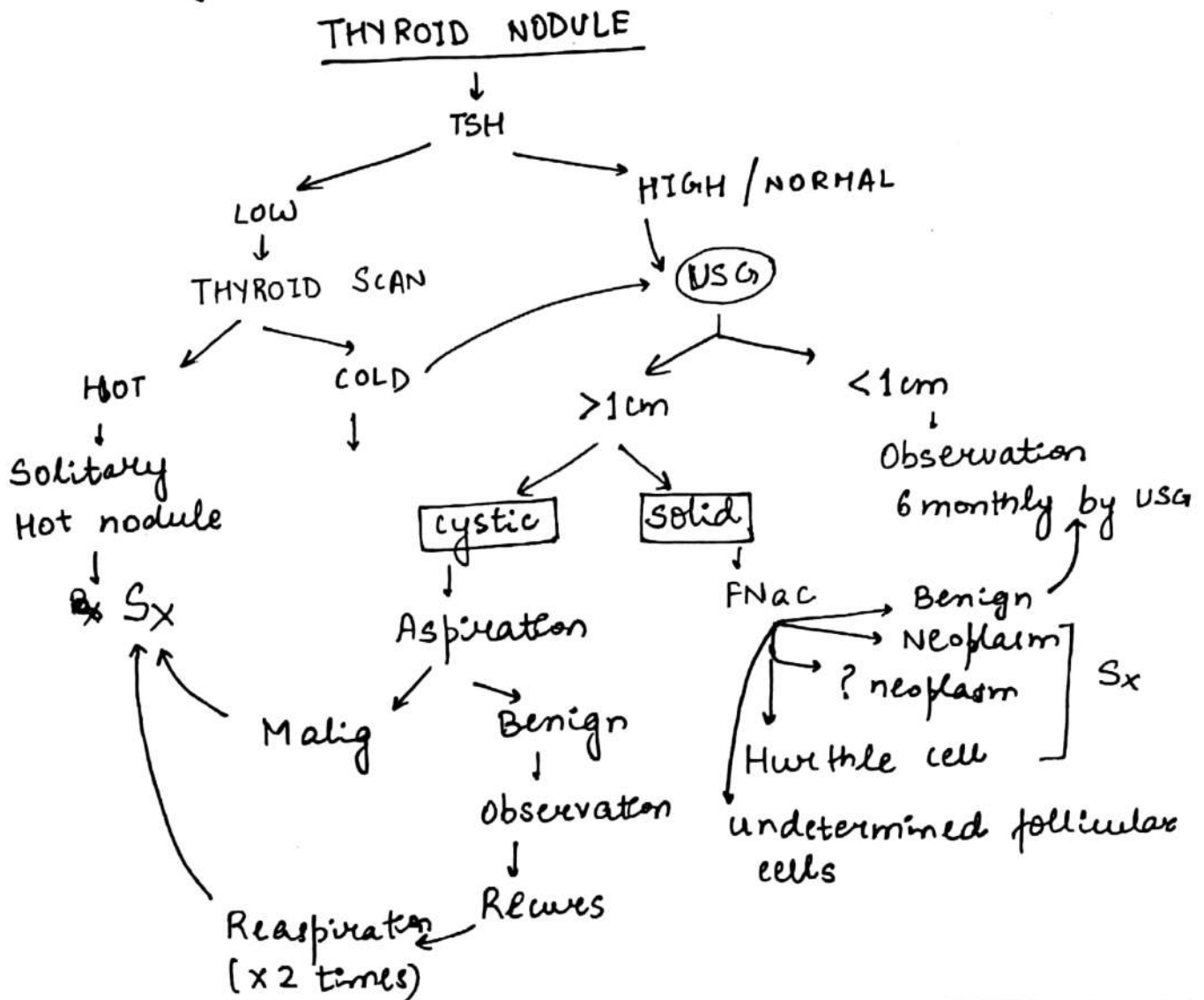
IOC - USG guided FNAC



Blind FNAC = High False Negative

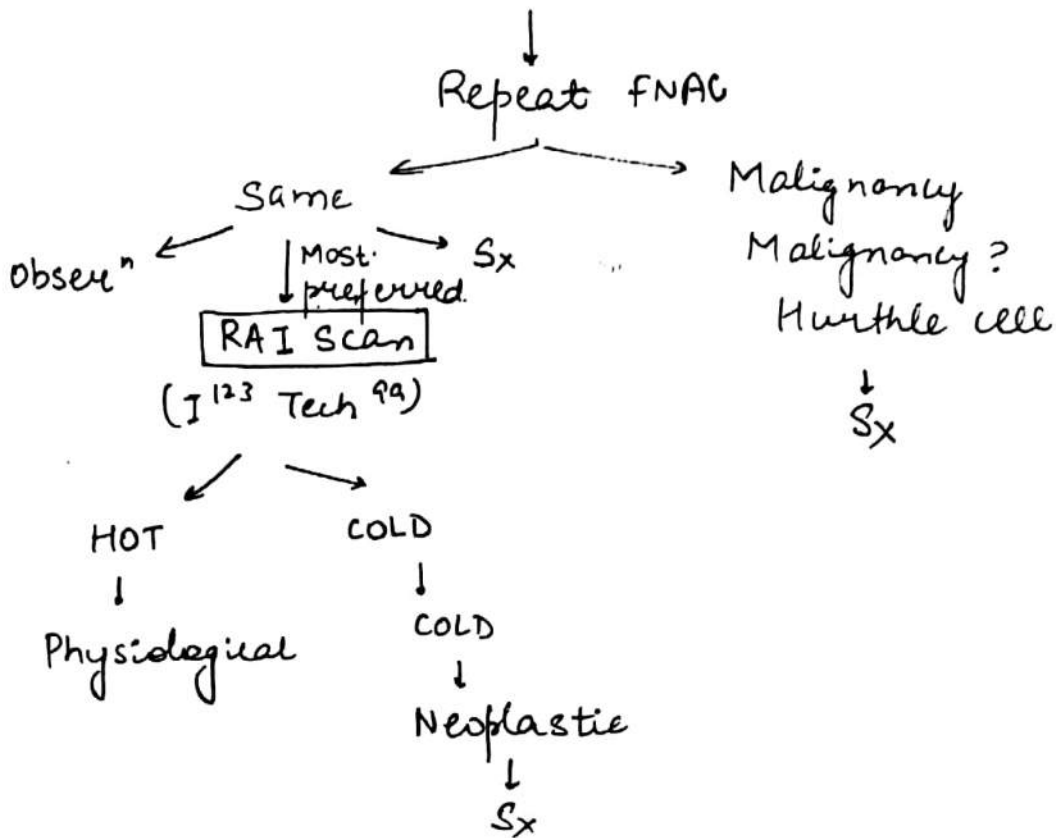
USG FEATURES S/O MALIGNANCY

- 1) Taller than wide
- 2) Microcalcification (<5mm) stippled
- 3) ↑ central vascularity
- 4) irregular border
- 5) Heterogeneous appearance



Undetermined Follicular cells

138



↑ RISK OF MALIGNANCY -

- 1) Male
- 2) Age > 40yrs
- 3) Children.
- 4) Post Radiation exposure.
- 5) Cold nodules

S_x = HEMITHYROIDECTOMY > LOBECTOMY

CARCINOMA

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GENETICS

RET
MET
TRK
BRAF] → PAPILARY CA.

RAS
γ PPAR.
gsp
p53
miRNA / 97 / 346] → FOLLICULAR CA.

RET → MEDULLARY CA.

[↑↑ RAS ↑↑ HMGE-1. ↑↑ Galectin 3 ⇒ Slow malignancy]

↓
useful to
differentiate Adenoma vs Carcinoma

FAMILIAL COND.

1) FAP -

→ AD

→ Chromosome 5q21

→ Papillary Ca of thyroid

2) WERNER SYNDROME / Adult PROGEROID.

→ AR

→ WRN gene

3> COWDEN'S

140

→ AD

→ PTEN - 10p

→ ECTODERMAL GI Polyps (Most Imp.)



MACROCEPHALY

TRICHOLEMOMA

(2nd MC)

Mental Retardation

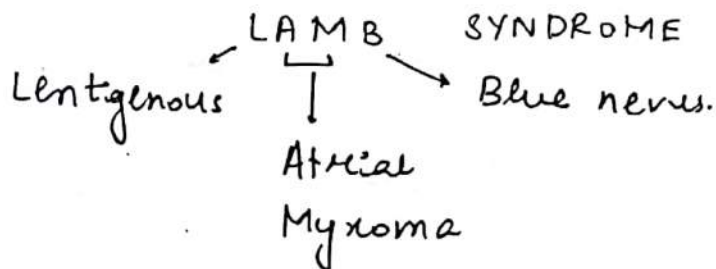
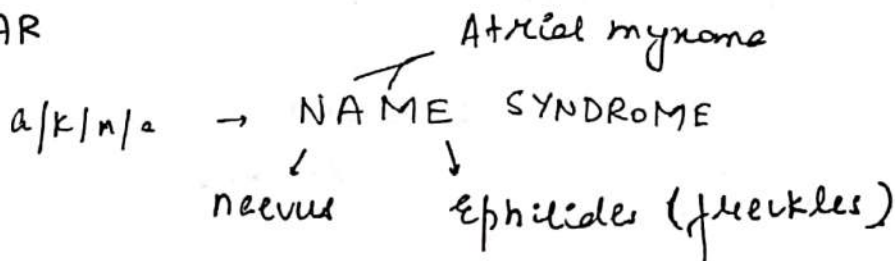
Thyroid / BREAST neoplasm.

→ Benign w.h.t. colon.

4> CARNEY'S COMPLEX TYPE 1

→ AD

→ Y PPAR



BATMAN

[not an official name. mnemonic]

Breast

Adrenal

Thyroid Tx

Myxoma

Nevus

57 McCUNE ALBRIGHT SYNDROME

141

- AR
- gNAS mutⁿ
- Cafe-au-lait spots
- osteoste dysphatic Bone changes

PAPILLARY CA THYROID

- H/c carcinoma
 - overall
 - Post Radiation
 - I₂ sufficient area

→ ♀ > ♂

→ 30-50 yrs.

→ a/e Lymphatic spread.

→ FEATURES

1> FLAT on cut section [N/Benign lesion always bulging]

2> cuboidal cells & ↑↑ cytoplasm

3> ORPHAN ANNIE EYE BODIES, coffee Bean nuclei
These are inclusion bodies.

4> Nuclear crowding
& grooving in of nucleus

5> PSAMMOMA BODIES

calcified sloughed off dead cell



Other ~~sets~~ Reason for PSAMOMMA.

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Meningeoma

Mesothelioma

Serous cyst adeno Ca ovary

Endometrial Adeno Ca

Adeno Ca Lung

MICRO/OCCULT PAPILLARY CA-

- Size < 1cm
 - No Lymphatic
 - No vascular
 - No capsular
- } invasion

PROGNOSTIC FACTORS-

- Age is most imp. factor for DTC (Differentiated Thyroid Cancer)

Follicular Papillary

- 2nd M.I. size

For PAPILLARY

1) AGES → Age, Grade, Extension, Size

2) AMES → Age, Metastasis, Extension, Size

3) MACIS → Metastasis, Age, completeness of Sx, Invasiveness, Size

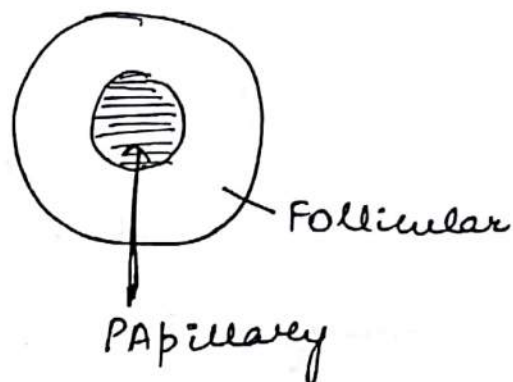
	GOOD	BAD
Age	< 40cm	> 40cm
Size	< 2cm	> 4cm
Sex	♀	♂

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LINSAY TUMOUR

Well circumscribed
Follicular variant of
Papillary Carcinoma

Genetics - ↑↑ RAS
↓↓ RAS/PTC
↑↑ BRAF



Mx OF PAPILLARY CA

MULTIFOCAL → 85%

°° TOC - TOTAL THYROIDECTOMY
[Routine Central Neck Dissecⁿ is not Done]

INDICATIONS FOR CENTRAL NECK DISSECⁿ (CND)

- 1) Any $T_m > 4cm$ size
- 2) ++ LN in Central Neck

INDICATIONS FOR MRND + CND

- 1) LAT (Lateral aberrant Thyroid)
- 2) ++ LN in Lateral part of Neck

FOLLICULAR CARCINOMA

144

♀ > ♂

40-60yr

SOLITARY (papillary - multifocal)

well capsulated

M/c Type [In I₂ Deficiency
arising from long standing
multi-nodular Goitre

Microscopy → Follicles +nt
But Devoid of colloid

Hematogenous spread.

↓
M/c site = Bones >> Lung

↓
Osteolytic (Pulsatile mets)

Adenoma can't be differentiated from Ca.
by FNAC

Age > 40yrs } more s/o CARCINOMA.
Size > 4cm }

FOLLICULAR.

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MINIMALLY INVASIVE

CARCINOMA $\bar{c}$

Microscopic Invasion
into capsule or

Invasion of small.,
medium size vessels/
lymphatics

WIDELY INVASIVE

Gross capsular invasion
or

Invasion of Large size
vessel / ~~ve~~ lymphatics

PROGNOSTIC FACTORS

- 1) AGE
 - 2) SIZE
 - 3) Capsular
 - 4) Lympho
 - 5) Vascular
 - 6) Family H/o
 - 7) Metastasis
- } Invasion

Mx of Follicular

TOTAL THYROIDECTOMY

>4cm

2-4cm $\bar{c}$ High Risk Features

Capsular Invasion

Lymphatic "

vascular "

HEMI THYROIDECTOMY

<2cm

2-4cm $\bar{c}$ but any
additional risk

NO Neck Dissecⁿ needed

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HURTHLE CELL NEOPLASM -

Variant of Follicular CA. {

♀ >> ♂

Age → 60-75yrs

Capsulated x MULTIFOCAL.

Lymphatic + Hematogenous spread

Microscopy → HURTHLE CELLS seen.

Highly infiltrative.

∴ LT Neck/MRI is mandatory for Hurthle cell carcinoma

M_x →

Hurthle Cell Adenoma

↓
Hemi Thyroidectomy
>> Lobectomy

Hurthle cell Carcinoma

↓
Total Thyroidectomy
+
Central Neck Dissection

ANAPLASTIC CANCER

- Elderly (7th - 8th decade)
- <1%.
- Rapid, Painful enlargement of long standing Goitre
- On Microscopy - Pleomorphic Giant cells
Spindle cells
Epithelioid cells

M_x - TOTAL THYROIDECTOMY + CENTRAL NECK
DISSECTION

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Pre-op CT/MRI is Mandatory

Post-Sx → chemotherapy

chemosensitizer → ADRIAMYCIN (DOXORUBICIN)
+
PACLITAXEL / CISPLATIN

In case of local extension

↳ [enblock Thyroidectomy]

LYMPHOMA

< 0.5%

Non-Hodgkin's Type → Extranodal → DLCL
Diffuse B cell
Lymphoma.

R_x - CHOP

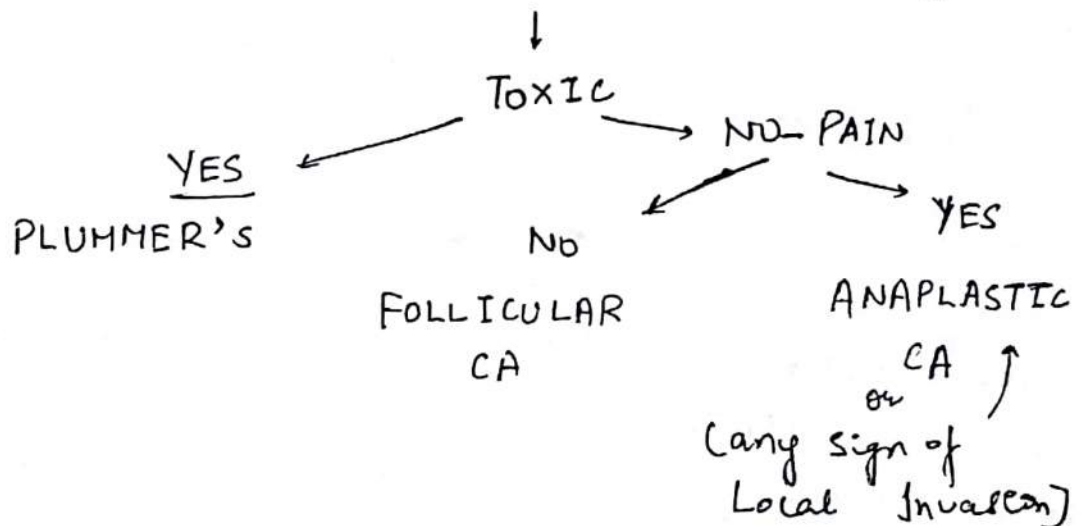
C - cyclophosphamide

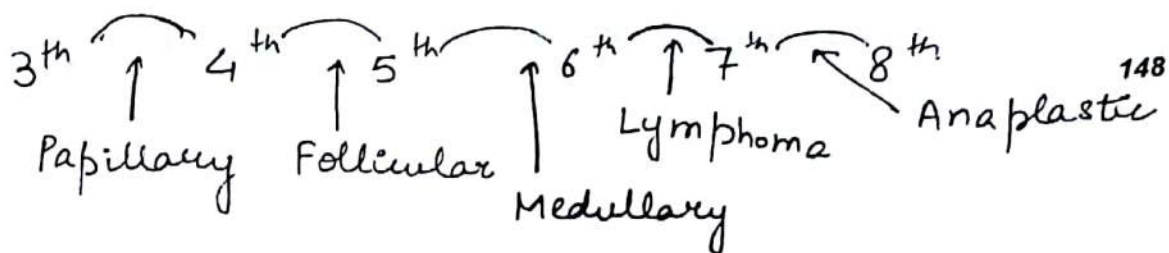
H - Doxorubicin

O - Vincristine

P - Prednisolone.

LONG STANDING MNG + Rapid Enlargement





POST-OP Mx OF DTC after TOTAL THYROIDECTOMY

Thyroid Scan

Follow up $\bar{c}$ Thyroglobulin

INDICATION

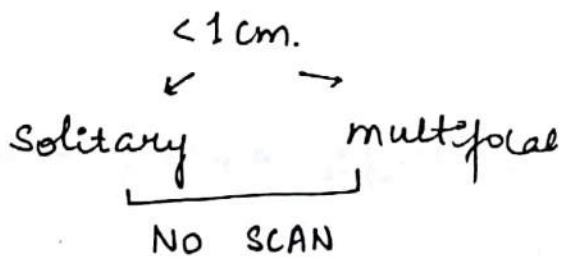
Most Imp. Tumour Marker for follow-up

1> Post Total Thyroidectomy $\bar{c}$ Metastasis

2> $>4cm$

3> 1-4cm $\bar{c}$ High Risk features

4> Capsular }
5> Lympho }
6> Vascular }
 I
 N
 V
 A
 S
 I
 O
 N



PREPARATION

CONVENTIONAL

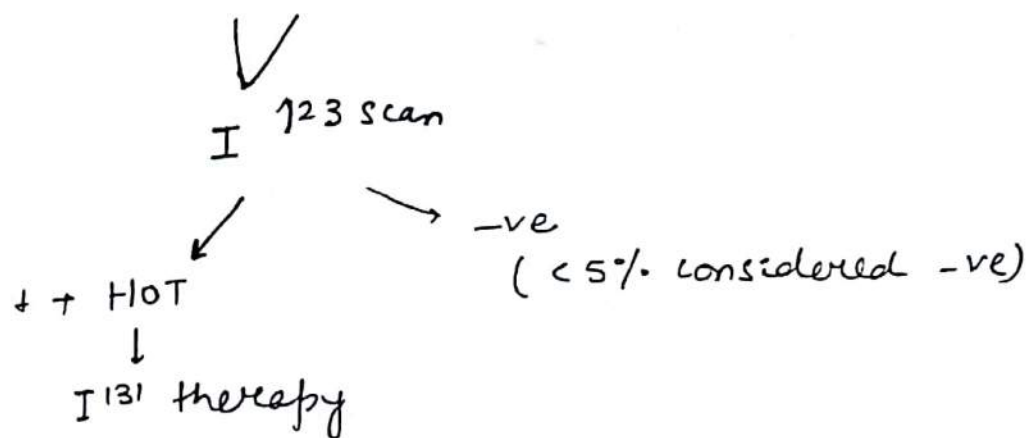
RECOMBINANT

Keep thyroid supplementation away for 4-6 wks.

AIM $\rightarrow$ $\uparrow\uparrow$ TSH ($30\mu U/dL$)

TSH
ADV

$\rightarrow$ Test can be done in 48hrs
No waiting for 4-6 wks
No Risk of Life threatening Hypo



DOSE - 200 mCu $\rightarrow$ $\bar{e}$ out Dosimetry
1500 - 1000 m $\cdot$ $\bar{e}$ Dosimetry

Thyroid scan $\rightarrow$ -ve , Tg $\uparrow\uparrow\uparrow$

CASE-2

↓

Single Dose I^{131}

↓

Persistent Ig elevation

PET SCAN ∞

also in

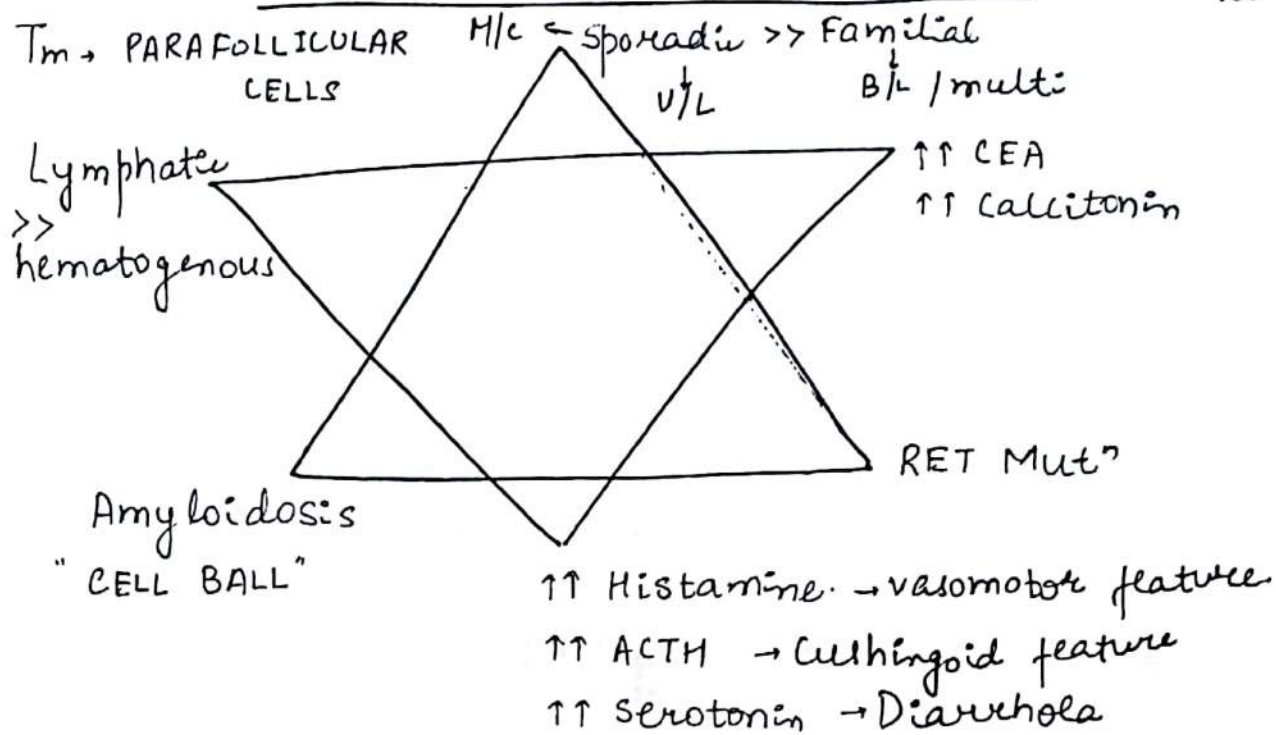
[FOLLOW-UP OF HURTHLE CELL.]

THYROID REPLACEMENT	POST. TOTAL THYROID ¹²⁵ DTC
(THYROID SUPPRESSION DOSE)	

<u>CONDITION</u>	<u>TARGET TSH</u>
Residual Disease	$< 0.1 \mu\text{U/dL}$
Disease Free + High Risk	$0.2 - 0.5 \mu\text{U/dL}$
Disease Free (No added Risk)	$0.5 - 2 \mu\text{U/dL}$

MEDULLARY THYROID CANCER

150



M/C distant Mets → LIVER >> BONES.
(osteoblastic)

M_X - TOTAL THYROIDECTOMY
± prophylactic central neck Dissec.

INDICATIONS for MRND + CND

- 1) ± Central Neck node
- 2) Size > 1.5 cm

Remain ~~one~~ ^{one} step Ahead -



TT + CND



TT + CND + MRND (± ipsilateral)



TT + CND + MRND + (B/L)

Mx of Adv. MTC (Metastatic)

151

1) Debulking Thyroidectomy

2) Chemotherapy

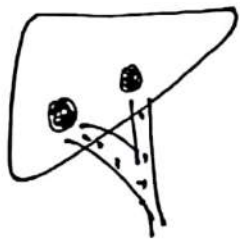
Vandetanib → Doc for metastatic MTC

Labetuzumab (anti-CEA)

3) Radiotherapy

⇒ No Role of Radioactive Iodine Ablation

For LIVER METS



→ TRANS ARTERIAL CHEMOEMBOLISATION (TACE)

→ TARE → I^{131} , Yttrium⁹⁰
↓
radiotherapy

DEBIRI → technique of TACE.

Drug eluting Beads of Irinotecan

CALCITONIN → used for follow up of medullary thyroid cancer.

PARATHYROID

152

ANATOMY

Sup. PT ○ ○

Inf PT ○ ○

40-50mg each.

Colour → yellow

↳ in newborn = Gray

Sup. PT

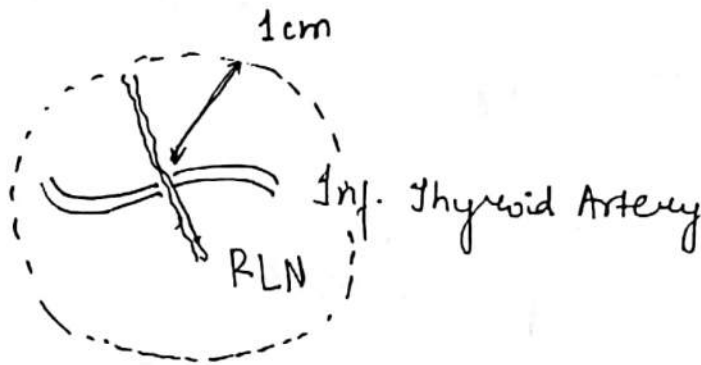


Develops from 4th Pharyngeal arch

Inf. PT



Develops from 3rd Pharyngeal arch



● Inf. Parathyroid



● Sup. Parathyroid

V I D S
ventral ↓ Inf. Dorsal → Sup.

MICROSCOPY

153

OXYPHILL cell

CHIEF cells

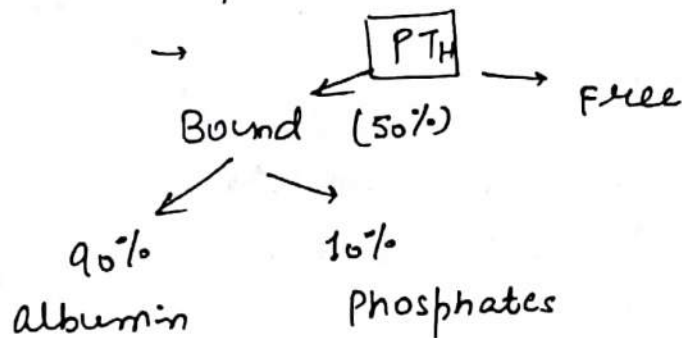
WATER cells

Most imp

Seen after Puberty

PHYSIOLOGY

PARATHORMONE → 84 AA
32 AA functional
Rest non-functional



→ $t_{1/2}$ of PT → 3 min

→ ↑↑ Blood Calcium Levels

→ Calcium → albumin

(i.e. every rise or fall above 4 gm/dL of albumin levels.

↳ S. Calcium changes by 0.8 mg/dL

Eg.

If $\text{Ca}^{2+} = 8.8 \text{ mg/dL}$

Albumin = 6 $4 \xrightarrow{2} 8$

$$2 \times 0.8 = 1.6$$

$$\text{Ca}_{\text{eff}} = 8.8 - 1.6 = 7.2$$

HYPERPARATHYROIDISM

154

M/c → Adenoma > Hyperplasia > Carcinoma

↳ in MEN-1 → Hyperplasia > Adenoma

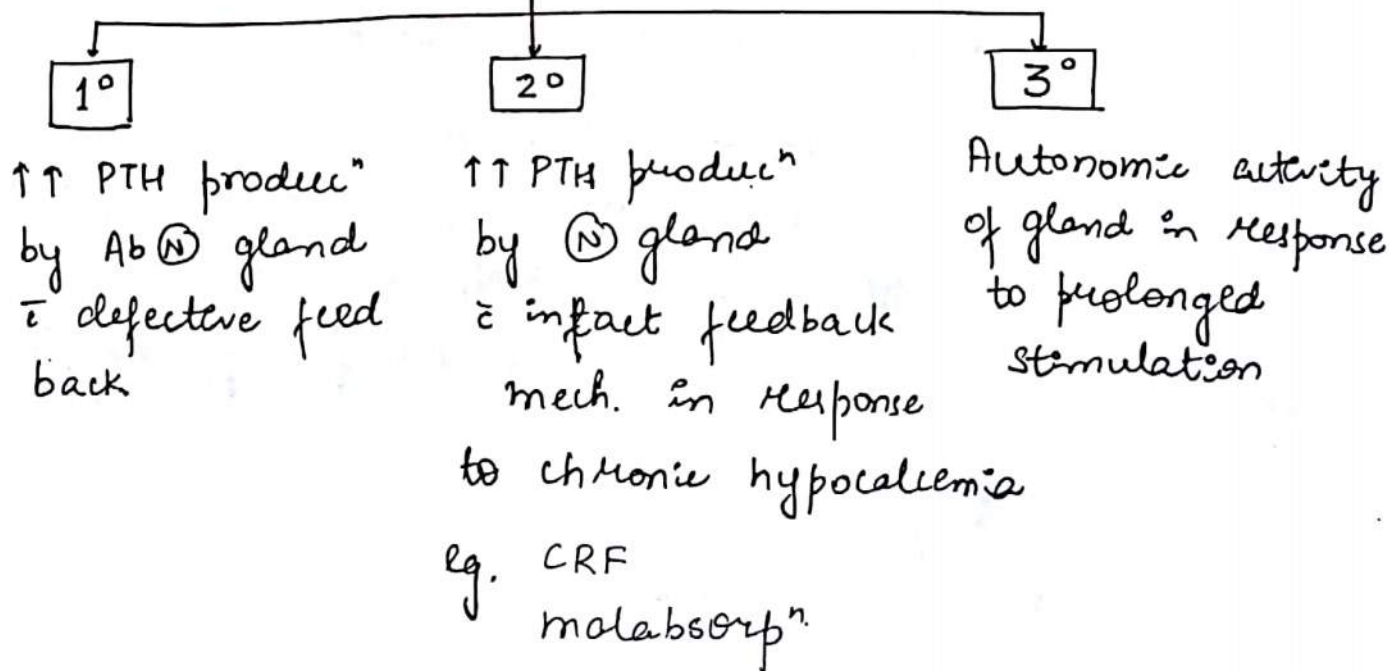
ADENOMA = enlargement of single PT out of 4

HYPERPLASIA = enlargement of all PTS.

If 2 enlarged → double adenoma

CARCINOMA - P.T. is ↑↑ in size + Atypical features +
Capsular Invasion +
↑ mitotic count +
Pleomorphism

TYPES



DKA HUNGRY BONE DISEASE

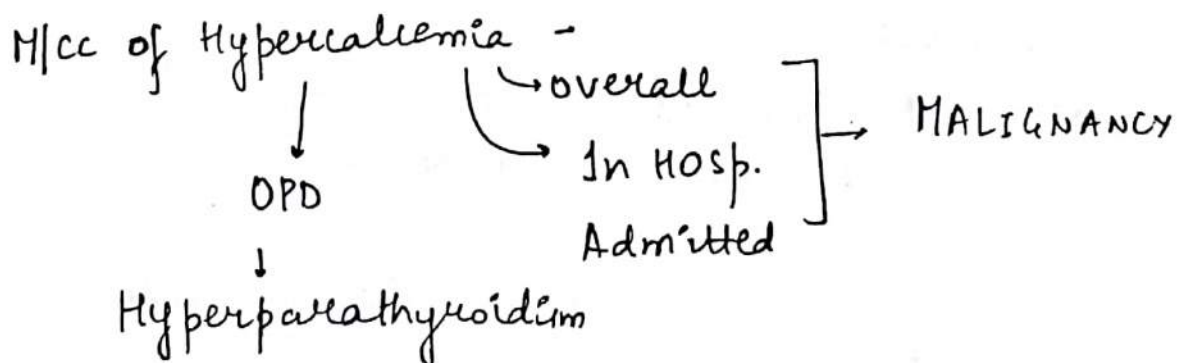
Rapid, massive absorption of Calcium by the bones after correction of Hyperparathyroidism. leading to life-threatening Hypocalcemia.

CALCIPHYLAXIS (Uremic arteriopathy)

Necrotising gangrenous lesions due to blockage of arteries by deposition of calcium in a/̄ state of uremia

DIAGNOSIS

- 1) S. PTH $\rightarrow \uparrow$
- 2) $Ca^{2+} \uparrow\uparrow$
- 3) $[S. Cl^- : PO_4^{3-} > 33]$.
- 4) Mild Metabolic acidosis (Hyperchloremic)
- 5) S. $Mg^{2+} \rightarrow \textcircled{N}$ or $\textcircled{\downarrow}$ (Osteitis Fibrosa cystica)



FEATURES

Painful Bones
Kidney Stones
Abdominal groans

Psychic Moans.

156

Fatigue overtone

Nowadays

- 1) Dyspepsia
- 2) Polyuria
- 3) Polydipsia
- 4) Anxiety
- 5) Myalgia

KIDNEY → 1) Nephrocalcinosis

2) Polyuria

3) Polydipsia

4) HTN

5) Nephrolithiasis (<20%)

BONES → 1) Subperiosteal Bone Resorption of

2) Osteoporosis

3) Osteopenia

4) Osteitis fibrosa cystica
(woven cancellous bone)

X-RAY → 1) Subperiosteal Bone resorpⁿ of Radial
Aspect of middle phalanx of 2/3rd finger

2) Tufting of distal phalanx

3) Salt & pepper skull

4) osteoneuromatosis of Jaw (BROWN TUMOURS ¹⁵⁷ OF JAW)

GIT - 1) Dyspepsia

2) ulcers

3) Ac. Pancreatitis

[Calcium > 12.5 mg/dL]

Neurological Symp - Depression
Anxiety

Others → Myopathy → proximal. ⁸⁸
purely muscular weakness.

Rx -

PR-OP LOCALISATION OF PARA-THYROID :- QQQ

NON-INVASIVE

(Preferred)

SESTAMIBI SCAN (BEST)

↓
(DUAL SCAN)

↙ Tech ⁹⁹ ↘
[SPECT]
Loc for ectopic
parathyroids

↓
Para-esophagus >>

Mediastinal >

Intrathymic >

Intracervical >
thyroid >

Carotid sheath

INVASIVE

FNAC

Arterial sampling

4D-CT $\rightarrow$ 4th Dimension for functional assessment
checks vascular gradient

USG $\rightarrow$ IOC for Intrathyroidal PT's

Rx-

INDICATION FOR Sx

1) All Symptomatic HPT

2) or

Asymptomatic Patient $\bar{c}$ any of the following

a) Age < 55 yrs

b) Nephrolithiasis

c) GFR < 60 mL/min $\rightarrow$ grade III CRF

d) Serum Calcium > 1 mg/dL above baseline

e) Z score < -2.5 D

Sx

ADENOMA

4 gland exploration
F/B Resecⁿ of Ab(N)
gland

Nowadays-

Minimal Invasive
Parathyroidectomy
is done via 2cm
incision

HYPERPLASIA

Either
① Partial Parathy-
roidectomy
or

3 1/2 gland Sx

Preserve 30-40 mg
of most (N)
appearing gland

CARCINOMA

Removal of gland
+
adjacent tissue +
Ipsilateral Neck
Dissection.

- ② Total Parathyroidectomy
F/B autoimplantation
into brachioradialis
of non-dominant arm



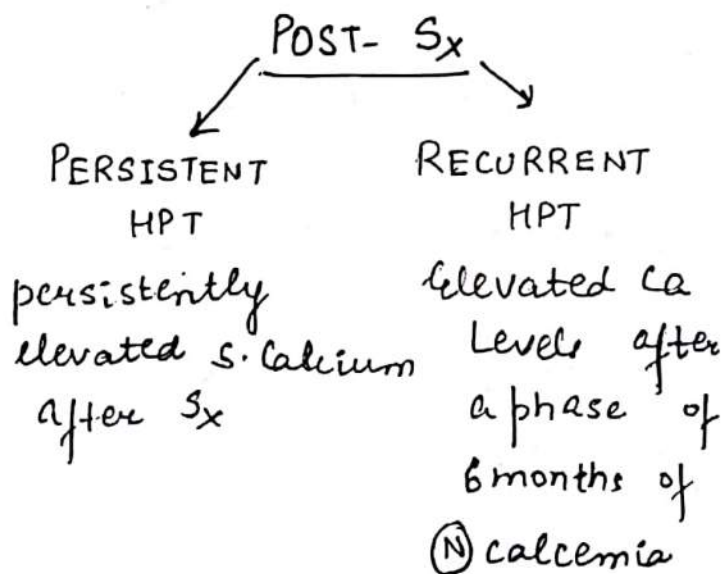
Pockets

10-12

1-3 pieces / Pocket

Size = 1-2 cm.

For Localisation in
future → Non-absorbable
suture or clips are
used



- * Intra operative PT Assay
Confirmatory PTest for PTs
Fall in PTH level > 50% after
to min of removal of Ab (N)
gland

HYPOCALCEMIA

160

S. Calcium $< 8.5 \text{ mg/dL}$

FEATURES

- 1) Earliest - ~~Hyp~~ Tingling or perioral numbness
- 2) Tachycardia / Palpitation / arrhythmia
- 3) Chvostek Sign
Twitch @ facial M/S on tapping over zygomatic arch
- 4) Trousseau's Sign (Most sp.)
carpal pedal spasm

Mx -

$< 8.5 \text{ mg} \rightarrow 7.8 \text{ mg/dL} \rightarrow$ Oral Calcium
($1 \text{ gm} \times \text{QID}$)
+
Vit D / Rho calcitriol.

$\text{Ca}^{2+} < 7.8 \text{ mg/dL} \rightarrow$ I.V. Calcium gluconate

ADRENALS

161

PHEOCHROMOCYTOMA

Tm arising from chromaffin cells of Adrenal medulla (derived from neural crest cells)

also k/n/a 10% TUMOUR

10% Familial

10% - B/L

10% - Malignant → Any Pheo ± metastasis

10% - Extradrenal

Non-specific - (seen in Benign also)

Pleomorphism

↑↑ Mitotic count

Atypical cells

HIGH PASS score → Pheo in adrenal severity score
↑↑ Ki67 → s/o malignancy
↑ Index of necrosis

→ PARAGANGLIOMA - Extra-adrenal Pheo

M/C site = ORGAN OF ZUCKERKANDL.



↓ M/C location
Ⓛ to Bifurcation of Aorta

→ sporadic >> familial

↓ M/C
5th - 6th D

↓
3rd Decade

Familial → a/c MEN₂
VHL
NF₁

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→ GENETIC - Mutⁿ In SDH (succinyl dehydrogenase)



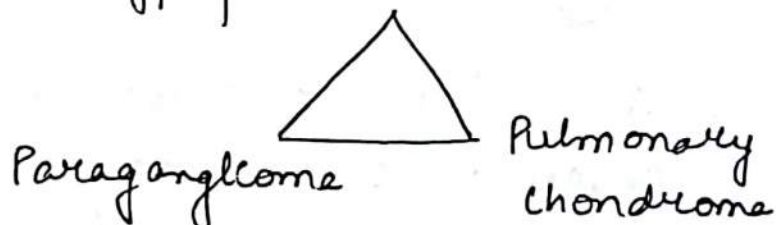
Norepi → $\xrightarrow{\text{PNMT}}$ Epinephrine
(Phenylethanolamine
N-Methyl Transferase)

Pheo → ↑↑ NE / ↑↑ E

Paraganglioma → only NE (except → org. of
Zuckerkandl. it
contains PNMT also)
So, ↑↑ E.

CARNEY'S TRIAD

Wild type of Gastric GIST



CD 117 ⊖

PDGF ⊖

BRAF ++

Ins like GF ++

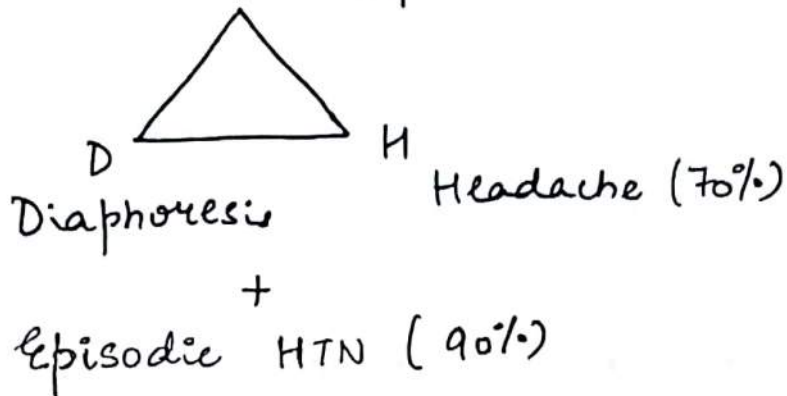
CARNEY'S STRATIKIS SYNDROME

163

GIST + Paraganglioma.

C/F-

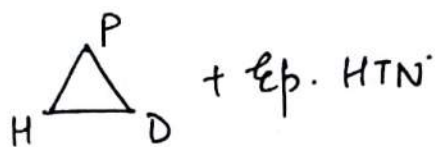
P = Palpitation.



Δsis -

IOc = Urine 24hrs Free METANEPHRINE.

1st Line Inv → Plasma free metanephrine



Rules out Pheo $\leftarrow \ominus$ Plasma Free Metanephrine

$\downarrow \oplus$

24 Hr. Free Urine Metanephrine

$\ominus$ $\swarrow$

$\oplus$

Δ sis

Repeat 24 Hr

Pheo $\leftarrow \ominus$ Urine free

Ruled out

Metanephrine

EQUIVOCAL

CLONIDINE SUPPRESSION TEST

$\oplus$

Pheo ruled out

$\ominus$

Δ sis confirmed

LOCALISATION

IOC - MRI > CECT

[Ligh Bulb Sign] (also seen in Hemangioma Liver)

DOPA
PET
HIBG
Scan

$\left[\begin{array}{l} < 50\% \text{ or} \\ \text{Suspecting multiple} \\ \text{lesion} \end{array} \right.$

$> 50\% \text{ or} \\ \text{solitary}$

(Methods Benzyl guanidine)

PR-OPERATIVE Conditioning

α BLOCKERS $\rightarrow$ Phenoxybenzamine (2 weeks prior to Sx)
 1st sign of Blockade $\rightarrow$ Nasal congestion.
 other $\rightarrow$ orthostatic Hypotension.

Add β Blocker prior to Sx
 (2 days prior to Sx)

Sx = Lap. Adrenalectomy (upto 5cm)
 open > 5cm.

α -agonist may
 be added to
 prevent hypotension

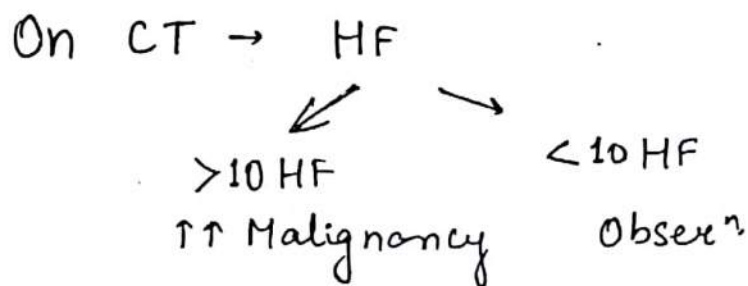
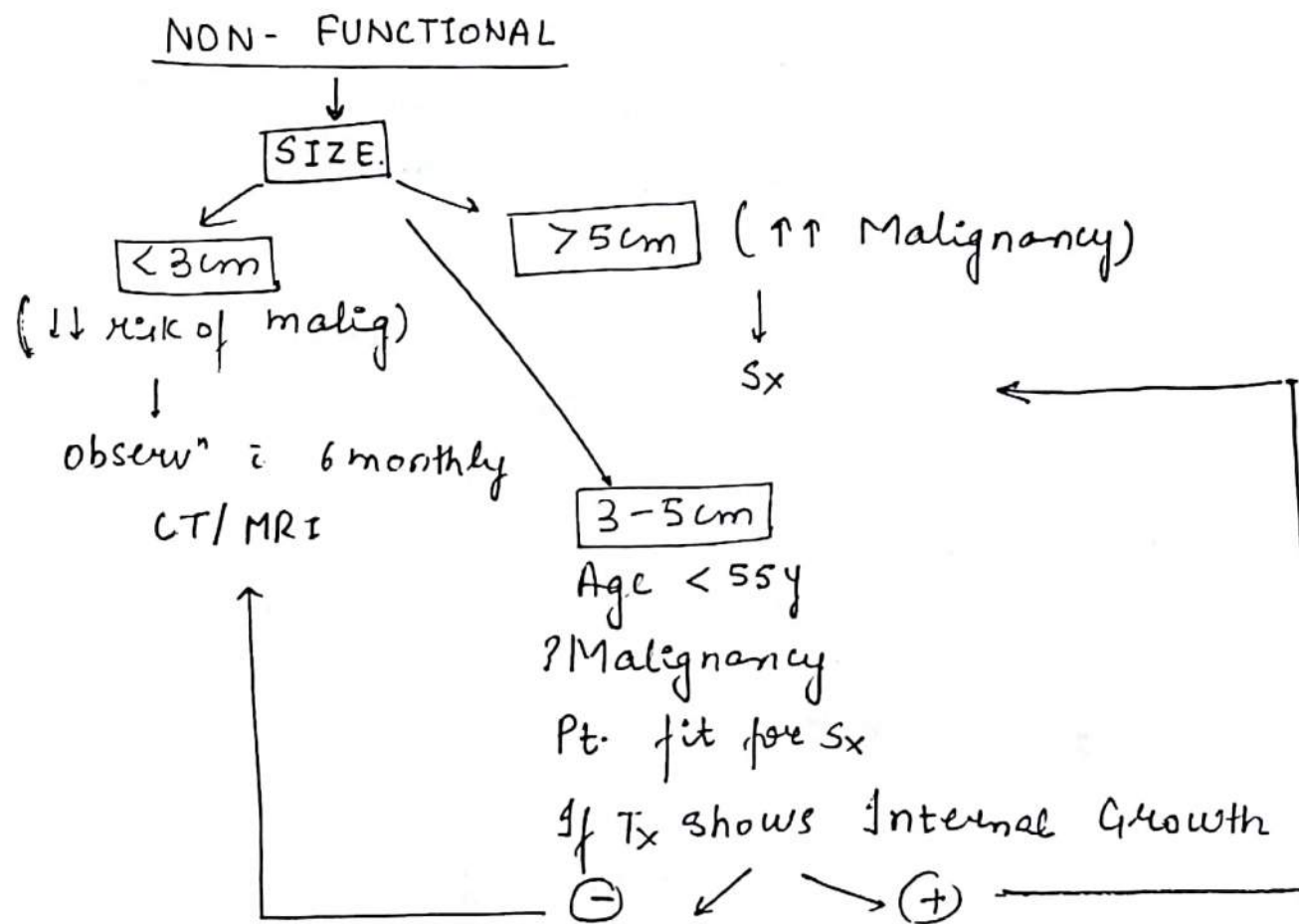
In $\odot \Rightarrow$ Termination of $\odot$

Lap Adrenalectomy Sx

ADRENAL INCIDENTALLOMA

166

- Accidentally/ Incidentally detected while screening for other pathology
- 70% - non functional
30% - functional (Aldosteroma - M/C)



ADRENOCORTICAL CARCINOMA

167

→ Rare

→ ♀:♂ (1.5:1)

→ Bimodal Age - 1st → 1st Decade
2nd → 5th - 6th Decade.

→ Mostly → Acc [Functional]

↓
H/cc

Aldosteronoma >> Cushing's

Features s/o Malignancy

▷ WEISS Index

↑↑ size (>5cm)

Atypical cells

Pleomorphism

↑↑ mitotic count

WHO CLASSIFICATION

I <5cm size

II >5cm

III Any size ± Local Invasion

IV Disseminated

R_x - Radical Resecⁿ of Adrenal

MEN SYNDROME

168

[Multiple Endocrine Neoplasia]

MEN₁
WERMER SYND.

MENIN

On 11q13 [110 codons
AD 610 axons]

JUN-D proto-oncogene mut^r.

MEN₂

SIPPLE Synd

← GENE →

RET protooncogene
(Rearrangement during transfection)
chr. 10
AD

gDNF
glial derived neurotrophic factor

MEN-1

Parathyroids
(80%)

Pancreas
(60-70%)

Pituitary
(40-50%)

PARATHYROID

M/c site for MEN1

M/c ab(N) ⇒ Hyperparathyroidism

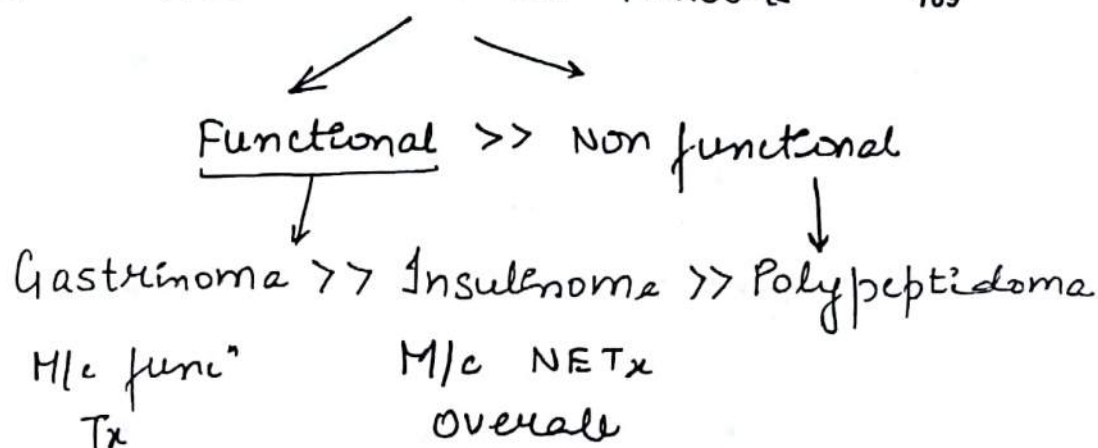
M/c

Hyperplasia >> Adenoma

M/c } Biochemical Ab(N) ⇒ Hypercalcaemia
1st age - 13-15 yrs.

PANCREAS - Neuro-endocrine Tumours

169



Other → VIPoma (vasoactive Intestinal Peptidoma)

↓

WDHA Syndrome / Verner Morrison Synd.

Watery Diarrhoea

Hypokalaemia

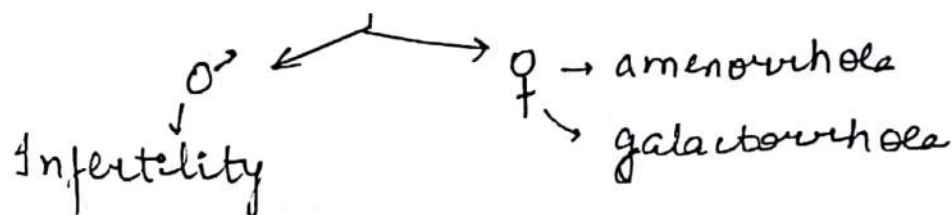
Achlorhydria

PITUITARY

Post Pituitary is never Involved

Only Ant. Pituitary involved.

M/c Lesion = PROLACTINOMA



Blindness may be seen due to compression over optic chiasm

Other Tx of MEN-1

170

1> Bronchial / Thymic / Gastric Carcinoid.

CARCINOID → [gut M/c]

Appendix → Ileum → Rectum → Bronchus

2> Lipoma

3> Cutaneous + Facial Angiofibromas

4> Thyroid Tumours

5> Adrenal Mass

Δ su of MEN₁

CRITERIA → Involvement of 2 out of 3 target
endocrine organ.

FAMILIAL MEN₁ → Any 1 of 3
target organs involved in 1st
degree relative of MEN-1

SCREENING

→ At Birth :- MENIN GENE MUTⁿ

⊕ ⊖
MEN-1 ruled out

At 5yr.
MRI ⊕⊕ Pituitary @

Annual 3x. Prolactin.

↓
Sestamibi Scan ← At 8yr @ Parathyroid
@ Annual 3x. PTH / Ca²⁺

At 20yr @ Pancreas

171

@ annual sc.

Evaluate that
NET

- Gastrinoma
- Insulinoma → C-peptide
- Glucagon.
- VIPoma

(chromogranin A
synaptophysin) → NF Tumour

Δ-- Gastrinoma →

BAO → $> 15 \text{ mEq/hour}$
or

$> 5 \text{ mEq/hr.}$

(in post vagotomy status)

+

↑↑ Fasting Gastrin

($> 1000 \text{ pg/mL}$ → Asu

$100 - 1000 \text{ pg/mL}$ → equivocal)

↓

Secretin Stimulation Test

↓

Rise $> 200 \text{ pg}$ above Baseline. Δstic

Insulinoma → IOG = 72hrs monitored fasting
glucose

↑↑ C-peptide $> 1.2 \text{ μg/dL}$

Insulin $> 12 \text{ μIU/mL}$

$< 50 \text{ mg/dL}$ → ♂

$< 40 \text{ mg/dL}$ → ♀

Pro-Insulin > 40%

172

Ins: glucose > 3

MEN-2

MEN_{2A}

MEN_{2B}

More aggressive

M/C site

← MTC →

Interscapular
Region

← Pheo →

> Cut. Lichen (deposition of amyloid in Papillary Dermis)
flexure Amyloidosis

Hyperparathyroidism

Hirschprung's Disease
↳ No fecal soiling

Mucosal neuroma
(M/C → Lips, Buccal cavity)

GI neurogloma

Morfinoid Habitus

Everted Eyebrows

Megalodon.

chr. constipation
↳ fecal soiling (+)

Tongue nodules

SCREENING

At Birth → RET Mutⁿ

⊕

⊖

MEN₂ ruled out

Pentagastrin

stimulated calcitonin

Level ↓

elevated → Prophylactic Total Thyroidectomy

MEN_{2B} → T in 1 year

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MEN_{2A} → < 5-6 year

(No L.N. Dissection)

SALIVARY GLAND

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TUMOURS

BENIGN

1) PLEOMORPHIC ADENOMA (PLA)

M/c Overall salivary Gland Tumour

M/c Tumour of Parotid Gland

M/c Benign Tumour overall

PLA - epithelial cell
Mesenchymal cell } $\Rightarrow$ Pleomorphic
Duct cell

♀ >> ♂ [3:1]

* PAROTID PLEOMORPHIC ADENOMA =

M/c site $\Rightarrow$ Superficial Lobe Lower Pole
(Tail)

DUMBLE Tx $\rightarrow$ when Both lobes involved
(sup & Deep)

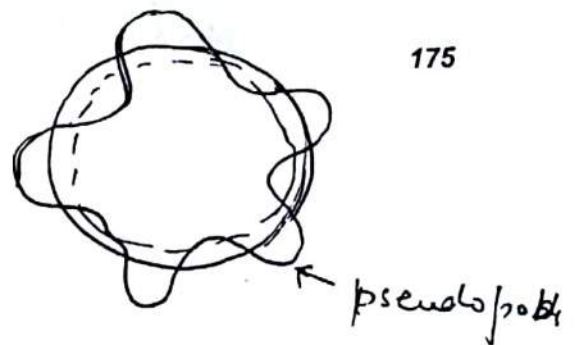
Medial Displacement of Tonsillar Pillar



FEATURES-

- Encapsulated
- Firm
- mobility
 - ↳ freely mobile
- except in upward direction
- CURTAIN SIGN

(due to insertion of deep cervical fascia into zygomatic arch)



175

No hole of enucleation.

SIGNS OF MALIGNANCY

- Facial N/V weakness
- Ulceration
- Fixity
- Rapid ↑ in size
 ↳ onset Pain.

CARCINOMA EX- PLEOMORPHIC ADENOMA

Malignant conversion of long standing PLA

Q PLEOMORPHIC AD. CARCINOMATOSIS

100% Carcinomatosis conversion
= no adenoma component



Asis :

PAROTID MASS

176

IOC = FNAC

100% accurate

95% specific

90% sensitive

Biopsy is C/I

duct ↑↑ Risk of

1) FN ~~Inf.~~ Facial N/V Injury

2) Tumour spillage

3) Parotid Fistula.

Tm for malignancy → MUC₁; DF₃

For Malignancy ? → MRI > ECT

to evaluate gland + its
relation.

PAROTID MASS

BENIGN

MALIGNANT

Sup. Lobe

Deep Lobe

Radical Parotidectomy

IOC = Sup.
Parotidectomy
or

Superficial
Parotidectomy

Total conservative
Parotidectomy
(N/V sparing)

(Parotid +
~~Pre~~ Pre-Auricular
LN +

Involved part of
Facial N/V

↓
RT

Recurrent PLA $\rightarrow$ Sx $\rightarrow$ RT QQQ

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FACIAL N/V RECONSTRUCT

Sural N/V (BEST)

Others - Auricular Temporal N/V

Anti-lubital Brachial N/V

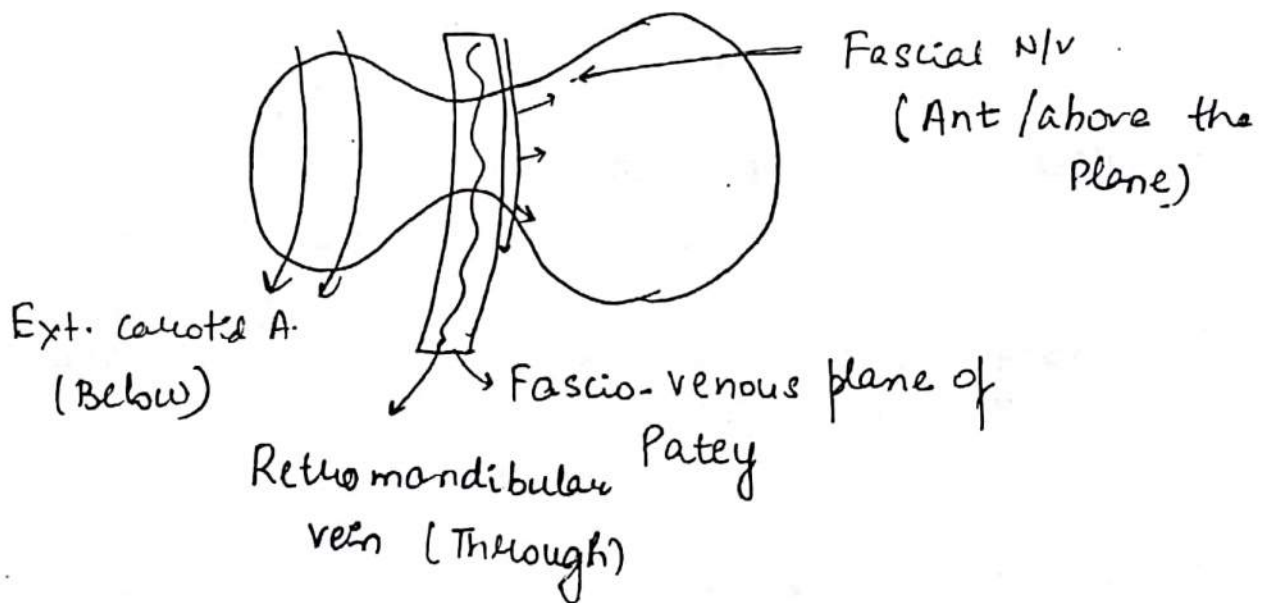
Sup. Parotidectomy $\rightarrow$

Removal of sup. Lobe of Parotid to expose
Branches of Facial N/V.

Suprafacial Parotidectomy $\rightarrow$

Wide local excision of Benign sup. Lobe Tx
out exposure of Facial N/V branches

Adv $\rightarrow$ Less Inj to Facial N/V



27 WARTHIN'S TUMOUR

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2nd M/c Salivary Gland Tumour.

Exclusive to Parotid

K/n as ADENOLYMPHOMA → lymphoma

K/m as PAPILLARY CYSTADENOLYMPHOMATOSIS

♂ > ♀ (4:1)

Can be B/L (10%)

Strongly A/E Smoking
Radiation

↑↑ in Mitochondria

↓
Tech⁹⁹

↓
HOT SPOT

M/c Site → TAIL of parotid

Microscopy - 2 rows of papillae lined columnar epithelium.

37 ONCOCYTOMA (<1%)

K/n as OXYPHILIC ADENOMA

Tan or Mahogany colour
pseudocapsule

Parotid → H/c site

179

Tech⁹⁹ → FLOT SPOT

(overall → kidney → H/c site → oncocytoma)

H/c Benign Tx

4) LYMPHOEPITHELIAL LESIONS

a/e CMV Infecⁿ

k/n as GODWIN'S TUMOUR

Mostly Benign

ass/c → BLEL → Benign Lymphoepithelial Lesion.

Gland Parenchyma → replaced by Lymphocytes.

<5% ⇒ malignant

↓
ESKIMOMAS

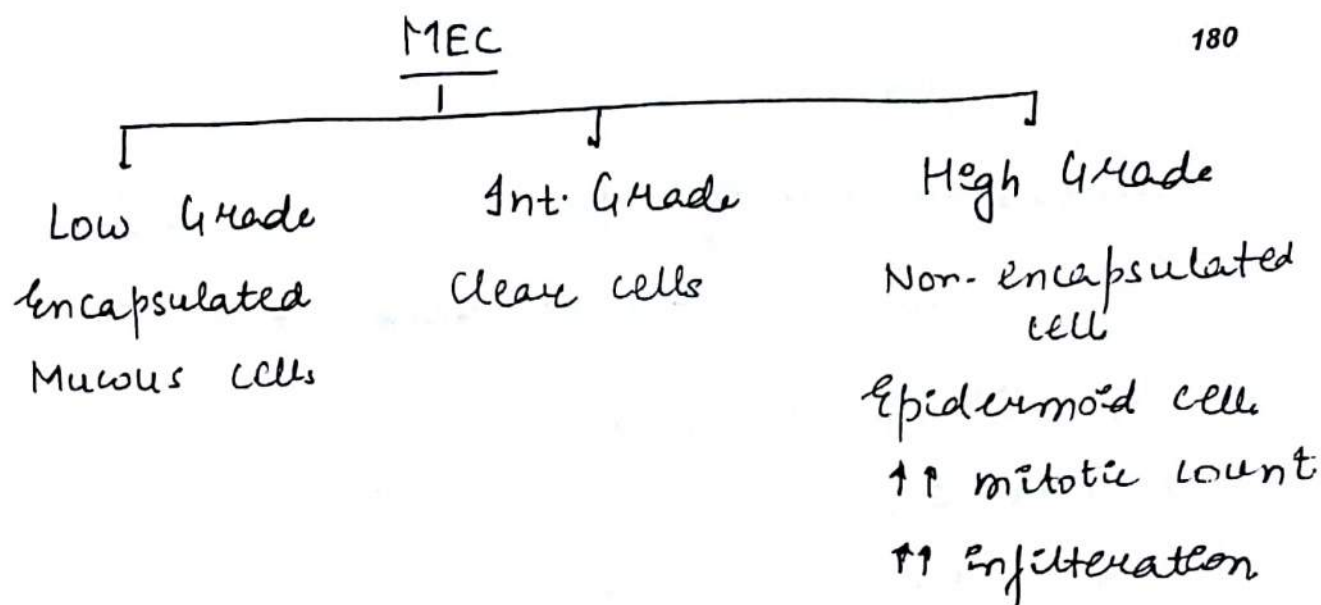
MALIGNANT

1) MUCOEPIDERMOID CARCINOMA

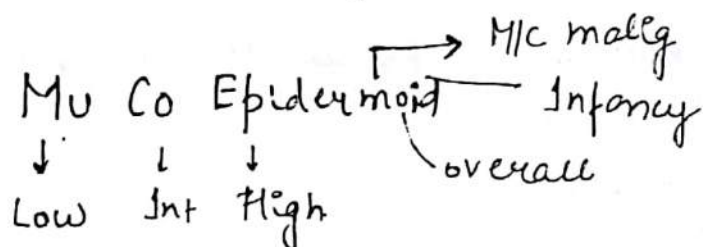
→ H/c malignancy

- overall
- Parotid
- Infancy

→ a/e radiation



R_x = Radical Resection f/b RT
[except Low grade mucoepidermoid]

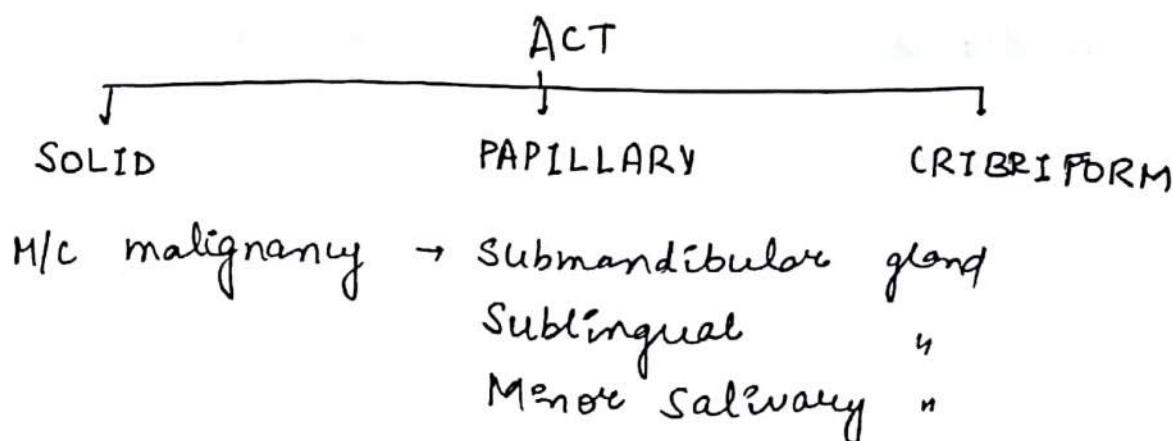


27 ADENOID CYSTIC TUMOUR

Low grade
slow growing

a/c → Perineural Invasion
→ Hematogenous spread.

also known as CYLINDROMATOUS TUMOUR



On Microscopy → SWISS CHEESE

→ [HIV PAROTITIS] ¹⁸¹

Rx- Radical Resection

RT must

37 ACINIC CELL TUMOUR

→ Low grade Tumour

→ slow growing

→ Tm of pure serous gland

↓
90%

↓
Parotid

→ a/c Lymphatic spread

Microcystic Type is M/C

Other types → Papillary, follicular, medullary.

Microscopy → ZYMOGEN GRANULES

BUBBLY BASOPHILS

Rx- Radical Gland Resection



GIT

Blankito 183

16/12/17

ESOPHAGUS

(PGI, AIIMS)

length of oesophagus - 25cm

* 3 pt of constriction: from incisor

15cm → Cricopharynx C₆ T₄ (L) Bronchus

25cm → (C) bronchus T₄

40cm → diaphragm T₁₀

(diaphragm) T₁₀

T₁₁ GEJ

Cricopharynx is narrowest part of whole of GIT.
next narrowest part is ileocaecal junction?

(L) Bronchus - 22.5 } they approx. are at 25cm.
Aorta - 27.5

* Opening of Diaphragm -

① T₈ - IVC ——— (R) phrenic nerve

② T₁₀ - oesophagus { B/L vagus
Branches of (L) gastric artery

③ T₁₂ - aorta → azygous vein
thoracic duct

drain into
Brachiocephalic vein
inf. thyroid vein.

AIIMS

Blood Supply of oesophagus

(Lung)

Brof
thyrocervical
trunk

inf thyroid
artery

aorta
& Bronchial artery

(L) gastric vein

drains into
portal vein

(Liver)

(L) gastric

inf phrenic

Dr of abd. aorta

(A) (L) gastric &
inf phrenic

azygous vein
drain into
IVC

It has no serosa. → hence there is no subserosal plexus.

↓
they have submucosal plexus.

Q. $\subseteq$ organ of GIT has no submucosa → G.B.

longitudinal muscle → Helicoidal pattern



① Diffuse oesophageal spasm. (DES)
↳ cork screw appearance in Ba swallow

② Distensibility → good potⁿ of stretching
Dysphagia as a symptom occurs
when there is obstruction > 75%.

↓
Hence Ca oesophagus has late presentation
poor prognosis

5 year survival rate < 20%.

Epithelium-

non-keratinised stratified sq. epithelium.

upper
middle

sq. cell ca

Adenoc

Z line

cuboidal initially

↳ later columnar

Muc 40-50%

(Pre-malignant)

Barrett's oesophagus

in case of GERD, goblet cells develop

Intestinal metaplasia (intestinal columnar)

Commonest Ca of oesophagus $\Rightarrow$ Sq. Cell Ca.
 Site $\Rightarrow$ Middle $\frac{1}{3}$ rd

Adeno Ca $\Rightarrow$ Lower $\frac{1}{3}$ rd
 common in White σ

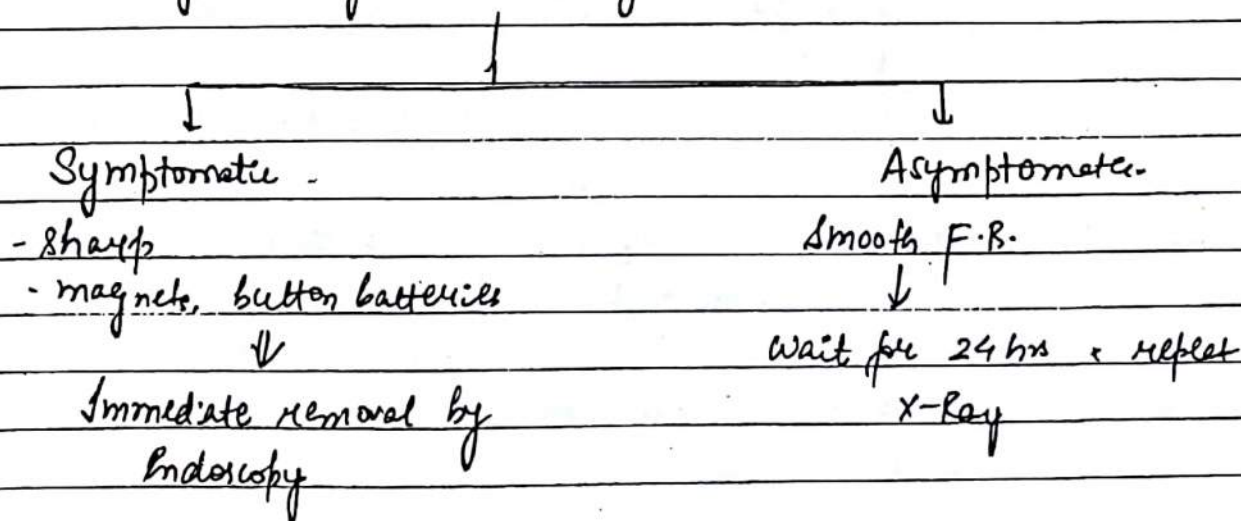
Q. Long segment of Barrett's $\Rightarrow$ $> 3\text{cm}$ squamous

Q. What dye is used for Barrett's $\Rightarrow$ Iodine!
 $\nearrow$ Chromoendoscopy
 earliest Dx for oesophageal Ca.

for columnar $\Rightarrow$ Methylene Blue
 AIPY Oral cavity $\Rightarrow$ Toluidine Blue

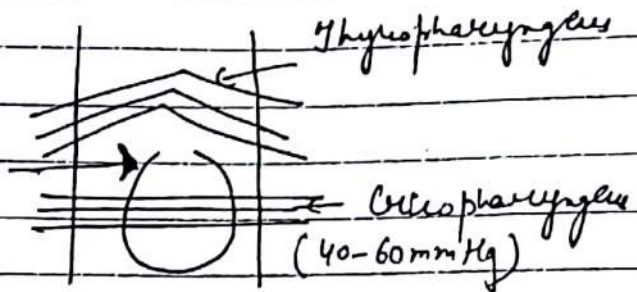
For Histology, (1) Gillian Blue, (2) Alcian Blue, (3) Metanil Yellow

Plus Foreign Body In Oesophagus



ZENKER'S DIVERTICULUM

- Pulsion Diverticula from Killian's Dehiscence
- Acquired Dehiscence



- common in ♂, old age

Pressure ↑
Ach

Pressure ↓
VIP

Nitric oxide

Congenital

- True
- all 3 layers

Acquired

- False
- only 1 layer

① ⇒ Pulsion diverticula.

② ⇒ Traction diverticula

Killian's Dehiscence is posteriorly (hyopharynx)

Diverticula is common in (L) side

③ Zenker's (Pulsion)

④ Traction

⑤ epiphrenic diverticula (Pulsion)

2nd swallowing is found in Ba meal studies in Zenker's diverticula.

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Y/E -

① Regurgitation (old/undigested)

② Dysphagia (intermittent)

M/c of Intermittent Dysphagia $\Rightarrow$ DES

other cause ① Schatzki's Ring

② Zenker's

③ eosinophilic esophagitis

③ Halitosis

④ Aspiration pneumonia (M/c complication)

⑤ Lung abscess next common

⑥ Lung Ca oesophagus 5% M/c.

Morris Classification -

< 2 cm $\Rightarrow$

2-4 cm

> 4 cm.

Von Overblek

compared to vertebra

< 1 vertebra

1-2 "

> 3 "

IxOC $\Rightarrow$ Barium Swallow

M/c site of iatrogenic perforation $\Rightarrow$ cervical oesophagus

* Indications for Ba swallow :-

① Complete Dysphagia

② Liquid dysphagia

③ anatomical delineation

Structure

Diverticulum

Stomach - hiatus hernia
volvulus

R_x

> 4cm $\Rightarrow$ Diverticulectomy
+ oesopharyngomyotomy
(cervical myotomy)

If ZDU ≤ 2 cm $\Rightarrow$ oesopharyngomyotomy or
Botulinum toxin injection.
 $\hookrightarrow$ $\ominus$ release of ACh

2-4 cm $\Rightarrow$ myotomy or Bot. toxin injection.
+
Diverticulopexy

Dohlmann's Procedure

- Endoscopic procedure

- staplers used

- not ^{done} good for very small
diverticula

these days CO₂ lasers are used

Any size can be done

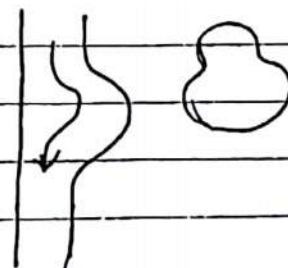
Von Overbeek done it 1st

Monilcal.

If odynophagia $\rightarrow$ candidial or herpes esophagitis or
pill induced esophagitis.



$\Downarrow$



ESOPHAGEAL WEBS & RINGS

* Plummer Vinson Syndrome / Paterson Brown Kelly Syndrome

- Asymmetrical mucosal web
- Seen at the level of cricopharynx (Post-cricoid)
- Med. aged / Perimenopausal / Edentulous ♀
- associated $\bar{c}$ Fe Deficiency Anaemia
- Asymptomatic, rarely may cause Dysphagia
- Sideropenic Dysphagia
- Cancer ring ↑
- IxO c- Barium Swallow.

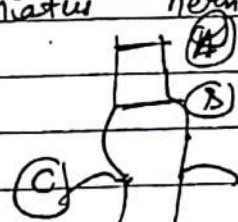
- Rx (i) Asymptomatic $\Rightarrow$ Fe supplementation.

② Symptomatic

- Balloon Dilatation.
- Savary Dilator & Rupture web.
- CO₂ laser.

* Rings $\rightarrow$ Schatzki Ring / B Ring

- Symmetrical
- Submucosal fibrous thickening
- at Z line, above diaphragm.
- seen $\downarrow$ along $\bar{c}$ sliding hiatus hernia.
- Non-progressive Ring
- happens due to GERD.
- Asymptomatic
- Pt will never have dysphagia for liquids



- Only dysphagia for solids (mild - moderate)
- Sudden aphagia

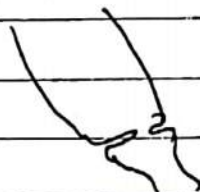
Ixoc → Barium Swallow

R_x - Asymptomatic - $\frac{1}{4}$ reflux.

Symptomatic -

Balloon Dilatation + rupture the ring
Hiatus Hernia → Fundoplication

Q True statements reg. Schatzki's.
Ring is/are



- ① dysphagia predominantly to solids
- ② Symmetrical
- ③ ↑ HCL & GERD
- ④ involve muscle → No, submucosal

SPONTANEOUS RUPTURE / BOERHAAVE'S SYNDROME

- caused by Barotrauma

It is spontaneous rupture of ② lower oesophagus (97%)
due to vomiting / retching against closed glottis
↓
Pleural effusion.

Meckler's Triad $\Rightarrow$

- ① Vomiting/ Hatching
- ② Retrosternal pain
- ③ Surgical Emphysema (air in subcutaneous plane)

Hamman's Sign $\Rightarrow$
 Sign of pneumomediastinum.
 auscultatory finding

$\downarrow$
 Air Crunch $\bar{c}$ Heart Beat

Ixo $\Rightarrow$ X-Ray $\Rightarrow$ CECT $\leftarrow$ Most accurate

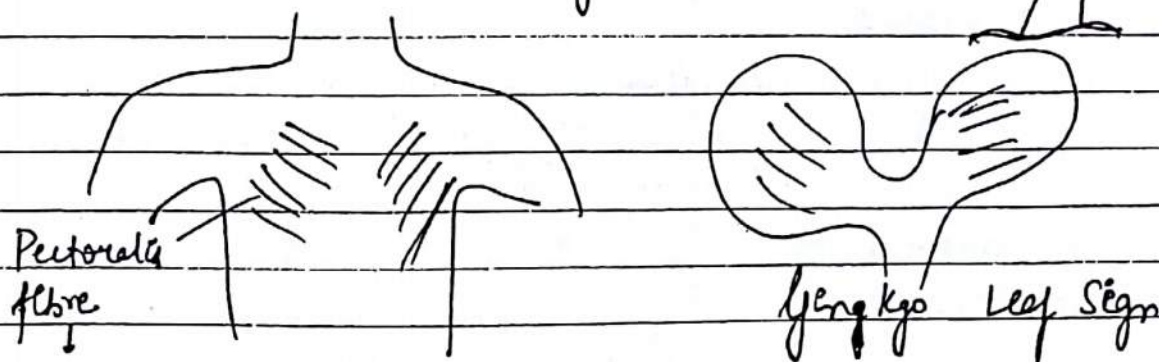
Don't prefer Barium in case of perforation. $\hookrightarrow$
 Basa, is water insoluble

$\hookrightarrow$ (R) Lateral Position is best for visualization.

Gastrogroffen $\rightarrow$ water soluble but Hypersoluble

Plain X-Ray $\Rightarrow$ ① Air shadow btw ② diaphragm
 $\hookrightarrow$ continuous diaphragm sign
 ② Neckers-V sign.

③ Sail sign or Spinnaker sign.



Seen in surgical emphysema

Rx - Post lateral (L) thoracotomy & 1° closure
 ↑ for lower oesophagus
 1° closure = vicryl

< 48 hr $\Rightarrow$ 1° closure

> 48 hr ~~24 hr~~ $\Rightarrow$ ~~72 hr~~ $\Rightarrow$ No 1° closure

Thoracotomy $\rightarrow$ ligate above + below the tear

- Damage + drainage
- Feeding jejunostomy
- Cervical oesophagostomy
 $\rightarrow$ for suction, aspiration.

Discharge after recovery

↓
 After 3 ~~weeks~~ months
 Excise the diseased part

↓
 Bowel Interposition
 (Jejunum > colon (L))

MALLORY WEIS TEAR -

- Barotrauma
- Longitudinal tear

↓
 Below GEJ (70%)

- Commonly seen in ♂ & ♀



- ② alcoholic binge
- ③ Hiatus hernia

- Partial thickness tear (Mucosa, submucosa involved)
H/o - vomiting initially → Haematemesis.

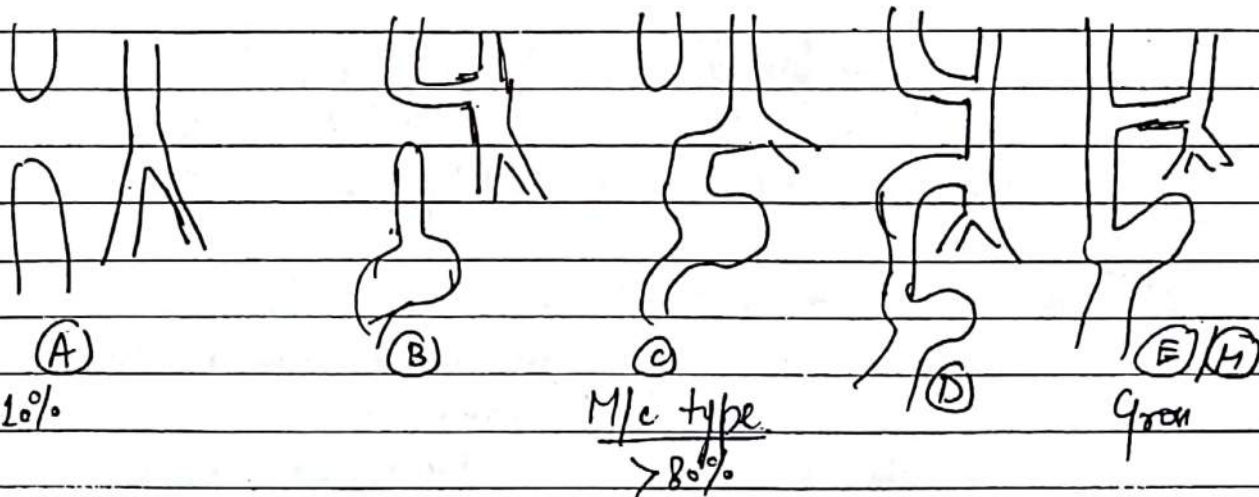
Ix0 c → Endoscopy

Rx - ① conservative

② Sx - sclerotherapy

Q. E artery bleeds in Mallory-Weiss Tear?
① gastric artery

TRACHEO - OESOPHAGEAL FISTULA



Q/E -

① Continuous dribbling of saliva

Type (A) + (B) ⇒ Scaphoid abdomen as air can't enter

② Choking while feeding

VOGT → © → 36.

- Incidence 1:5000

- ♂ > ♀

- common in Down's Syndrome

- Cong. malformation

- Polyhydramnios (50%)

GIT obstruction → Poly

Renal → oligo.

- 50% → multiple Congenital anomalies VACTERL

V → Vertebral

2nd H/C A → Anorectal

H/C → C - cardiac VSD, PDA, TGF.

T → TEF

E

R → Renal

L → Limb → Radial Hypoplasia

Relative 4:1 to BMV

IXOC →

① NG tube → take X-Ray.

↳ Coiling of tube in upper esophagus 10cm

if tube in lungs → Proximal fistula

ATZMS 2012

H type fistula → Most accurate Ix.

Tracheobronchoscopy

Safest contrast for leak → Dianasil.

Water soluble

Low osmolality

R. ① O₂ ~~fluid~~ I.v. fluid. Antesioten

① Feeding gastrostomy for sick babies.

③ (R) posterolateral thoracotomy (for middle oesophagus)
ligation of fistula & do oesophageal
anastomosis (end to side anastomosis)
↳ ↓ risk of stricture

Waterston's Criteria :-

① Birth wt	> 5.5 lb	In Btw	< 4 lb.
② aspiration pneumonia	-ve		+
	↓	↓	↓
	Thoracotomy	Inflid make pete sx.	Feeding gastrostomy

Ppt

ACHALASIA CARDIA

→ Improper Relaxation of LES.

Submucosal → meissner's

Muscle → Auerbach's or myenteric
(Motor ganglion)

Cause

→ absence of ganglion-inhibitory ganglion

2° Achalasia → Chagas Disease (Trypanosoma Cruzi)
common in S. America

Pseudoachalasia → by cancer



- young age (20-40 yrs)
- $\varphi \gg \sigma$
- c/f - ① Dysphagia - for liquids & solids
 - progressive

Both for liquids & solids.
Non-progressive

② Regurgitation

- aspiration
- halitosis
- wt. loss.

③ Cancer $\Rightarrow$ Sq. cell carcinoma

Triad $\rightarrow$ ① Dysphagia
② Regurgitation
③ wt loss

* Triple A syndrome / Albright Syndrome -

A - achalasia

A - alacrimia

A - ACTH @ adrenocortical insufficiency

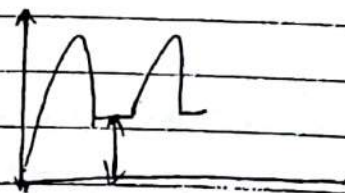
~~IXC~~ $\Rightarrow$ Iw

- ① Plain X-Ray - ① absence of fundal gas shadow
② Widened mediastinum
③ Air-fluid level in mediastinum

② Manometry - gold std.

$\rightarrow$ Non-relaxation of LES

③ $\rightarrow$ $\uparrow$ pressure of LES



Amyle nitrate inhalation test is used to detect - Achalasia Cardia

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- ~~Non~~ Atonic Oesophagus or high pressure non propagating.

③ Barium swallow -

Bird Beak appearance

Rat tail deformity

↳ Oesophageal Cancer

- irregular margins
- filling defect



Rx - ① Medical Rx - 10% efficacy - CCB

Nitrates

Highest
Response

② Injⁿ of Botulinum Toxin → recurrence rate > 50%
in 6 months

③ Balloon Dilatation.

45F - 60F

48F ⇒

5% risk of perforation

3Fr = 1mm.

↳ outer diameter
of tube

④ Heller's Myotomy

By laparotomy or laparoscopy

So, compⁿ → GERD



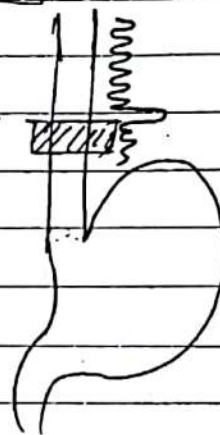
collar sling → prevent GERD
Helvetius collar fibres

So, we do Heller's Myotomy + Partial Fundoplication.

NUTCRACKER OESOPHAGUS / SUPERSQUEEZER

OESOPHAGUS

- Middle aged
- ♀
- C/F → ① Retrosternal pain.



M/c motility disorder of oesophagus
↳ nutcracker

M/c " " " " presenting as Dysphagia
↳ Achalasia Cardia

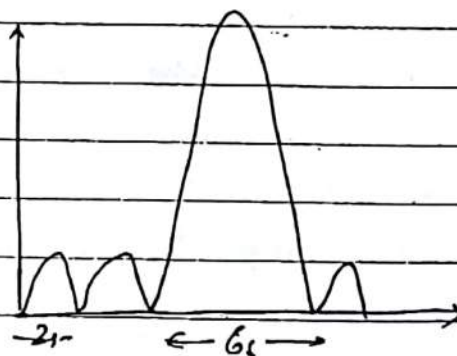
Inx - Manometry

O' Castell Criteria

- pressure > 180 mmHg
- duration of wave > 6s

⇓

↳ nutcracker oesophagus



R_x - Medical R_x → ① CCB
② Nitrate

* scleroderma is associated w GERD

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GERD - MAJOR TOPIC

Pathophysiology-

pH of stomach - 1-3.

pH of oesophagus - 5-7.

if pH of oesophagus $< 4 \Rightarrow$ Pathological.

* Protective Factors

(1) LES.

(N) pressure - 20 ± 5 mmHg.
physiological sphincter

(2) Intra-abdominal length

should be $> 2-2.5$ cm.

if < 1 cm $\rightarrow$ reflux occurs

(3) Intra-abdominal pressure

$\hookrightarrow$ $\uparrow$ sphincter pressure

(4) Supine position. $\uparrow$ sphincter pressure

(5) TLESR (Transient LES relaxation)

more frequent.

LES $\uparrow$ by

(1) Protein diet

(2) Gastrin

(3) Ach

(4) Secretin

(5) PGF

(6) α -stimulation

LES $\downarrow$ by

(1) Fat

(2) Alcohol

(3) Smoking

(4) β stimulation

(5) Somatostatin

(6) CCB, Nitrate

(7) Atropine

(8) Theophylline

(9) Morphine

(10) Diazepam.

(II) Low Intra-abdominal pressure -
reflux ↑.

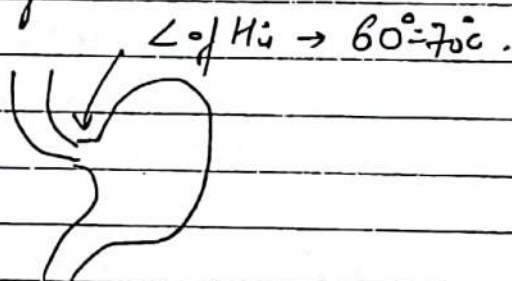
(III) 2° Peristalsis -

↳ starts from oesophagus
Results from reflux, propagatory
1° peristalsis → in response to swallowing
propagatory

ATIMS
3° peristalsis → non-propagatory

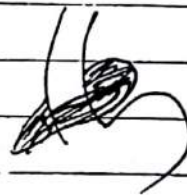
Presbyesophagus → motility disorder
3° peristalsis.
seen in old age

IV Angle between GEJ
if < becomes 90° → reflux
occurs



V Mucosal folds at GEJ. (gastric Rosette)
helpful

VI Curvature of Diaphragm. Pinch.
① curve prevents reflux
Cock effect



Allison Repair → tightening of ② curve of diaphragm.

Btw ① & ② curve of diaphragm, → Medial arcuate ligament
present at T12
Below it Coeliac trunk
+ Lt

When medial arcuate lig goes below it compresses
Coeliac trunk $\Rightarrow$ Medial Arcuate Lig. Syndrome.

Q/E -

- ① Heart Burn / epigastric pain
- ② Water Brash.

If laryngeal spill over $\Rightarrow$ Aspiration.
Vocal cord nodule
Dental caries
CSOM.

} Complicated
Reflux

M/c presentation in child $\Rightarrow$ aspiration.

Other Comp^s of reflux -

- ① ulcer $\rightarrow$ Bleed $\rightarrow$ structure $\rightarrow$ Dysphagia.
- ② Barrett's oesophagus $\rightarrow$ ~~lung~~ Cancer
- ③ Schatzki Ring

Inv

- ① Ba Swallow - Deep ulcer
structure
hiatal hernia

- ② Manometry $\rightarrow$ TLESR.
2° peristalsis

I 1st inv $\rightarrow$ Endoscopy $\rightarrow$ very helpful

Gold Std $\rightarrow$ 24 hr PH monitoring

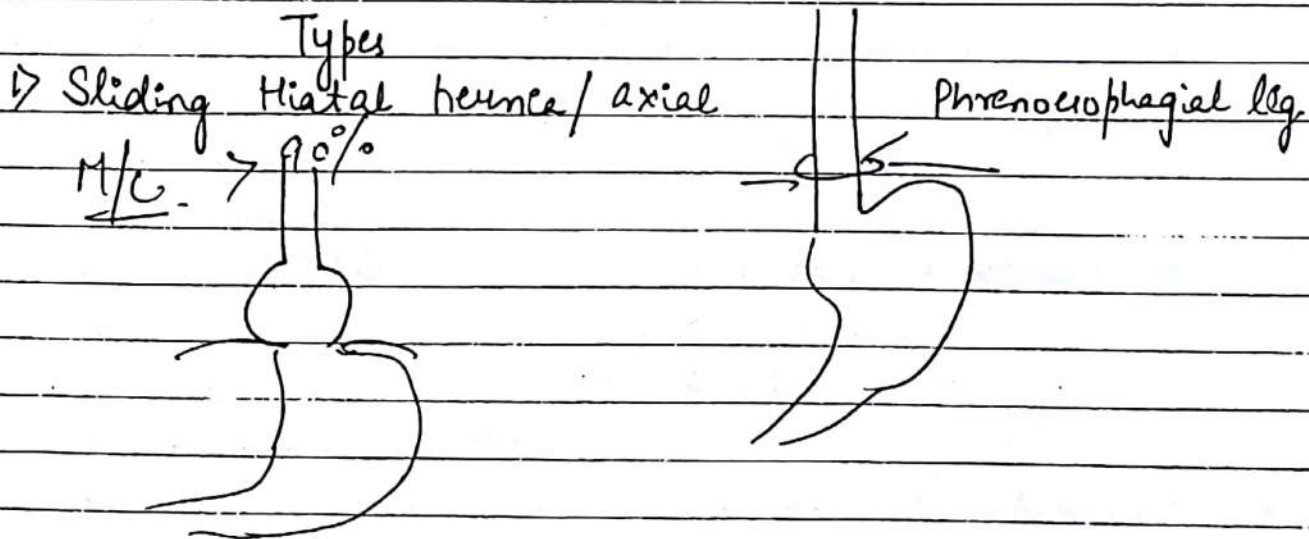
Where exactly pH is measured $\Rightarrow$ 5cm above GEJ

De Meester Criteria - 6 parameters for
diagnosing GERD
when score $> 14.72 \Rightarrow$ s/o GERD.

Bernstein test $\rightarrow$ obsolete. Now.

- Rx -
- ① Lifestyle modification
 - ② $\downarrow$ obesity
 - ③ H_2 blocker + PPI + Prokinetics.

HIATAL HERNIA



- No tear in ligament (phrenoesophageal lig)
- Peritoneum covers only. (L) side.

② Rolling Hiatal Hernia/ Para-esophageal 5%



- Ligament is torn
- complete fundus is covered by peritoneum
- Fundus goes up. Carcinoma often seen.

③ Mixed - Both. → most complication.

④ other Bowel parts herniate

C/F -

① sliding hernia ⇒ Reflux. GERD

② Rolling hernia ⇒ pain/dysphagia
Necrosis, ischemia more common

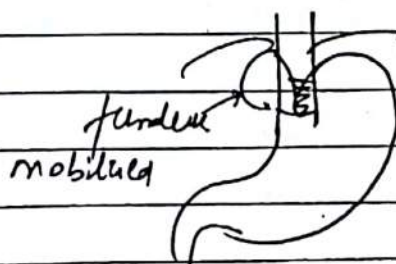
dx

Barium Swallow in Trendelenburg position

DWB 14

Plain X-ray ⇒ Retrocardiac air-fluid level
↳ fundal gas shadow.

Sx - ① Nissen's Fundoplication - 360°



Length wrapped $\rightarrow 3-4\text{cm}$

Wrap should be loose $\Rightarrow$ Floppy wrap

M/c Compⁿ of fundoplication $\Rightarrow$ Gas Bloat Syndrome
 earlier times - pneumothorax
 Dysphagia

② Belsey
 270° wrap
 done by thoracotomy

③ Toupet
 $<270^\circ$ post. wrap

④ Dor
 $<270^\circ$ ant. wrap

⑤ Watson
 180° ant.

Allison Repair $\rightarrow$ approximate crus of Diaphragm

Hill's Repair $\rightarrow$ stitch cardia of stomach & lower
 oesophagus posteriorly to median arcuate
 ligament

Collis J. Gastroplasty $\rightarrow$ done for short oesophagus
 using of flap of stomach.
 lengthening of oesophagus done

ESOPHAGEAL CARCINOMA (P4I)

1) ♂

2) old age

3) M/c site → Middle $\frac{1}{3}$ rd

4) M/c type → Sq Cell Carcinoma

5) ♂:♀ = 2-3:1

Adeno Ce → common in lower $\frac{1}{3}$ rd

" in white ♂

♂:♀ = 10-15:1

ALIMS

Risk Factor :-

① Diet - Vit C Deficiency

Hot Beverages

Smoked fish

→ > of ⑤

Nitrosamine compounds → > for stomach

Smoking & alcohol

Vit A Deficiency

Calcium "

Molybdenum "

② Zenker's Diverticulum

③ Plummer Vinson Syndrome

④ Achalasia Cardia

⑤ H. pylori → CAG-A

⑥ HPV (16), 18, 31, 33

⑦ Tylosis → AD inheritance

Chr. 17

Howel Evans Syndrome

Palm-plantar Hyperkeratosis

⑧ Alkali stricture

↳ caustic → NaOH. (lye)

⑨ Yeast infection candidiasis

Adenocarcinoma -

R/F

- ① Barrett's Oesophagus
- ② obesity (↑ fat)
- ③ scleroderma → causes reflux -
- ④ ~~H. pylori~~ H. Pylori (Protective)
- ⑤ PSS

Presentation -

- Gen symptoms -
- ① wt loss
 - ② loss of appetite
 - ③ Cachexia

Metastasis - Nodes > Blood

Local - ① Dysphagia

- late feature
- 77% lumen blocked
- starts as solid
- progressive
- short duodenum

Paraneoplastic Syndrome -
Hypercalcaemia

Inv

- ① 1st / Best → Endoscopy + Biopsy
Earliest Diagnosis

② Stage	T		PET-CT	→ for metastasis
	N		CECT	
	M			

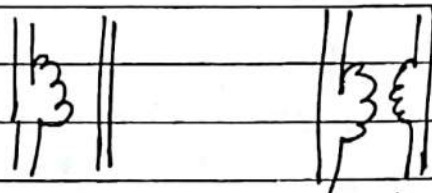
N > NTT

③ For T $\Rightarrow$ depth. $\Rightarrow$ Endoscopic USG (15-17 MHz)
Node - Biopsy.

Higher frequency $\rightarrow$ less depth $\rightarrow$ high resolution.
Low " $\rightarrow$ more penetration.

For M $\Rightarrow$ ^{18}F FDG PET Scan.
 $t_{1/2} \rightarrow 110 \text{ min.}$

Ba swallow



Apple Core
 $\hookrightarrow$ (L) Colon.

R_x -

SCC $\rightarrow$ Radio (S)
Chemo (S)

Cervical esophageal Ca $\rightarrow$ can be R_x by RT $\pm$ CT.
Thoracic " $\rightarrow$ RT can affect $\heartsuit$, lung.

$\downarrow$
Hence, surgery is imp.

Neoadjuvant $\rightarrow$ Before Sx.
to $\downarrow$ the size of tumour $\rightarrow$ make it operable

Adjuvant $\rightarrow$ after Sx
to prevent recurrence

CT. $\rightarrow$ Cisplatin $\leftarrow$ Doc + 5FU.
 $\hookrightarrow$ ATN (nephrotoxic)

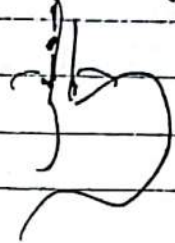
Initially hydrate the pt. + give cisplatin
infusion given along c manifold.

- vomiting
- ototoxic.

Sx → ① Ivor-Lewis Oesophagectomy (for lower, middle oesophagus)

1st Laprotomy → for mobilising stomach

thoracotomy → for removing T.



Remove Cancer → gastric pulling → gastro-anastomosis in ~~thorax~~ thorax.

H/c cause of mortality → Leak

Safe Margin for oesophagus → 10cm due to oesophageal lymphatics

Best substitute for oesophagus → Stomach in cancer

② Total Oesophagectomy / McKeeown Oesophagectomy
 ↳ Laprotomy > ② thoracotomy > Neck.
 En Block Oesophagectomy

③ Trans-Hiatal Oesophagectomy / ORRINGER
 (for lower & middle oesophagus)
 Laprotomy > Neck incision
 No thoracotomy → ↓↓ lung complications.

Flap is based on.

Lesser curvature
greater "

- (R) Gastric artery
- (R) Gastrophrenic artery

Palliation - → To improve quality of life

Relief for Dysphagia

① Stent - Endoprosthesis

• MB tube → obsolete

• SEMS - Self Expanding Metallic Stents

↳ less chance of perforation

Made up of Nickel - Titanium alloy
is called Nitinol alloy.

Complication - → ① Blockage

Now, coated SEMS are made - PTFE

② SEPS

They are smooth, hence they

② Migrate. → M/a comp.

② RT

③ Laser

④ Photodynamic Therapy

Feeding

gastrostomy.
jejunostomy

→ Not done becoz they
don't improve quality of
life

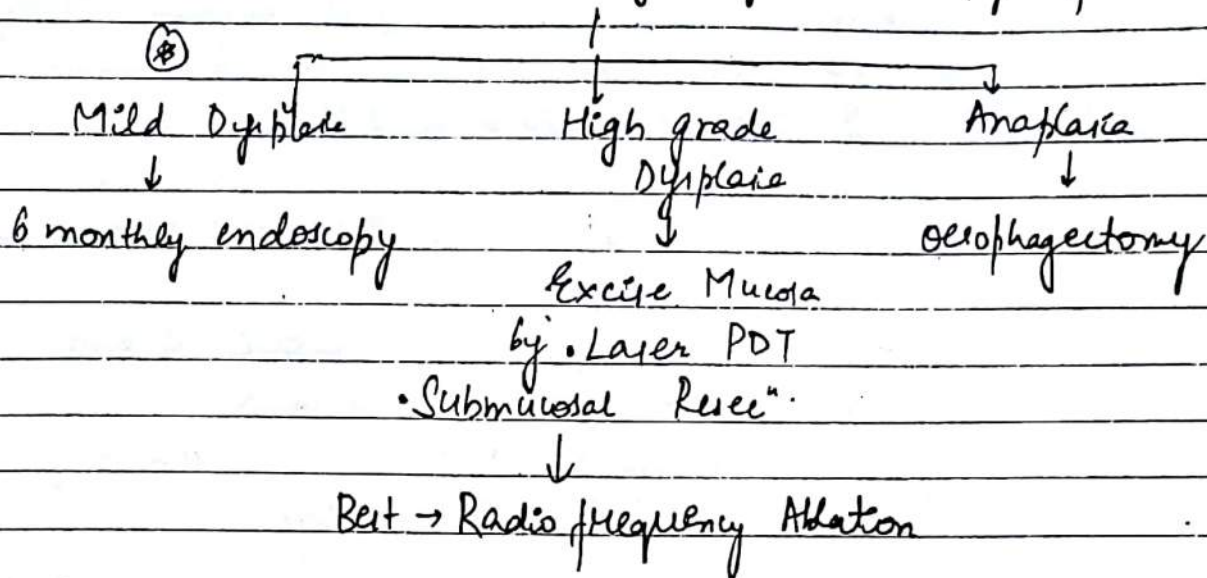
⑤ Cryo

Q. Malignant TEF → Rx - Stents

or surgical Bypass.

Stain → Alcian Blue

Barrett's oesophagus - - Medical Rx
- yearly endoscopy for 2-3 months



MENETRIER'S DISEASE

Hyperplastic Protein Losing Gastropathy

- Mainly involves proximal part of stomach
- mucosa becomes thick
- giant rugal folds
- Deep ulcers
- Follicular hypertrophy → Mucous producⁿ ↑
- all chief & parietal cells ~~lose~~ → Mucous cells
↓
produce mucous containing protein.

Protein loss causes Death
↑ TGFα → ↑ Cancer risk

Adults $\rightarrow$ associated $\bar{c}$ H. pylori
 Children $\rightarrow$ " , CMV.

Dx $\rightarrow$ Endoscopy $\rightarrow$ Biopsy $\rightarrow$ CECT

Rx - ① Replenish protein

② PPI

③ In severe cases $\rightarrow$ Gastrectomy

④ Cetuximab $\rightarrow$ Colon & cancer w/ RAS.

~~not~~ Head Neck - Cisplatin Resistant

Irinotecan Resistant

TRICHOBEZOAR $\rightarrow$ Hair ball in stomach

OR RAPUNZEL SYNDROME. young $\bar{f}$ psychiatric.

PHYTOBEZOAR $\rightarrow$ Veg. fibres.

17/12/17

CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

- Incidence 3:1000

- $\sigma > \bar{f}$ = 4:1, 1st born male child

- Familial Predisposition, mother - 20%

- white $>$ Black.

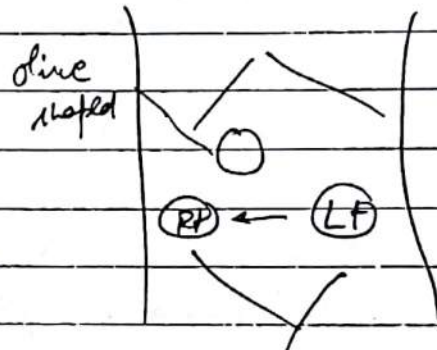
- Erythromycin $\bar{a}$ $\uparrow$ risk of the condⁿ

C/F- ① Gastric outlet obstruction:

- ② Non-Bilious vomiting & projectile
- ③ presents 3-8 wks after birth (4-6 wks most common)
- ④ Antenatal & postnatal child is normal
- ⑤ Stomach empty.
- ⑥ Hungry child.
- ⑦ No feature of PEM.

Examⁿ -

- ① Olive shaped lump
- ② Peristaltic wave L → R.
- ③



Inv.

X-Ray - Single Bubble Sign

Fluoroscopy - String Sign
or Mushroom Sign
or Caterpillar Sign

IOC - USG - ① Length of pylorus > 16mm.
width " " > 4mm

- ② Empty Stomach
- ③ Antral Nipple Sign
- ④ Cervix ~~band~~ sign

R_x -

Electrolyte imbalance - Hypochlo^r Hypokalemia hypochloremic
met. alkalosis +
Paradoxical Aciduria due to
presence of aldosterone

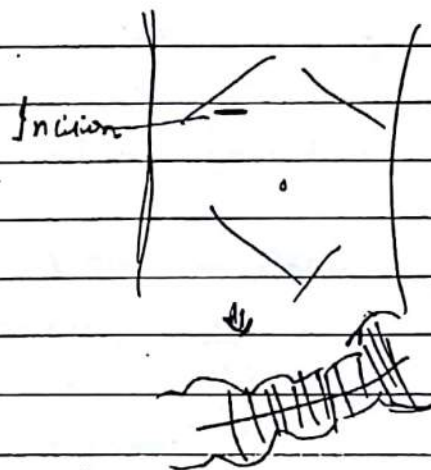
Fluid- ① N → 0.45% NS
 2 + 2.5% Dextrose
 + KCl

② RL. - Na^+ - 130 mEq/L. , K^+ - 4 mEq/L Cl^- - 100 mEq/L.

S_x - Ramstead Pyloromyotomy

Muscle splitting incision.

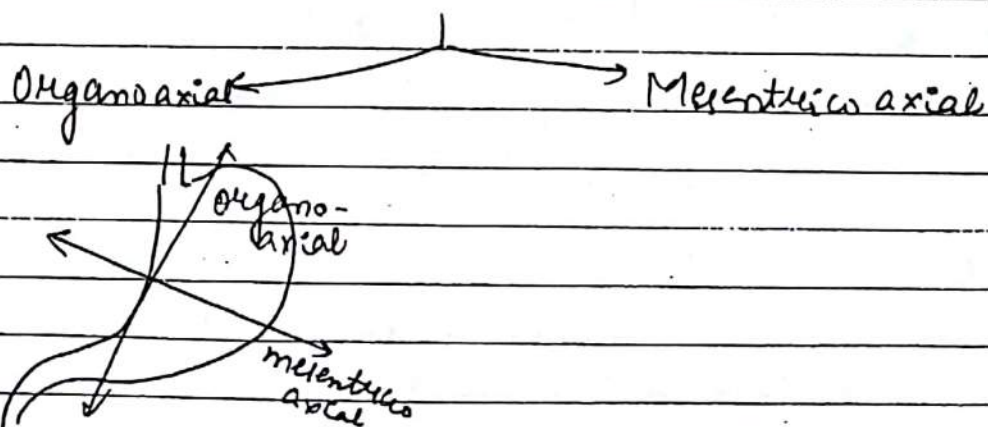
↓
 Pyloro-myotomy



Medical Management - Atropine.
 Not very effective.
 Can start feeding after 6hr.

GASTRIC VOLVULUS

Solid organ → torsion
 Hollow " → volvulus



① More common

More

- Predisposing factor

Present

Absent

- Presentation - acute

chronic

- Complications are common

Rare

* Borchaardt's Triad -

① Epigastric pain

② Retching & vomiting

③ Inability to pass Ryle's tube

IOC Barium meal - cup & spill sign

- cascade sign



R_x ~~Extra~~ exploratory laparotomy

↓

Detortate stomach

↓

Gastropexy.

GASTRITIS

TYPE A

① Autoimmune

② Proximal part - fundus

③ (Ab) → parietal cells

TYPE B

① H. Pylori - Antrum

↓

Atrophic gastritis

HCl ↓ → Fe Deficiency anaemia

I.F.I ↓ → Vit B₁₂ deficiency

↓
Pernicious Anaemia

↳ Atrophic Gastritis

• HCl ↓

• Gastrin ↑

ULCER

GASTRIC

↓ Mucosal Resistance

H. Pylori 75%

Pain - epigastric

Meal → ↑ pain

Lean rather pt.

DUODENAL

↑ acid produⁿ

90%

Seasonal variation

Meals → ↓ pain

Hunger pain

obese

Blood grp - 'O' Hk factor

Complication -

Perforation.

① gastric artery bleed

Haematemesis-melaena 60:40

Cancer - found

Bleeding

Gastroduodenal artery

40:60

Rare.

Rx - Gastrectomy

Vagotomy + Drainage

* Cushing's ulcer are found in gastric, duodenal, oesophageal

* Dye used for H. pylori is WARTHIN-STARRY STAIN

Johnson's Classification

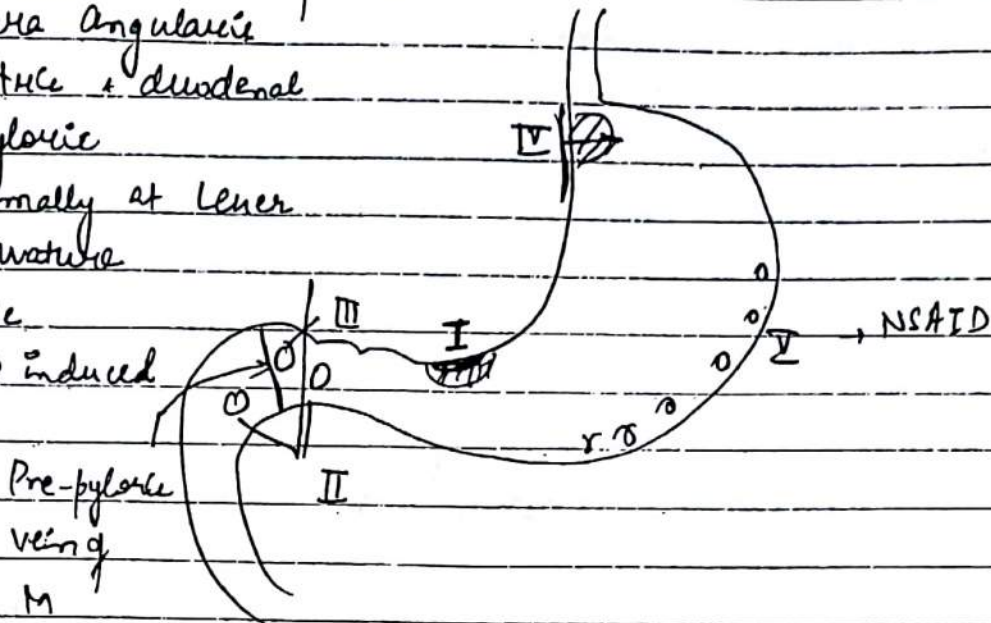
I → Incisura angularis

II → B gastric + duodenal

III → Prepyloric

IV → Proximally at lesser curvature

V → Diffuse
NSAID induced



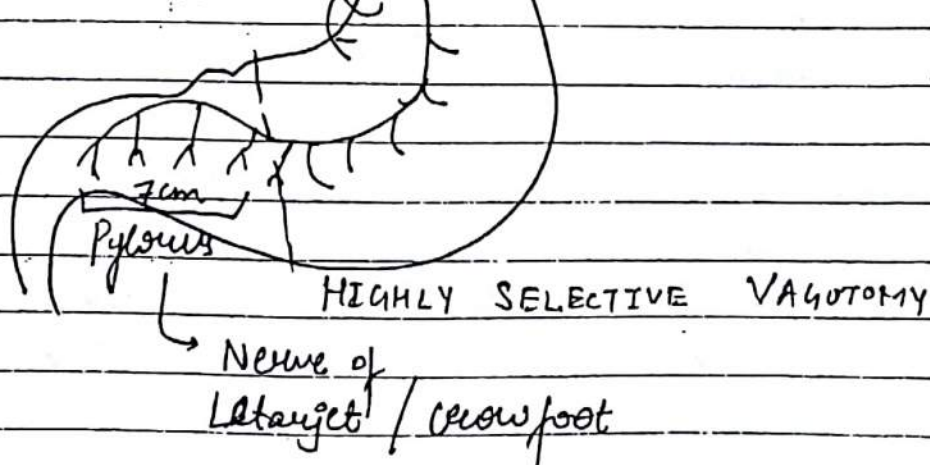
Q. Which are the ulcers associated with ↑ acid production?
→ Duodenal (II + III).

Q. c gastric ulcer bleed → IV (L. gastric artery)

VAGOTOMY (R) → P (A) ← L

G.B. motility ← Hepatic plexus ——— TRUNCAL VAGOTOMY

Intestine ← Coeliac plexus ——— SELECTIVE VAGOTOMY ——— parietal branches



Truncal vagotomy → ① UB Stone
② Post vagotomy Diarrhoea.

5% of pts. i Truncal Vagotomy + Selective vagotomy

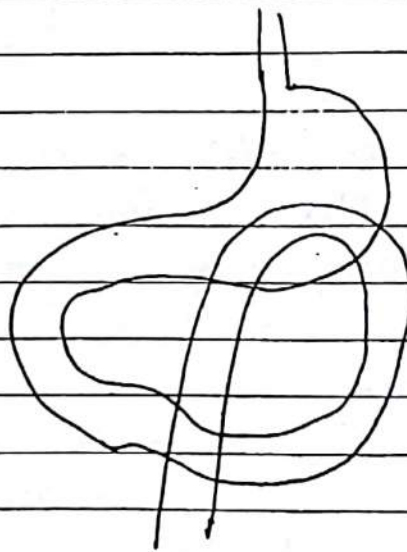
↓
Leads to G.O.O.

↓

So, drainage operation required.

① Pyloroplasty → Finney's
Heincke Meckulicz

② Gastrojejunostomy



③ Antrectomy

Antrectomy + TV ⇒ least Recurrence < 1%

Highly Selective Vagotomy ⇒ No drainage Required.

Q. Best Vagotomy for chr duodenal Ulcer?

↳ HSV.

Q. e has least recurrence $\rightarrow$ Truncal Vagotomy (1-5%)

Recurrence in HSV $\rightarrow$ 6-8%

* Criminal Nerve of Grassi -
Responsible for recurrence
these branches originate in thoracic region

Hence while doing HSV -
extent $\rightarrow$ 8cm proximal to G.E.J. (Inlet point)
7cm proximal to pylorus (end point)
 $\downarrow$
to preserve n/v of Lateral jet

* Hill & Backer Operation -

Ant. HSV + Post. Truncal Vagotomy.
 $\rightarrow$ Prevents recurrence

* Serratomy -

Ant. Serratomy + Post. Truncal Vagotomy
Taylor operation.

GASTRECTOMY

Bilioth I

Bilioth II

Polya

Bilioth I $\rightarrow$ Obsolete now

Done for gastric ulcer



Kocherization $\rightarrow$ Mobilization of duodenum.

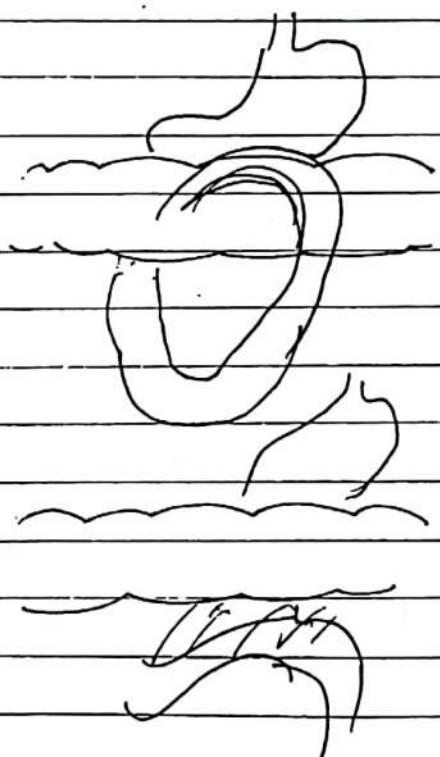
Bilroth II

Done for ① Gastric Cancer
② Duodenal ulcer

Preferred in cancer.



gastro
jejunostomy.



$\rightarrow$ if we go in front of ~~col~~ Transverse colon — length $\uparrow$.

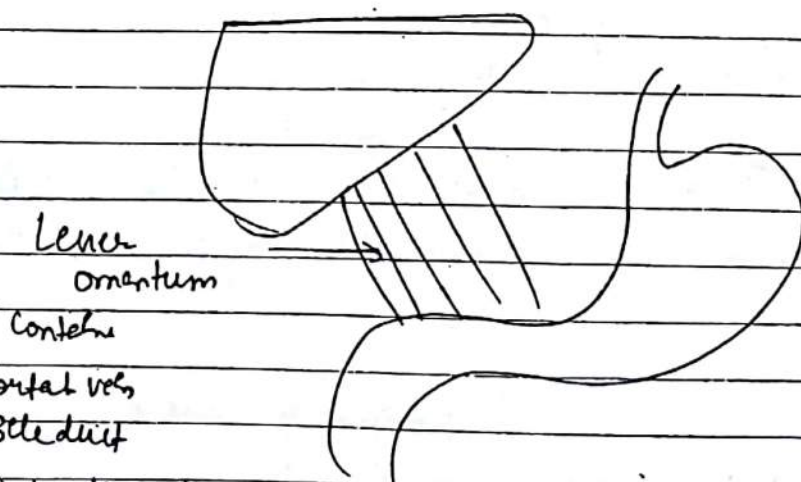
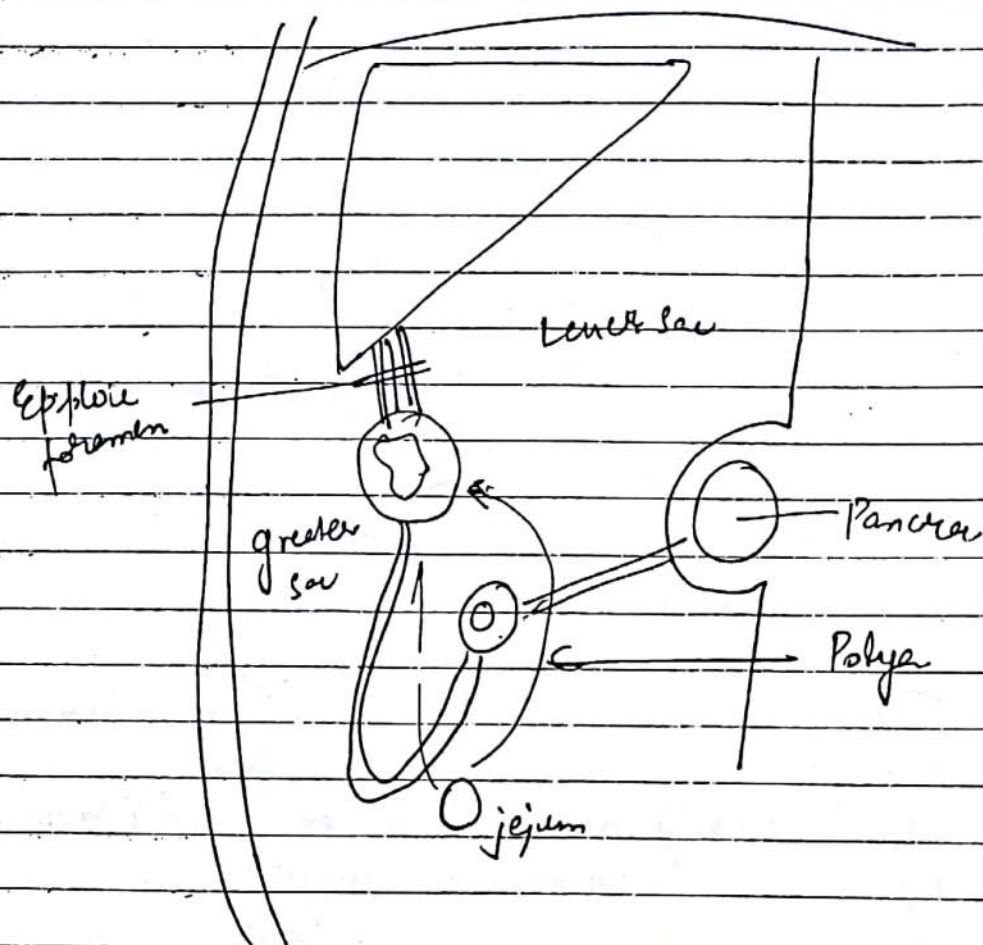
Polya $\rightarrow$

- Retrocolic Procedure
- Preferred in case of Ulcer

$\rightarrow$ Length of ascending limb $\downarrow$

Ascending colon + Descending colon $\Rightarrow$ Fixed.

Port. Duodenal artery perforate $\Rightarrow$ Bleeding.



- Lesser
Omentum
Contains
- ① Portal vein
 - ② Bile duct
 - ③ ④ Hepatic artery

Pringle's Manoeuvre-

- clamp the lesser omentum
- It clamps the Portal vein, hepatic artery together
- to control bleeding during.

If It can't stop bleeding from Hepatic vein.

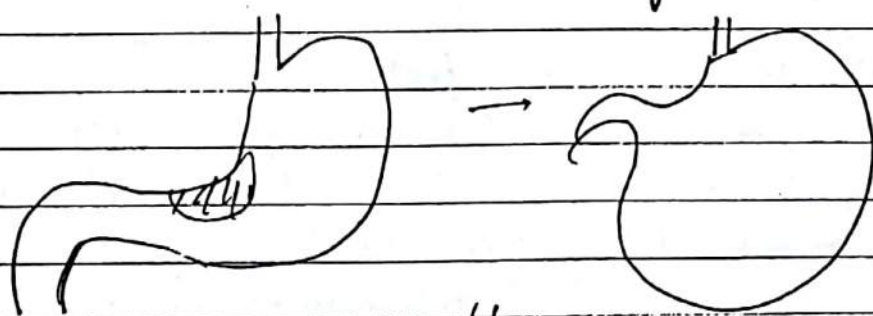
- Pouchet
 - Csendes
 - Kelling Madlener
- } - When ulcer is proximal
 ← - When it is stable
 ↘ - When it is unstable

COMPLICATION OF ULCER

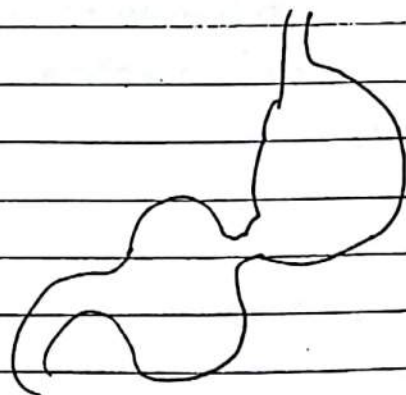
Ulcer is deep → erosion is superficial

hence when it heals,
it causes scarring

on healing no
scarring



Tea Pot stomach



Hour Glass Stomach

↳ If ulcer is on both ant & post. surface.

GOD is M/C caused by ulcer in 1st part of duodenum

M/C of GOD $\rightarrow$ Cancer

$\rightarrow$ Perforation.

CF -

① sudden diffuse pain.
 $\downarrow$ in 4-8 hrs.

$\hookrightarrow$ dilution by
peritoneal fluid

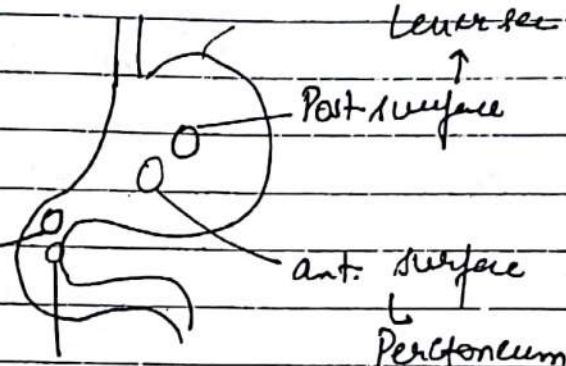
(phase of delusion)

ant.
duodenum

$\downarrow$
perforation

post.
duodenum

$\hookrightarrow$ Bleeding.



② Guarding

③ Board like Rigidity

④ Tenderness, Rebound Tenderness $\rightarrow$ Blumberg Sign

⑤ Pain on coughing $\rightarrow$ Durnphrey sign

⑥ Marking of Liver dullness

Inv $\rightarrow$ ① X-Ray chest under erect posture - 80%
 $\hookrightarrow$ Gas Below ② Dome of Diaphragm

② X-Ray Abd. under ③ lateral Decubitus :
 $\hookrightarrow$ Most Accurate (75%)
in erect posture - 70% accurate

CT Scan $\rightarrow$ Most Accurate.

- Cupola Sign

- Football Sign

- Doge Sign $\rightarrow$ A lar cap like shadow due to
air in Morrison's pouch

Telltale Δ

Falciform ligament sign

D/D of Pneumoperitoneum -

Chilaidete Syndrome / Pseudopneumoperitoneum

Bowel interposition. b/w diaphragm & liver.

R_x - Resuscitate



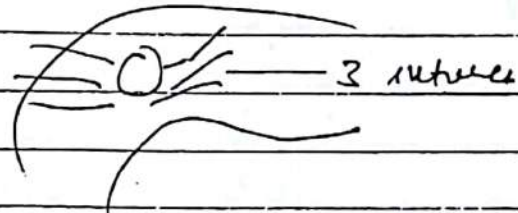
Exploratory laprotomy

I - Graham's Omental Patch Repair + H. Pylori Eradication.
M/c ly performed Sx.

II - Graham's Omental Patch Repair + HSY
done $\bar{c}$ in 4 hours of perforation.
in young pts

III - TV + Antrectomy

In Gastric Ulcer Perforation



① Omental Patch Repair +
H. pylori Eradication +
Biopsy (malignancy pot^l)

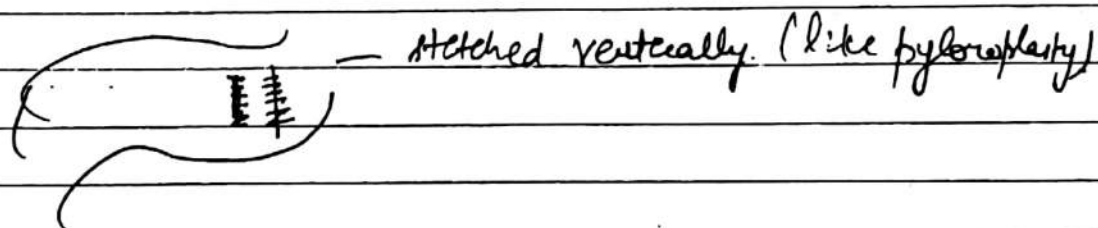
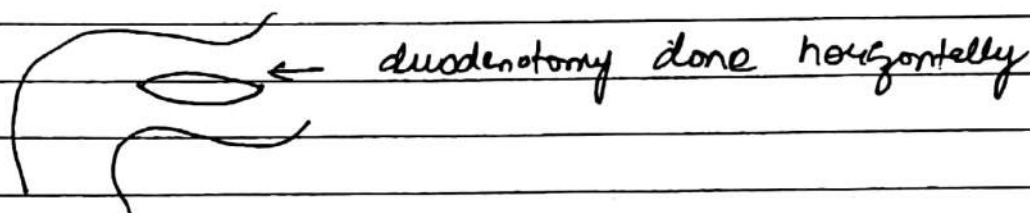
② Gastrectomy
- not preferred

Sup. Mesenteric Artery supplies to $\frac{2}{3}^{\text{rd}}$ of Transverse colon.

M/c of upper GI Bleed $\rightarrow$ Peptic Ulcer

Post Duodenal Ulcer diagnosed by Endoscopy +
Htd by sclerotherapy = adrenaline (arterial)

Sx -



Longitudinal duodenotomy.

↓
Undermining suture of Bleeding
close the ulcer

↓
Close duodenotomy like Pyloroplasty.
↓ Recurrence rate > 50%.

↓
If pt is fit

Truncal vagotomy

↓
Unfit

H. pylori eradication

* TBUN is a clue to the diagnosis of upper GI bleeding.

COMPLICATIONS OF SURGERY

Vagotomy -

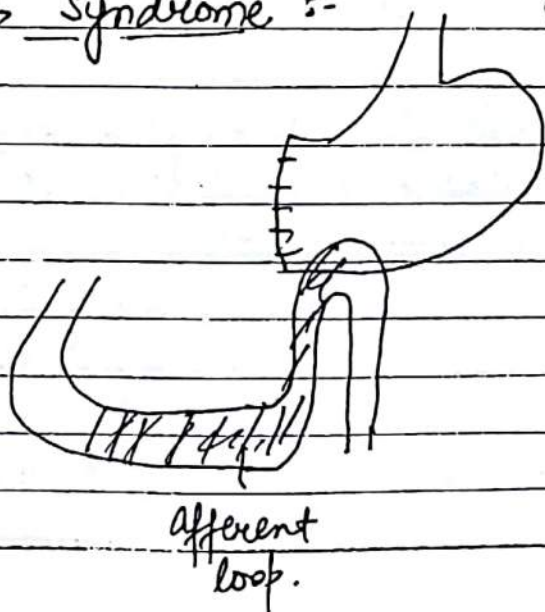
- ① Gall stone
- ② Post. Vagotomy Diarrhoea
- ③ Loss of relaxation $\rightarrow$ early satiety.

Gastrectomy -

- ① Loss of reservoir
- ② Fe deficiency anaemia $\rightarrow$ duodenal bypassed in Billroth II
- ③ B₁₂ deficiency
- ④ Calcium deficiency
- ⑤ Steatorrhoea
- ⑥ Recurrent ulcer - G.I. site $\rightarrow$ Stomal ulcer towards jejunum site
- ⑦ Gastro-jejuno-colonic fistula
 $\rightarrow$ Bert Dx by Barium Enema
- ⑧ Water absorption
 $75\% \rightarrow$ small intestine (jejunum > ileum)
 $25\% \rightarrow$ large

* Afferent Loop Syndrome :-

Stasis of bile



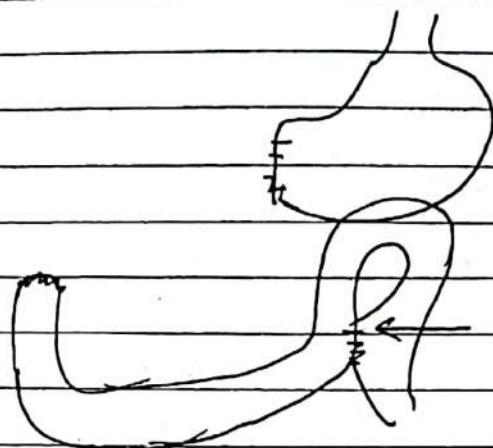
Pathology.

- Kinking
- int. herniation
- Adhesion
- twisted
- stenosis
- food entering in afferent loop

Duodenal Blow out

M/c. seen on 4th Day Post-operative

Avoid. →



Side to side anastomosis
jejunojejunotomy.

↓
to bypass bile

Dumping Syndrome

Food. Remains in. stomach for 4-6 hrs after eating
due to pylorus.
↓

10-15 mL released. + rest → Milling occurs.

τ each contracⁿ.

(Gastric emptying is significant)

↳ duodenum makes isomolale

When pylorus is removed

↓

Rapid Gastric emptying

↓

Hyperosmolar fluid enters intestine

↓

Diarrhoea.

↓

τ in 30-40 min. pt. goes into Hypoglycemia.

- Rapid exposure of Hyperosmolar food into S.I.

↓
1/F

Diarrhoea

Tachycardia

Thirst

Vasomotor change

Symptoms appear in 15-30 min.

< 15 min → last for 30 min

↓

Relieved by supine position

↓

Hyperglycemia

↓

Insulin release

(Reactionary hypoglycemia) Hypoglycemia [LATE DUMPING]

↓

Last for 30 min., food can relieve

R_x - Diet

→ small frequent meals

avoid carbohydrate

avoid water in meal (dry meals)

Octreotide [somatostatin analogue]

S_x - Roux-en-Y

FORREST CLASSIFICATION (on basis of Endoscopy)

I → Bleeding Ulcer [a → spurting
b → oozing

II → Past Bleeding [a visible vessel^{NS}
b adherent clot
c coffee ground base

III → No bleeding

BLEED CLASSIFICATION

BL → ongoing bleeding

E → ↑ PT

E → Enroute Mental Status

D → Untable comorbid Disease.

WATERMELON STOMACH / GAVE (Image)

Gastric Antral Vascular Ectasia

→ Degenerative Condⁿ

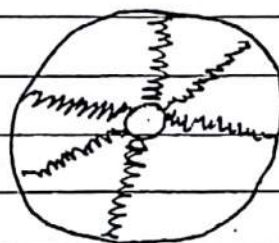
→ $\phi > \sigma$

→ associated to CLD.

CRD.

Collagen vascular Disease

Endoscopy →
longitudinally dilated
tortuous vessels.



Px - conservative → Argon Plasma Laser
Sx → Antrectomy



DIEULAFOY LESION :-

- Congenital malformation / Developmental.
- Submucosal artery. $\rightarrow$ keeps on dilating & then rupture
- Site - in 6 cm of GEJ.
- presents $\bar{c}$ fresh haematemesis, melena, anaemia
Hemorrhage is common.

Endoscopy $\rightarrow$ ~~at~~ spurting or clot

Rx - coagulation by endoscopy
endoscope thermoprobe coagulation

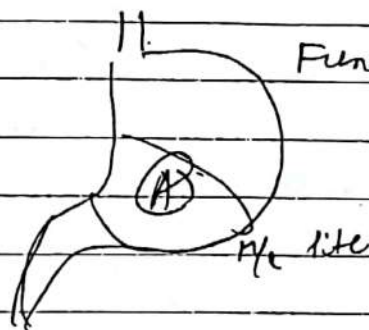
GASTRIC CARCINOMA

1) $\sigma : f = 2:1$

2) Age > 55 yrs.

SEIWARD CLASSIFICATION
for GEJ Cancer

15
3
5



* Risk Factors -

- 1) Diet - Vit C Deficiency $\rightarrow$ Premalignant
- $\uparrow$ salt Diet $\rightarrow$ Premalignant
- Smoked fish $\rightarrow$ (B)
- Nitrosamine compound (P)
- Regeneration is protective factor

- Veg A.E. Co deficiency
- ↑ fat carbs diet

• Fresh fruit + Veg → are protective

2) Pernicious anaemia

3) Biliary gastritis → either by partial gastrectomy or drainage

4) EBY

5) Menetrier's Disease

Premalignant Condⁿ -

1) Atrophic Gastritis

2) H. pylori infectⁿ

3) Adenomatous polyp.

4) Intestinal Metaplasia III

5)

M/c Polyp of Stomach → Hyperplastic

Fundic gland polyp

↳ Metaplasia
(B & L)

LAUREN CLASSIFICATION

Intestinal

1) $\sigma > \phi$

2) Old age

3) distal part

4) Sporadic

5) H. Pylori is Risk factor

6) Metastasis - Blood Borne

7) Intestinal Metaplasia + goblet cells

Diffuse

1) $\phi > \sigma$

2) younger

3) Proximal part

4) Familial

5) Blood Group 'A' Risk factor

6) Lymphatic metastasis

7) Signet cell

Poor Prognosis

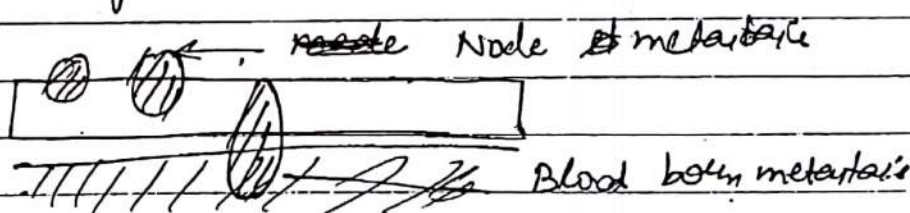
Onco gene	APC (adenomatous polyposis)	① E-Cadherin ↓
	MSI (microsatellite)	p53 ↓
	p53 ↓	p16 ↓
	p16 ↓	

BOREMAN on growth pattern

- I → Exophytic or Cauliflower
- II → Ulcerated, elevated margin edges,
well defined margin
- III → Diffuse margin
- IV → infiltrative

EARLY GASTRIC CANCER

Cancer involving Mucosa or Submucosa ± L. Node



SUPERFICIAL SPREADING

- Common in JAPAN
- good prognosis

- For oesophagus & stomach ⇒ Imp prognostic indicator
DEPTH
- For colon ⇒ Nodal status is imp prognostic indicator
- M/I indicator for Metastatic Potential ⇒ DEPTH (T stage)

Japanese Classification

I

II

III

IV

✓ F

General - Anaemia
Fe def. con

Local - Pain
Dyspepsia

Metastasis. Node > Blood → Liver (through portal vein)

1) ① Supraceliac Node - Virchow's node
Troisier's sign

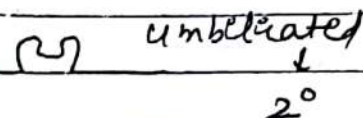
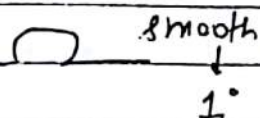
2) ② Axillary node - Irish node

③ Ovary → Krukenberg tumour

④ Pouch of Douglas → Blumer's shelf

⑤ Umbilicus → Sister Mary Joseph Nodule
Not pathognomic of ~~egg~~ gastric ~~etc~~ Ca

6) Liver → Nodular Liver / jaundice



7) Peritoneum →

Laparoscopy is best way to assess peritoneal metastases

Paraneoplastic Syndrome-

1) Leser Trelat Syndrome - Sebaceous keratosis on back.

Not pathognomonic of Gastric Ca

2) Trousseau Palm syndrome-

Hyperkeratosis + Pigmentation

Not pathognomonic of Gastric Ca

Inv.

① Endoscopy + Biopsy

② Stage

T	→ PET - CT
N	
M	

③ Depth → Endoscopic USG

④ For Metastases → 18 FDG PET scan

⑤ Ba Meal -

Benign
Lesser curvature
Exo luminal

A diagram of a stomach with an ulcer on the lesser curvature. The ulcer is shown as a crater-like indentation on the outer surface, labeled "Exo luminal".

Malignant
greater curvature
Endo luminal

A diagram of a stomach with an ulcer on the greater curvature. The ulcer is shown as a crater-like indentation on the inner surface, labeled "Endo luminal".

• Mucosal folds

Hampton Line Ulcer

Carmen Meniscus
Kieckhefer complexTranslucent
Line

Staging -

 $N_1 < 3$ $a = 7-14$ $N_2 3-6$ $b = > 15$ ATM $N_3 > 7$ Men. L.N. removed ~~late~~while radical gastrectomy
for staging

Rx

M/c site for local recurrence $\Rightarrow$ Gastric Bed
Anastomosis

Chemo.

5FU + Leucovorin (folinic acid) $\pm$ Cisplatin /
for 5 days. OxaliplatinFOLFOX $\rightarrow$ for colorectal ca

continuous infusion

(S-1) chemotherapy $\rightarrow$ Oxal

for 1 year

for advanced case

used in JAPAN $\rightarrow$ good results

Oxal derivative of Fluoropyrimidine

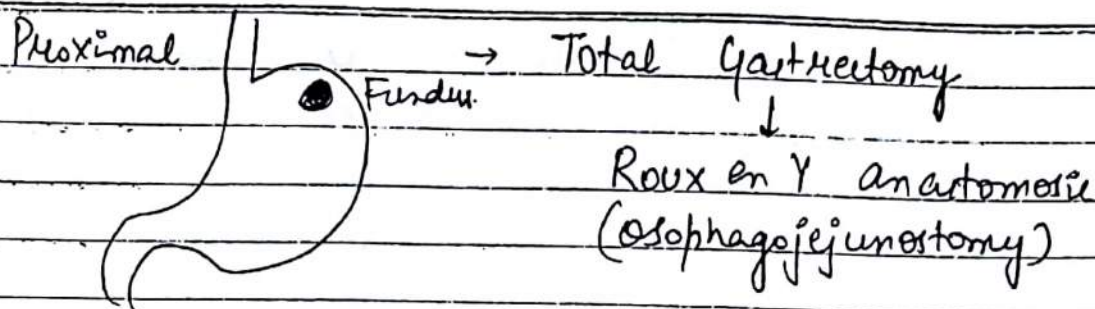
Tegafur + Cernivacil + Otteracil

Sx

© Radical Gastrectomy -

Distal

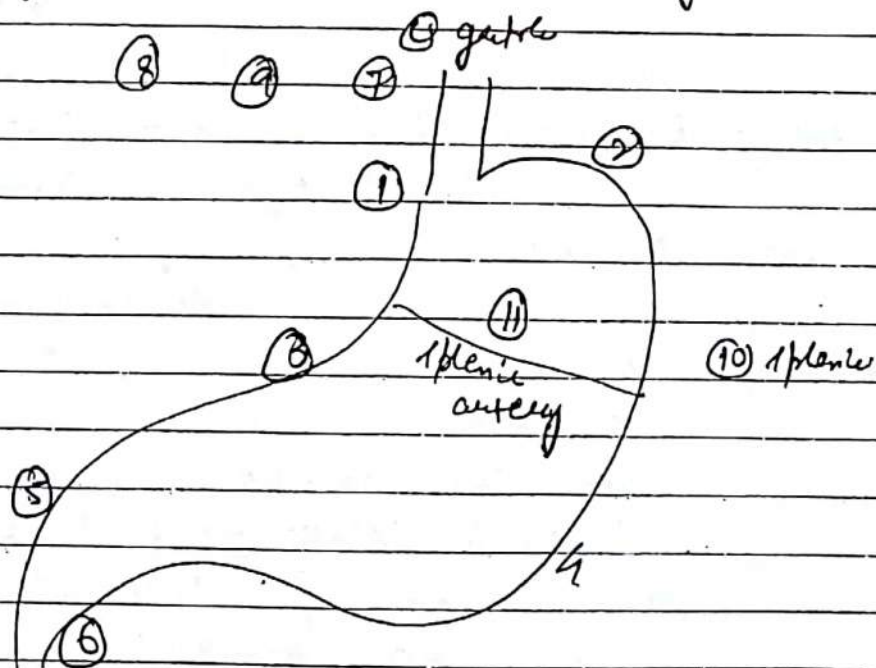
 $\rightarrow$ Partial / subtotal Distal Gastrectomy
 $+ \rightarrow$ Billroth II



Radical → Lesser omentum
+ greater "
L₁, L₂, L₃ nodes
+ celiac trunk

D₂ gastrectomy

Beyond celiac trunk ⇒ D₃ gastrectomy



R₀ → No residual tumour

R₁ → microscopic disease left

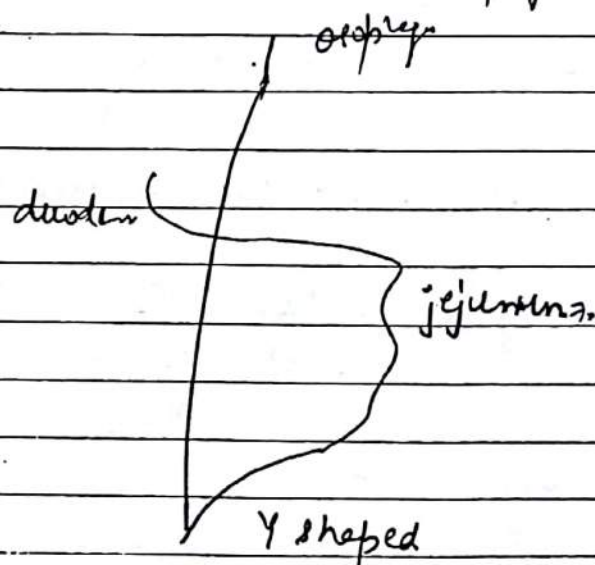
R₂ → Macroscopic / gross disease left. [PALLIATIVE]

1/ tail of pancreas, spleen involved.

↓
Do Splenectomy + Distal pancreatectomy
+ D₂ gastrectomy.

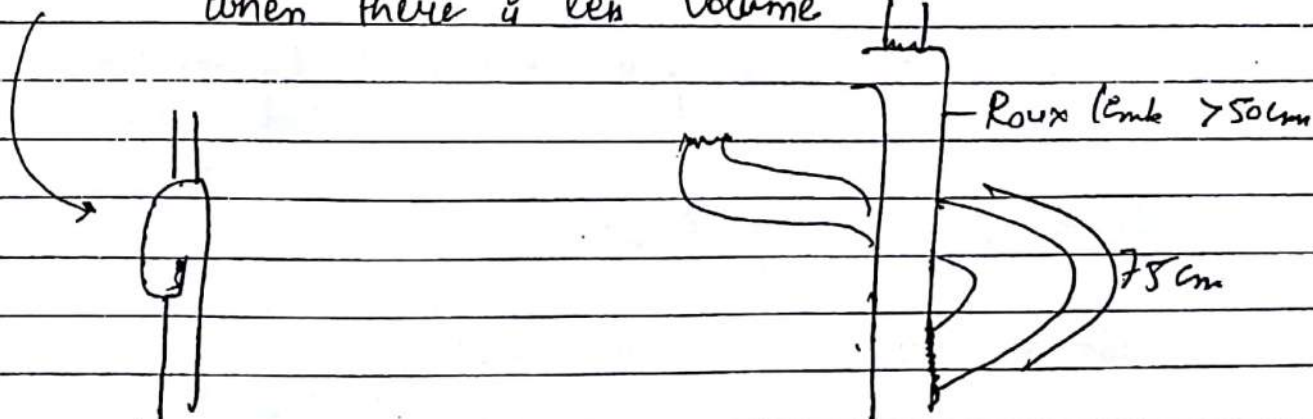
ROUX-EN-Y ANASTOMOSIS.

Gastrectomy +
Jejunum is divided +
Distal jejunum segment anastomosed to oesophagus
Jejunum-jejunostomy



Lawrence Hunt pouch-

when there is less volume



LYMPHOMA

2nd M/c Stomach Cancer.

M/c type → MALTOMA (Mucosa associated lymphoma)
Associated with H. Pylori

NHL → B cell DLCL

GIST (Gastro-Intestinal Stromal Tumour)

- 4%

- earlier called as Leiomyosarcoma.

- Origin - Interstitial cell of Cajal

- 95% → CKit +ve → act through ~~Thyrosine~~ Tyrosine Kinase

5% PDGF +ve → Better Prognosis

Atypical / Wild GIST

CKit -ve

PDGF -ve

50% → Stomach

25% → Ileum

Rare sites - Rectum

Esophagus

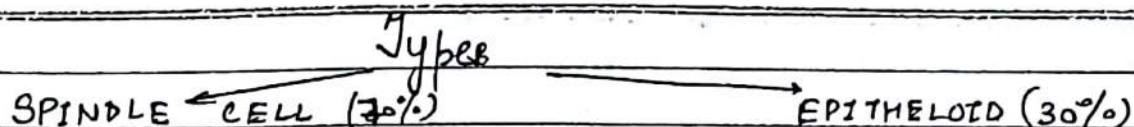
M/c Benign tumour of Stomach = Mesenchymal tumour
or Leiomyoma

M/c presentation → Bleeding

Metastasis → Blood Borne → Liver

↳ Direct → Surrounding area

Node → rare



FLETCHER CRITERIA

- ① Size > 5cm.
- ② Metastasis
- ③ Mitotic index > 5/50 HPF

IxOC - CECT

No Biopsy → ↑ dissemination / Bleeding

IxOC for Recurrence → PET SCAN.

Tumour Marker → CD117

DOG-1 (Detected on GIST)

CD34

BCl 2

Protein Kinase c theta

R_x Surgery - 2cm Margin. (>1cm)

Radiosensitive

Adjuvant therapy → Tyrosine kinase Inhibitors III
Imatinib Mesylate (Gleevec)



For Imatinib Resistant case
Sunitinib.



For Sunitinib (R) case
Regorafenib

cause

hypophosphatemia

Carney Triad $\rightarrow$ 1. GIST

2. Paraganglioma / Extra adrenal Pheochromocytoma

3. Pulmonary chondroma

Carney dyad / Stradaker's dyad

① GIST

② Paraganglioma

DUODENAL ATRESIA.

- 1:2500

- Site - just distal to ampulla of Vater

- Presentation $\rightarrow$ recurrent bilious vomiting

- associated w/ Down's Syndrome

- 50% $\rightarrow$ Polyhydramnios

TYPES

Type I

wall intact

Meentery intact



Type II

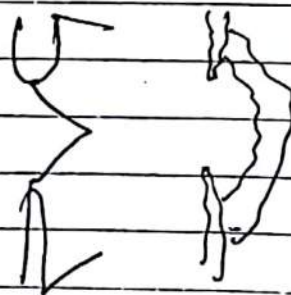
wall & gap

Meentery intact



Type III

wall & gap



Wind Sock Deformity → false appearance of Distal deformity in spite of proximal



Appel Peel Sign → Seen in 3b type

Inv

* X-Ray abd in erect posture

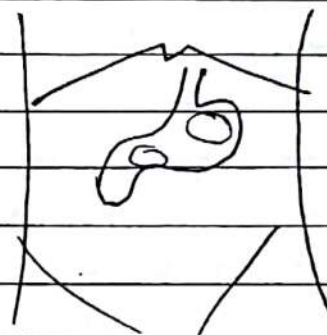
Double Bubble Sign (Image).

in case of cong. obstruction of 2nd part of duodenum

1) Duodenal atresia

4 Annular pancreas

3) Ladd's Band



Rx-



Diamond shaped Duodeno-duodenostomy

Annular Pancreas

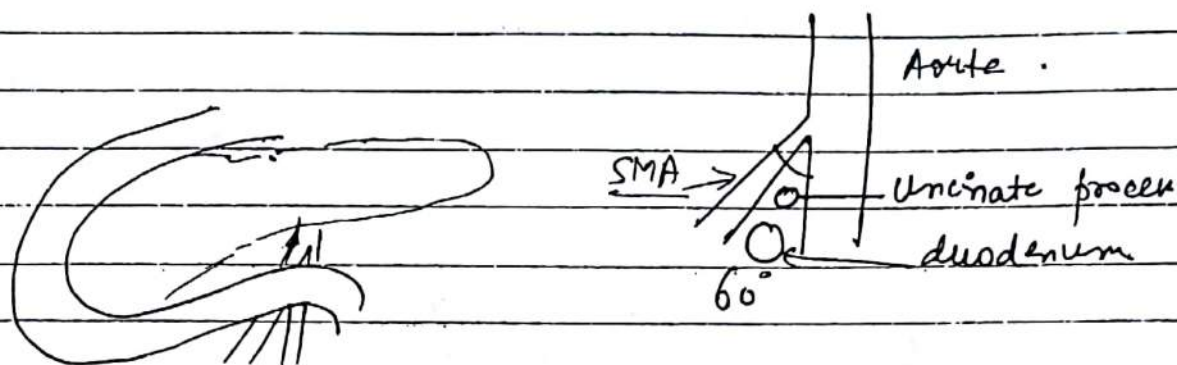
→ Duodeno-duodenostomy (D-D)
Duodeno-jejunostomy (D-J)

↓
Retractable

SUPERIOR MESENTERIC ARTERY SYNDROME (CT Image)

or WILKIE SYNDROME

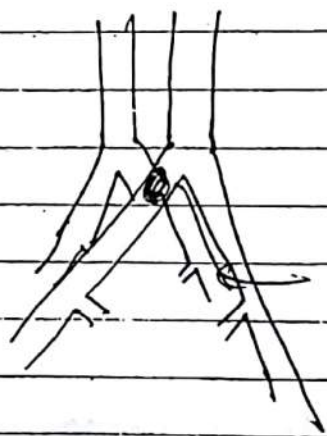
or CAST SYNDROME



- young, lean + thin lady
 → due to loss of fat around duodenum
 If $< 20^\circ \rightarrow$ SMA syndrome

Dx $\rightarrow$ CECT.

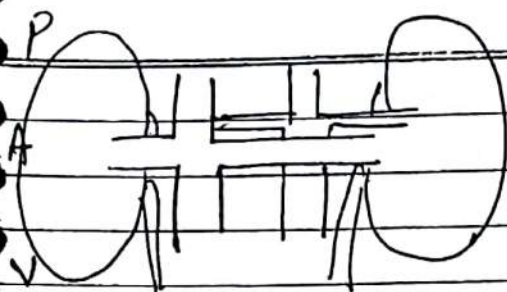
Rx - Duodeno-jejunostomy



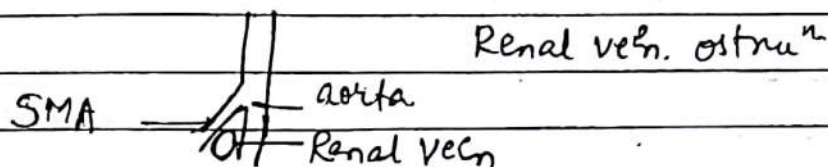
Compression of ①

- May Thurner Syndrome

① common iliac vein by ②
 common iliac artery



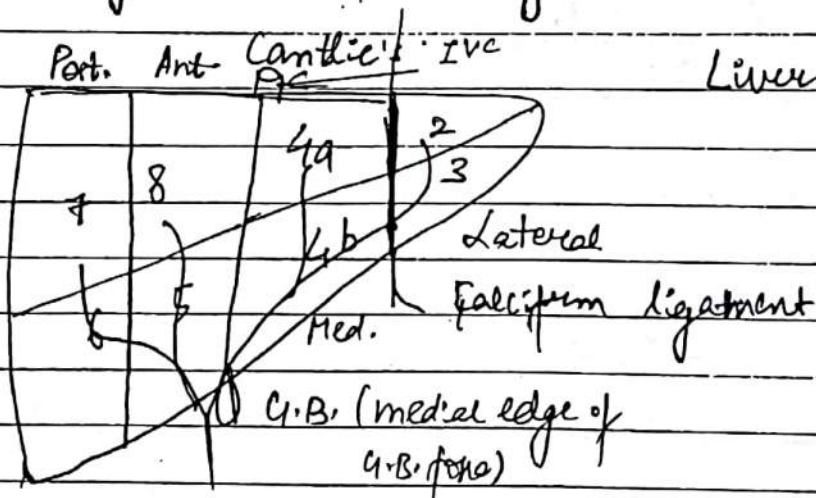
- ① Renal artery > ② Renal artery
 ③ Kidney is preferred for transplant



Nut Cracker Syndrome

LIVER

Anatomy was proposed by Couinaud.

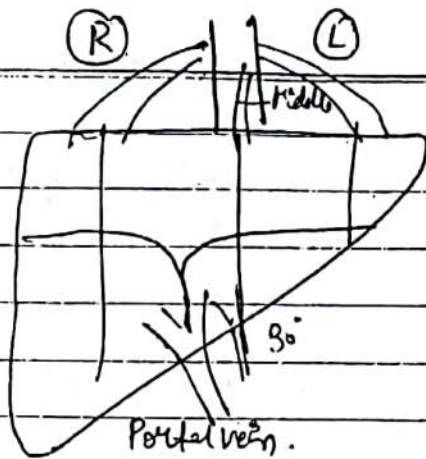


Liver has 2 Lobes.

4 ~~8~~ sectors
 8 segment

Bismuth → Anteromedial - 4a, 4b, 3.
 Posterolateral - 2

3 Major Fissure (Vertical line)
 2 Minor (Horizontal line)



Cantle's line is middle
hepatic.

Horizontal line is based on
Portal vein.

Barre area of Liver

3 parts -

- Spiegelian ^{caudate}
- Para-aortal ^(IX)
- Caudate process

Segment 1 → behind 4a
Caudate lobe

Segment 4 → Quadrate lobe

Segment 1 has blood supply on
both lobes (BL)

Segment 1 drains directly to IVC

BUDD CHIARI SYNDROME

- Hepatic vein thrombosis

- M/c cause → Polycythemia Vera

- Segment 1 is spared due to direct
↓ drainage to IVC.

so it undergoes compensatory hypertrophy

Falciform Ligament: Btw (2) & (3) $\leftrightarrow$ (4a), (4b)

Riedel's Lobe -

In few persons, extension of (2) lobe is present
It is palpable.

- (L) Lateral Hepatectomy $\rightarrow$ only (2) & (3) removed

- (R) Extended /
(4a), (4b) + (2) lobe of Liver ± 1 .

- (R) Hepatectomy $\rightarrow$ (5), (6), (8), (9)

(L) " $\rightarrow$ (2), (3), (4a), (4b), ± 1

Indication of (L) Lateral Hepatectomy -
Liver transplant from Donor - $\frac{1}{3}$ rd.

Regeneration of Liver $\rightarrow$ ~~$\frac{2}{3}$~~ $\frac{2}{3}$ rd ~~$\frac{2}{3}$~~ .

LIVER ABCESS

AMOEBIc ABCESS

- Liver $\rightarrow$ (2) lobe $\rightarrow$ postero-superior quadrant
- $\sigma > \phi$ 8-10:1
- young age (20-40y)
Presents $\hat{=}$ pain, hepatomegaly

Usually single

- Usually single
- Colour of pure - Anchovy sauce

↓ fish
culture → no pathogen.
cell → smooth

- Scrapping of wall $\rightarrow$ amoeba

- Lung Compⁿ -

Serology → ELISA, Indirect Haemagglutination, RPT

LFT $\rightarrow$ jaundice 10%

Alk Phosphatase ↑

- USC → I_XOC

CECT $\rightarrow$ Peripheral Enhancement

- Rx - Metronidazole 750mg TDS for 10 days.

Damage is not much required.

Abscess takes approx 9 months to resolve

Follow-up $\rightarrow$ USC. Initially weekly
than Monthly

USG guided Drainage

- ded Drainage
1) Size $> 9\text{cm}$ ($> 10\text{cm}$ - absolute indicator)

- 2) Impending Rupture or Ruptured

- 3) Immuno compromised

- 5) DM

- 5) ϕ

- 6) ① lobe abscess $\rightarrow$ ruptures into pericardium leading to tamponade.

- Doubtful Pyogenic Abscess

PYOGENIC LIVER ABSCESS

Route →

1) Bile duct → cholangitis (E. Coli)

2) Portal Vein. → portal pyemia
appendix
diverticula

3) Hepatic artery → Staph. aureus

4) Contiguous.

M/c causative → E. Coli

M/c " in children → Staph. Aureus

M/c granulomatous → Staph. aureus

M/c cause in Asian → Klebsiella

M/c cause in pyogenic liver abscess - endophthalmitis
↳ Klebsiella

CF - " O: P - 2-3%

1) > 40 yrs

2) Multiple. 7/50% - clusters in CT.

3) Systemic Disease ↑

4) Fever >> Pain

5) Serology -ve.

6) LFT deranged
Bilirubin ↑. (30-40%)

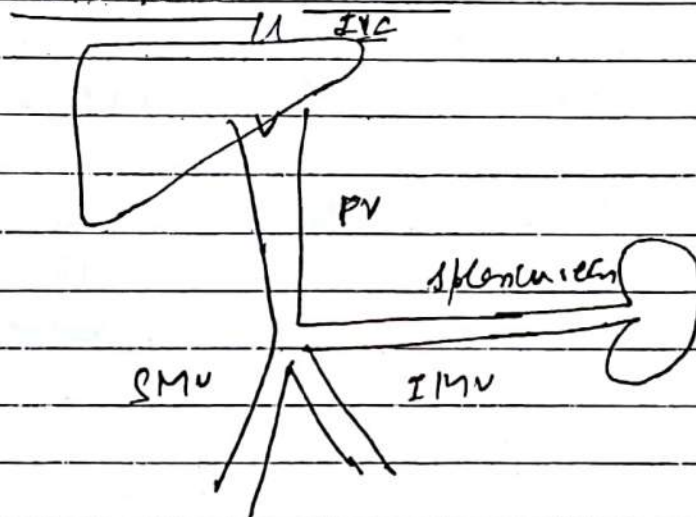
Rx - Antibiotics + Drainage

(

GRANULOMATOUS ABSCESS

- NADPH Oxidase dysfunction
- CT Scan $\rightarrow$ enhancement in peripheral
- Px - Percutaneous Drainage + γ -interferon (intraleisional)
- autosomal Recessive

PORTAL HTN



P - 5-10 mm Hg.

>10 $\rightarrow$ Portal HTN

>12 $\rightarrow$ Varices develop

M/c of P. HTN in children

Causes

Pre-hepatic $\rightarrow$ (1) Portal Vein Thrombosis

(2) Extra hepatic portal fibrosis

Pre-sinusoidal - schistosomiasis (M/c)

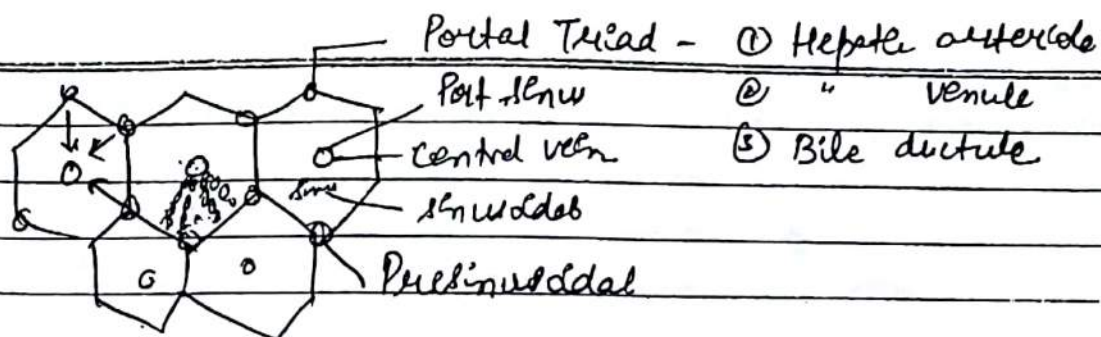
Hepatic

sarcoidosis

Sinusoidal - Cirrhosis

Post-sinusoidal - Central Vein Thrombosis

Veno-occlusive disease
Budd chiari



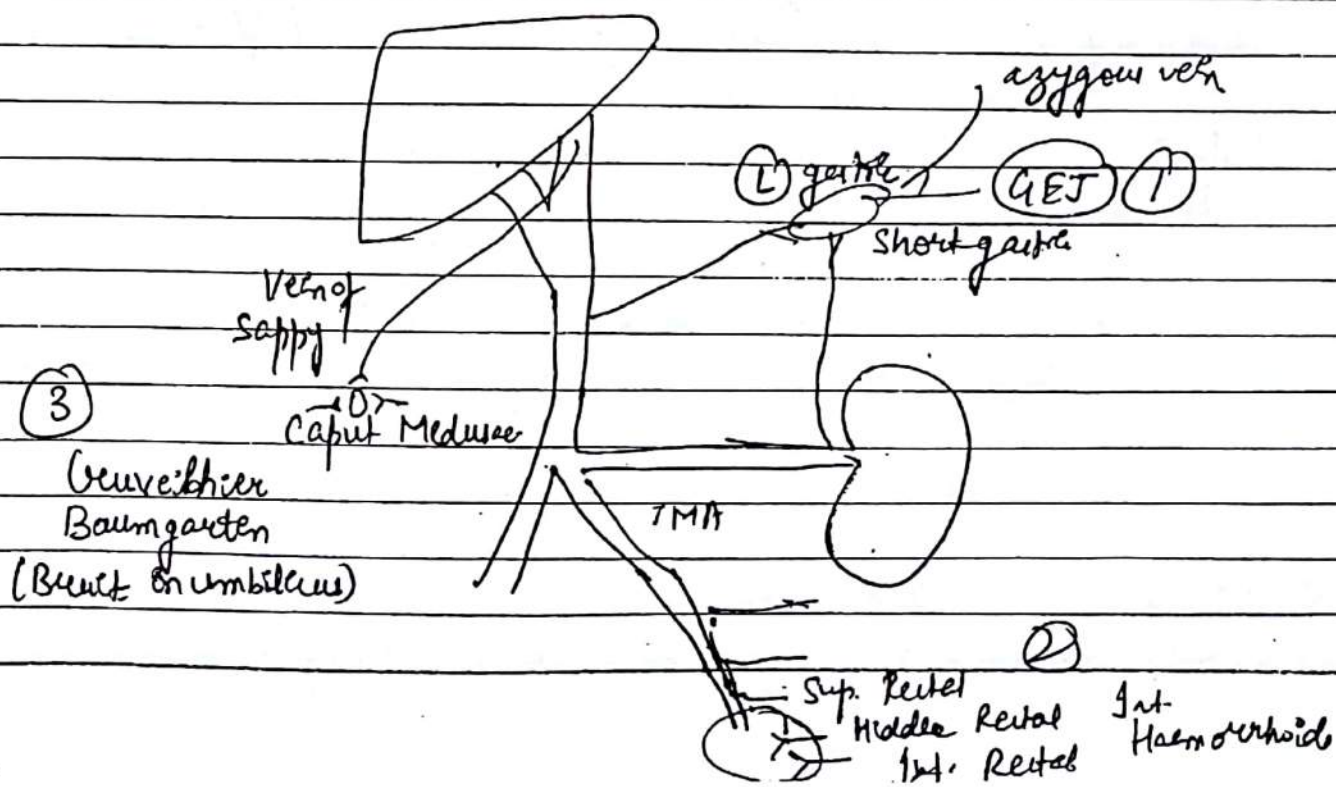
Nervous innervation from Central part.

^{Intestine}
Nervous spreads from centre to periphery,

Post-Hepatic → Budd-Chiari

Q/F

- 1) Splenomegaly (rule in P. HTN)
- 2) Ascites ($\uparrow$ Hydrostatic acid)
- 3) Varices



④ Vein of supply $\leftarrow$ $\rightarrow$ Return

$\downarrow$ Back (Retroperitoneal)
They $\uparrow$ the incidence of Hepatic Encephalopathy

Inv

1) Varices $\rightarrow$ Endoscopy

Early $\rightarrow$ Bar swallow

$\uparrow$ Risk $\rightarrow$ cherry red dot
whiplash appearance
Blue wheal marking

2) USG. $\rightarrow$ PV diameter (N) < 1.3 cm. ≈ 13 mm

if > 15 mm $\Rightarrow$ P. HTN.

CHILD'S PUGH SCORE $\rightarrow$ Read

R_x - End to Side Porto-caval Shunt

Emergency

Prophylaxis

Definite

1) ABC.

2) Drugs - Octreotide (DOC)
Somatostatin.

• Vasopressin $\rightarrow$ potent vasoconstrictor

• Terlipressin $\rightarrow$ cause Mesenteric Ischaemia

$\downarrow$
If it has to given, + NTG

3) Endoscopy $\rightarrow$ Sclerotherapy
(Diagnostic/therapeutic) Band ligation (EVL) - safer

Sclerotherapy $\rightarrow$ Ethanol amine oleate
 Sod. tetra deyl SO_4
 Sod. Morrhuate

* Balloon Tamponade

When we Retroflex Endoscope,
 Sclerotherapy is difficult

$\downarrow$
 So Balloon Tamponade
 by Sangstaken Blakemore
 tube



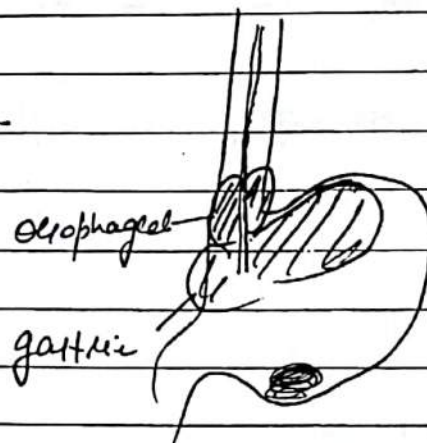
$\rightarrow$ Gastric Balloon - 200 mL - 300 mL

$\rightarrow$ Esophageal " 25-40 mm Hg.

$\rightarrow$ 1 more tube $\rightarrow$ for aspiration

Max Permissible time is 24 hours

If $> 24\text{h}$ $\rightarrow$ cause ischaemia



Minnesota Tube $\rightarrow$ for saliva
 $\hookrightarrow$ 1 more port

TIPSS (Transjugular Intrahepatic Portosystemic Shunt)

- using CO_2 venography.

- It is temporary as it gets blocked
 in 1 yr

- Roach needle is used



* Indicate of TIPSS- (Image)

1) Intractable Bleeding

2) " Ascites

3) Before transplantation, if risk of varice + nt

~~Complication~~

S/E -

① Encephalopathy

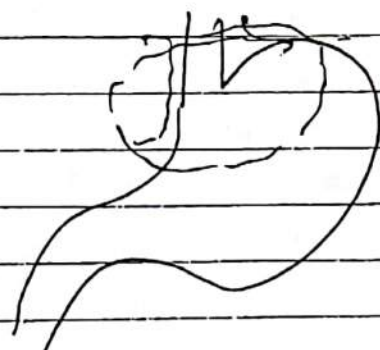
② Bleeding Risk.

③ ~~For~~ Not done for Pre-hepatic.
Post-hepatic.

oo

• Devascularisation + Transsection = Sugrva Procedure

20% Mortality



splenectomy

(Image)

Transplant

↓
<1yr.
TIPSS

↓
>1yr
Sugrva

Prophylaxis -

① Propranolol

② Isosorbide mononitrate

↳ In High Risk → EVL

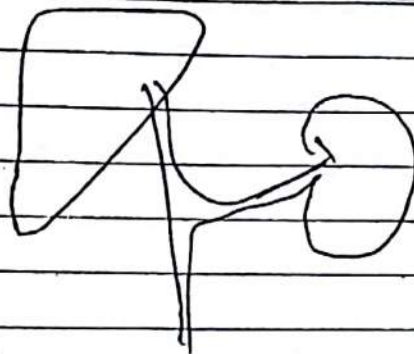
↳ sclerotherapy has no role

Definitive T/t

Total Shunt -

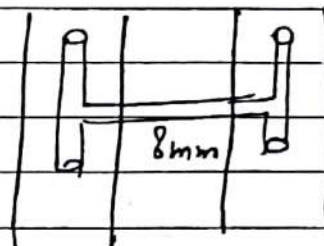
① End to Side Portocaval Shunt

② Side to Side portocaval shunt



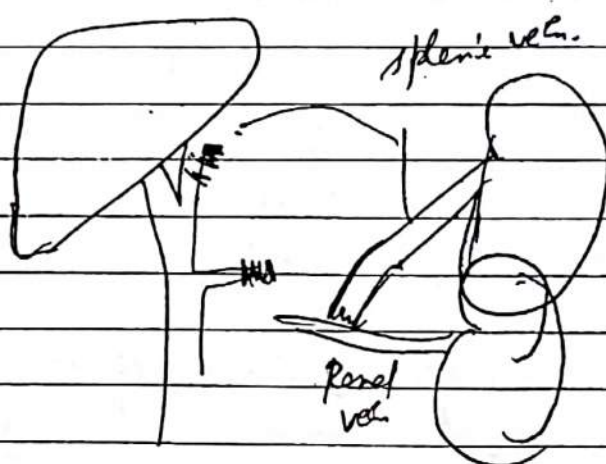
If shunt $< 1\text{cm} \Rightarrow$ Partial

Portocaval / Mesenterocaval H graft



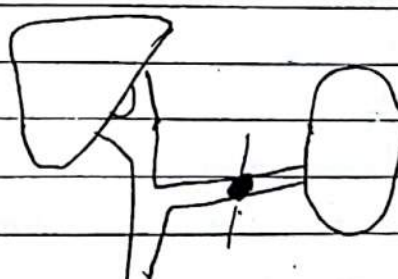
Selective Shunt -

Distal splenorenal shunt
(Warren shunt).



① (L) Sided Portal HTN :-

Cause - Splenic Vein
Thrombosis



Presentation - ① Splenomegaly

② gastric fundal varices due to short
artery.

Rx

① Splenectomy

② Distal spleno-renal shunt

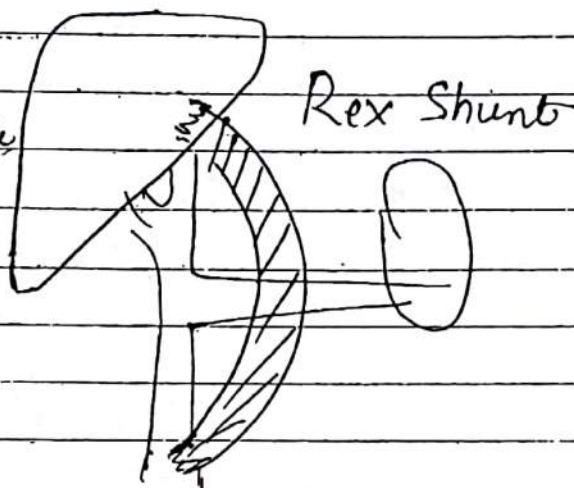
M/c cause of Portal HTN in Children →

- ① Non-cirrhotic Portal vein Fibrosis
- ② Extra-Hepatic Portal vein obstruction

↓
Splenomegaly

↓
<15yr

Indication of Rex shunt
- shunt for Pre-hepatic



M/c Benign Tumours of Liver - Haemangioma

HAEMANGIOMA

- Benign

- ♀

- Middle age

- Hamartoma

- Incidentaloma (tumour found by incidental exam
out any clinical symptoms)

- Encapsulated

- Estrogen associated

- Asymptomatic

Giant: >5cm. → cause thrombocytopenia

Kasabach Meritt Syndrome

Haemangioma cause

Ivcc → CECT.

↳ Peripheral enhancement

R_x =

- asymptomatic → under

- Symptomatic -

- enucleation

- Bleeding → Angioembolization

ADENOMA

- ♀ > ♂

- 20-40 yrs

- encapsulated

- single

- OC Pills

- only supplied by Hepatic A

- consist of Hepatocytes ⁸⁰

↑ glycogen

↑ fat

- ↑ risk of Bleeding & Cancer

FOCAL NODULAR HYPERPLASIA

- ♀ > ♂

- 30-50 yrs

- Not-encapsulated

- multiple

- OC Pill association very poor

- Haemorrhage Risk low

- Cancer - Nil

- consist of all liver cells

• Portal Tract

• ~~low~~ Kupffer cells

Only Liver Tumour i Kupffer cells



stellate scar

CT scan

Angio → spoke wheel pattern

OC pills do not cause FNM, but may ↑ the size/lesion

FNM ADENOMA FIBROLAMELLAR

Capsule

-nt

+nt

255^{LA}
+nt

Central
scar

+nt

-nt

-nt

Haemorrhage

rare

+nt

+nt

Steatosis

variable

+nt

variable

Kupffer
cell

+nt

-nt

-nt

Histosis

-nt

-nt

+nt

Clonality

Poly

Mono

Mono

* Spoke-wheel Pattern in UET

- 1) Renal oncocytoma
- 2) Serous Cystadenoma
- 3) FNH (Liver)

* Test to Differentiate FNH, Adenoma -

• HIDA Scan.

Kupffer cell scan → Sulphur Colloid Scan

Cold	Hot
Adenoma	FNH

Rx -

* Adenoma → stop OC Pills +
excise adenoma

M/c Haemoperitoneum ~~but~~ Trauma → Adenoma
in ♀ taking OC Pills →

* FNH → stop OC pills
Keep under observation.

HCC / HEPATOMA

- $\sigma^2 > \phi$
- old age
- East Asia, East Africa → Taiwan. [Hep B]

Risk Factors -

1) Viral - Hep B & C

2) Cirrhosis 4% - Viral } High Risk

3) alcohol }
Cryptogenic - Mod.
1° Biliary cirrhosis

3) Chr. Active Hepatitis - High

4) Metabolic -

- Haemochromatosis - (High)
- Tyrosinemia - (High)
- α_1 antitrypsin deficiency
- Wilson's - low
- Oxidic aciduria

5) Aflatoxin - B

6) Alagille Syndrome

7) DM II

NASH

8) ~~Polyvinyl~~

Polyvinyl chloride → cause angiosarcoma

E/F

1) Vague

2) Hepatomegaly } all are seen late
Jaundice } s/o inoperability

Paraneoplastic Syndrome

- Hypoglycemia
- Hypercholesterolemia
- Polycythemia
- Hypercalcaemia

Inv

- USG $\rightarrow$ follow-up.

- CECT $\rightarrow$ IOC - Triple phase.

Initially Tumour gets hyperdense
 $\downarrow$
 then Liver gets hyperdense
 $\downarrow$
 Tumour gets hypodense

} Early uptake & early Release.

.. Multiple Hypodense Liver Tumour $\Rightarrow$ 2°.

Less Vascular

Tumour Markers.

① AFP - $+1/2$ - 5-7 days.

- Non-seminoma
- HCC.

for follow up.

Nowadays used for diagnosis

If AFP > 400 + CECT diagnostic

$\downarrow$
 No Biopsy Required for Diagnosis of HCC

② PIVKA → Protein Induced by Vit K Absence)
Des gamma carboxy Prothrombin.

③ AFP (L₃) — Lactin fraction 3

④ Hep PAR-1

R_x - Radioresistant
Chemo.

Surgery → inoperable T_x

↓
SORAFENIB (oral)

↓
Regorafenib

Liver funcⁿ is required.

Hepatectomy

↓
Residual
function.

>30%

↓
Hepatectomy
+ 7

small
<30%

↓
②
Hepatic PV
Thrombosis

↓
Induce liver

Regeneration
(NIMURA TECHNIQUE)

① Child's criteria
↳ Borec
PV Thrombosis

③ Indocyanine green without
⑤ Li Max

Methaceten + C¹³

↓
CYP1A2 (Liver) → PCM. + C¹³ → CO₂
in Breath

* Transplant

MELD Score -

> 19

End Stage Liver Disease

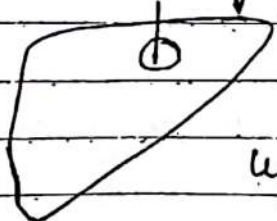
MILAN

Criteria for transplant in Cancer.

- 1) Single < 5cm. (T_1)
- 2) Multiple tumours < 3 in no.
< 3cm in size
- 3) No Major Vascular invasion

Other T/4 Modalities-

- ① USG guided acetic acid Injection.
Obsolete now
- ② USG guided absolute alcohol Injection.
In case of < 3cm Tx can be done
Rarely used
- ③ Cryo → Rapid Freeze + Gradual Thaw
Laser
Microwave
- ④ Radiofrequency Ablation.
alternating current used
probe in liver → ↑ Temp
350-450 KHz frequency Probe
upto 2cm.
 T_x < 5cm can be used



In case of vessel in proximity → stray artefact
sink



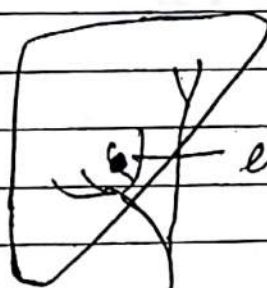
Microspheres

⑤ TACE (Trans Arterial Chemo Embolization)

C/I to TACE

① PV Thrombosis

as liver will not get
supply as ② sources
will be blocked.



embolization
Microspheres



• Ciprater

• Adriamycin

② LFT Abnormal

③ Encephalopathy

⑥ TARE / Transarterial Radio Embolization

SIRE (Systemic Internal Radio Embolization)

→ Yttrium 90 is used

PROGNOSTIC INDICATORS

OKUDA

- Tumour Size
- Bilirubin
- Ascites
- Albumin

CLIP

- Tumour Size
- Child Score ^{pre-op}
- α -FP - ~~child~~ clip
- PV Thrombosis

BCLC

- Tumour Size
- LFT
- Performance status
- or Child Pugh

Karnofsky Score

ECOG (Eastern Cooperative Oncology group)

0-5 about performance status

5 year survival Rate - 8-5%

FIBROLAMELLAR CANCER

- ♀ > ♂

- 20-40yrs

- Cerebrosis is not a risk factor

- Tumour is well circumscribed
not encapsulated

- 50% - show calcification
internal scar may be a feature

- Tx Marker -

~~α~~ Neurotensin

- Metastases late. L.N. involve

Tx - only surgery
↓

Nodal excision

Q Liver 2° show calcification?

- ① Colorectal } mucinous Ca
- ② Breast }
- ③ Ovary }

HEPATOBLASTOMA

↳ Tx of children < 3yrs

2) ~~Rx~~ Chemo Responsive.

3) ~~Rx~~ - Neoadjuvant Chemotherapy → Surgery

SIMPLE HEPATIC CYST

- Congenital

- Risk factor for Ca

- It is sequestered Bile duct, not communicating
to Bile duct

- Lined by cuboidal cell

- fluid → Plasma
No Bile

CT Scan → Hypoechoic

Rx If asymptomatic → aspirate + sclerosing agent
filled

Symptomatic → Decrooping
Laparoscopically

QUINKE'S TRIAD - HEAMOBILIA

cause - Iatrogenic / Biliary

Pain

Jaundice

Bleeding

Malena

> 50mL

occult blood stool

Guaiac Test

Diagnosed by Angiography.

T/H → Angioembolisation

00

AIIMS 2017

BILHEMIA

Inu

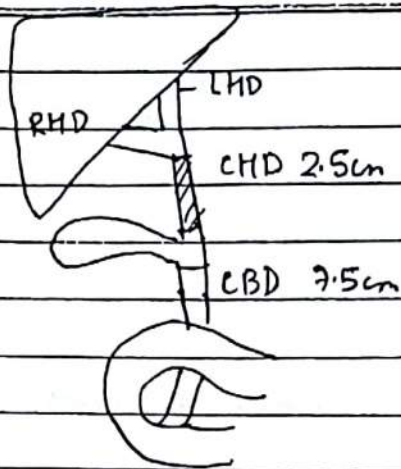
- ERCP

21

GALL BLADDER

265

23/12/17

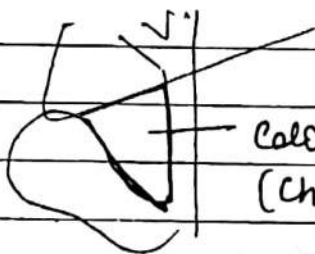


CBD Lyr - 7.5cm.

* Part of CBD -

- 1) Supraduodenal
- 2) Retroduodenal
- 3) Infraduodenal

Retroduodenal + Infraduodenal part are inaccessible.



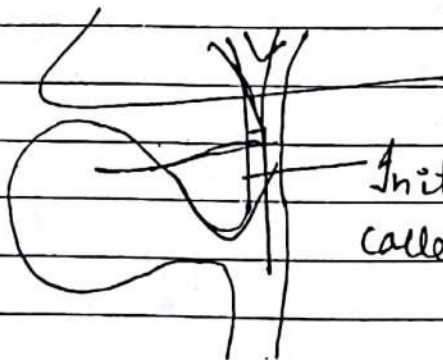
Calot's Δ
(Cholecystohepatic Δ)

Boundaries -

- 1) Inf. Border of Liver
- 2) cystic duct
- 3) CHD.

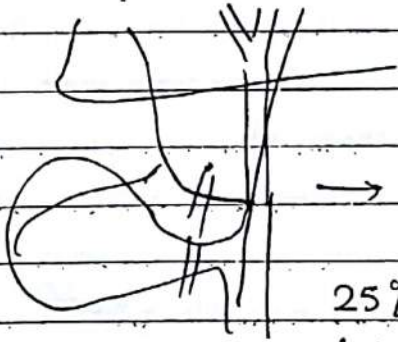
Content -

- 1) Fat Fibrofatty tissue
- 2) Cystic artery
- 3) L.N. of Lund / cystic node



Initially this was called Calot's Δ.

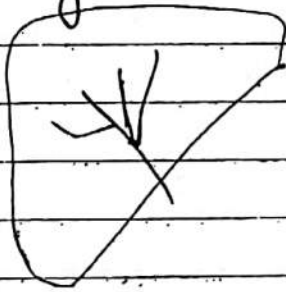
* Anatomical aberration → ~~Morhi~~ Morrhison's Hump / Caterpillar Hump



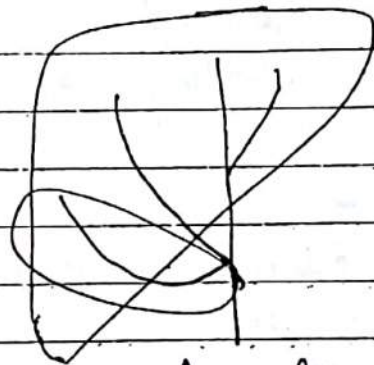
→ Prone to injury in cholecystectomy

25% of individual have anatomical defect

M/c Congenital anomaly



→ shape - globular

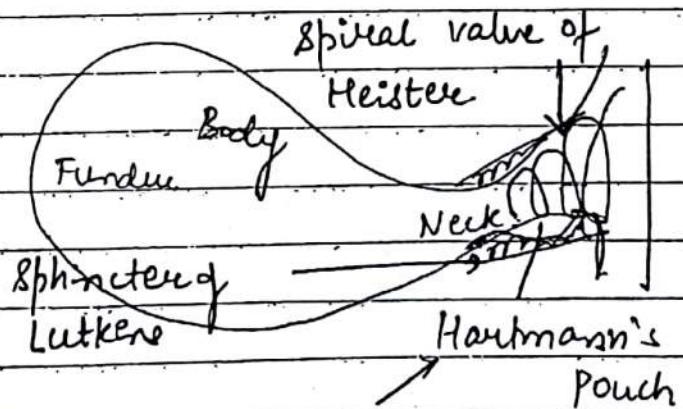


Anomaly

→ Vol. of GB → 30 cc

→ Bile is concentrated 10x in GB.

→ absorption $\text{Na}^+ \text{Cl}^- \text{H}_2\text{O}$



• epithelium → columnar (simple)

M/c site for Gallstone lodgement

Histology

- No submucosa
- NO muscularis mucosae
- Crypts reach upto muscle
(other GIT organs, crypts are only upto mucosa)



Rokitansky Ashoff Sinuses (RAS sinus)

↓
• Crypts of Luschka

- Gland Proliferation in muscle → Adenomyomatosis.
- Cholesterol deposits in crypts → Cholesterolosis / Strawberry GB.
- If sinus goes out → GB diverticulum



CHOLELITHIASIS

Types-

1) **Mixed**

"M/c type"

M/c type in India

2) **Cholesterol**

↑

M/c type in

caucasians

Cholesterol content > 70%

3) **Pigment**

Black

Brown

↓
• Infection

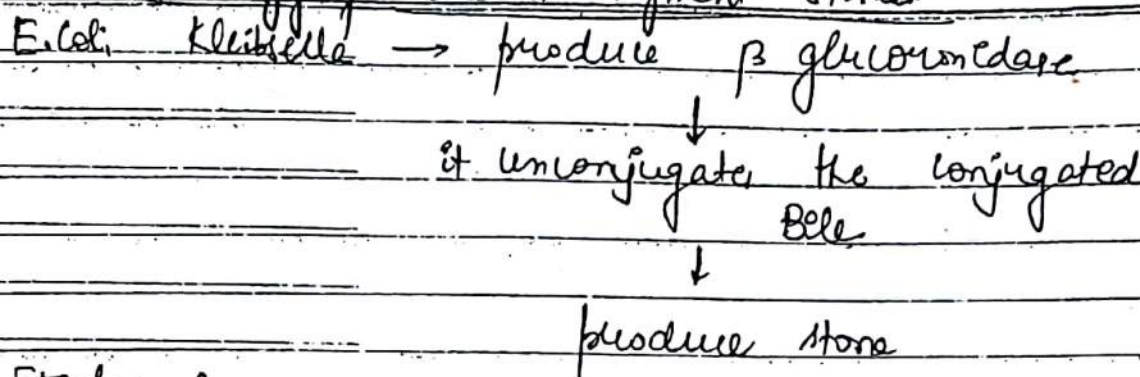
Haemolytic anaemia • More

common in Asia

• Recurrent

↓
Oriental Cholangitis / Recurrent Pyogenic Cholangitis.

* Pathology of Brown Pigment stone.



* Etiology:-

1) Supersaturation of Bile-

Cholesterol ↑

Bile salt or Lecithin ↓

↓

Crystallization

↓

Nucleation

↓

Growth

2) Stasis

3) ^{poor} Nucleation

Cause of cholesterol ↑ →

Fat, fertile, female or fatty → most prone

• Obesity

• Clofibrate therapy

• Rapid wt. loss

• fat

• ↑ age

Bilio-pancreatic diversion. $\rightarrow$ Bariatric surgery for morbid obesity

Causes of Bile salt $\downarrow$

- 1) Malabsorption syndrome ($\downarrow$ Enterohepatic circulation)
- 2) UC
- 3) Crohn's
- 4) Coeliac sprue
- 5) Ileal resection
- 6) (R) Hemicolectomy
- 7) 1° Biliary Cirrhosis
- 8) CYP7A1 deficiency mutation
- 9) HDR $\rightarrow$ $\downarrow$ Lecithin.

Causes of Steatorrhea -

- 1) Truncal Vagotomy
- 2) Prolonged Starvation
- 3) Total Parenteral Nutrition
- 4) Somatostatinoma
- 5) Octreotide therapy

Causes of Pronucleation -

Alipoproteinemia $\rightarrow$ $\downarrow$ nucleation.

- 1) A Lipoprotein deficiency
- 2) ceftriaxone

CF-

1) Asymptomatic

↳ Keep under observation

2) Biliary Colic

3) Cholecystitis

→ all features of inflammatory disease

- Pain (R) Hypochondrium
- Radiating to back & (R) shoulder
- Hyperesthesia posteriorly at 11th or 12th I.C. space (BOAS'S SIGN)

- MURPHY'S SIGN - tenderness on deep inspiration in (R) Hypochondrium

4) Acute Cholecystitis

↳ Acute

↳ Chronic → Thick walled, contracted

↳ Empyema → Thick walled, pur

↳ Mucocele

↳ stone proximally located impacted
wall thinned
enlarged

95% → calculous Cholecystitis

5% → Acalculous Cholecystitis

Cause - Bacter

Shock

Dengue

Immunocompromised

Typhoid

prone to gangrene
necrosis, perforationby gas forming organism - Clostridium
E. Coli

cause emphysematous

Cholecystitis

Emphysematous Pyonephrosis → E. coli

Inv.

USG → IOC

Most accurate

Hypoechoic, acoustic shadow behind stone.

CT Scan → Not a good modality.

Cholecystitis →

USG → IOC

HIDA Scan → Most accurate

Non-visualisation of GB.

CT Scan →

On basis of accuracy → HIDA

↓

CT Scan

↓

USG

↓

WES triad / sign

- 1) Wall edema
- 2) echogenic shadow of stone
- 3) acoustic shadow.

Adenomyomatosis →

USG → COMET TAIL SIGN

(Image)

ROSARY BEAD SIGN

→ MRI (Image)

PEARL NECKLACE SIGN.

(Image)

Emphysematous GB →

CT Scan → Best modality

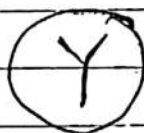
CHAMPAGNE SIGN in USG, CT (Images)

multiple effusions

In X-Ray → only 10% stone are found (radio-opaque)



• MERCEDES BENZ SIGN -



• SEAGULL SIGN -



To Differentiate Renal Stone & Gall stone

↓
Take Lateral View.

On the spine
(Renal stone)

In front of spine
(Gall stone)

Management of Ac. Cholecystitis -

Old Protocol -

Conservative Sx

↓
Discharge

↓
> 6 weeks

↓
Interval Cholecystectomy

New →

Immediate Cholecystectomy

in 2-3 days

Acalculous/Emphysematous Cholecystitis -

↳ (Fit) Cholecystectomy

Unfit
Cholecystostomy
Cholecystectomy.

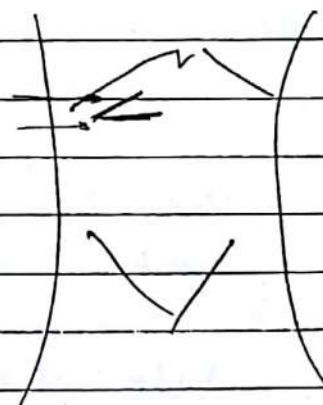
Not advised in Benger.

A 75yr old lady was case of asymptomatic gallstone
& case of terminal cancer. Life expectancy short
She develops Cholecystitis?

Cholecystectomy

CHOLECYSTECTOMY

1) OPEN

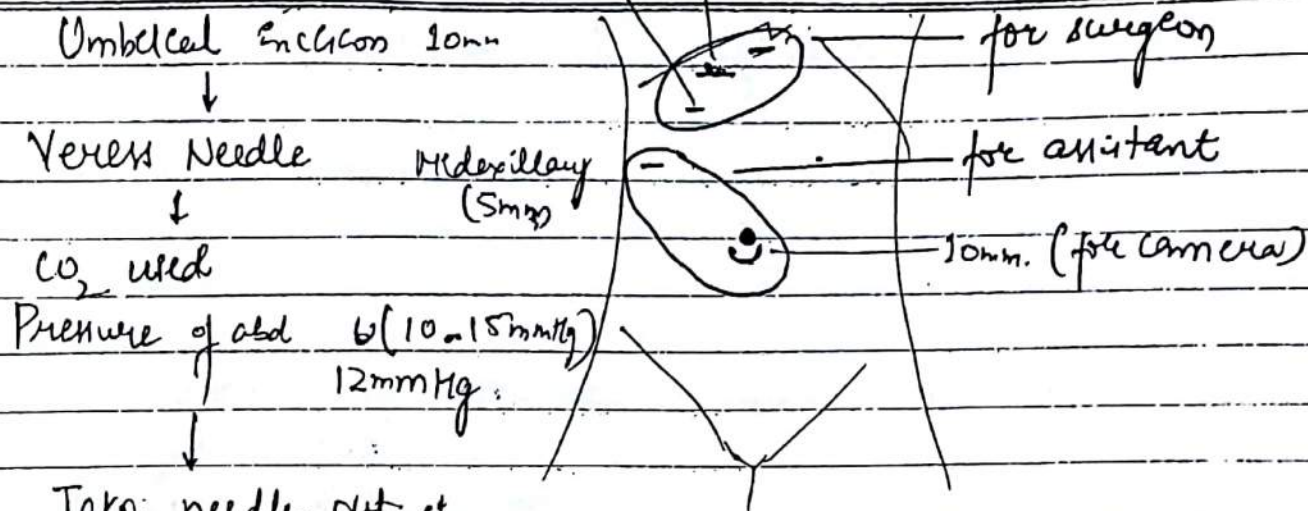
a) approach through cystic duct
(Calot's Δ)Kohler's
Kehar

b) approach through fundus
↳ Fundoscopic/retrograde
cholecystectomy

2) Laparoscopy

1st laparoscopic surgery → ERIC MUHE

Midclavicular (10mm)
epigastrie (10mm port).



Take needle out it
Put tube inside

Mexyland
Meryland tip forcep (artery forcep)

Gall Bladder is removed from Epigastrie Port

OPEN

to occlude air entry.

Hasson's cannula
(Image).

When umbilical is not available
we approach through Palmer's

Midclavicular line Palmer
3cm below reb. site

Veress needle
(Image)



SILS - Single Incision Laproscopic Surgery.

DNB 15

NOTES - Natural Orifice Transluminal
Endoscopic Surgery



flexible endoscope
Scarless procedure

Physiological Changes + Comp^s of Laparoscopy -

1) Perforation

2) Rapid stretch of peritoneum can cause
Vasovagal attack → leading to Bradycardia.

3) CO_2 Rate → $< 1 \text{ Litre/min.}$

If IVC is compressed → ↓ Venous Return
↓ Preload
EF ↓ / ↓ CO.
↑ HR
↑ JVP.

After load ↑ becoz systemic Resistant ↑

4) Diaphragm elevated

↓ Vital Capacity
↑ Pulmonary Resistance
 PaO_2 ↓ PaCO_2 ↑

5) If Aorta compressed → ↓ tissue perfusion
↓ GFR
↓ urine output

↑ aldosterone / Renin ↑ — ↑ Peripheral Vascular Resistance

↓
↑ Afterload

6) If ↑ retention of CO_2 — Resp. acidosis.

↓
Cerebral vasodilatation.
↑ ICP.

Complication of Gall Stone

Gallstone Ileus.

- 100% case → Cholecysto-duodenal Fistula / Cholecystenteric fistula
- Commonly seen in old pt
- ♀

• Pt have had many attacks.

- Size of stone > 2.5cm

- Stone get stuck → 2 feet proximal to ileocaecal junction (Distal ileum)
or
Ileocaecal junction

Pt presents w Small Bowel Obstruction.

Inv → IECT

RIGGLER'S TRIAD → Radiopaque shadow in ileum

- ~~with~~ Bowel distension
- Air in GB (Pneumobella)

Tx → Surgery → Relieve obstruction.

cholecystectomy ~~done~~ immediately not done. Routinely
may

Open ileum at mid-ileum.

Distal ileum not opened due to leak.

* BOUVERET SYNDROME -

Stone gets stuck in 1st part of duodenum

↓
Presents like Gastric Outlet Obstruction.

* MIRIZZI SYNDROME -

In chronic cases, Gall stone ~~may~~ lodged in Hartmann's pouch. may compress CBD from outside

↓
Obstructive Jaundice

↓
may lead to formation of fistula

Type IV in Sander's classification denotes fistula.

SAINT'S TRIAD →

- 1) Gall Stone
- 2) Diverticulosis
- 3) Hiatal Hernia

Cholecystectomy in.

* Indication of Asymptomatic Choleliths -

- 1) Size $> 3-4\text{cm}$
- 2) Multiple small stones $\bar{c}$ wide cystic duct
- 3) Immuno-compromised pt
- 4) $\odot$
- 5) Typhoid Carriers
- 6) GB Polyp
- 7) If stone $> 10\text{mm}$.
- 8) Porcelain GB $\rightarrow$ calcified (Pre-malignant).
- 9) Hemolytic anaemia $\bar{c}$ Gall Stone
- 10) Bacterial surges (few of them)
- 11) ~~12)~~

Medical Rx-

Ursodeoxycholic acid or chenodeoxycholic acid
for 6 months to 2 yrs

Indication -

- 1) Size $< 2\text{cm}$ / single
- 2) functioning GB
- 3) Non-calcified stone
- 4) $\odot$

BILIARY DYSKINESIA -

- group of conditions

- Cholelithopathy $\rightarrow$ Improper contract of GB

Inv $\rightarrow$ USG

But Inv $\rightarrow$ HIDA Scan

Efficient Fraction $< 35\% \rightarrow$ Motility Disorder

$\downarrow$
Cholecystectomy

Sphincter of Oddi Dyskinesia--

ALP4

fail to relief

NARDI Test --

Obsolete Test now

Administer Neostigmine + Morphine

Induce pain

Measure S-amylase, lipase

if ↑↑↑ → test +ve.

Manometry → IOC

T/T → sphincterotomy by ERCP.

CHOLEDOCHOLITHIASIS

1°

2°

formed in CBD

from gall Bladder.

M/E

Brown pigment stones
are H/C in CBD

~~Recurrent~~ Retained

Recurrent Retches

After GB removal if

CBD stone

> 2yr

→ Recurrent

< 2yr

→ Retained



QF →

17 Presents w/ Cholangitis (Infect of Bile of CBD)

Org. → E. coli, Bacteroid

① CHARCOT'S TRIAD.

a) Pain

b) Fever

c) Jaundice

Intermittent

Cause of Intermittent Jaundice

①. Cholangitis

② Pericampillary Ca

27-11

R_x

1) Pt responds w/ Antiseptic 77%

In Few pt, it progresses to septicemia.

↓

RAYNAULD'S PENTAD - Charcot's triad

+ Shock

+ Coma

Diagn. Pw. by [ERCP + Decompression] -
 o papillotomy }
 o sphincterotomy }

IOC → MRCP. (Non-invasive)

ERCP - Equally good but due to invasive procedure, no diagnostic role

- CBD stone

- Stricture

- Cholelith cyst

Biliary Leak $\rightarrow$ ERCP

For Cancer $\rightarrow$ PET stage

Microolith $\rightarrow$ EUS

Hepatobiliary

- USG

- LFT.

USG

① Supraduodenal stone



Stone visible

② Intra/retroduodenal stone



CBD dilated

LFT. $\rightarrow$ conjugated hyperbilirubinemia

Alk Phosphatase > 2.5 times (N)

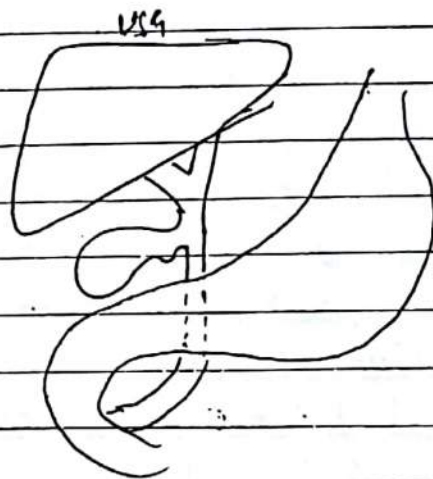
$\hookrightarrow$ also $\uparrow$ osteoblastic bone 2°

① USG $\oplus$, $\rightarrow$ CBD $\oplus$, LFT (N) $\rightarrow$ Cholelithiasis

② USG - gallstone, CBD dilated, LFT altered $\rightarrow$



go for MRCP.



①	②	③
USG - Gallstone.	USG - Gallstone	USG - Gallstone
CBD (N)	CBD dilated	CBD - CBD stone
LFT (N)	> 1cm.	LFT - obstructive jaundice
↓	LFT - obstructive jaundice	↓
Cholecystectomy	↓	1st ERCP done
	MRCP.	↓
		later Lap. cholecystectomy
		If ERCP 4/1 = cholecystolithotomy

* Cholecystolithotomy -

Lap. → has < 60% success rate & 'tough'.

① Supraduodenal

① Cholecystectomy

② Supraduodenal cholecystectomy

↓
Desjardins's forceps

T-Tube insertion

↓
> 8 days, it can be removed
mostly in India 10-14 days.

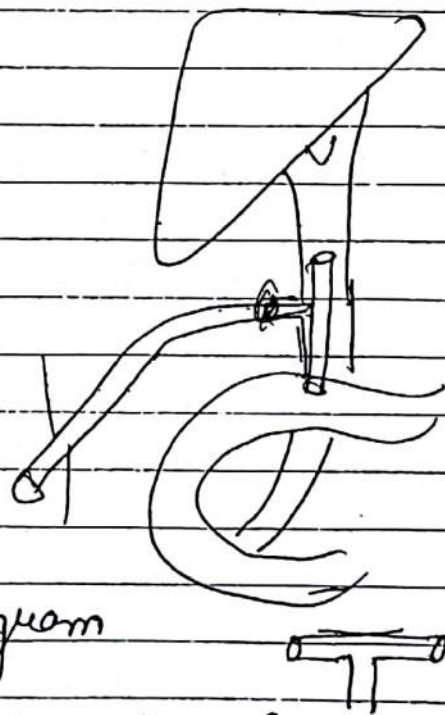
↓
Before Removal (after 7 days)

we perform T-tube Cholangiogram

↓
if stone still not → Meniscus sign seen.

↓
after 24 hours, T-tube is removed

↓
Hole epithelialise by itself in 24-48 hrs



* How to ~~remove~~ Remove Retained Stone when T-tube is in-situ?

T-tube cholangiogram shows stone (filling defect)

↓
Leave T-tube for 5 weeks

↓
Fibrosed channel is formed

↓
Cholangioscope or droma basket through T-tube

↓
Remove stone

↓

OR AIP4

BURHENNE TECHNIQUE

CHOLEDOCHODUODENOSTOMY -

If there is distal obstruction in CBD, CBD dilated, open CBD + duodenum + anastomose them.

Pre-requisite -

- CBD > 1cm.

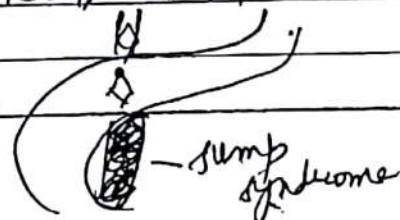
- size of anastomosis > 2.5cm.

Risk of ascending cholangitis is very ↑ as there is no sphincter.

SUMP SYNDROME -

The part of CBD is kept open after Cholecho-
duodenostomy → growth of bacteria, stone, etc

complication of this surgery



If pt. is unstable in case of gallstone + CBD stone + obstructive jaundice

↓
we don't go for ERCP

Proceed to ERCP + decompression.

CHOLEDOCHAL CYST

- ♀
- Incidence 1:20,000 (variable)
- Etiology - anomalous biliary-pancreatic junction
sphincter of oddi dysfunction - sphincter

Alamozaj Classification / Todani

I → M/C type

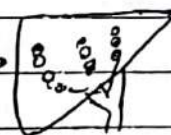
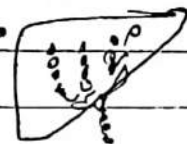
II → Diverticulum

III → Cholelascocoele
Intramural dilatation

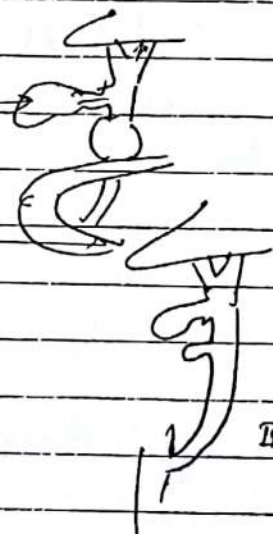
IVa → Extra, intrahepatic bile duct
atresia

IVb → Extrahepatic atresia

V → Intrahepatic atresia
CAROLI'S DISEASE



Intramural



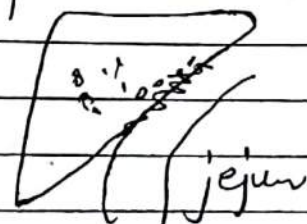
Porto-jejunostomy Procedure / KASAI operation

↳ Type IV

ATIMS

In Caroli's Disease

CT → Central Dot Sign



Q Ioc for Intrahepatic Atresia ⇒ Liver Biopsy

Q Ioc for Extrahepatic Atresia ⇒ HIDA Scan

Q USG in Biliary Atresia

→ Triangular cord Sign

→ Ghost Gall Bladder

↳ atretic GB
 $< 1.8 \text{ cm}$

normal
 mass

C/F

1) ~ Cholangitis - + Lump.

2) Pre-malignant - 22% HGK

3) Rupture → can cause Biliary Peritonitis.

Inv

USG followed by MRCP.

T/t

1) Choledochocysto-duodenostomy

Not done nowadays. Since ↑ chance of infection.

↑ HGK

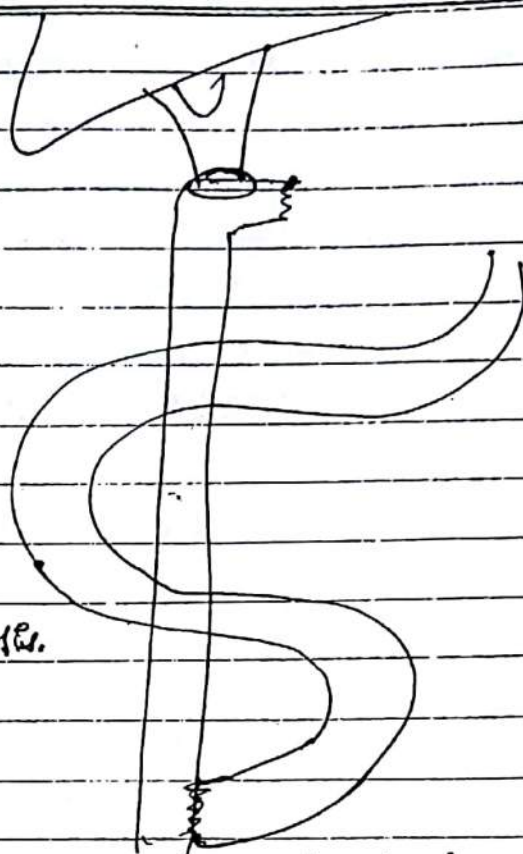
2) Roux-en-Y Hepaticojejunostomy

Remove GB, CBD.

↓
Divide jejunum

↓
Anastomose to common
hepatic ~~duet~~ duct

↓
jejunio-jejunostomy anastomosis.



HUTSON LOOP

for Recurrent Pyogenic
Cholangitis

- Single layer

- Use Vicryl

↓
Make a Roux-en-Y Hepatico-J anastomosis

↓
take Roux limb to skin

Advantage → to approach easily by endoscope
whenever required

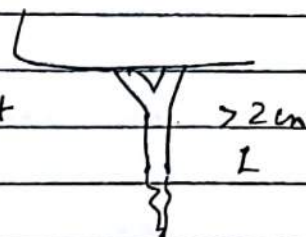
CBD Injury & Structure

H/cc → Iatrogenic

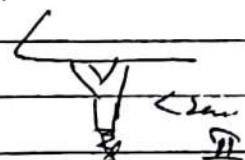
Bismuth Classification-

depends upon length of hepatic duct

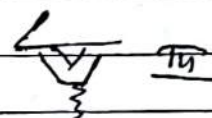
Type I → $> 2\text{cm}$



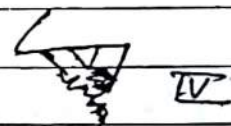
Type II → $< 2\text{cm}$



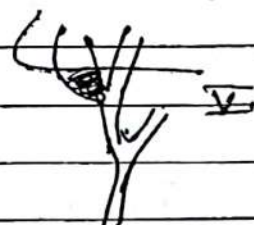
Type III → Confluence is preserved
No length of CHD



Type IV → 'junc' is gone



Type V → Post. sectoral duct injury
seg 6 & 7

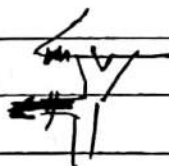


Strasberg classification

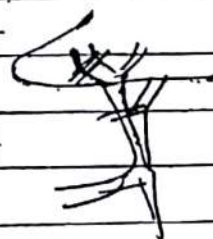
(A) → Cystic stump Blow out

C.B. fone leaked

Don't present - Bile duct leak



(B) → Ligation of (R) hepatic or post. sectoral duct



(C) → Transection of (R) hepatic / Post. sectoral duct

(D) → Lateral injury of main duct.

(E) → Stricture

$E_1, E_2, E_3, E_4, E_5 \Rightarrow$ Same as Bismuth.

Approach

- ① USG guided drain CECT gives best impression
Wait for day 1 or 2 of collection

↓
Bile leak

↓
ERCP

- ① cystic lump leak (Bismuth I)

↳ ① put a ERCP stent

② or do open & lap → put clips again
re-explore & re-ligate

- ② If there is neck in CBD.

small neck → Hepatec over T-tube

- ③ If CBD is transected at any level

↓
Roux-en-Y Hepato-jejunostomy

Don't prefer Roux-en-Y - cholecho-jejunostomy
since blood supply is from above
downwards,

Hence, Hegher we go → better results

GB Cancer / CHOLANGIO CA.

GB Ca

CBD Ca

- ♀ > ♂

♂ > ♀

- Poorer Prognosis

Poorer

Risk Factors for Both

- 1) Cong. Hepatic Cyst
- 2) Caroli's Disease
- 3) Choledochal Cyst
- 4) Von-Mayerberg Complex → Biliary Hamartoma
- 5) Worms → ~~Clonorchis sinensis~~ Clonorchis sinensis (Chinese liver fluke)
Opisthorchis (Asian liver fluke)
- 6) Sclerosing Cholangitis ← U.C.
- 7) ~~the~~
- 7) Toxins → Thorotrast (was used as dye for angiography)
- 5) Drugs - estrogen
L-methyl dopa
INH

6) 1° Biliary Cirrhosis

7) Cholelithiasis

8) Typhoid Carrier

GB Ca.

L/F

- ♀

- > 50%

- M/C site - Fundus

- M/C type → Infiltrative

- $90^\circ\text{Cu}_2\text{S}$ → Gall stone
- Nevin classification is for Ca GB.
- Common in India (North)

* Port site excision Role -

- ① therapeutic
- ② staging

T_{1b} → Wide excision

1cm⁺ margin of liver tissue excised

> T₂ → Extended Cholecystectomy

Remove • CB

• Lesser omentum

• Cystic node

• Liver segment 4b + V

↓

If cystic stump +ve for tumour cells
or Cystic node +ve

↓

then, CBD is also removed

↓

Perform Roux-en-Y hepatico-jejunostomy

Poorly Chemo sensitive → so 5FU + Gemcitabine

Cholangio Ca

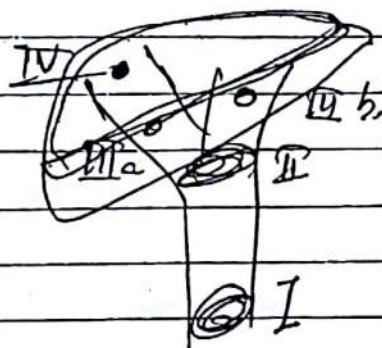
Bismuth Classification for Ca

1) I → Below juncⁿ

2) II → at juncⁿ

3) III → above juncⁿ

4) IV → intrahepatic



Klatskin → Type ~~II~~ II
Better Prognosis

M/c to site → type II.

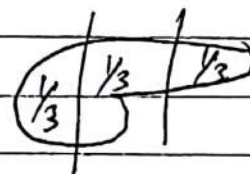
PANCREAS

Ca Pancreas → 3rd M/c cancer in GIT.

Exocrine → 98% → adenocarcinoma (98%)
Endocrine → 2% → Head
↳ Insulinoma M/c.

INSULINOMA

- 2/3rd of all endocrine tumours
- 90% Benign / single
- < 2cm, equally distributed.



- encapsulated.
- Presentation - Hypoglycemia

WHIPPLE'S TRIAD - attacks of hypoglycemia
- B. sugar < 5mmol/L @ presentation
- Become (N) to sugar

Not pathognomonic of Insulinoma

- Insulin/sugar ratio > 0.3

Most accurate biochemical test $\rightarrow$ 72 hour fasting sugar value

* Insulinoma/ Inj of insulin

↓
go for C-peptide

↓
Injⁿ of (N) Insulin.

↑
Insulinoma

* Insulinoma against sulphonylurea toxicity
C-peptide ↑ in both.

1) S. sulphonylurea level

2) Insulin/sugar ratio.

if $> 0.3 \Rightarrow$ Insulinoma

GASTRINOMA.

2nd M/c Endocrine Tumour

MEN $\rightarrow$ M/c tumour.

MEN₁ $\rightarrow$ WERMER SYNDROME

$> 50\%$ $\rightarrow$ malignant / multiple

Enteropancreatic tumour $\rightarrow$ as it comes from duodenum
gastrinoma - M/c enteropancreatic Tm.

PASSARO Δ → ① Joinⁿ of cystic duct & CBD
 ② " " neck & body of pancreas
 ③ " " 2nd & 3rd part of duodenum

Site of origin -

1st part of Duodenum > 2nd part of D > Head of pancreas

ZOLINGER ELLISON TRIAD -

- 1) ↑ Gastrin level
- 2) Multiple ulcers → unusual position, refractory
- 3) No β cell tumour of pancreas

Presentation -

- 1) Pain
- 2) Diarrhoea - due to hypertrophy of gastric mucosa

Diagnosis -

S. gastrin levels > 1000 → malignant gastrinoma

(N) level ~ 150

Borderline cases btw 150 - 500

↓
 & ~~gastrin~~ ① Secretin stimulation Test

(N)

↓ gastrin

Gastrinoma

↑ gastrin

② Basal Acid Output

(N) - 5-6 mEq/hour

In gastrinoma

> 15 mEq/h

(3) BAO: MAO

BAO > 60% of MAO $\Rightarrow$ Gastrinoma

VIPoma

1) $\phi > 0$

2) old age

3) 70% $\rightarrow$ malignant potential

4) Presents $\bar{c}$
Pain

Steatorrhea

* WDHA syndrome - / Werner Morrison / Pancreatic cholera

WD - Watery Diarrhea

H - Hypokalemia

A - Achlorhydria + acedosis

GLUCAGONOMA

$\rightarrow$ Presents $\bar{c}$ DM

Anemia

Stomatitis

Dermatitis

Thromboembolic episodes

Leukemia

Border - ~~normal~~

Necrolytic Migratory Erythema



skin normal in
b/w

SOMATOSTATINOMA

① Present - Gallstone → cause attack
DM → $\ominus$ Insulin

② Common in MEN₁
VHL → cerebellar haemangioma
RCC

Inv.

① EUS →
Ioc for Insulinoma
CECT.

Other tumours - SRS (Somatostatin Receptor
Scintigraphy).

- Octreotide Indium¹¹¹ - earlier use

- Now, Pentetreotide - Indium¹¹¹

MRI PET scan not helpful

Tumour Marker -
Chromogranin A

Rx - Octreotide - medical Rx

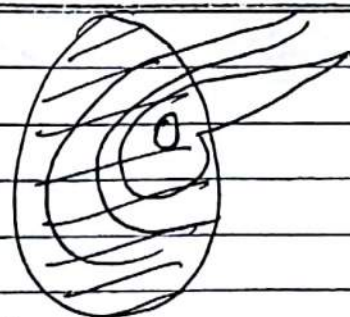
- Radio (R)

- Slightly Chemo (S) → Streptozocin + 5Fu / Adriamycin

Head -

S_x → Whipple's operation
↳ Pancreato-duodenectomy

Tail → Distal pancreatectomy.



Radical S_x are preferred in case of pancreas ~~in~~ Tumour except Insulinoma (encapsulated)

If Insulinoma
Size < 2cm
Location - away from duct
↓
Enucleation.

If > 2cm, attached to duct → Whipple's.
If in tail → Distal pancreatectomy.

CYSTIC Tx OF PANCREAS

- ① Serous cystadenoma
- ② Mucinous "
- ③ Intraductal Papillary mucinous neoplasm (IPMN)

Serous Cystadenoma

1) ♀ > 50

2) > 60 yr

3) arising in Head - microcystic.

lined by cuboidal cells
bunch of grape appearance

- ↑ Glycogen +ve
Mucin -ve

- Benign.

CT Scan → Central Scar
⊕ SUN BURST APPEARANCE

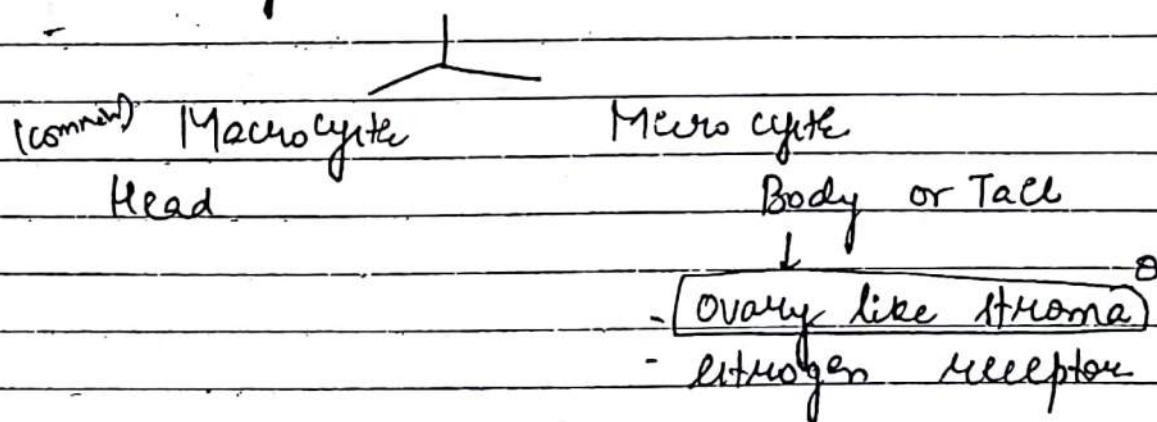
Rx:-

1) asymptomatic → observation

2) Symptomatic → Central Pancreatectomy.

MUCINOUS CYSTADENOMA

- ♀ > ♂ 10:1
- > 40 yrs



- Columnar cell → Mucin +ve ↑
glycogen -ve

- Malignant potential

- Tx → CEA +ve

CT Scan $\rightarrow$ Hypodense lesion / Internal septation.
Wall calcification

Rx
Surgery:

IPMN (Tanaka classification)

1) $\neq \geq 0$

2) old age

ERCP -

- Excessive mucous coming
out from ampulla

FISH MOUTH APPEARANCE of ampulla

$\uparrow$ cancer $\rightarrow$ PIN (Pancreatic Intraepithelial Neoplasia)

CEA / CA19-9 $\uparrow$

Rx - Surgery

EXOCRINE Tx

ACINIC CELL TUMOUR

- seen in serous gland tumours

- SCHMID TRIAD - ① Subcutaneous Nodule
② Polyarthralgia
③ Cholinophilia

Branch duct
(Microcystic)

Main duct
(Intramural nodule)
 $\uparrow$ Mucin.



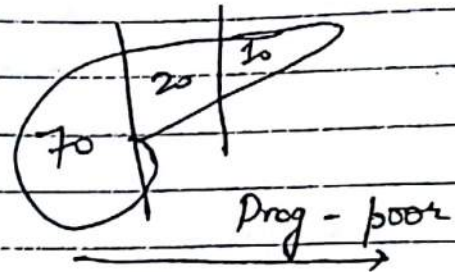
ADENOCARCINOMA

- ♂

- Old age > 55 yrs

- ~~Head~~ Distribution

- Black > white



Risk Factor -

- 1) Smoking
- 2) Obesity
- 3) High Fat diet
- 4) Chr Diabetes
- 5) Chr Pancreatitis
- 6) Chr alcoholism

Protective - fruit + veg

Familial

① Hereditary Pancreatitis → Chr 7 PRSS1

② Familial atypical multiple mole melanoma Syndr
(FAMMM) - PC - Chr 9 P CDKN2A
P16

③ Peutz-Jegher - Chr 19 57K11/LKB1
100 times ↑

④ Breast Ovary Syndrome BRCA 1 - 17
BRCA 2 - 13

⑤ Ataxia-Telangiectasia Chr 11 ATM

⑥ HNPCC MSI Better Prognosis

APC gene $\Rightarrow$ Perianipullary Cancer.

Non-Familial

- RAS $\rightarrow$ 95-100%
- p53 - 75%
- HER2/Neu

Presentation-

- General Symptoms
anorexia, wt. loss
- Jaundice
- Palpable GB.
- Pain.

Back $\rightarrow$ invaded splanchnic n/v
so $\nrightarrow$ inoperable Tx.

Courvoisier Law $\rightarrow$

Obstructive jaundice + Palpable GB $\Rightarrow$ Malignancy.
" + Impalpable GB $\Rightarrow$ stone

If there is obstructive jaundice + Palpable GB, it's
not due to stone $\Rightarrow$ Impacted Cancer.

Exception $\rightarrow$ P. Mucocele.

$\hookrightarrow$ Double Impaction of Stone.
 $\hookrightarrow$ CBD $\rightarrow$ jaundice

Trousseau Syndrome

Migratory Thrombophlebitis.

Not pathognomonic

Inu -

① RECT → IOC - No Biopsy.

Pseudotumour → inflammatory

FRANTZ Tx - Pseudopapillary tumour of pancreas

② IBFD4 PET → for metastasis

③ EUS → - Biopsy

- Peridampullary Cancer - 99% accurate

ERCP/MRCP ⇒ DOUBLE DUCT SIGN

Humour Marker.

CA 19-9 > 80%

follow-up,

Roof top / Chaverson Incision → for whipple's operation

If CA 19-9 > 100, then don't
go for operation

Pre-operative Lap. for staging can be done

or size of Tx > 3cm
Tx out / fail

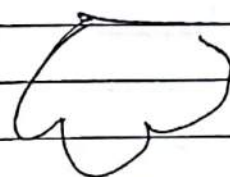


Ba ~~swallowing~~ meal:

??

Hypotonic duodenography.

- ↳ Wide C loop of duodenum
- Mucosal irregularity → Rose thorn sign
- Antreal Pad Sign.
- Reverse 3 Sign. of Frostberg.



Rx - Radio (R)

Only 1 minor role → along c chemo neoadjuvant for downstaging

Chemotherapy → ① Gemcitabine → Capecitabine

- 5-FU
- Eribotinib
- Docetaxel

② Folfurinox - Folinic acid
5FU
Irinotecan
Oxaliplatin

Whipple's → Pancreato-duodenectomy
Initially antrum was also removed

↓
Now pylorus is preserved

Mod. Whipple's / Pylorus Preserving pancreato-duodenectomy
(LONGMIRE & TRAVERSO OPERATION)

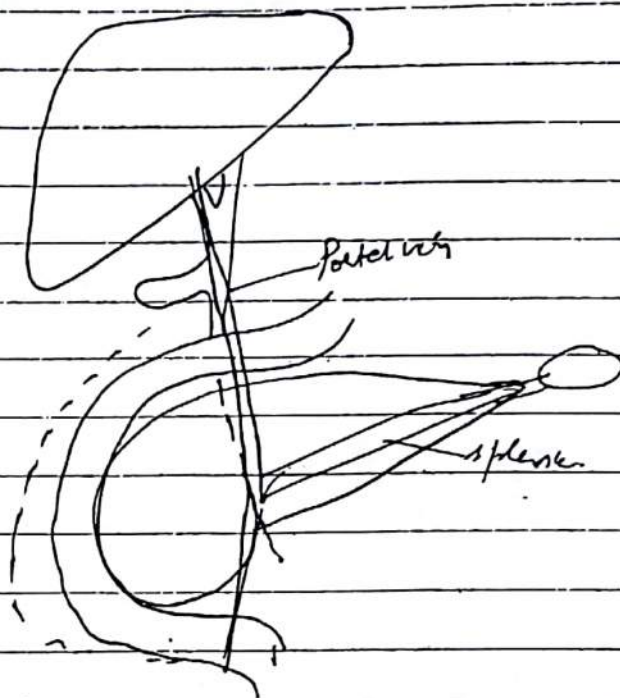
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WHIPPLE'S OPERATION

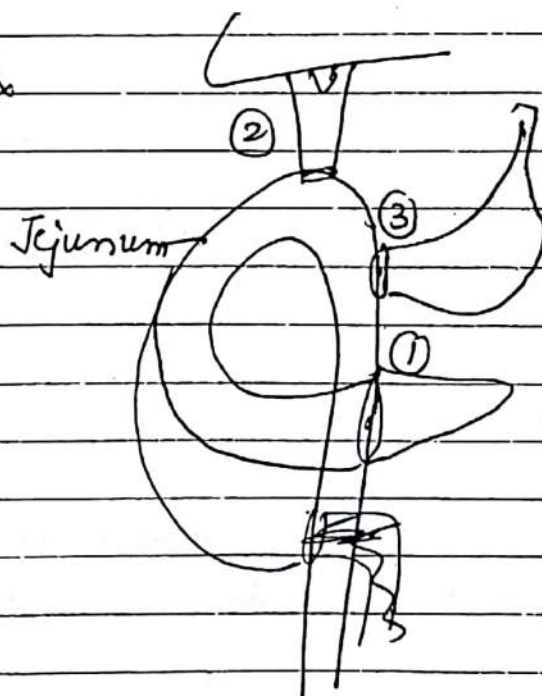
M/c Comp^a of Whipple's - ~~Pylor~~
Drainage Problems

↑ Risk of Leak
Pancreas > Bile duct > Stomach

- If origin of artery (SMA) is involved → then operation is 1/2 of SMA
- If $< \frac{1}{2}$ circumference compressed
↓
then relative 1/2 to S₁₀

Resectable Tx

Localised to Pancreas
no evidence of SMV or
portal vein involvement



Palliative-

▷ Jaundice

>80%

sometimes done Pre-operative
when S. Bil is ↑↑↑,

Manage

→ a) Stenting by ERCP.

metallic stent used so that tumour
doesn't compress



If not by ERCP then PTC.

b) S_x - • Cholecysto duodenostomy

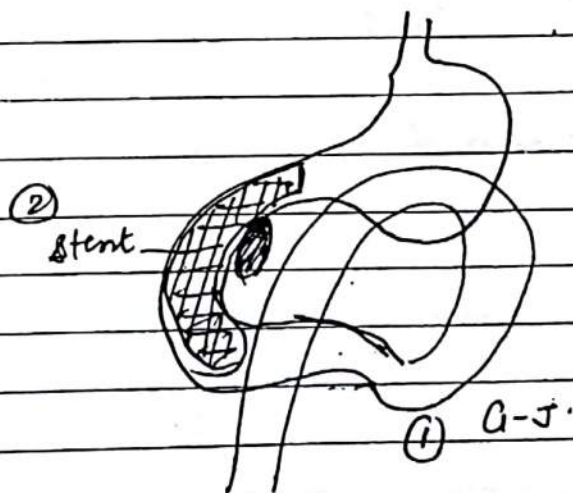
It has a tendency to get involved by T₄
Hence not preferred.

• Cholecystojejunostomy

• Roux-en-Y - hepatojejunostomy

27 G.O.O.

20-30% cases.



→ Metallic Stents

- oesophagus
- CBD
- duodenum.
- colon

3) Pain.

- Celiac ganglion block
- Splanchnic nerve block $\rightarrow$ Radio frequency Ablation

$\downarrow$
B/L, T₁₂-L₁.

Complication-

Early - Hypotension.

late - Diarrhoea

5 year survival for Pancreas in operated case - 15%

" " " " inoperable case - 5%

SOLID PSEUDOPAPILLARY T_x OF PANCREAS / FRANTZ T_x

- ♀, 10-30 yrs

- 2/3rd in Tail

- Encapsulated

- Large > 8cm

- Solid & cystic composition - centre - cystic
periphery - solid

- Low grade Cancer

- Metastasis < 15% $\rightarrow$ direct
(Blood-Borne)

APC, β Catenin +ve
 Progesteron Receptor +ve
 Vimentin +ve
 NSE +ve
 S100 +ve

CT Scan $\rightarrow$ Solid + cystic component
 Haemorrhage necrosis.

Histology - Foamy macrophages
 Cholesterol ~~clips~~ clefts
 Hyaline granules.

Rx Surgery

ACUTE PANCREATITIS

Enzymes inside pancreas are inactive

$\downarrow$
 activated in pancreas

$\downarrow$
 auto digestion.

1st enzyme $\rightarrow$ Phospholipase A.

Leithen $\xrightarrow{\quad\quad\quad}$ Lysoleithen

OPIE Common channel theory -

Common channel for Bile

Bile enters pancreas causing Pancreatitis.

Now, Pancreatic $P_R > Bile P_R$

↳ Hence bile enters pancreas

Pressure Theory / Co-localization.

In the vesicle where enzymes are stored in pancreas
Cathepsin D is also found here

↓
Cathepsin D can activate the enzyme

↓
Trypsinogen → Trypsin

M/c site for pseudopancreatic cyst → Retroperitoneal?

QY haemorrhagic Pancreatitis?

Blood vessels contain Elastin.

Elastase is released in pancreatitis

↓
damages vessels

↓
Haemorrhage (Diaphragm to pelvis)

SIRS (Systemic Inflammatory Response Syndrome)

IL₂ (IL₆) IL₈ TNF, CAM-1

↓
Vasodilatation

↓
Endothelial damage.

↓
intravascular fluid goes to extra-vascular space

SIRS

↓

Sepsis → infection.

↓
Severe sepsis

→ acidosis

→ organ failure → lung/heart/kidney

↓
Septicaemia & shock

SBP < 90 mmHg

↳ Later Liver
haematological
Neurological.

Criteria of SIRS

1) HR > 90/min.

2) Temp > 38°C or < 36°C

3) TLC > 12,000 or < 4000

4) RR > 20/min. or PaCO₂ < 32 mmHg

Causes

- 1) Gallstone - M/c } 75%
- 2) Alcohol }
- 3) Idiopathic }
- 4) Trauma - ERCP - M/c Compⁿ - Pancreatitis
Cholangitis.
- 5) Metabolic

Hypercholesterolemia

Hyperlipoproteinemia - ~~Not~~ Not much Imp.

Hypertriglyceridemia

Hyperparathyroid

CRF

Hypercalcemia

- 6) Virus - CMV
Mumps
Coxsackie

- 7) Toxins - Methyl alcohol
Amnita → mushroom toxin
Black & scorpio venom

- 8) Drugs -

Azathioprine

Dilaudid

6-mercaptopurine

Zidovudine

Pentamidine

Steroid

LS periginase

Methocarbonyl

Cytosine arabinoside

Esteroid

Furosemide

Doxycycline, Tetracycline etc.

Thioglycol

Telmithopren +

Na valproate

sulfamethoxazole

9) Tropical pancreatitis

H/c in Kerala

Diet - Casava / Tapioca associated

SPINK-1 mutation

10) Congenital anomalies.

Pancreatic Divisum

incidence 10%

11) Familial type.

Histidine in place of Arginine

Trypsinogen is altered in this type.

Presentation.

1) Pain - epigastric region

relieved by moving bending forward

2) Grey Turner Sign.

discoloration in flanks.

3) Cullen's Sign

discoloration around umbilicus

4) Fox Sign

discoloration in inguinal canal

Inv

S. Amylase $\rightarrow$ early $\uparrow$, early $\downarrow$

Persistently $\uparrow$ amylase $\Rightarrow$ s/o Complication

Pseudocyst of Pancreas

Sensitivity - 80%

Alcoholic } amylase may be high (N)
Hypertiglyceridemia }

Specificity - 80%

* Causes of ↑ S. amylase

- 1) Parotitis
- 2) Boerhaave syndrome
- 3) P. Embolism
- 4) Duodenal perforation
- 5) Ac. cholecystitis
- 6) Ac mesenteric ischaemia
- 7) Dissecting Abdominal aneurysm of aorta
- 8) twisted Ovarian cyst
- 9) Ruptured ectopic
- 10) CRF
- 11) Cystic Fibrosis → (N) if No malabsorption, only then ↑ amylase

Never ↑ in Cardiac pathologies.

S. amylase ⇒ No prognostic Role
 > 3 times (N) ⇒ Pancreatitis

2) S. Lipase

Late rise, late fall
 More sensitive, specific than amylase
 We don't rely due to late rise

No prognostic significance
 > 3 times (N) ⇒ Pancreatitis

3) Urinary Amylase / Creatinine Ratio

Obsolete now

① ratio < 5

if $> 15 \Rightarrow$ s/o Pancreatitis.

↳ Macroamylasemia or pancreatitis - to differentiate

4) Urinary trypsinogen / Faecal Elastase

Radiology

1) Plain X-Ray -

- Sentinel loop.
- COLON CUP OFF SIGN
- OBSCURED PSOAS SHADOW
- pancreatic calcification
 - ↳ seen in acute or chronic cases.
- (L) Pleural Effusion.
- Ground Glass Appearance $\Rightarrow$ Peritonitis.

2) USG - 1st inv.

not a good modality for pancreas.

- edema
 - collection
 - CBD / gall stone
- } can be seen

3) CECT $\rightarrow$ IOC

Most accurate

changes - 12-18 hrs

Neutrophils > 72 hrs

↳ 0-10 score, > 7 Severe

B - BUN

I - Impaired mental status

S - SIRS

A - Age < 60 yr.
> 60 yr.

P - Pleural effusion

5) Atlanta 2012

Local Compⁿ:

Organ Failure

Mild

(-)

(-)

Mod.

(+)

(+ but Transient
< 48 hr.

Severe

(+)

Present +
Persistent, > 48 hr

6) Ranson's Score

< 24 hr.

> 48 hr

Age

> 55

Fluid loss > 6L

TLC

> 16,000/mm³PaO₂ < 60 mm Hg

LDH

> 350

Fall in Haematocrit > 10

SGOT

> 250

S. calcium < 8 mg/dL

Sugar

> 200 mg/dL

B. uree > 5

Base Deficit > 4

Score

1-2 = 1%

3-4 = 15%

5-6 = 40%

> 7 = 100%

7/3 ⇒ SEVERE

Mod. Ranson $\rightarrow$ for GB stones.

7) Glasgow Score

Age

TLC

LDS

SGOT

Sugar

pO₂

S. Cal

S. albumin

B. Urea

$\neq > 3$ severe

Glasgow > 3 } $\Rightarrow$ < 24 hrs
 Apache II > 8 }

Ranson's > 7 } $\Rightarrow$ > 48 hrs
 ATLANTA }

CT severity index > 72 hours

R_x - critical care management

- Fluid
- O₂
- Calcium
- PPI
- Nutriton
- Give orally, when tolerate orally
- analgesic $\rightarrow$ NSAID
 $\rightarrow$ Opoids - Meperidine, Buprenorphine

Antibiotics -

Mild - Metrogyl
+ ofloxacin.

Imipenem → DOC

Octreotide }
Aprepitant }

Sx -

1) ERCP -

only 1 indication → Gall Stone Pancreatitis
Golden Period - 48hrs

2) Infected Peripancreatic fluid collection.

Peripancreatic fluid collection → later per pancreatic pseudocyst

↓ Percutaneous drainage

3) Pancreatic Abscess. → Drain.

4) Infected necrotizing pancreatitis
↳ necrosectomy

5) Pseudopancreatic cyst

- Fibrous wall around peripancreatic fluid collection.
- seen in lesser sac
- 4 weeks
- wall matures in ~~6~~ weeks

• Ac Pancreatitis

Chr. "

M/cc Pseudocyst in children $\Rightarrow$ TRAUMA

Chr Pancreatitis $\rightarrow$ Communicate w pancreas duct
Trauma

- No epithelial lining
- Lined by - granulation tissue
- M/c complication
Infection $\rightarrow$ ~~follow~~ Haemorrhage

Inv CECT

Sx - Pre-req

1) Size $> 5\text{cm}$

2) duration $> 6\text{wks}$

gen 8-12 wks

M/c Comp $\rightarrow$ Haemorrhage
from wall

Cysto-gastrostomy. JURASZ PROCEDURE - TOC

If cyst is below ^{Meio} Transverse Colon

$\rightarrow$ cysto-jejunostomy $\rightarrow$ lower recurrence

Only 1 indication $\rightarrow$ low lying cyst

Cysto-duodenostomy can also be done

DIGIDO CLASSIFICATION -

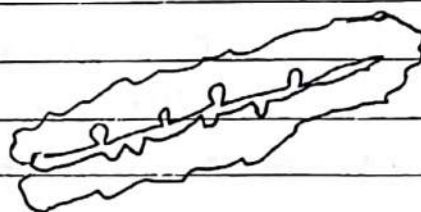
- Pancreatic duct
- Communicating $\bar{c}$ duct

H/c vascular Compⁿ of pancreatitis $\Rightarrow$ Splenic vein
Thrombosis

H/c arterial Compⁿ of pancreatitis $\Rightarrow$ Splenic artery
aneurysm

CHRONIC PANCREATITISPathology -

- ① Fibrosis
- ② calcification.

C/E

- Pain
- Malabsorption
- DM.

Sx has Limited Role.

& Drainage can be done to drain the secretion
it reduces pain, & malabsorption.

Cause -

T - Toxic & metabolic $\rightarrow$ H/c - alcohol

I - Idiopathic

G - Genetic $\rightarrow$ PRSS1
 $\rightarrow$ SPINK
 $\rightarrow$ CFTR

A - Autoimmune

R - Recurrent acute

O - obstructive

Autoimmune Pancreatitis- or sclerosing

IgG₄ RSD/SS (Immunoglobulin G₄ Related Systemic Disease)

HISORT

H - Histology

I - Imaging

S&S - Serology

T - T/t

R - Response to steroids

Histology → Lymphoplasmacytic
storiform fibrosis.

I → CT - sausage shaped pancreas.
Delayed Rim enhancement

E → ANA, Antilactoferrin Ab.

Response to steroids.

Stellate cell accumulation in Pancreas

↓

Collagen deposition

↓

Fibrosis

Inv.

I - Malabsorption

① Steatorrhea

② NBT PABA test / Benthoimide test

↳ Nitro Blue Tetrazolium.

4) Endoscopy → look for $\pm$ enzyme deficient

3) Secretin-

measure HCO_3^- in pancreatic juice

4) Lundh.

Protein rich diet → pancreatic juice
look for Trypsinogen

Radiology.

X-Ray - Pancreatic calcification
Not preferred

USG - Not good

CECT → Perichymal Fibrosis calcification

CRCP → CHAIN OF LAKE APPEARANCE

MRCP → Secretin stimulation MRCP.

EUS →

Rosemont Criteria

Major -

(A) → Echogenic shadow in pancreas $\bar{c}$ post acoustic shadow
→ Stone in main duct

(B) → Gland lobation $\bar{c}$ honeycomb.

Rx

Medical-

Lipase $> 30,000$ units.

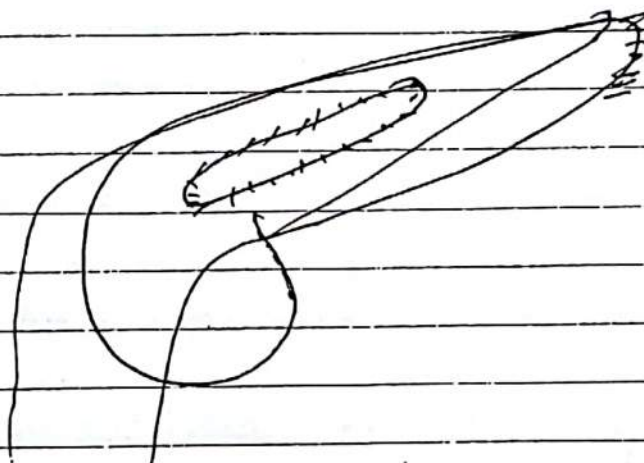
Sx is only indicated when medical management fails

When Duct is not dilated $\rightarrow$ ERCP stenting
Duct dilated $> 6\text{mm}$ Divide
the duct

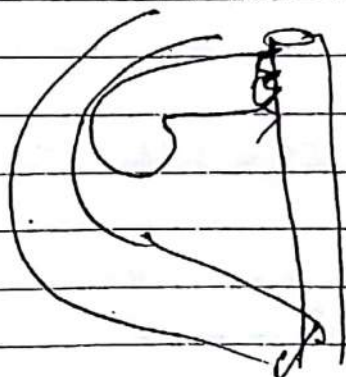
Divide jejunum

Longitudinal
Pancreatic-

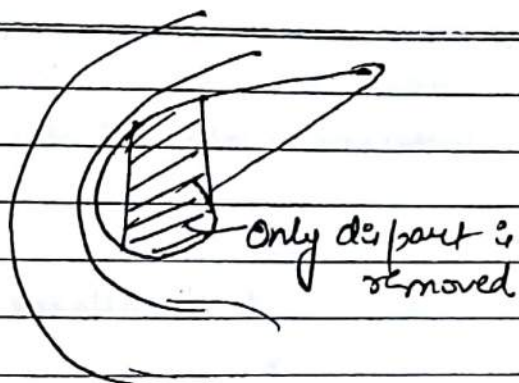
Jejunostomy.


PUESTOW OPERATION

- Bager
- Frey's
- Duval $\rightarrow$ when tail is involved

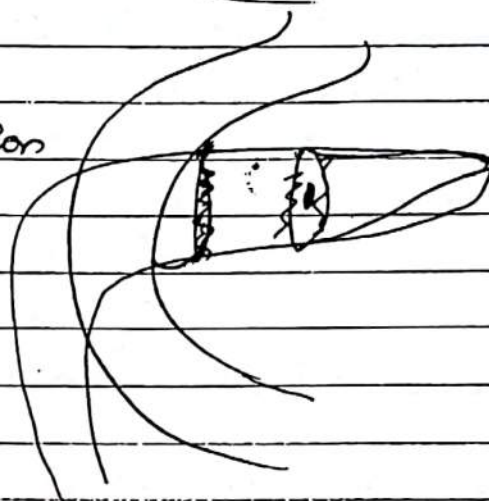


Bager - Duodenum preserving
pancreatic head resection



Frey's
Open the duct
↓

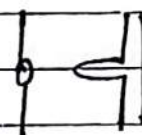
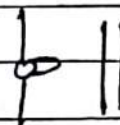
Scoop out the contents
Similar to Puestow's operation



Pancreatic calculi are made up of CaCO_3 .
Submandibular gland stone
Prostate stone made up of $\text{Ca}_3(\text{PO}_4)_2$

MECKEL'S DIVERTICULUM

- True Proximal end of
- Persistence of Vitello-intestinal duct
- Release of mucus, meconium from it



Meckel's Diverticulum

- Present on Anti-mesenteric Border
- It has independent blood supply

RULE of 2

- +nt in 2% population
- 2 inches long
- 2 feet cm proximal to ICI
- Male: female 2:1

- Ectopic tissue - Gastric (50%)
Pancreatic
Jejunal or
Colonic

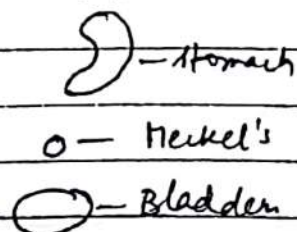
- M/c presentation - (1) Bleeding
↓ Due to ectopic gastric tissue
in children. (50%)

(2) Obstruction (30%)
seen in adults

- (3) Pain
- (4) Perforation
- (5) Diverticulitis

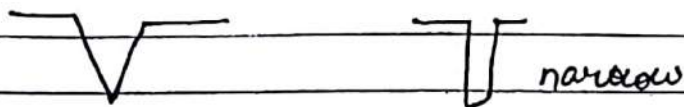
Inv (1) Tc^{99} Scan → for parietal cell (Image)
↳ Diagnose gastric ectopia
No use if no ectopic tissue

(2) CECT



Rx

- If incidentally found diverticula in laproscopy laprotomy

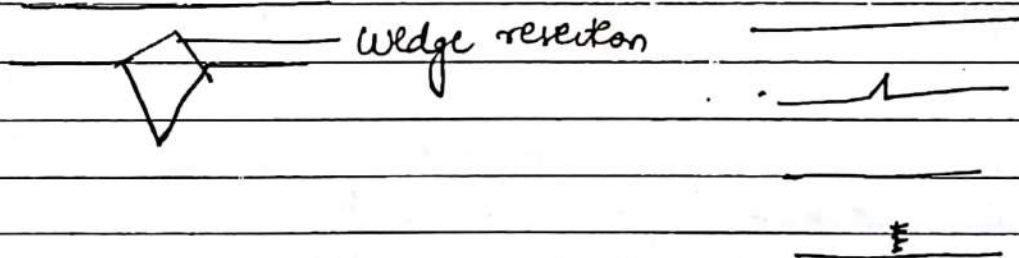


If mouth is narrow or ectopic is +nt $\Rightarrow$ Remove it.

- If presentation is diverticulitis, no ectopic
Rx $\rightarrow$ Diverticulectomy

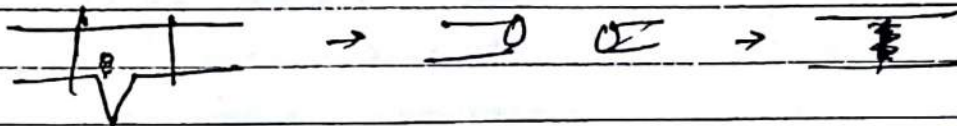
- If ectopic tissue present

Rx - Resection + anastomosis



It should not be closed longitudinally $\rightarrow$ structure
It should be done transversally.

Ectopic tissue



INTUSUSCEPTION

HCC - < 2 yrs.

Bg Peyer's Patch Hypertrophy
act as lead point

+ It is due to

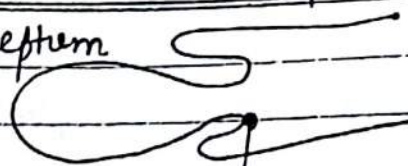
- weaning
- lymphoma

> 2 yrs → HSP.

Polyp
Meckel's.

Intussusception

Intussusceptum



Lead point

L.N.

Types

Ileocolic - H/c type (70%)

Ileoileal

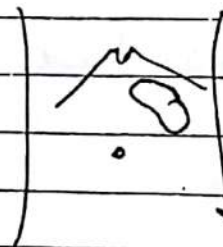
Colo-colic

Presentation-

- Pain - intermittent
- Red mucous → Red Currant Jelly stool

Examⁿ

- 1) Empty (R) Iliac fossa - DANCE SIGN
- 2) Sausage or banana shaped lump
→ concavity toward umbilicus
due to mesenteric loop pull
- 3) prolapse



Inv. USG → Ba Enema

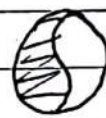
USG → Target Sign
Doughnut Sign
Pseudo Kidney Sign

CECT → Most accurate

Bowel inside Bowel (Ileo-ileal)

Ba Enema →

- Claw Sign
- Pincer shaped deformity
- Cup shaped deformity



CT Scan

ying-yang sign

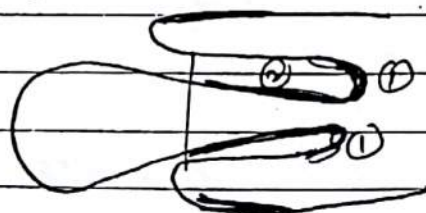
It has therapeutic success of 70%.

Rx-

1) Exploratory laprotomy
Reduce manually → squeeze it out.
never pull it off

↓
look for Lead point

Gangrene → Resection & anastomosis.



① > ② > ③

CARCINOID SYNDROME

come from Kultchisky cells.

ECL

APUD^{ome} cell (amide precursor uptake decarboxylase)

H/c system involved $\rightarrow$ GIT $>$ Rep $>$ Genitourinary

$\downarrow$
midgut $>$ Hindgut $>$ Foregut

H/c site - Ileum $>$ Rectum $>$ Appendix.

Stomach $\rightarrow$ atrophic gastritis. } Benign
MEN-1

Sporadic - Cancer $\uparrow$

Bronchial Carcinoid

90% Benign $\rightarrow$ Adenoma

10% Cancer - atypical

Chromogranin $\uparrow$ -ve

Serotonin -ve

Ki67 $++$

GIT $\rightarrow$ chemical Mediator

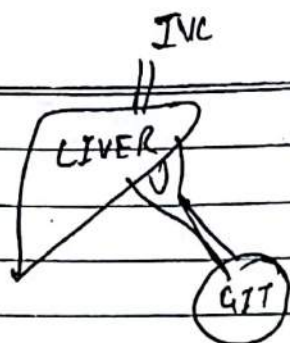
$\downarrow$

Liver $\rightarrow$

metabolize

urine $\rightarrow$ 5HIAA

(Hydroxy indole acetic acid)



Syndrome occurs when liver is
produce chemical mediators * 12:3
occurs due to liver & 2°:
P

Pain.

Flushing

Diarrhoea

Histamine 1st

Palpitation

Heart - Subendo cardial fusion

M/c $\text{TR} > \text{TS} > \text{PS}$, Heart PR

Inv

① SRS (Somatostatin R) ~~sensitivity~~ ^{scintigraphy}

② $\begin{matrix} \uparrow \\ -ve \end{matrix}$

MIBG (Meta-iodo-Benzyl guanidine)
↳ for Pheochromocytoma

③ CBCT

Tumour Marker -

Blood - Chromogranin A

Urine - 5HIAA

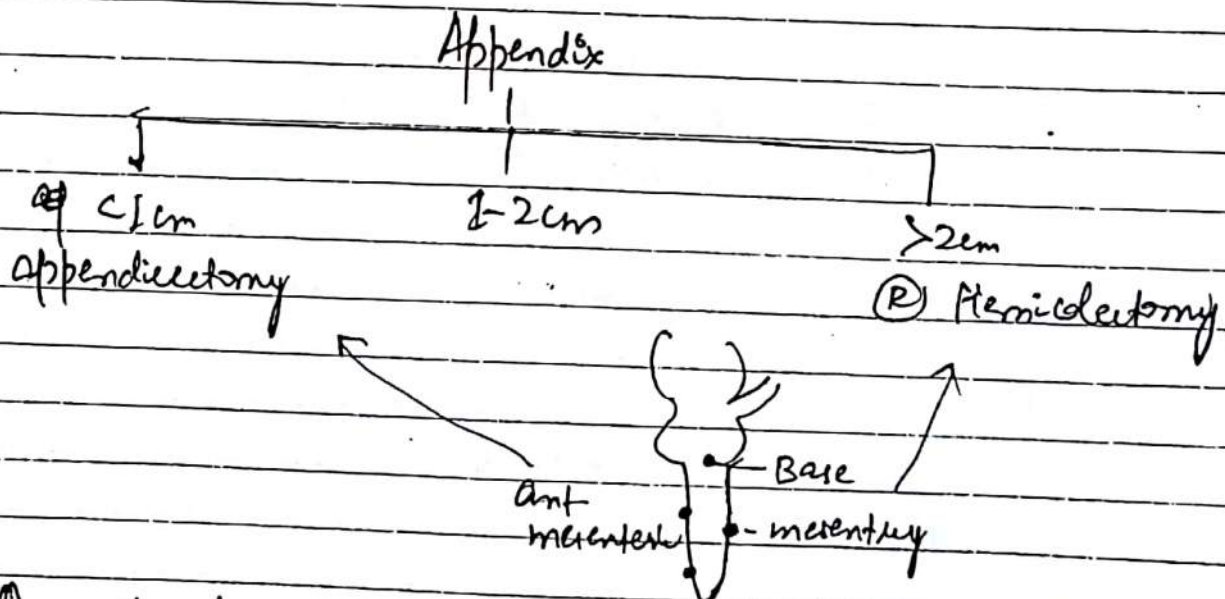
	Well	Mod.	Poor
① Mitotic index	<2	2-20	>20/HPF
② Ki67	<3%	3-20%	>20%
③ Neurosis	absent		present
④ Pleomorphism	absent		Present

R_x Octreotide

2) Radio resistant

3) Chemotherapy — Streptozocin + 5FU / Adriamycin

4) S_x —
> 2cm margin



One of tumours where Liver 2nd is considered Operable.

→ Curative
→ Palliative → Incidence of carcinoma

CELIAC DISEASE

Gluten Sensitive Enteropathy

↓
White / Barley / Rye

Gliadin (alcohol soluble part)

↓ ↑ Main culprit

Int. rxⁿ / CD4⁺ T_H17 → Destroy villi

HLA DQ2 - 98%

HLA DQ8 - 2%

Presentation -

1) Malabsorption

Diarrhoea

Steatorrhoea

2) Dermatitis → herpetiformis

Dx

1) Serological -

Anti TTG (tissue transglutaminase)

Anti-endomysial (specific)

2) Biopsy

① Lymphocyte infiltration

② crypt cell proliferation

③ villi atrophy

④ Flat mucosa (Image)

3) CEC Syndrome → Intracranial calcification occipital region
Carotid artery calcification
calciophylaxis
folate acid deficiency

Rx 1) Gluten free diet

SHORT BOWEL SYNDROME

ICJ - preserved < 18cm
 Removed < 200cm

Min length. adult ≥ 60 cm
 child > 40 cm

Cause -

Adults - Mesenteric Ischaemia

Trauma

IBD

volvulus

embolus (50%)

arterial thrombus (25%)

venous thrombus

Non occlusive (NOMT)

M/c artery involved
 ↳ SMA.

Children - atresia

midgut volvulus

Neweratinin.

Bonemerin

GLP-2

villi length ↑

Presentation -

1) Malabsorption

Diarrhoea

steatorrhoea

↑ Gastric Secretion

↑ Gall Stone → cholesterol (↓ Bile Salts)

Renal Stone → oxalate

(N) Calcium binds $\bar{c}$ oxalate $\rightarrow$ $\downarrow$ absorption

In malabsorpⁿ $\rightarrow$ Ca^{2+} + Fat, So oxalate becomes free

$\downarrow$
absorption $\uparrow$
Hyperoxaluria

$\downarrow$
Oxalate Stone

R_x

① GLP-2.

② Glutamine

S_x - BIANCHI OPERATION.

STEP (Serial Transverse Enteroplasty)
Intestinal Transplant

$\downarrow$ $\swarrow$
Mid-ileum (150cm)
Max Graft vs Host Disease

MESENTERIC CYST

Meckel's is from -

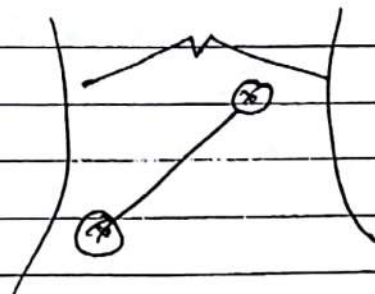
DJ to "ileo-caecal Junction"

Chylo Types

① Lymphatic - H/C

② Enterogenous

- Thin walled, lined by flat endothelial
- Clear fluid or chylous
- Separate gut supply



Enterogenous - thick walled.
stratified epithelium
mucinous.
common blood vessel

Age - 2nd decade < 30 yrs

CR - Abd. lump

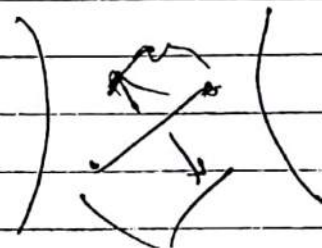
Loc - GECT

Tillaux TRIAD -

1) Mid-abdominal cystic swelling

2) mobile at $\perp^r$ to root of mesentery

3) there is a band of resonance in front of cyst



Rx

Chylolympathic $\rightarrow$ Enucleation

Enterogenous $\rightarrow$ Excision of cyst + Resection of Bowel

oo

IPSID (Immunoproliferative Small intestinal Disease)

H/c presentation $\rightarrow$ Malabsorption

Associated: campylobacter jejuni

H/c site $\rightarrow$ Duodenum > jejunum

Ig → Truncated Heavy chain
NO lgh chain.

→ Heavy chain Disease

Translation.

- Can cause Immunoblastic lymphoma, t(9:14) involving
PAX5 gene

Rx - antibiotics

→ if not responsive → then chemotherapy

MALROTATION

- Duodenum, T gets fixed = 6-9 wks 90°

- Cecum goes below liver &
gets fixed in R iliac fossa.
180° rotation. (9-12 wks).

Cecum

① hypochondrium - non-rotation

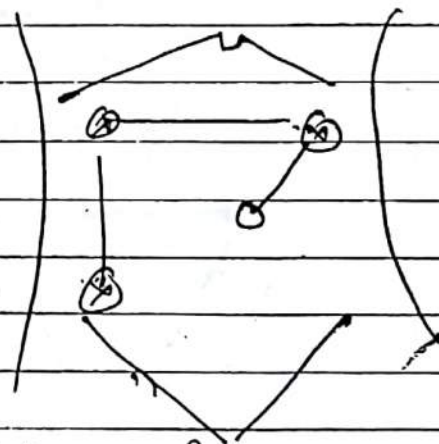
② "

- incomplete rotation 270°

anticlockwise

mobile

- non-fixation



Non-rotation

①

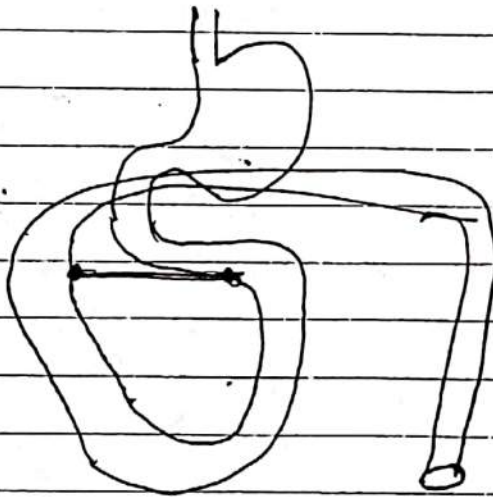


→ Ladd's band obstructs
2nd part of duodenum

↓
Bilious vomiting

Ladd's band
Caecum

② Incomplete Rotation → due to mesentery



↓
midgut Volvulus

↓
Presents in Lye

Inv

1) Ba meal follow through

↓
Coiled screw appearance

2) CT Scan

whirl wheel appearance

R_x - LADD'S OPERATION

Division of Ladd's Band

↓
Wedging of Mesentery

↓
Prophylactic appendectomy

Reverse Rotation - Type of incomplete rotation.
 (Ant) Duodenum → artery → colon (Post)

MECONIUM ILEUS

Seen in Cystic fibrosis - AR
 - CFTR

Presentation

① Antenatal obstructⁿ.

↓
 Perforation
 ↓

Cause chemical peritonitis

- Intra-abdominal calcification

- SNOWSTORM APPEARANCE on X-Ray

② Pseudocyst.

③ Bowel stricture/atresia

④ Microcolon.

Obstruction → Meconium ileus

SOAP BUBBLE APPEARANCE (Newhausen sign)

Rx - Meconium Plug syndrome

↳ Gastrografin enema - 2 attempts

Sx - Bishop Koop operation.

Suenson.

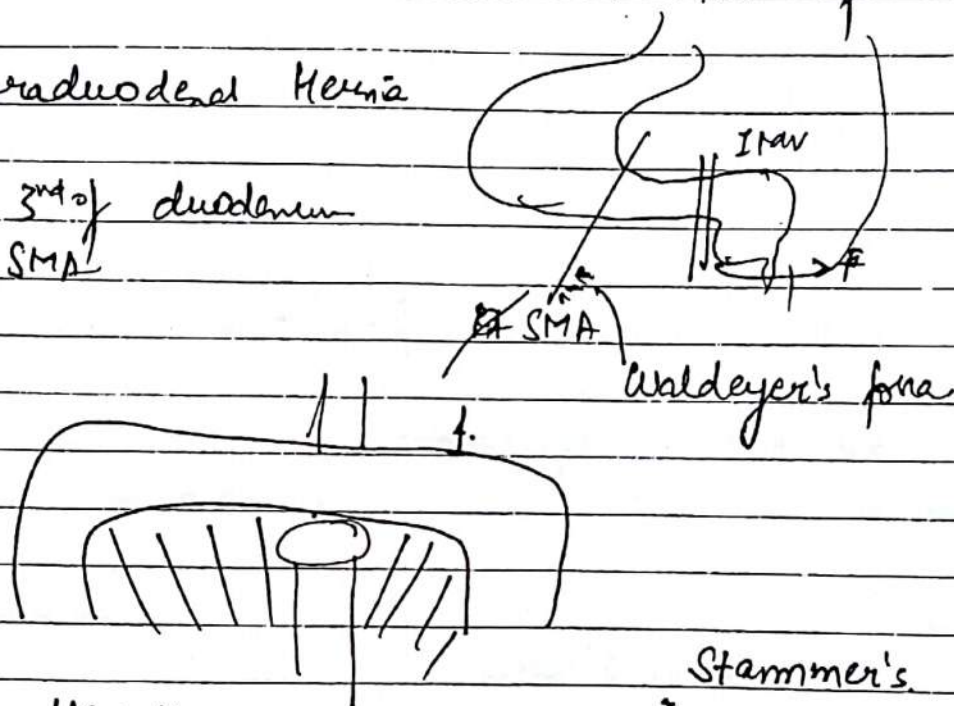
INTERNAL HERNIA.

M/c- ① Paraduodendal Hernia

Behind IMV, 4th of duodenum
due to lifting of peritoneal fold.
Fossa of Landzert

② Paraduodendal Hernia

Behind 3rd of duodenum
SMA



Paterson Hernia

Complication
surgery

Reux-en-Y

Stammer's

or gastric bypass

Paterson.

COLORECTAL CA

M/c Cancer in GIT

M/c c of Cancer death.

Site :- Rectum > Sigmoid > Caecum.

in colon → Sigmoid M/c.

colorectal → rectum M/c.

- ♂

- > 55 yrs.

- Risk Factors -

Diet - ① Selenium Deficiency

- ↑ fibre diet (is protective) → not correct now
JIPMER

② ↑ animal fat is causative.

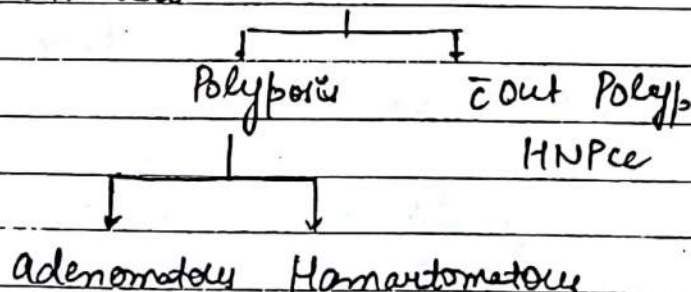
③ UC -

- > 10 yrs. long seg. (beyond splenic flexure)
after 10 yrs, risk is 1% per year.

So, yearly colonoscopy is recommended

④ Cholecystectomy → ↑ colon cancer (R) sided

⑤ Familial.



ADENOMATOUS POLYP

FAP - AD

gene - APC on 5q
2nd decade

Polyp no. $\uparrow$ w age $\rightarrow$ by 35 yrs >100 Polyps

Cancer Risk - 100%

in 40 yrs, pt develop cancer

Periampullary cancer

spigelman classification - depends on

- histology
- No.
- Size
- Dysplasia

Gardner's Syndrome -

① - soft tissue tumours - Fibroma

Osteoma - jaw, forehead

Lipoma

Sebaceous cyst

Dermoid tumours

Ant Rectal Sheath

$\uparrow$ $\rightarrow$

malignant

wide excision.

recurrent $\rightarrow$ Radiotherapy

② Intra-abdominal

$\uparrow$ aggressive

Turcot's Syndrome - Polyp + CNS
 ↳ can be AD or AR

↓
 Medulloblastoma (APC)

adults → Glioblastoma Multiforme
 ↳ & HNPCC

Type of Polyp

Tubular
 70%

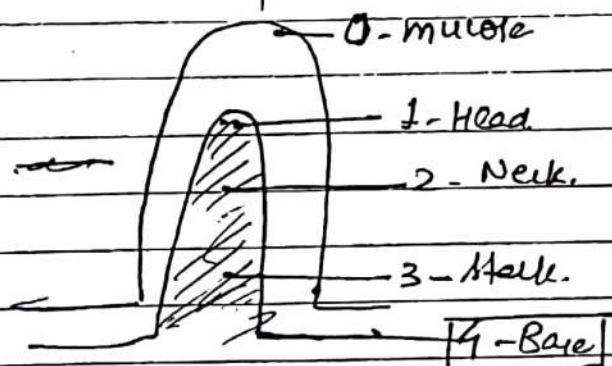
Tubovillous
 20%

Villous
 10%

↑ Cancer Risk

Haggitt classification
 On basis of Depth.

All villous adenoma
 are level (4).



Require Sx

HAMARTOMATOUS ~~POLYP~~ POLYP

- AD (1) PUTZ-JEJUNER SYNDROME

MODERATE RISK

- Chr 19

- gene - STK11 / LKB1.

- Pol Site - ~~Polyp~~ → Jejunum → Duodenum → Colon
 ↑ Cancer Risk in Pancreas / Breast / Lung

Melanin deposition at mucocutaneous mark

Ovary → Granulosa Cell Tumour
 Testis → Sertoli Cell Tumour

COWDEN

→ LOW RISK

- chr 10, gene - PTEN
- Polyp - Cancer risk ↓
- ↑ uterine leiomyoma

Thyroid Ca

Breast Ca

Facial Trichilemmoma → Benign interosseous neoplasm

MUIR TORE

- MODERATE RISK

Breast Cancer

Sebaceous adenoma

BANNYAN RILEY RUVALCORA SYNDROME.

NON-FAMILIAL

CRONKHITE CANADA SYNDROME - LOW RISK

- Thick mucosa
 - Deep crefts
 - Follicular hypertrophy
 - ↑ protein loss
- ectodermal dysplasia → Nail Dystrophy
 → Skin pigmentation
 → Alopecia

ONCOGENES

Adenoma - Ca - sequence
Fearon & Vogelstein (1990)

HNPce

Microsatellite Instability

Mismatch Repair

APC (5) Deletion

MSH₂ - 75%

MLH₁ - 15%

β catenin ↑

MSH₆

~~MSH₂~~ MLH₂

↓ WNT pathway

PMS-1

PMS-2

Pro-apoptotic

Cyc D1
MyC

↓ suppress
TCFβ

↓ BAX

Normal mucosa → Aberrant crypt
Crypt

↓ cell death

COX Inhibitor ↓ Reversible

Early Adenoma

↓ RAS (12) - TGFβ

Intermediate Adenoma

↓ Dcc (18) - BRAF
SMAD-4

Late adenoma

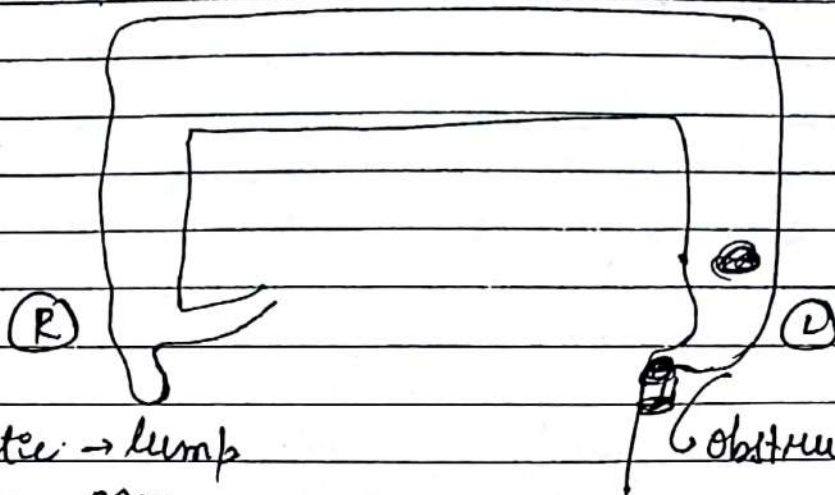
↓ p53, Chr (17)

Carcinoma

Estrogen + NSAID (COX-2) are protective

C/F

L > R



- Exophytic → lump

- Bleeding - ooze
↓

Occult blood.

Rectal Cancer - Bleeding PR

- anaemia + RIF lump.

Rectosigmoid Ca → alternating
Bowel habitRIF + B₁₂ Def. anaemia -
Crohn's

Screening

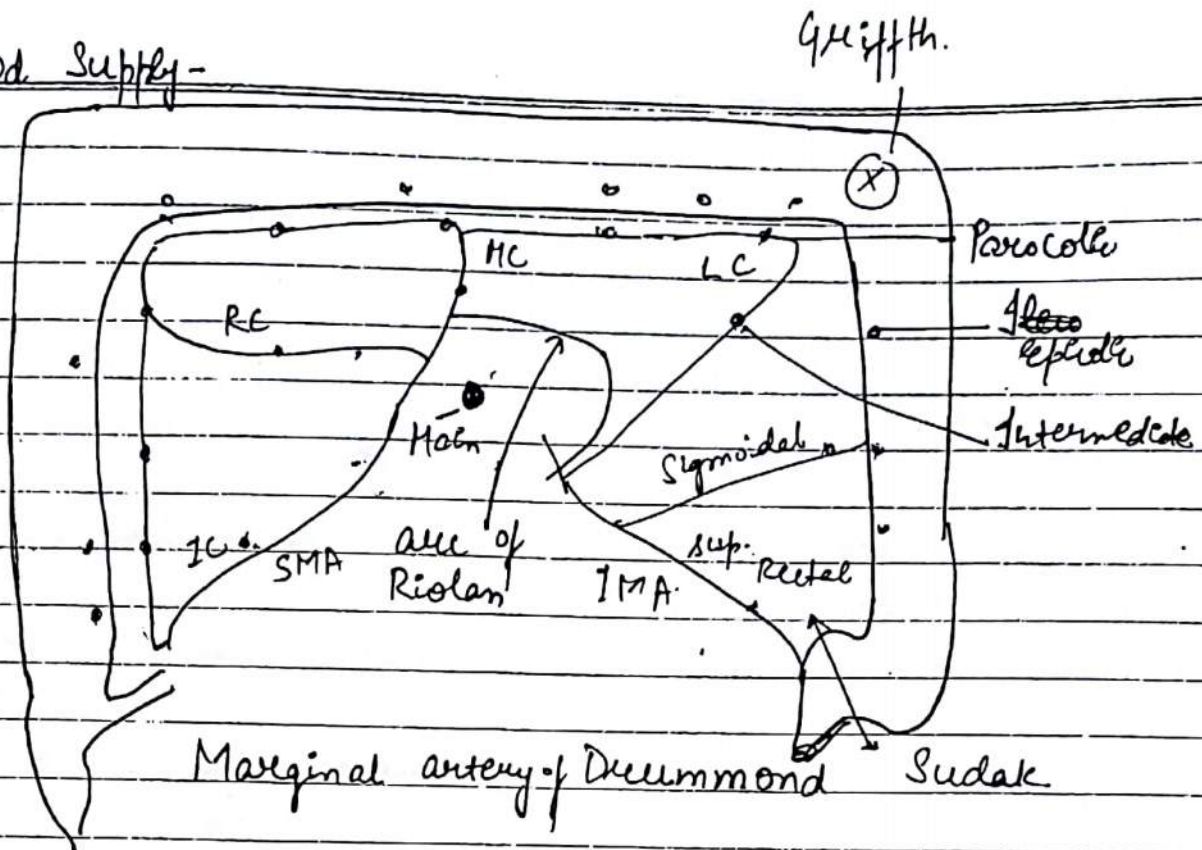
Colon Cancer -

① Sigmoid colonoscopy @ occult blood in stool - guaiac. Test
→ 1 year.

② Coloquard → DNA assessment in cells

③ Immunochemical Test → Blood

Blood Supply -



M/c site of Ischaemia in colon → ^{M/c} Splenic Flexure
↓
Called Griffith.

② 2nd → Sudak → Rectosigmoid junction

L.N.

- Epiploic → on colon
- Pexocolic → on marginal artery
- Intermediate → on Re, HC, LC, IC
- MAc → Root of SMA / IMA

Inv

① Colonoscopy + Biopsy

Examine whole colon

Since 5% ~~are~~ have multiple sites.Synchronous - $\leq$ 6 monthsMetachronous - > 6 months.

② PET- CT for staging

③ Virtual colonoscopy -

abs. in colon $\rightarrow$ 3D (CT) $\downarrow$ > 6 mmOnly disadvantage $\rightarrow$ can't take Biopsy.

Tumour Marker

CEA.

- glycoprotein

- $> 85\%$ - follow up $\rightarrow$ $\downarrow$ - Immunoradiotherapy $\downarrow$
anti CEA / I^{131}

Rectal Ca-

Inv 1) TRUS (Trans Rectal Ultrasound)

- for depth T stage

- (node) in mesorectum

2) Endorectal MRI

for local anatomy, "good for node."

Staging - DUKE Stage

A - confined to mucosa

B₁ - in muscle

B₂ - outside muscle

C₁ - in muscle + L.N.

C₂ - outside " + L.N.

D - metastatic.

R_x - Surgery

A - S_x

B₁ } S_x → CT.

B₂ }

C₁ }

C₂ - CT → S_x - CT
+ RT

CT → FOLFOX → Folic Acid (leucovorin)

5FU

Oxaliplatin.

- Cetuximab } → wild RAS +ve
- Panitumumab }

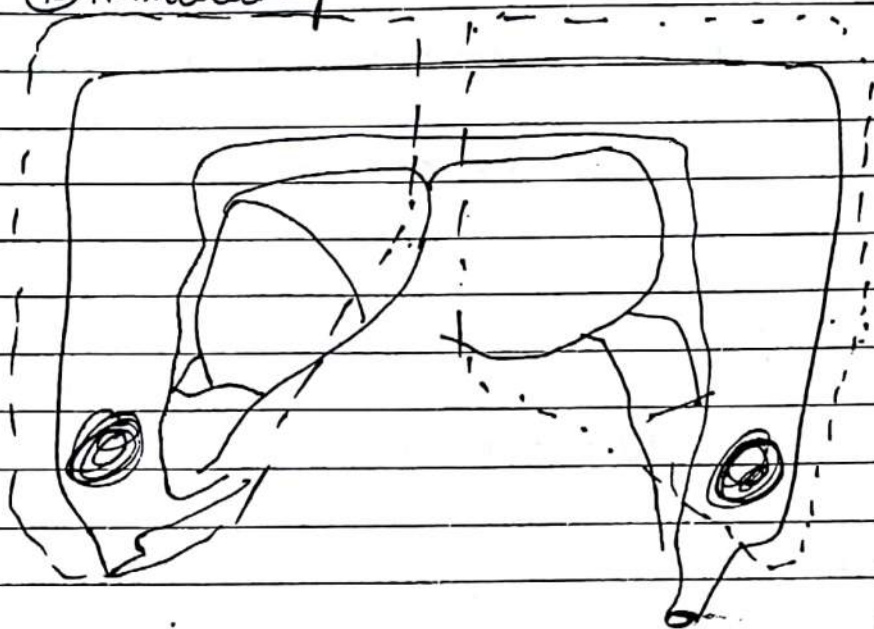
- Bevacizumab for VEGF

Sx → (R) → (R) Hemicolectomy
 (L) → (L) "

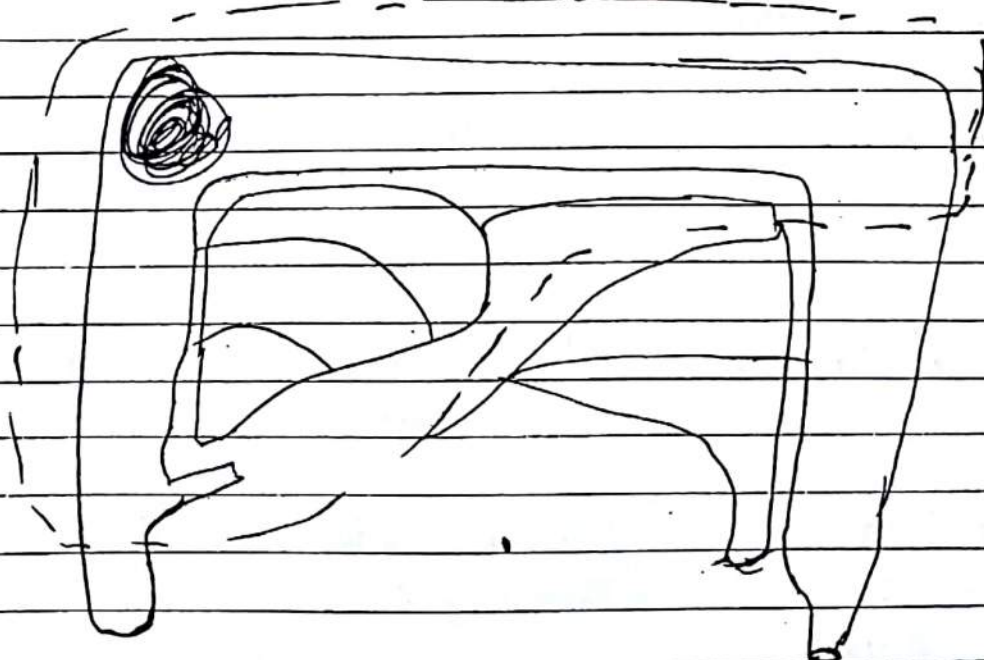
(R) Extended Hemicolectomy

(R) Hemicolectomy

(L) Hemicolectomy



(R) Extended Hemicolectomy



Liver 2° are considered operable in colon Ca

EKBERG CRITERIA

- < 4 in no. } 1cm margin only liver
 - B/L

Late → good prognosis.

Prognostic Indicator -

L. Node

Metastatic Potⁿ → Depth.

* KOHNE PROGNOSTIC CLASSIFICATION

alk. phosphates

No. of metastatic sites

WBC

Performance status

* GERCOR PROGNOSTIC CLASSIFICATION

CRS + HIPEC

(Cytoreductive Surgery) + (Hyperthermic Intraperitoneal Chemotherapy)



T/t of Peritoneal Ca (Carcinomatous Peritoneum)
 pseudomyxoma Peritonei

S_x - R₂ resection.

RECTAL CANCER

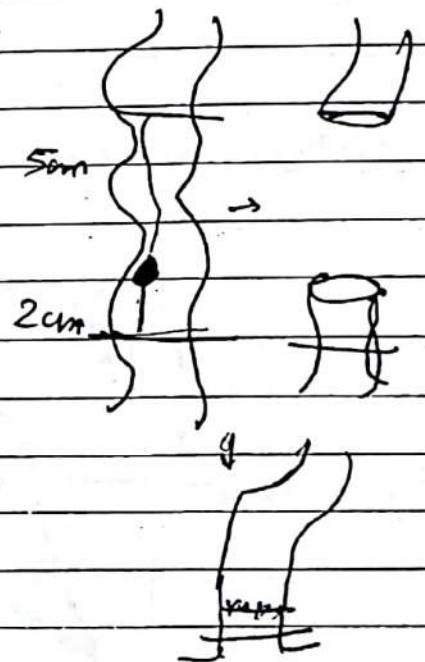
Rx

- ① Transanal excision (TEM)
- ② Ant. Resection
- ③ APR. (Abdomino Perineal Resection) → MILE's operation Resection.

1) Transanal excision-

- Size < 4cm.
- Anal verge < 10cm.
- circumference < 40%
- T_{1s} or T₁. No.

2) Ant. Resection.

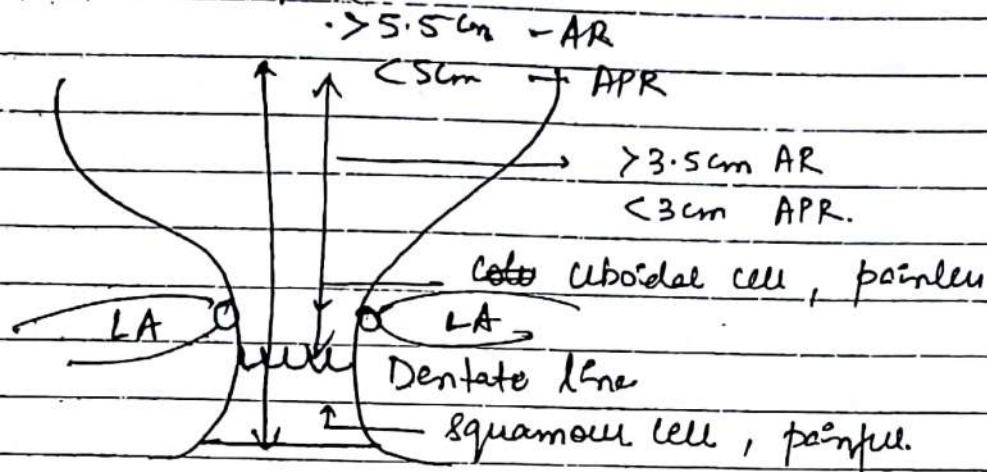


APR

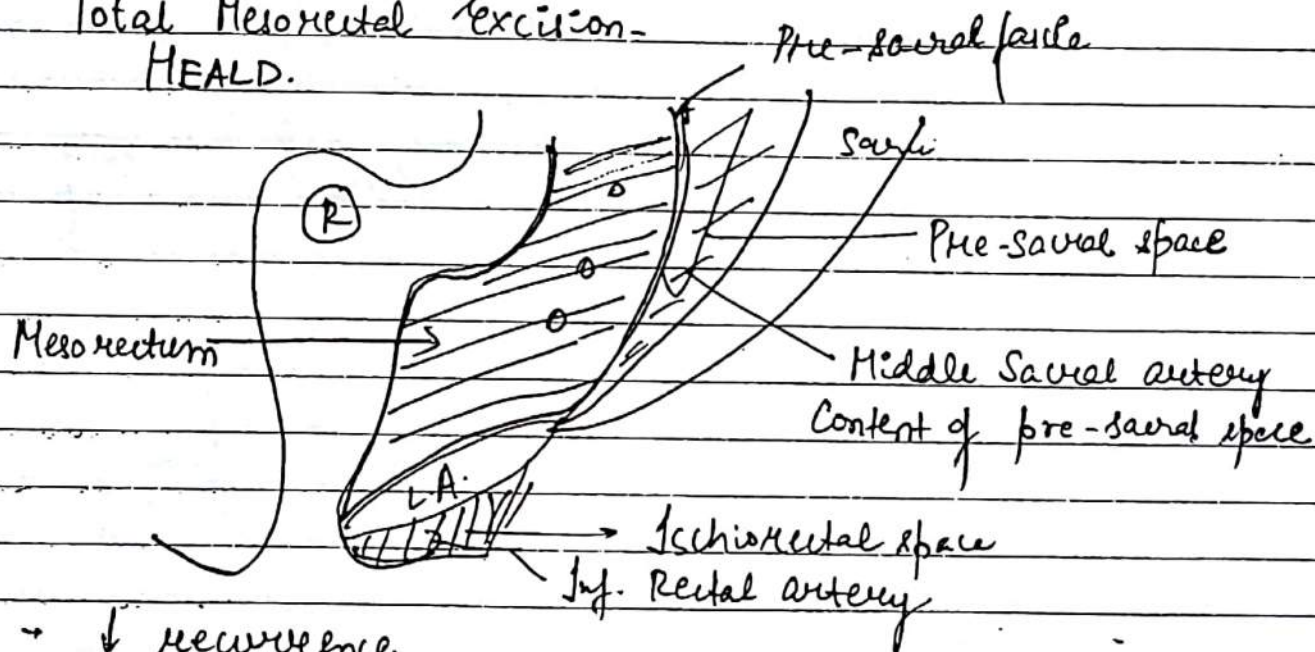


→ followed by End Colostomy

$> 5.5 \text{ cm} \rightarrow \text{Ant Resection} \rightarrow 5 \text{ cm} \rightarrow \text{APR.}$
 $< 5 \text{ cm} \rightarrow \text{APR}$



Total Mesorectal Excision -
 HEALD.



↓ recurrence

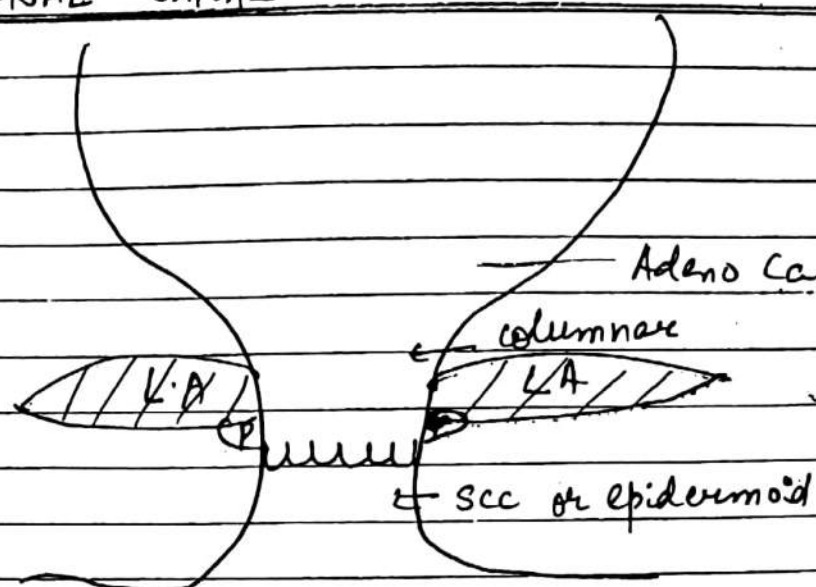
Content of

- Fibrofatty tissue
- L.N.

- Inf. hypogastric plexus
- Sup. Rectal artery

Remove mesorectum upto (D) colic artery

ANAL CANAL

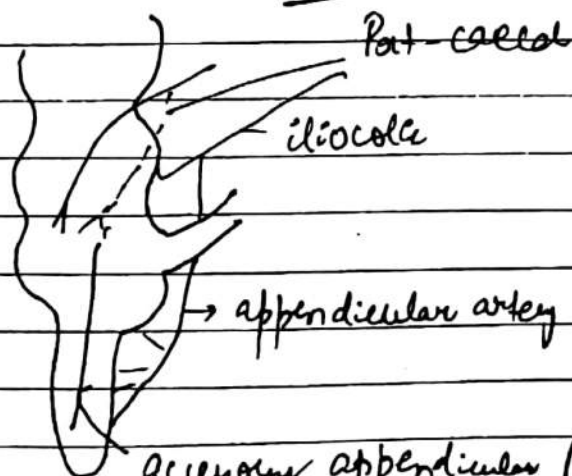
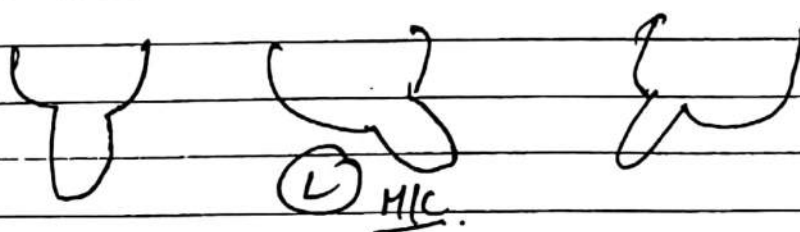


T₁ of SCC → GT → RT ← NIGRO'S REGIME.

5 FU + Cisplatin (old times - Mitomycin - c)

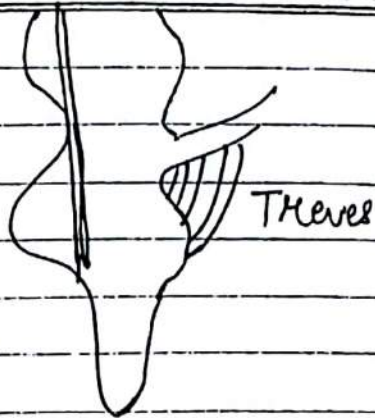
APPENDIX

M/c position - Retrocaecal
Rarest → Post-ileal.



accessory appendicular (artery of Sheshachalam)

Jackson membrane



Valve of Gerlach. → at the appendicular orifice, there is a mucous fold

APPENDICITIS

M/c of abd. emergency.

" " " " in ♂

Types

Obstructive

Catarrhal
visceral peritoneal T10

Murphy's Triad -
Pain →

Vomiting

Temperature

Umbilicus

→ McBurney's point

↳ parietal peritoneum

Pain > vomiting

McBurney's Point

At the junction of $\frac{2}{3}$ rd medial - $\frac{1}{3}$ rd lateral

DeWitt's Triad.
 Guarding
 Tenderness
 Hyperaesthesia } RIF

Rovsing Sign → Pain in RIF when pressure given at LIF

Cope

Psoas Sign

In retrocaecal appendix

Extension of hip joint causes pain

Obturator Sign

Internal rotation of thigh causes pain

Dumphy

Cough causes pain

Aaron Test -

Press @ RIF causes pain in epigastrium

Ten Horn Test -

♂, pull @ testis down causes pain in RIF
obscure now.

Bestedo -

Inflate colon with air → causes pain.

Adler Test -

To differentiate

Point of tenderness
↓

change position
↓

But no shift in tenderness in appendicitis

M/c D/D in children - Mesenteric Adenitis

Inv.

TLC ↑

DLC - polymorphs ↑

CRP ↑ - 100% - the predictive value

USG → IOC

tubular structure blind ending
non compressible
non peristaltic

length > 6cm, width > 6mm

Doppler → FLAME SIGN.

Prognostic Indicator

ALVARADO Score / MANTRELS Score

M	Migratory pain	-①	Total - 10
A	Anorexia	-①	if > 7 ⇒ appendicitis
N	N, V	-①	5-7 ⇒ CECT.
T	Tenderness	-②	
R	Rebound tenderness	①	
E	Elevated Temp.	①	
L	Leucocytosis	① ②	
S	Shift to left	①	

Tzanakis

Tenderness

- 4

Total (15)

Rebound tenderness

- 3

Leucocytosis

- 2

USG +ve

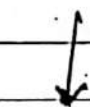
- (6)

RIPASA.

AIRS (appendicitis Inflammatory Response Scoring)

Iczbicki Score.

Rx appendicitis → appendicectomy



Delay > 3-4 days.



Appendiceal Lump.

Conservative

OS (Ochsner Sheren Regimen)



Pt. is stable

Discharge



> 6 wks → Interval Appendicectomy

APPENDICULAR ABCESS

1) Extraperitoneal drainage

Perforated Appendix → Exploratory Laprotomy
Lavage

APPENDICECTOMY

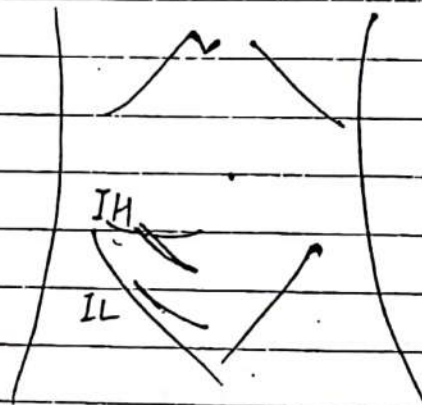
1) McBurney's Incision

① muscle splitting → Grid Iron incision

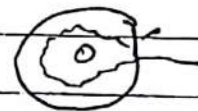
② muscle cutting → Rutherford Morrison incision

Ilio-hypogastric n/v may get damaged.

③ Long incision - Transverse incision



Stump < 5mm



If base is gangrenous → Don't crush the base
for ligation → Absorbable suture used

In case of Crohn's Disease -

(N) → Leave

Appendicitis → Base involved → Leave

" free → Remove

MANEC tumour (Mixed adenocarcinoma + neuroendocrine).

Adenocarcinoma + neuroendocrine
 $>30\%$ $>30\%$

↓
 Synaptophysin.
 Chromogranin.

VOLVULUS

Sigmoid → old age.
 counter clock wise

Caecal
 young age
 ante clock wise

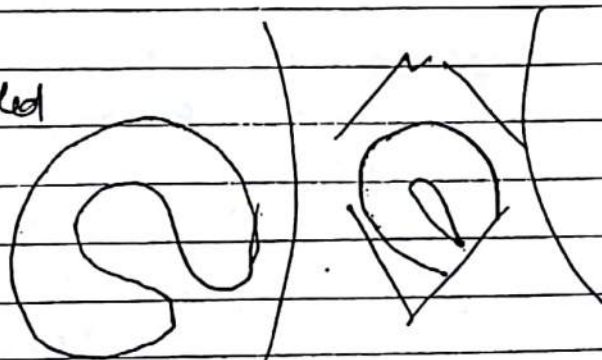
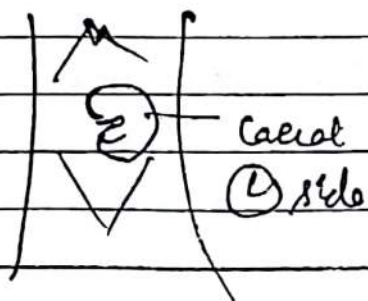
narrow pedicle, long Base-Mesentery

Presentation-

- Pain
 - Distension
 - Complete obstruction
 - Recurrence
- Hyper-resonant

Gangrene → Peritonitis

X-Ray - OMEGA SIGN → (R) side
 COFFEE BEAN



Ba

- Bird on Prey Sign

Flatus tube / Sigmoidoscope

↓
Try to derotate

Exploratory Laprotomy > Manual Derotation

↓
Sigmoidomepexy

Gangrene → Resection + Hartman's procedure.

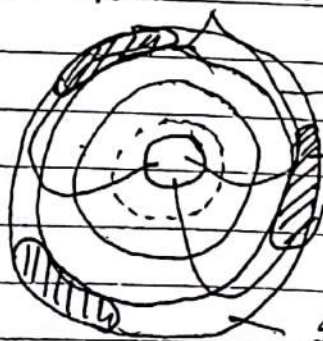
↓
> 6 wks

↓
Hartman's closure after
bowel preparation.

DIVERTICULOSIS

- Colon > Sigmoid

- Longitudinal muscle in colon, is pattern of 3,
not all around.



nutrient artery

Tunica

Toughest layer → submucosa

Intestine Area

SMA $\rightarrow$ artery $\pm$ bleed in Diverticulosis

- Diverticulum comes out from inter-tenia area.

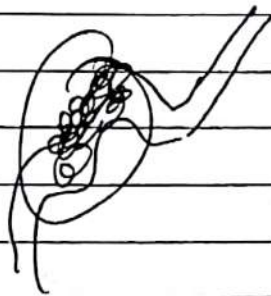
- Diverticulosis $> 50\%$

presents $\pm$ Bleeding

M/cc colonic Bleeding $\rightarrow$ Diverticulosis

" Massive colonic Bleeding $\rightarrow$ Diverticulosis

M/cc Bleeding PR in India $\rightarrow$ Haemorrhoids.



Diverticulitis $\rightarrow$ Pain/Temp. $\rightarrow$ (L) Ulcer/abscess

Perforation

Int.

Int. fistula $\rightarrow$ M/c of fistula

M/c of fistula in young (< 50) Crohn's

" " " " ($> 50\%$) $\rightarrow$ Diverticulitis

Inv

1) Barium Enema [IOC]

$\hookrightarrow$ Saw Tooth Appearance

Diverticulitis $\rightarrow$ CT Scan - Best Inv

HIENCHEY CLASSIFICATION

I - Localized abscess

II - Diffuse "

III - Purulent Peritonitis

IV - Feculent "

R_x - 0 } → Drain abscess → Manage Infection
 I }
 ↓
 Discharge after recovery
 ↓
 > 6 weeks → Reset disease part
 ↓
 Bowel Preparation
 ↓
 Anastomosis

II } → Laprotomy → Reset disease
 III }
 IV }
 ↓
 Hartman's procedure
 ↓
 Reversal after 6 weeks after
 Bowel preparation

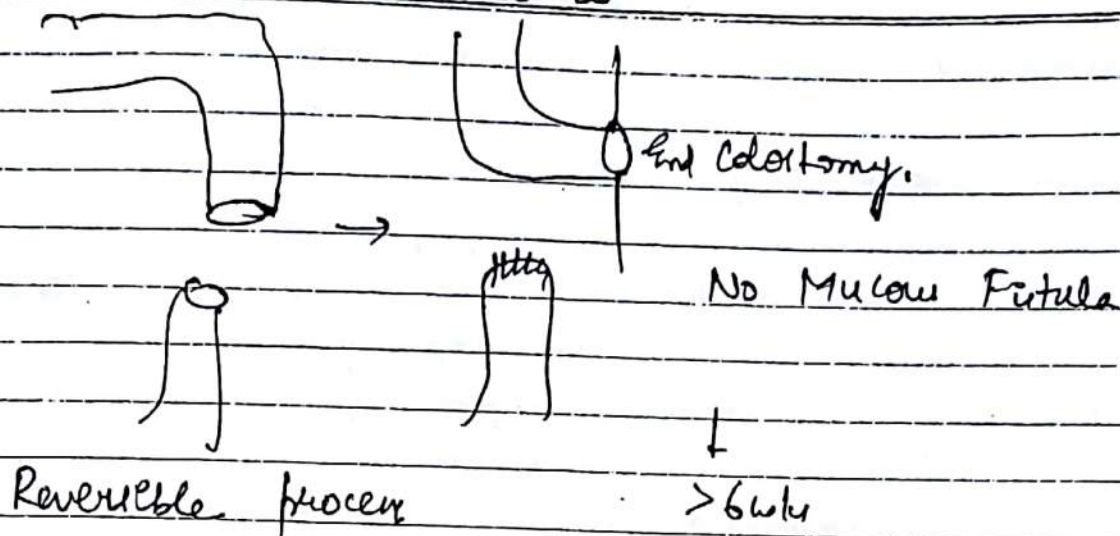
ANGIODYSPLASIA (Image)

- Degenerative Condⁿ
 - Involves (R) colon > ileum
 - Mucosal/submucosal (veins) → Bleed
 ↑ dilated/tortuous
- 2nd MCC of colonic Bleed

- May be associated to AS - HAYDE SYNDROME

Efficiency of VWF Defⁿ
 ADAMTS 13 → it destroys VWF factor

Hartmann's Procedure



> 6 wks

↓
anastomosis

in (L) Colon → 1° closure not done

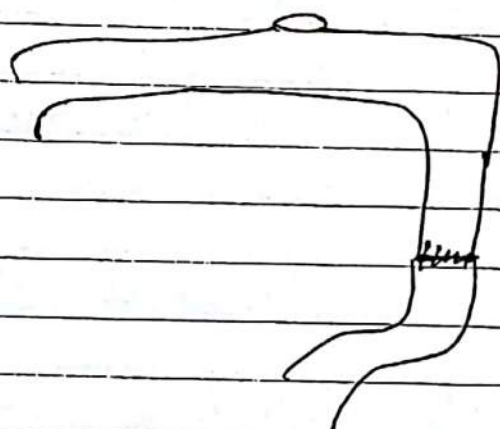
In case of if 1° closure is done

↓

Dependent colostomy done

↓
> 6 wks

↓
Reversal

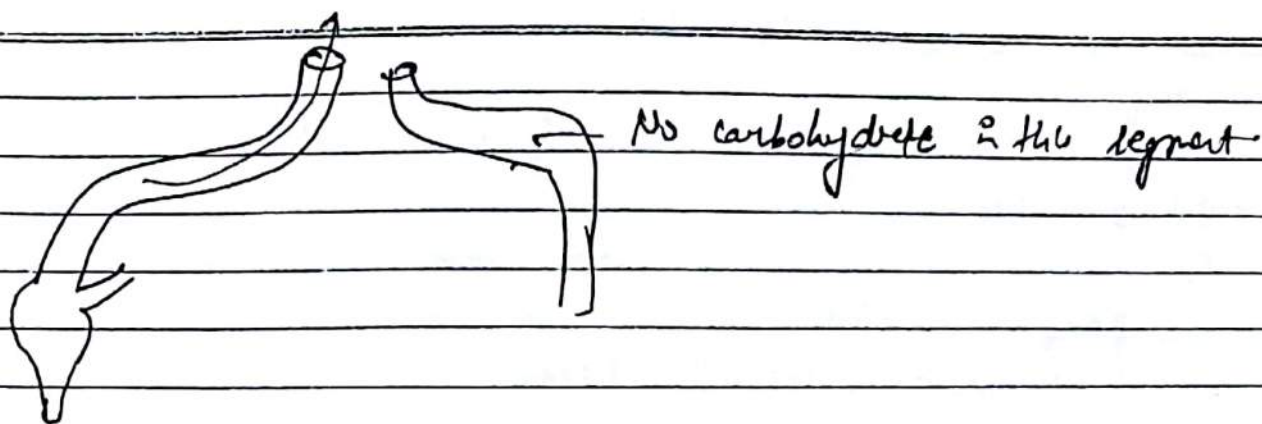


Diversion Colitis

Small intestine → Glutamine is req. for mucosa
Large Bowel → Bacteria is req. for viability

Carbohydrate in food → Bacteria → Short chain FA (Butyrate)

Mucosal atrophy of Bowel distal to colostomy/ileostomy



Rx - Butyrate enema
 Mesalazine
 Steroid enema

NEUTROPENIC ENTEROCOLITIS (typhilek) On chemotherapy

TLC < 1000

(N) < 500

Ileo-caecal junction →

Inflammatory ulcers → Transmural
 ↓
 gangrene

CT Scan — thickening of Caecum
 Fat stranding

PNEUMATOSIS 1° ← → 2° INTESTINALIS

submucosal
 15%

Require Rx

subserosal
 85%

COPD & connective tissue disease
 CT.

HIRSCHSPRUNG'S DISEASE

Cong. Megacolon

- Aganglionosis

- $\rightarrow$

- ganglion absent $\left\{ \begin{array}{l} \text{Submucosal} \\ \text{Muscle} \end{array} \right.$

- involves Rectosigmoid

- Familial

Down's syndrome

MEN₂ - Chr 10 - RET.

Pigmentation $\rightarrow$ pigmentation.

Central Hypo ventilation Syndrome

At Birth $\rightarrow$ Unable to pass meconium.

- Delayed passage of "

PR Exam $\rightarrow$ collapsed Rectum.

No rectal ampulla

Rectum grips finger

There can be delayed presentation

No faecal soiling

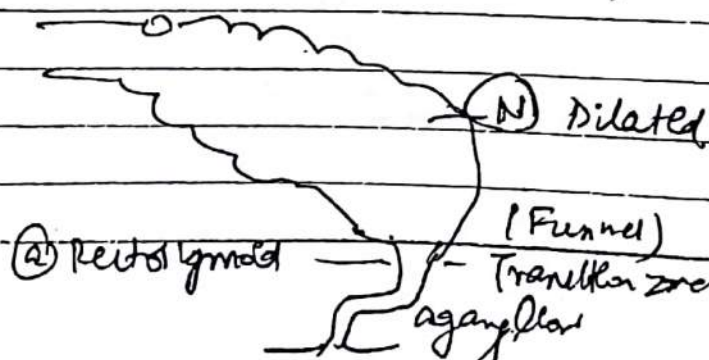
Distended abdomen

Tense shiny skin

Dilated veins

Transverse Colostomy

Inv - Ba study



② Manometry → Rectal pressure > Sigmoidal Pressure

③ Gold std - Biopsy
 ↳ full thickness
 1.5cm above dentate line

Suction Biopsy → absence of ganglion
 elongated n/v
 hypertrophied n/v
 ↑ AChE

Rx - ① Swenson
 Resection + anastomosis

② Duhamel

③ Soave

④ Georganon - lap. ~~anastomosis~~ anastomosis

RECTAL PROLAPSE

Partial

< 4cm

Mucosa

Folds, Radial

young/old

Complete

> 4cm

Full thickness

Circular

Rx

Rule out constipation straining

↳ Mucosal Reposition.

Laxative

Mucosal excision.

Goldman's Ligature

Thiersch wiring.

* Perineal approach

Delorme

Altemeier

Rectopexy
↳ lithotomy

By Lap.

Rectopexy

least Hemo-rhene

→ ant - Ripstein In India

↳ post - Well's

↳ Lat - Orr - Logg

SRUS → Solitary Rectal Ulcer Syndrome



Puborectalis

↓
if no relaxation of muscle

↓
mucosal prolapse

↓
ulcer on ant. wall

- ♀
- middle age
- ulcerated lesion on ant. wall
- 5-8 cm. above anal verge
- due to non-relaxation of Pubo-rectalis during defecation

↓
leading to ant. wall prolapse through puborectalis (int. intussusception)

Presentation -

- Off + on Bleeding P/R
- Mucosa in stool
- incomplete defecation

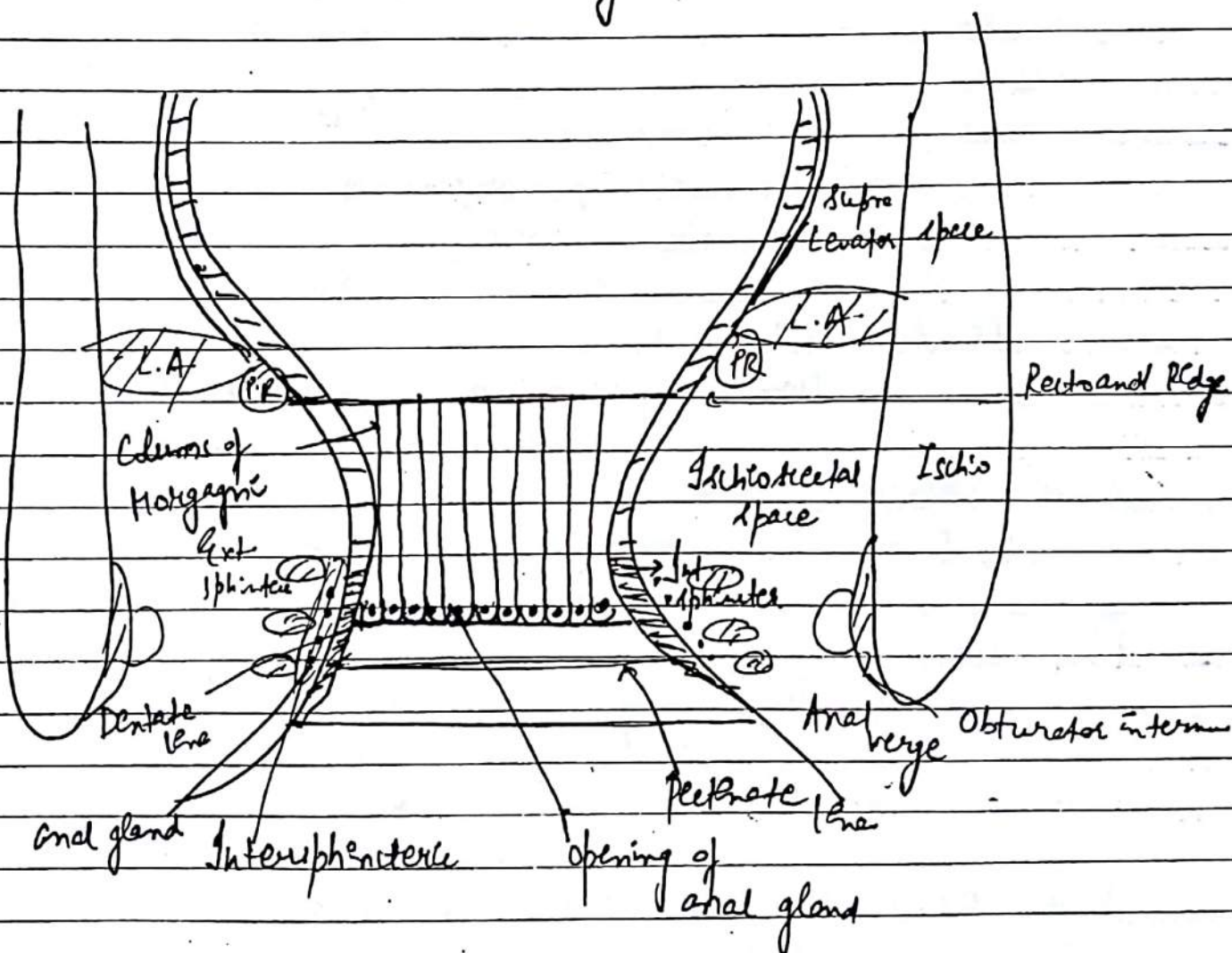
4th

4 Sigmoidoscopy

21 Defaecography

3) ^{or} ATNS Biopsy

-
- Collagen in ^{sub} mucosa
 - Colitis cystica profunda
 - ↳ muscle of muscularis mucosae disorganised
- glandular crypt abnormality



HAEMORRHOIDS

Submucosal bunch of vessel



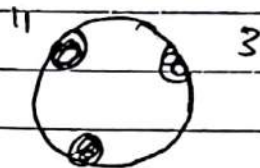
3 1° 140 → 3, 7, 11° clock

Grade

I → Sexile

II → ~~Ped~~ Pedunculated

comes out during defecation
go back spontaneously



III → ~~Ped~~ Pedunculated

Manual Reposition Required

IV → Bleeding

Thrombosed ~~at~~ pile → pain.

Diagnosis

- By Proctoscopy

I → Conservative

II → Band ligation → Barron Band.
Sclerotherapy

↓
Gr II internal

III → ① Haemorrhoidectomy

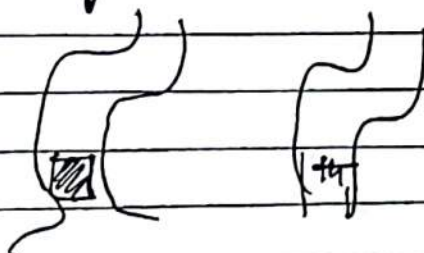
Open → Milligan Morgan

closed → Ferguson

② Stapled haemorrhoidectomy

Longo's

↓
1.5cm above dentate line



③ Cryo

leg N₂ → freeze → D/C

④ DUHAL (Doppler guided Haemorrhoidal ~~arter~~ arterial ligation) or HALO

↓
Recto-anal Repair

FISSURE - IN - ANO

- Pain - M/C

- Site → 6 o'clock

- Linear ulcer at ~~middle~~ mucocutaneous junction

Rx - No P/R or proctoscopy

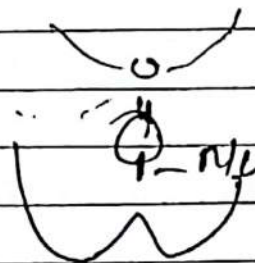
↓ Sitz Bath

Laxative

Analgesic

ointment

Botox Injecⁿ



Chr. fissure → skin tag → sentinel piles
↓
fibrous base

Rx - Fissurectomy

Sphincterotomy

→ Lev's dilatation

Lat sphincterotomy

FISTULA

H/c abscess → Peri-anal abscess.

Fistula → abscess ruptures to form fistula

Interphincture fistula → H/c type

Low lying → below L.A.

High " → High Above L.A.

D_x -

Best → MRI.

Multiple → Crohn's

Colloid Ca

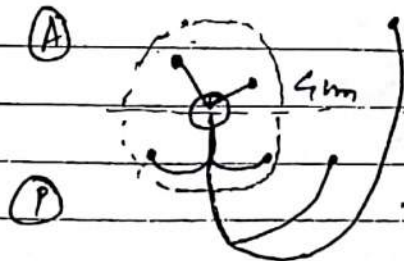
TB

~~LGV~~ LGV

R_x - Low - fistulectomy

High - Seton wiring

Goodsall's Rule



————— X —————

GENERAL SURGERY

SIRS (Systemic Inflammatory Response Syndrome)

It is the body's response to infection.

Coined for Pancreatitis but used for all

Mediated by IL-1, IL-6, TNF- α .

TLC < 4000 or > 12000 ϕ
or > 10% Band forms in the smear.

RR > 20/min

pO₂ < 32 mmHg

Temp < 34°C or > 36°C

PR > 90/min [c out the effect of β blockers]
or inotropes.

Any 2 or criteria out of 4 met $\rightarrow$ SIRS.

SEPSIS

Defined as (SIRS + known foci of infection)

Severe sepsis = when sepsis $\rightarrow$ hypotension.
but it responds to fluids.

SEPTIC SHOCK - when sepsis $\rightarrow$ hypotension
but doesn't respond to fluids

MODS (Multiple Organ Dysfunction Syndrome)

Defined as failure of ≥ 2 organ systems.

CAUSES OF POSTOPERATIVE FEVER :

4

Post-OP Day I - 1) M/c - Atelectasis - collapse of alveoli
2) incentive spirometer is given to pt.

Day II or III

- 1) M/c acquired Hospital Infection $\Rightarrow$ UTI
- 2) Thrombophlebitis (superficial)
M/c cause $\rightarrow$ I.V. line insertion.
- 3) Pneumonia

Day IV or V

- 1) M/c of hospital acquired infection in a Surgical pt is SSI (surgical site infection)

2)

It is defined as infectⁿ at the operated site & can occur in 30 days of surgery.

In case an implant ~~can~~ is placed,

any infectⁿ & occurs in 1 yr of surgery is considered SSI.

2) DVT

Pneumatic compression stocking is used for prevention.

Day VI

6th Day - Burst Abdomen or Abdominal Wound Dehiscence can occur.

Serous fluid Sign. or Salmon Sign.

Emergency Management

↳ Urobag Laprostomy or Bogota Bag Laprostomy.

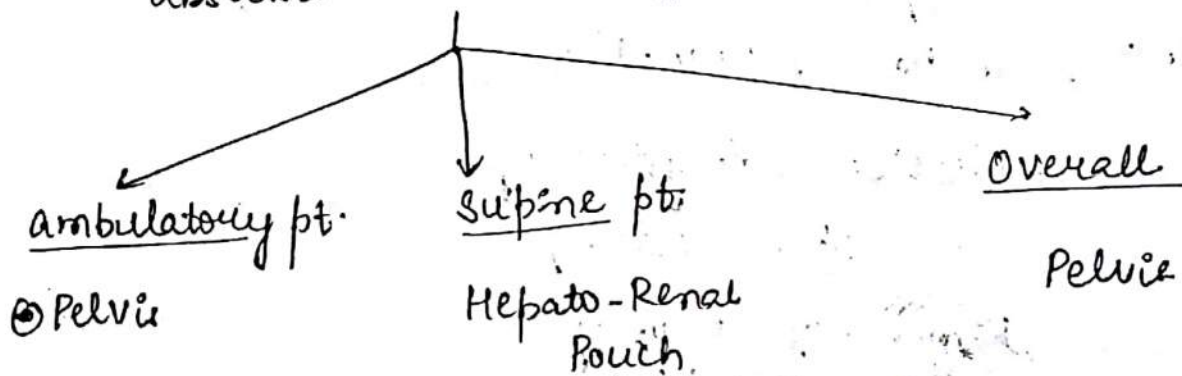
↓
Urobag placed on the wound, sutured to skin.

Definitive Management

↳ Re-suture the Rectus Sheath.

≥ VII Day

1) Intra-abdominal Collecⁿ or intra-abdominal abscesses.



IOC → CECT

Management → Pigtail Catheter Insertion.

↓
can be used in Liver Abscesses also.

TYPES OF WOUND

6

Type	Example	% SSI
① <u>CLEAN</u>	clean incised wound Knee replacement <u>Uncomplicated Hernia</u> Breast Sx except axilla Thyroid Sx CABG	< 2%
② <u>CLEAN CONTAMINATED</u>	GI/GUS when there is no inflammation - elective cholecystectomy - " appendicectomy - Removal of urinary stone when no UTI - Bowel Sx in a <u>prepared</u> Bowel	2-10%
③ <u>CONTAMINATED</u>	GI/GUS when there is inflammation. - emergency appendicectomy - " cholecystectomy - Bowel Sx in unprepared Bowel - Removal of urinary stone when UTI (+)	≥ 10%

④ DIRTY

- Peritonitis
- all abscesses
- Traumatic wound & has not been damaged. > 6 hrs

> 20%

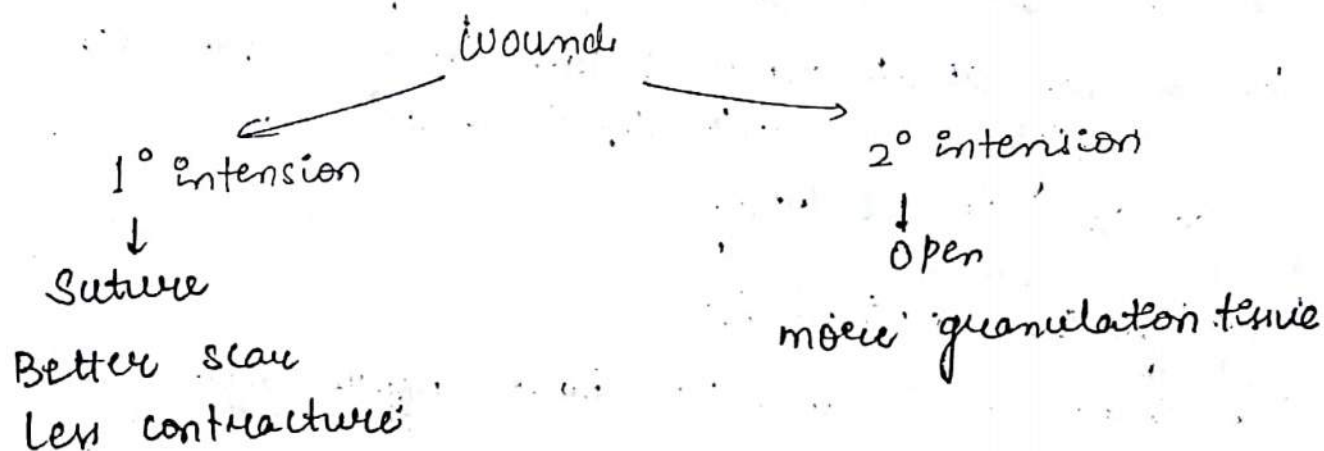
↓
golden period for
traumatic wound

SCORING SYSTEMS

ASEPTIC

SOUTHAMPTON:

Clean case is always 1st case in elective OT list.



3° Intension / delayed 1° closure

we initially leave the wound open due to infection

↓

once infection subsided in 2-3 days

He - suture the wound.

To Reduce Incidence of SSI

8

1) Handwashing (M/I)

- For 1st case of Day - 3-5 minutes.
- For every subsequent case - 2 mins is enough.
- 3 areas where contamination is mixed.
 - Thumb
 - Tip of finger
 - Interdigital cleft

2) Best way to remove hair from an operative site is Intraoperative Clipping of Hair

shaving or de-epilatory cream are associated with a higher wound infection rate as compared to clipping.

3) Prophylactic Antibiotics.

Best time - 30 min to 1 hour before Sx

When do we repeat the dose in case of prolonged Sx - 4hrs

4) Ideal O.T. Parameters.

4 Zones

PROTECTIVE - change rooms
Transfer bay
Pre & post op rooms
ICU / PACU

CLEAN - connects protective zone to aseptic zone
equipment store room
maintenance workshop

ASEPTIC - OT

DISPOSAL - where u dispose all waste.

-
- Proper zoning
 - Min 10-15 air changes in a hour. out of $\leq$ at least 4 should be fresh air changes.
 - 50-60% relative humidity
 - Temp - 21-23°C.
 - Inside theatre, we need to have positive pressure (2 mm Hg above atmospheric pressure).
 - air should flow from $\rightarrow$ sterile to less sterile area

PATIENT SAFETY

- Communication error is the cause of wrong side Sx

WHO surgical safety Checklist

Sign-In

Ward $\rightarrow$ OT

① Name

② MRD

③ Consent written

④ Site marking (+) (-)

Time-Out

Before starting procedure

1) Identify themselves

2) Nurse

Name

MRD No

Sign Out

Before skin closure

1) Nurse

Instrument

Gauze

(Radio-opaque lines)

⑤ Prophylactic
antibiotics given
or not

⑥ Known allergies

③ Surgeon

- surgery
- expected time
- anticipated blood loss
- any non-routine steps.

② Surgeon

- actual 3x 10
- non-routine step
- equipment failure

④ anaesthetist

- prophylactic antibiotics
- any allergy
- any non-routine step for concern

③ Anaesthetist

- actual blood loss
- any concerns

ESTIMATED BLOOD LOSS

One fist full of clots → 500 cc

Completely soaked mope → 500 cc

Subtract the amount used for irrigation.

SURGICAL BLADES

No. 11



Stab Blade

- To drain an abscess.

15, 20, 21 No.

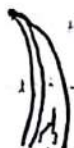


For skin incision.

Belly of
blade

→ sharpest portion
of blade

12 No.



For suture removal

IV LINES

OGG P: B 24

11

Orange 14

Grey 16

Green 16

Pink 20

Blue 22

Yellow 24

Earlier ATLS guidelines - ② 16 gauge cannulae in
Trauma pts

Latest ATLS guidelines - ② 18 gauge cannulae are
sufficient

COMMON SURGICAL POSITIONS

1) SUPINE → Hic position - Laprotomy, Thyroid, Breast

2) Lithotomy → gynaeco + obs.
Haemorrhoid
Femur
TURP

If proper padding is not provided.

↓
Common peroneal n/v can be injured.

3) Lateral position / Kidney Position.

Thoracotomy

Pielolithotomy [removing stone from pelvis]

Nephrolithotomy

Excessive abduction of arm → Brachial Plexus Injury

4) Jack Knife - knee-elbow position

Because of positional atrophy. this position¹²
no longer used.

earlier used for haemorrhoid
fistula

5) Prone

for spinal Sx

6) Fowler's / Sitting

- Best position for CNS Sx.
- Better exposure especially for posterior fossa
- Blood less field due to gravity
- chances of air embolism is higher due to
-ve pressure.

... can also be used for Breast neoplasms.

7) Neutral Position

Head end ————— Foot end

8) Trendelenberg Position

Head

Foot

used for operating Pelvis.

9) Reverse Trendelenberg (RT)

Head

Foot

used in lap. cholecystectomy

↳ RT + (R) side up.

Drawback -

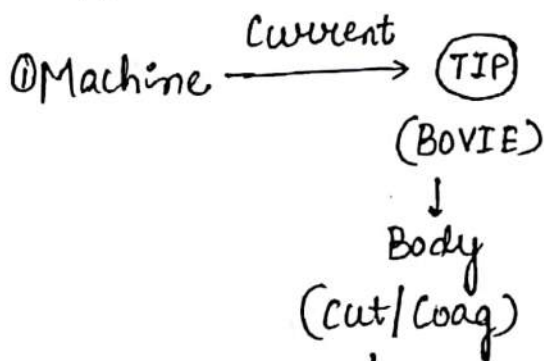
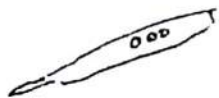
accumulation of gas beneath the R dome of diaphragm

↓
irritate the diaphragm

↓
 R shoulder top pain → M/c complication following lap chole.

ENERGY SOURCES

Unipolar Cautey



↓
exit through cautery pad on thigh.

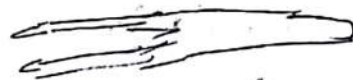
If pad is not placed → cautery will not work

② Improperly placed pad can lead to burns at the site of cautery pad

• [cautery pad should have wide area of contact + placed on well perfused area]

③ C/I in Pt. w/ pacemaker
becoz it passes through entire body can interfere w/ conduc.

Bipolar Cautey



① Circuit is completed betⁿ 2 paddles.

cautery pad not required

② safe to use when there are vital n/vs

③ only coagulation can be done

④ Bcoz there is lateral
dissipation of current in ~~up~~
unipolar cautery

14

↓
there can be thermal
damage to nearby n/v.

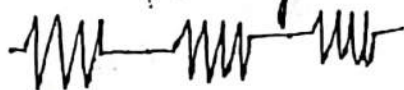
↓
So use Bipolar cautery
in such cases.

Yellow → cutting

Low voltage, continuous current


Blue → coagulation.

high voltage, alternating current



Blend mode -

Combination of both type
of currents.

LIGASURE

Uses Heat + Pressure ⇒ Coagulation.

Can coagulate vessels upto 7mm diameter

1st Gen → only coag

2nd Gen → coag followed by cutting

HARMONIC SCALPEL (Image)

1) Oscillatory Blade working on ultrasound

↳ 50,000 Hz.

↓
Oscillatory movement cause protein denaturation.

- coagulation can occur cut heat production 15
- can be used close to vital structure
- Precise cut
- ~~Cut~~ P can cut through scarred tissue as well

PRINCIPLES OF MINIMALLY INVASIVE SURGERY

- CO₂ is the gas used for creating Pneumoperitoneum
- No O₂ & air $\Rightarrow$ they support combustion.
- Pressure to be maintained $\rightarrow$ 10-14 mmHg.

pneumoperitoneum

OPEN (Hasson)

Used in

- Pregnant
- Abdominal adhesions

VERRES (Image)

- Stop valve + nt to regulate CO₂.

- Blunt tip. normally.
- But when we push it against hard surface, blunt tip retracts & cutting tip.

- when it cuts through the abdomen, blunt tip comes back to flat. Bowel doesn't damage.

$\Downarrow$
Spring loaded ~~bigam~~ needle

- To confirm whether

- ① Inject 5-10cc of saline through needle.

Saline should go on freely & if u try to aspirate $\rightarrow$ nothing

② If u put a drop of saline
↓
It gets sucked in peritoneum

16

Put In Trocar.

↓
Through Trocar instruments are put

* If Bowel Injury due to Trocar.
↓

Convert into open surgery
but keep Trocar in position.

* Laproscopic instruments → Black throughout except
tip
↓

for insulation & ensures
current only acts at tip

* If there is break in insulation

↓
Current leaks out through Trocar

↓
Burns abdominal wall.

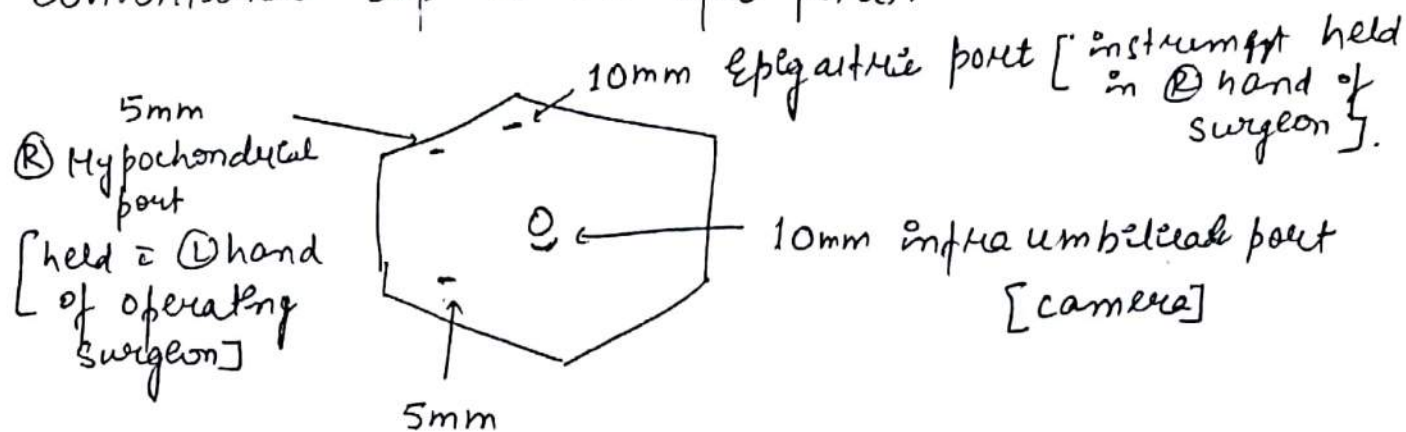
Capacitance

How to prevent

① Maintain proper insulation

② Use Plastic Trocar.

Conventional Lap → multiple ports.



② Lumbar

[Toothed grasper to hold G.B.]
held by assistant.

During lap chole, Surgeon + Person holding camera → Both stand on L side.

SILS (Single incision laparoscopic Sx)

we use SILS port

↓
multiple openings in it

15mm infra-umbilical incision

↓
SILS Trocar is inserted

↓
All instruments through this

NOTES (Natural orifice Transluminal Endoscopic Sx)

Through uterus → M/c orifice used.

Bladder

Oral cavity

Rectum

Umbilicus has no hole



ROBOTIC SURGERY

DA-VINCI Robotic Sx

18

Robotic Sx

Adv of Robotic Over Lap

- 1) 3D vision
- 2) More freedom of movement [7 degrees].
- 3) Better dissection
- 4) Faster recovery
- 5) TREMOR REDUCTION
- 6) Scaling of movement is possible
↳ ensures better dexterity, suturing

Disadvantages

- 1) Expensive
- 2) Longer ~~exp~~ learning curve.
- 3) Loss of tactile feedback.

SUTURE

19

- 3 instruments req. for ~~suture~~ skin suturing
 - Needle Holder
 - Toothed Forceps
 - Plain scissors

- Square throw
If crossed once.



1. square throw

- 2 square throw = Reef knot / Square knot
Secure knot
doesn't open up.

- Granny's knot / Slip knots
Knot is made but sides are not crossed.
Insecure knots.
can open up

- Surgeon's knot square throw
Crossed once + 2nd again in 1 go
Crossed once in 2nd go. (square throw)

- Secure knot

Skin suturing

Bowel suturing

- Everted edges
- Mattress suture required.
(when ends get inverted)

Horizontal

↓
same depth +
adjacent side.



Everted +
Haemostatic

[Least cut through rate]

Vertical

↓
go deep to other
side come back on
same line
superficially

• Subcuticular Sutures

Skin has no marks.

Sutures are made from inside the edge

Best suture material → MONOCRYL

20



• Aberdeen's Suture knot / Cobble's Knot

• correct way of tying a continuous suture

• start with 1 thread.

↓
left with 1 thread



↓
take 1 finger + pull out multiple times.

• Rubbing - locked suture

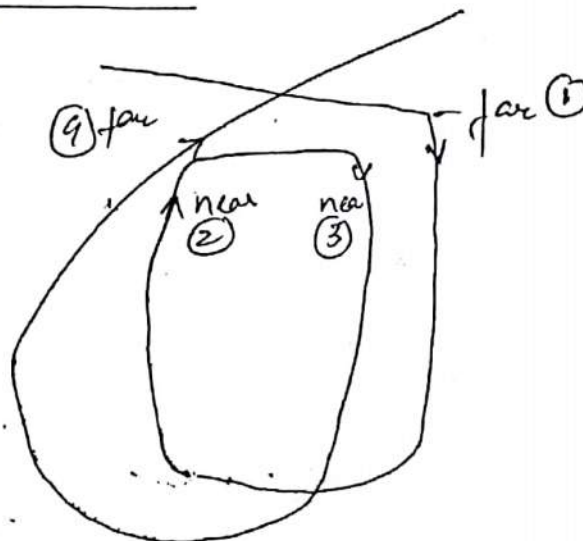
Advantage → Better approximation.
" Haemostasis

• Far - near - near - far suture

• approximation

• Filling of dead space

• Tension is adequately distributed

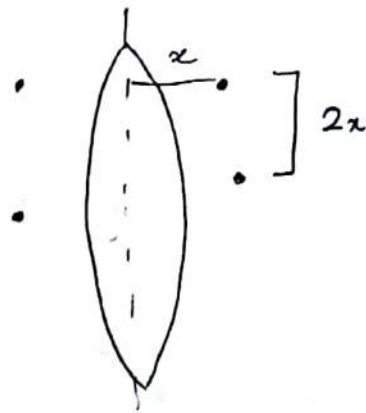


Lacerated wound, Q.
Depth, x cm.

21

Ideal distance betⁿ 2
Sutures. = $2x$.

Ideal distance betⁿ betⁿ 1
Lacerated end = x



SUTURE MATERIAL

MONOFILAMENT



BRAIDED



multiple threads
intertwined

- Single
- Stronger memory as compared to braided.

[Memory = tendency of suture to resist a knot]

- Higher wound infectⁿ rate due to crevices.

- Open up easily
- So multiple ~~suture~~ knots to ensure doesn't open-up

Monocryl

Nylon

PDS [Poly Dioxolane].

Vicryl
Silk.

ABSORBABLE SUTURE MATERIALS

22

Natural

Catgut → derived from gut of sheep of [submucosa] undergoes proteolytic degradation hold the tissue for 3-5 days (tensile strength)

Chromic Catgut

hold tissue for 7-10 days
Use of catgut in Sx has ↓
We ~~only~~ for approximation of subcutaneous.
Catgut is originally 1st layer in 2 layer Bowel anastomosis
But now replaced by Vicryl.

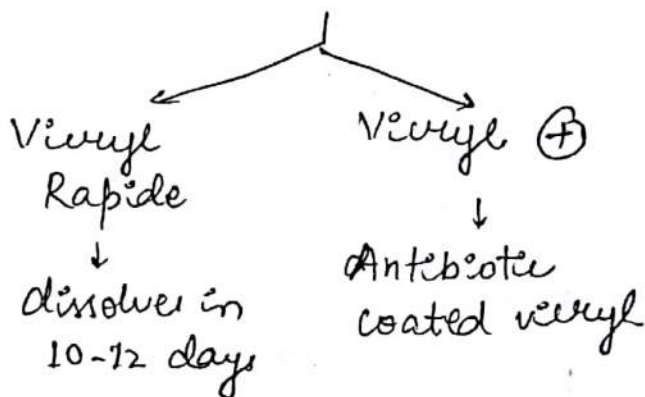
Synthetic

Monocryl

- Best for subcutaneous
- Simple

Vicryl / Polyglactan

- Purple
- Braided
- Dissolves in 60-90 days



USES of Vicryl

- 1) S/c tissue
 - 2) Bowel anast?
 - 3) CBD
 - 4) Bladder
- knot should be outside.

PDS / Polydioxane

- Dissolves in 180 Days
- Monofilament
- use → same as Vicryl

NON - ABSORBABLE SUTURE

23

NATURAL

SILK

Braided

USES

skin

2nd layer of 2

layer Bowel anastomosis

COTTON

SYNTHETIC

I> PROLENE / POLYPROPYLENE

① Mesh

② RECTUS Sheath closure

[Jenkins theory of mass closure]

Ideal length of suture

Required

= 4 times the length of wound

③ Vascular anastomosis or Vascular repair.

II> POLYESTER / ETHIBOND

III> NYLON (ETHILON).

Monofilament suture used for skin suturing

Natural suture material have antigen

↓
so more inflammation

So, most inert →

Synthetic Non-absorbable

Barbed V-cryl -

No need to tie a knot as spikes are ⊕ on it

Drawback - Painful

„ If it migrates, tissue will open up

STEEL SUTURES

24

- To close sternotomy incision.
- Shouldice repair → originally steel sutures were used.

SUTURE THICKNESS

No. 1
1-0
2-0

→ Thickest → To hold drains, silk is used

3-0
4-0

→ for skin, Monocryl is used

9-0
10-0
11-0

→ Microscopic Sx like microvascular anastomosis
Prolene is used.

→ Finest

For Rectus sheath → No. 1 Prolene

3 Bladder - 1st layer - Vercyl
2nd - Silk

Tendon - Nylon.

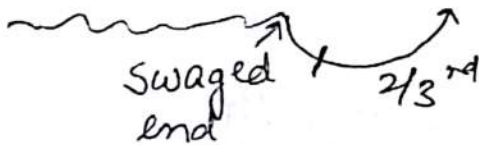
Cataract - 10-0 silk.

SUTURE REMOVAL

25

- ① Scalp → 7-9 days
- ② Face → 3-5 days
- ③ Neck → 5-7 days
- ④ Thorax → 10-12 days
- ⑤ Abd → 12-14 days
- ⑥ Perineum → Men 14 days

NEEDLE



where thread
is attached.

Ideal place to hold needle - $\frac{1}{3}$ rd from swaged end
 $\frac{2}{3}$ rd from pointed end.

NEEDLE

CUTTING / REV CUTTING



Triangular
Apex → inward
of concavity

Used for tough str.
like skin.

Apex - outward
to concavity

ROUND BODY

Rounded cross-section.


Atraumatic

Used for Delicate str
1) Bowel
2) CBD
3) Ureter.

Q. Pt. has undergone Bariatric Abdomen.

26

PA is planning Urobag/Bogota Laprostomy

↓
c suture to be used

3-0 Round
Body
Silk

2-0 Round Body
Nylon

✓ 2-0 Cutting
Nylon

3-0 Cutting
Vicryl

PRINCIPLES OF PLASTIC SURGERY

Langers → Parallel to the action of m/s
Incision along this line → good scar
But this was found wrong later becoz
he described this in cadaver.

KRAISSER → Relaxed tension lines.
⊥^r to M/s action.

BORGES → For incision over the face

SKIN GRAFTING

GRAFT

Any piece of tissue that doesn't have its own blood supply

FLAP

27

It has its own blood supply

SPLIT THICKNESS SKIN / THIERSCHE GRAFTS

GRAFT

THIERSCHE
Thin

DONOR

1) M/c Donor site

→ Thigh → followed by Buttocks

2) Larger Donor area

3) Can be raised using a HUMBY's knife or electric Dermatome

↓

• Petechial haemorrhages are seen as graft is raised [it means right thickness]

• 4) require just dressing

• 5) Donor site can be re-used for grafting

6) Max. duration for storage in Skin Banks.

2 weeks at 4°C

WOLFE'S GRAFT (full thickness)

M/c site - Post-auricular skin

Supra or infra clavicular fossa

can be raised through blade

require suturing

can't be used again.
or.

7) Meshing is done

28

- ↓
- ↑ surface area by 1.5 times
- prevents fluid accumulation beneath graft

RECIPIENT

- ① Better survival rate
- ② More resistant to trauma
- ③ cosmetically better
- ④ Better colour matching

Skin Graft Survival by 3 methods

- ① Imbibition → last for 24 hours.
- ② Inoculation →  for 1-3 days
- ③ Neovascularization → beyond 3 days.

FLAPS

*RANDOM FLAP

- Flap is not based on named blood vessel
- Failure chances are high

1) V-Y Plasty


incision

→


sutured

it causes elongation of wound
So, it is used for Post burn
Contractures

2) Z Plasty -

29



• Transposition of 2 flaps

↓
causes elongation of wound

• Ideal $\angle$ is $60^\circ \rightarrow 1.7$ times elongated of wound.

③ Rhomboid flap / Lindberg -
used for Pilonidal sinus surgery

* AXIAL FLAP

Rotated but based on a named BV.

M/c used flap for Head & Neck. $\rightarrow$ Pectoralis Major
Myocutaneous flap (PMMC)

Based on Pectoral branch of thoraco-
acromial VA

Deltpectoral Flap

Based on 2nd - 4th perforators of
internal mammary artery

Rotated laterally

Abbey Estlander

used for reconstruction of upper lip. angle of mouth

Based on labial vessels.

Lattissimus Dorsi Flap

$\rightarrow$ elliptical incision.

- Used for Breast reconstruction

swing forward

- Based on thoraco-dorsal vessels

TRAM FLAP

30

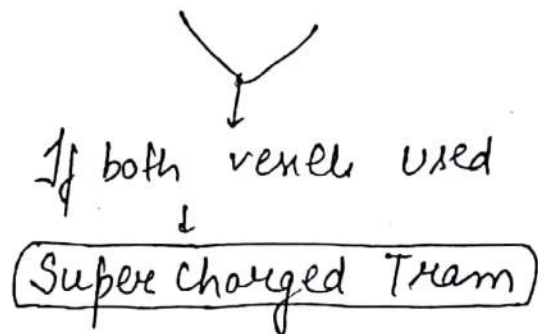
↳ Transverse Rectus Abdominis

Myotaneous Flap

Used for Breast Reconstruction.

elliptical incision following rectus M/s ^{cutting} & rotate upwards

Based on sup. epigastric or inf. epigastric
(axial) (free)



Disadvantage → chance of abd. wall hernia ↑

* FREE FLAP

When we disconnect tissue from Donor Site & carry out microvascular anastomosis at the recipient side → k/n/a free flap

↓
Prolene is used

eg. for mandibular reconstruction → free fibular graft

↓
Based on Peroneal vessels.

Beck Flap for ANDY GUMP DEFORMITY

↓
floor of mouth hangs when ant mandible recedes

Forearm Flap → Based on Radial artery

31

DIEP Flap Best flap for Breast Reconstruction

↳ Deep Inf. Epiparture artery Perforator

Elliptical Incision

↳ Only taking fat no muscle

↓
Reduced incidence of hernia +
fat reduced from abdomen.

* Best way of monitoring perfusion of flap
↳ Trans-cutaneous Doppler

SIGNS OF FLAP COMPROMISE

← Arterial Block

Temp - Cold

Colour - Pale

Capillary - Delayed
Refill

Pin
Prick

↓ blood
flow

→ Venous Block

Warm

congested

Quickly

↑ blood flow

In Both Condⁿ → Flap appears oedematous

SURGICAL NUTRITION

32

BASAL ENERGY EXPENDITURE (BEE)

- ① Mild Trauma / (N) → ① 20 kcal / kg / day
- ② Mod. Trauma / sepsis → ①.4
- ③ Sev. Sepsis → ①.8
- ④ Sev. Burns → ② 40 kcal / kg / day

NUTRITION

Enteral

Going through gut

>>

Parenteral

through veins.

- ① Physiological
- ② Cheap
- ③ maintains entero hepatic circulation
↓
prevents cholestasis
- ④ Keep intestinal mucovilli patent
- ⑤ *Prevent translocation of gut bacteria

ENTERAL NUTRITION

33

Mouth

If unable to
eat
↓
< 2-4 wks.

NG Tube / NJ tube

good gastric emptying
↳ NG

poor gastric emptying
↳ NJ

> 4 wks. or

unable to insert
NG / NJ tube

Feeding

gastrostomy

or
feeding

jejunostomy

↑ risk of
aspiration

STAM

↓
stab incision
on bowel & tube

↓
Disad - ↑ peritoneal
leakage

WITZEL

↓
Keep tube on
surface & create
a tunnel & then
insert into bowel

↓
Less leakage

PEG + Tracheostomy
(Sick Pt)

only for gastro-ostomy

↓
Percut. endoscopic
gastrostomy

↓
upper GI endoscopy
Put it under ant
surface

↓
incise ~~the~~ at that
site

Push

Pull

Introducer

Compⁿ of enteral feeding

34

- ① Osmotic Diarrhoea MC
- ② Tube related complication
 - a) Block
 - b) Migrate
 - c) Peridrain leakage

PARENTERAL NUTRITION

Indication -

- 1) High output Faecal fistula
>200 cc / 24 hr.
- 2) Acute episode of IBD
- 3) Prolonged paralytic ileus
- 4) Initial Phase of acute sev. Pancreatitis
- 5) Short Bowel Syndrome

DeJⁿ
+ Adults

<100 cm of SI in the
presence of ICIⁿ

<150 cm of SI in the
absence of ICI

Children

<⁴⁰~~150~~ cm of SI in the
presence of ICI

<60 cm of SI in ^{absence}~~presence~~ of
ICI

Management -

- ① Long term TPN
or
- ② SI Transplant
or

③ Surgery

BIANCHI

Open Bowel

↓
Split it into 2

↓
Roll over & anastomose

↓
Double the length

Disadvantage

- 1) Luminal compromise
- 2) Blood supply compromise

STEP

Serial Transverse Enteroplasty



Transit time ↑

↓
So more absorption.

Disadvantage

- ① Luminal compromise
- ② Blood supply compromise.

TPN

IV

(Peripheral)

Central Vein

Subclavian - H/C

- 1-2 Lts/24 hrs
- Rest of the fluid Req. - DNS/RL
- 40-50% → Carbs
- 30-35% → FAT
- 15-20% → Proteins

Trace elements + vitamins also present

36

On the basis of carb. content

Low-osmolar

Preferred in Pulmonary failure pt.

(less CO_2 formed from carb. metabolism)

High osmolar

Resp. Quotient > 1

$\uparrow$ risk of venous thrombosis

Compⁿ of TPN :-

Central Regime

- 1) Pneumothorax
- 2) arrhythmia
- 3) air embolism.
- 4) Thrombosis

M/C $\rightarrow$ CIS/CRS

(Catheter induced / related sepsis)

Feeding Regime

M/C overall $\rightarrow$ Hyperglycemia

- 1) Trace element Defⁿ
- 2) Vitamins Defⁿ
- 3) Biliary stasis

Cholestasis is imp. reason to withhold TPN

Refeeding Syndrome

Chronic malnourished pt.

[catabolic]

$\rightarrow$ Large quantity of TPN $\rightarrow$ Re-feeding syndrome

$\downarrow$
anabolism starts

Mg^{2+}
 PO_4^{3-} } Required inside cell

Cell

energy $\xleftarrow{\text{Insulin}}$ $\rightarrow$ K^+

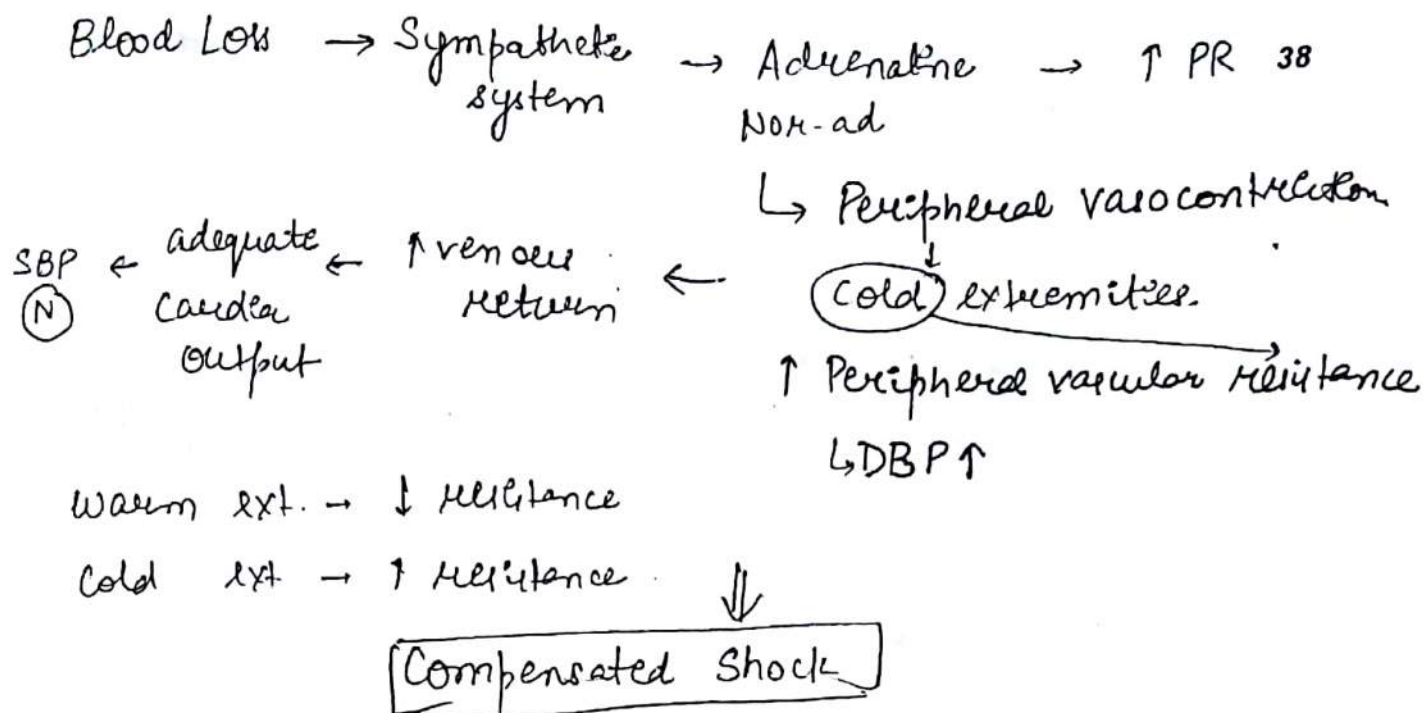
↓
 This leads to
 Hypomagnesemia
 " Phosphotemia
 " Kalemia
 Fluid overload

Associated to arrhythmia & congestive heart failure

SHOCK & TRAUMA

HYPOVOLEMIC SHOCK

CLASSES	I	II (Compensated)	III (Decompensated)	IV
% Blood vol Lost	0-15%	15-30%	30-40%	>40%
Amount of Blood lost	400-500cc	1L	1.5L	>2L
PR	(N)	↑	↑	Not recordable
SBP		(N)	↓	
DBP		↑	↓	
PP		Narrow.	Narrow.	
UO		(N) or ↓	↓	
RR		↑	↑	
Mental Status		Thirsty.	Confused.	Comatose
Management	oral liq.	IV crystalloid. [NS or RL] if trauma not mentioned	IV crystalloid + colloid in 3:1 ratio.	Controlled loss + Maximal B.T.



Non-pneumatic anti shock Garment

1-6 no.

reduces peripheral ~~loss~~ perfusion
 $\times$ shifts blood toward Heart

Best ~~Res~~ Indicator of fluid resuscitation in shock
 $\rightarrow$ Urine output

Best Indicator to determine amount of blood required for resuscitation $\rightarrow$ CVP.

SHOCK INDEX

HR/SBP

Best MODIFIED SHOCK INDEX

Q. **HR/MAP**

Better indicator

if $> 0.9 \rightarrow$ higher mortality

ROPE

HR/PR

of $>3 \Rightarrow$ ~~Pt going into~~ More chance of Pt. ³⁹ going into decompensated shock.

MASSIVE BLOOD TRANSFUSION

>10 units of Blood / 24 hrs
or

Replace the entire circulating Blood vol in 24 hours.

- Compⁿ :-
- 1) Hyperkalemia $\rightarrow$ RBC lyse to release K^+
 - 2) Hypothermia.
 - 3) Hypocalcemia
Becoz citrate (anticoagulant) chelates Ca.
 - 4) Coagulopathy
as platelets $\downarrow$ & clotting factors
Leading cause of death in Pt. Σ massive blood Transfusion.

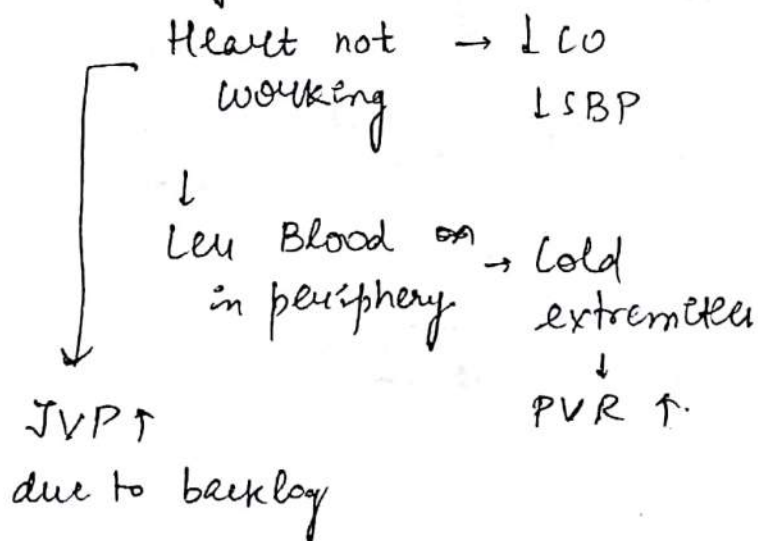
Q PRBC : FFP : Platelets = 1 : 1 : 1

CONTROL BLEEDING

- ① Pressure
- ② Patience
- ③ Packing

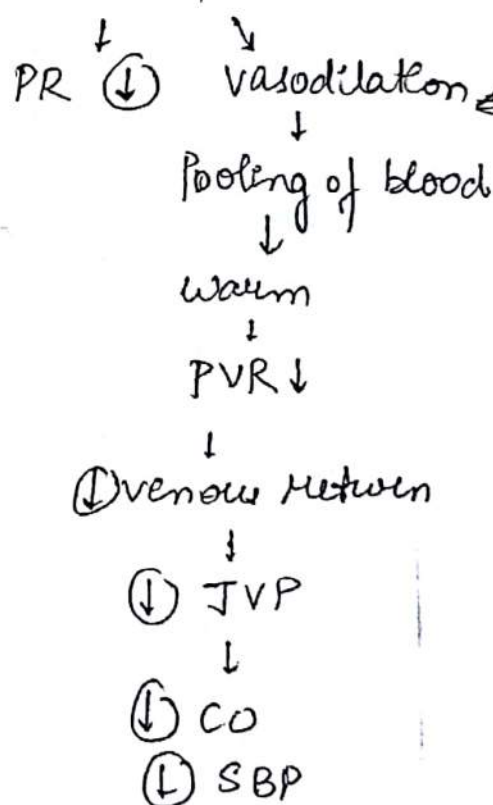
#	Hypovolemic	Cardiogenic	Neurogenic [spinal cord Transection]
PP	↑	↑/↓	↓
CO	↓	↓	↓
SBP	↓	↓	↓
PVR	↑	↑	↓
JVP	↓	↑	↓

Cardiogenic



Neurogenic

Sympathetic system inhibited



Anaphylactic
shock.



eg Mismatch B.T.

Anaphylaxis

Histamine

→ Vasodilation.

Sympathetic
system
intact

↓
PR ↑

Septic Shock

Warm



Cold⁴¹



Hyperdynamic
circulation

PR ↑
CO ↑

In late phases of
sepsis, bacterial
toxins suppress
the myocardium.

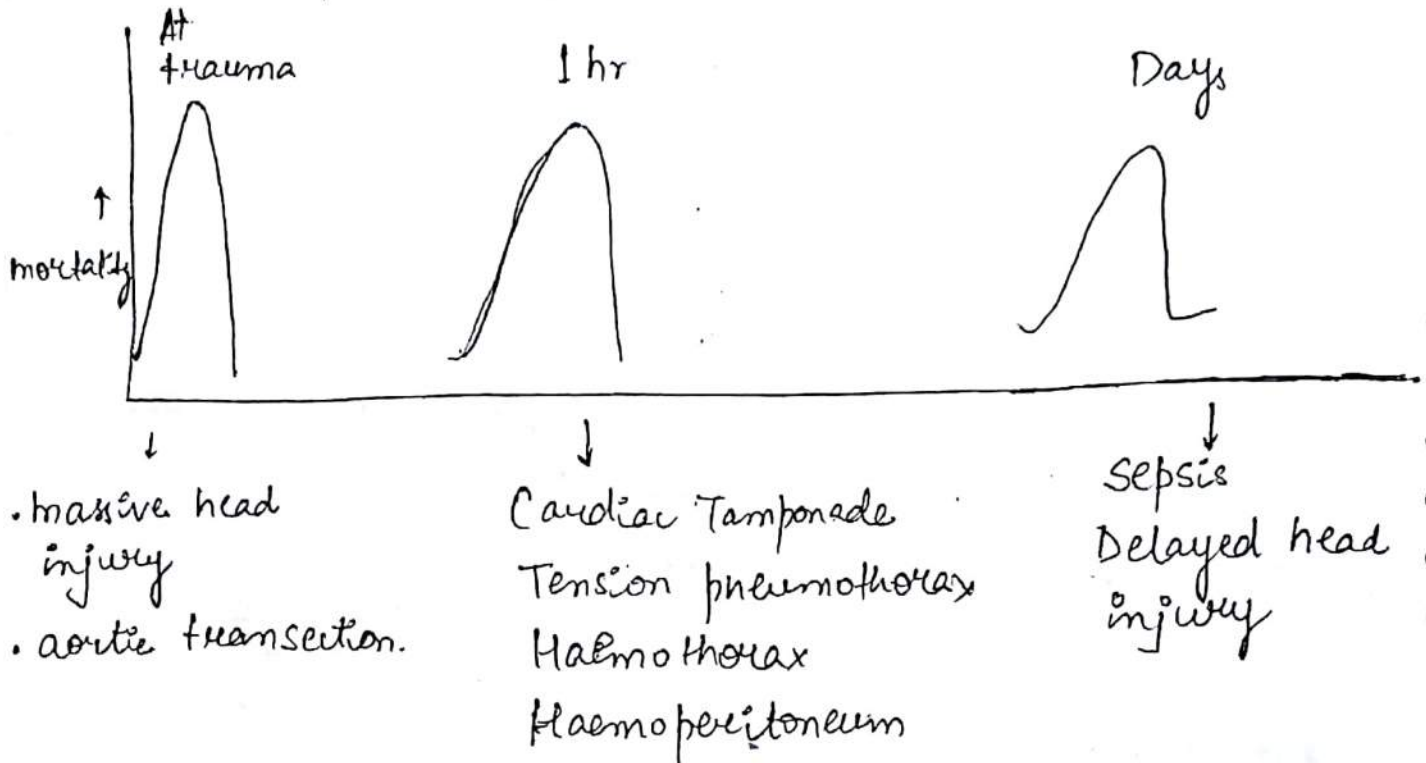
↓
Cardiotoxic

↓
(same as cardiogenic)

TRAUMA

42

3 spikes of mortality



TRIAGE

Done in case of mass casualty event

Red → Req. immediate intervention

- Active bleeding vessel
- Tension pneumothorax
- Cardiac tamponade
- Haemothorax
- Haemoperitoneum.

Yellow — Req. admission & stabilisation.
But intervention can be done latter.

eg. # shaft of femur

Green → walking wounded pts.
minor laceration.
First aid + medicines

43

Black → Dead Bodies or Moribound

ATLS

In Trauma

ABCD

BLS/ACLS

In Cardiac Pts.

CAB

ATLS

1° Survey

ABCD +

Life threatening injuries

↳ Cardiac Tamponade

Pneumothorax

Haemo thorax

↳ peritonium.

2° Survey

Detailed survey
(look for all other injuries)

Back

LOG ROLL

Q. 5 people Required for
effective log roll

AIRWAY

Cervical spine $\xrightarrow{F/B}$ airway

*Danger Sign s/o Cervical spine injury

① Comatose

② Head injury

③ Restricted neck movement

④ Bruising over C-spine.

Whenever in doubt → Put cervical collar

* Indications to achieve airway :-

quickest way to assess airway → ask the name

44

↓
If speaks ⇒ airway fine

1) Comatose pt.

2) GCS ≤ 8

3) Unable to speak

4) Sev. maxillo-facial trauma

5)

Orotracheal
Int

Common

But in pt. w/ sev maxillo
facial injury, 1 attempt of
Orotracheal Int fail. do
not attempt again

nasotracheal

C/I in ant. skull base

(cribriform plate)

& avoided in maxillo-
facial injuries.

sev. maxillo-facial injury

Emergency

needle cricothyroidotomy

{ infiltrate local anaesthesia
stab cricothyroid memb.
w/ 11 no. needle
Put tube

Definitive

↓
Tracheostomy

- 4-6mm tube

- 20 mins [as CO₂ starts
accumulating]

avoided in children < 12 yrs
becoz it can lead to subglottic stenosis

BREATHING

45

- Put pt on Ventilation.
- Identify → Tension pneumothorax
cardiac tamponade

CIRCULATION

② Large Bore IV line → 18 gauge.

In Trauma.

↓
IV crystalloid [NS preferred in Trauma]

Unable to insert IV line

Emergency

↓
Venous
cut
down

↓
great saphenous
vein.
(just ant. to med'el
malleolus)

↓
Intraosseous
infusion

↓
Pierce tibia
just below tibial
tuberosity

↓
(fluids
drugs)

↓
easier children < 6yrs
Latest → any ^{age} group.

Defensive

↓
central line

H/c → IJV

DISABILITY

46

Pupillary Response

GCS

Min - 3,
Max - 15

Dead Body - 3

Eye opening

Verbal Response

Motor response

E_4 → spontaneous eye opening

E_3 → on verbal command

E_2 → painful stimulus

[sternum or supra-orbital ridge]

E_1 - no eye opening

V_5 - normal speech

V_4 - confused

V_3 - inappropriate words

V_2 - incomprehensible sounds

V_1 - no speech.

V_T - $\bar{c}$ tube.

(1T)

M_6 - (N)

M_5 - localises pain

M_4 - $\bar{c}$ draws away from pain

M_3 - ab (N) flexion

(decorticate rigidity)

M_2 - Ab (N)

extension

(decerebrate)

M_1 - NO

20yr old M, RTA, Intubated @ site the accident 2hrs later brought to emergency.

Spontaneously opening & closing eyes.

Moving all his limbs.

Max. → 11T $[E_4 + M_6 + 1T]$.

* Same pt in emergency

(L) Hand localizes pain ←

(R) " ab (D) flexion

Motor Score? → (5) → Highest motor response is noted

47

Mild - 13-15

Mod. - 9-12

Severe - < 8

4/2/18

ABDOMINAL TRAUMA

- 1) M/c organ injured in Blunt abdominal Trauma
= Spleen
- 2) M/c organ injured in penetrating " = LIVER > SI
- 3) " " " Gun shot wound = SI

SEAT BELT SYNDROME -

Abdominal organs get compressed between vertebral column & seat belt

M/c organ injured = MESENTRY

DECELERATION Injury.

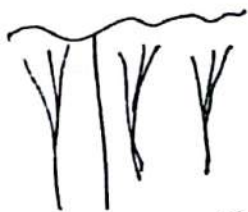
Mobile contents move forward, retroperitoneal organs stay there

↓
Jear @ Junction ⇒ DJ flexure.

>
Ileocecal Juncⁿ

BOWEL INJURIES

48



Longitudinal Injury Tear/Haem

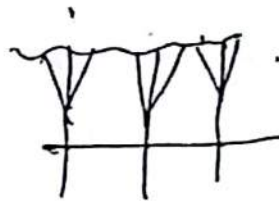
1 vessel gets injured
but adjacent vessel also
supplies the area.



Hence, no loss of vascularity



Rx - only repair the tear



Transverse Injury Tear /
Haematoma

vascularised in lobe

Rx - resection +
anastomosis

BLUNT ABDOMINAL TRAUMA

Haemodynamically
Stable

Flut Inv

FAST

Ioc

CECT

Haemodynamically
unstable

FAST

FAST - focused assessment sonogram in Trauma

Advantage → Saves time

2-4 min is required.

Probe - (4)

① epigastrium

for cardiac tamponade

②

Hypo
Chondrium

③

Hypo
Chondrium

Suprapubic
region

eFAST → Extended FAST

Probe - 4 + ②

49

↓
pleural cavity

BOAST (Beside organ assessment Sonogram in Trauma)
same as eFAST.

FAST

↓
any collecⁿ on FAST. (FAST ⊕)

↓
Laparotomy [midline incision in Trauma]

PENETRATING ABDOMINAL TRAUMA

~~If wound is superficial to peritoneum.~~

← wound - superficial
to peritoneum

no peritonitis.

PT is stable

↓

Locally explore the wound
& suture it

→ If peritoneal breach ⊕

• peritonitis

• Bile draining or dressing

• omentum hanging out of
wound

• Gunshot wound & Breach

↓

Laparotomy.

SPLEEN

50

Splenic artery. → Br. of Coeliac Trunk

on C ligament pedicle of spleen lies ⇒ Lienorenal

C vessels are +nt in Gastro-splenic ligament ⇒ short gastric vessels

SPLENICULI - accessory splenic tissue

M/c site → Hilum of spleen

Importance →

If this spleniculi is left behind when we are doing splenectomy for haematological condⁿ

↓
It gives rise to neurosis.

M/c Benign Tumour → Haemangioma

M/c Malignant Tumour → Lymphoma

M/c True cyst → Hydatid Cyst

M/c Cystic lesion → Pseudocyst
(C can occur after injury)

Min Platelet Count required for Sx in a N pt
1 lakh

Min " " " " " in a pt. of ITP
50,000

SPLenic TRAUMA

51

Suspect Splenic Injury

9-11th Ribs #
on (L) side

Bruising over
(L) lower chest

KEHR sign ⊕
(seen in splenic rupture)

If we have (L) LL of pt.
all the blood will
accumulate below the
(L) Dome of diaphragm
↓

Pt will have (L) shoulder
tip pain.

GRADES OF SPLenic INJURY

(I) → Non expanding subcapsular
Haematoma (10%)

↳ Laceration < 1cm in Depth

(II) - Non-expanding subcapsular haematoma (10-50%)
Laceration 1-3cm in Depth

(III) - Expanding haematoma & > 50%
Laceration > 3cm in Depth

(IV) Injury Splenic Pedicle

(V) Shattered spleen

Rx Depends on Grade

52

I → Haemodynamic Stable → IOC → CECT. → Conservative
II

Serial CECT

(12-24 hr)

Monitor vitals

If Grade of Inj ↑ on CECT

↓
Angiographic embolisation.

- ① If it fails or
- ② pt. becomes unstable or
- ③ Contract blush on CECT



Indications for Sx
Splenorrhaphy or splenic preservation

III — If stable → by Grade I+II
 └ If unstable → by Grade III+IV

IV] unstable
 ↓
 V] IOC - FAST
 ↓
 Sx
 Splenectomy

COMPLICATIONS FOLLOWING SPLENECTOMY :-
 M/C 1) Atelectasis or ② lower lung complications

2) Haemorrhage

3) Pancreatic Fistula

[pancreatic tail is associated w hilum of spleen]

4) Haematological changes

Transient

upto 2 weeks

↑ WBC → can be confused
 w infection

↑ RBC

↑ platelets

↳ if > 10 lakh

Indication for
 starting pt. on prophylactic
 aspirin.

Permanent

• Howell Jolly Bodies

• Basophilic stippling

• Reticulocytosis

• Hypersegmented Neutrophils

OPSI (Opportunistic Post Splenectomy ph.)

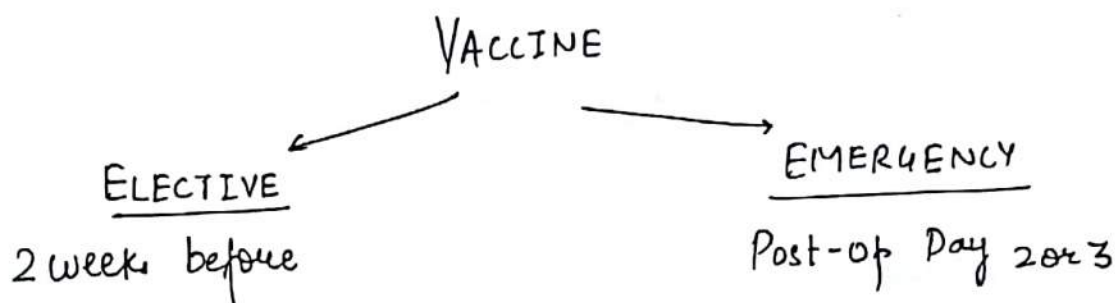
↳ causative → M/C Pneumococci

H. influenzae

Meningococci

children > adults

- Usually occurs in 1st 2 yrs after splenectomy
- More common when indication is haematological⁵⁴
Condⁿ > Trauma
- ↑ mortality Rate
- Can be prevented by Vaccine.

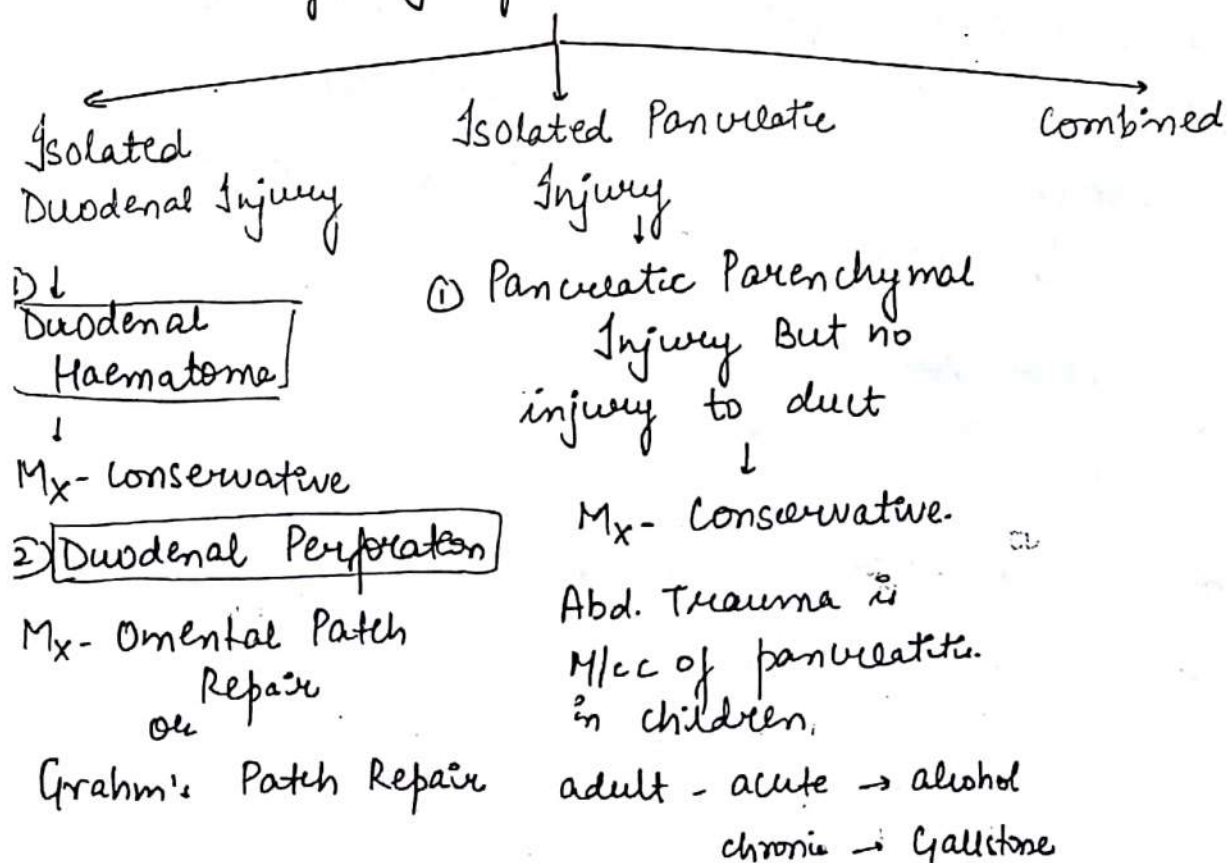


↑ Ab titres achieved ↑ before Sx.

PANCREATICO-DUODENAL TRAUMA

Rate

Penetrating Injury > Blunt



② Inj. to H & N of Pancreas, &
Duct Disruption

55

↓
BEGGER

Duodenal preserving pancreatic
head resection.

③ Injury to distal pancreas & duct
disruption

↓
Mx - Distal Pancreatectomy.

Combined Pancreatic - Duodenal Injury
Injury to H & N of Pancreas + Duct + Duodenum

↓
Mx - Whipple [Pancreaticoduodenectomy].

BOWEL / COLONIC INJURY

SI injury

↓
If pt. presents early
↓ contamination
Stable

↓
Resection + anastomosis

↓
Late
↑ contamination
Unstable

↓
Ileostomy

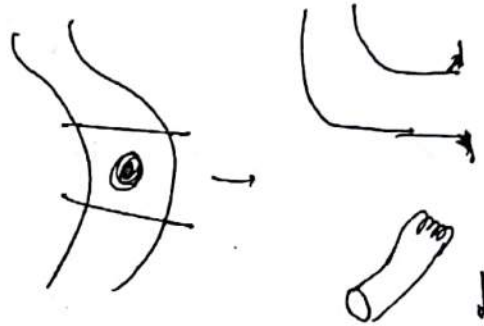
Colonic Injury

56

Sigmoid colon.

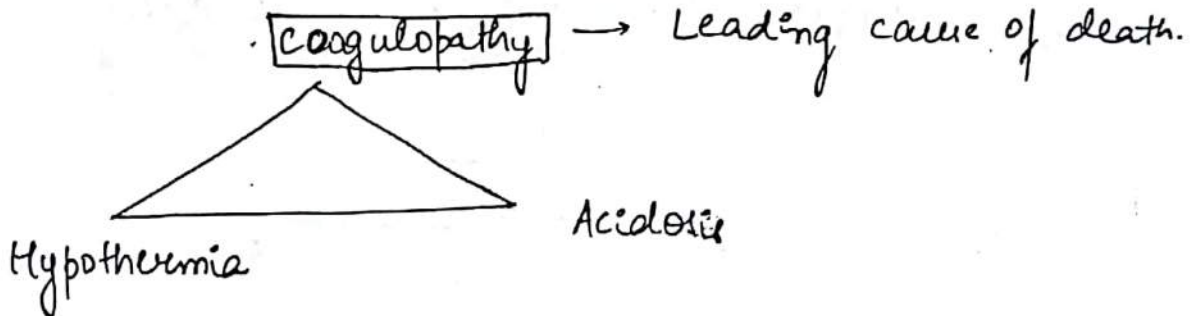
If pt. +nhs early
↓ contamination
stable
↓
Resection anastomosis

late presentation
↑ contamination
Unstable
↓
HARTMANN'S procedure



once pt. stable
anastomose after 6-8 wks.

DAMAGE CONTROL Sx / ABBREVIATED LAPROTOMY



A trauma pt. suffering from the triad

⇒ Damage control s.

Phase I

Emergency
Laprotomy
(1M)
① stop bleeding
② prevent contamination.

Phase II

ICU care.
Temporary closure
by Bogota bag
↓
(1M) - correct the Triad.

Phase III

Re-exploration.
(1M) - correct anatomy.

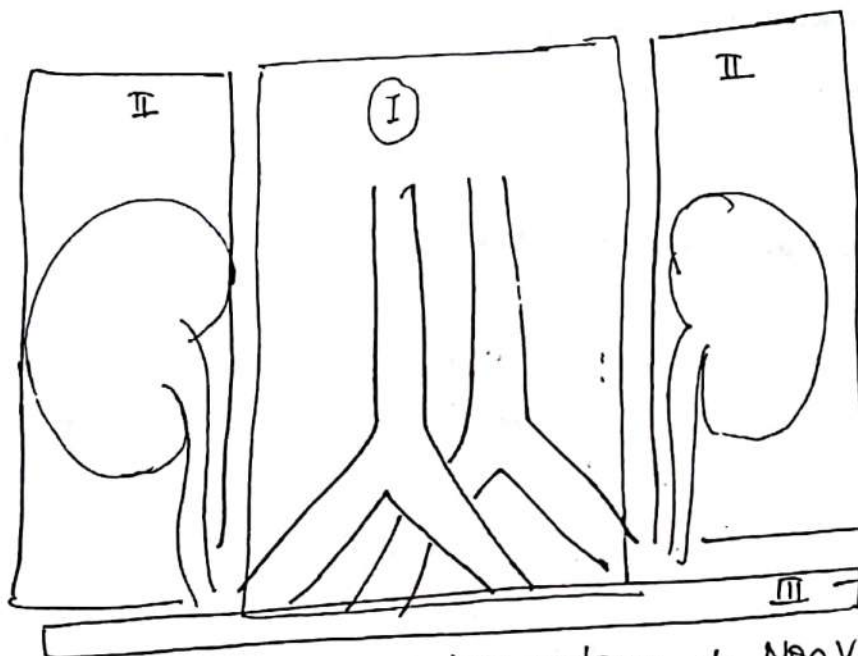
RETROPERITONEAL TRAUMA

57

Zone I → Includes Major Blood vessels
associated $\bar{c}$ maximum mortality
all Stab injuries to zone I require exploration.

Zone II → Includes Kidney & ureters.
Ioc - single shot IVU

FAST not useful in
retroperitoneal
injuries



If there is expanding haematoma + Non visualization of kidney
↓

Suspect Renal vessel Injury

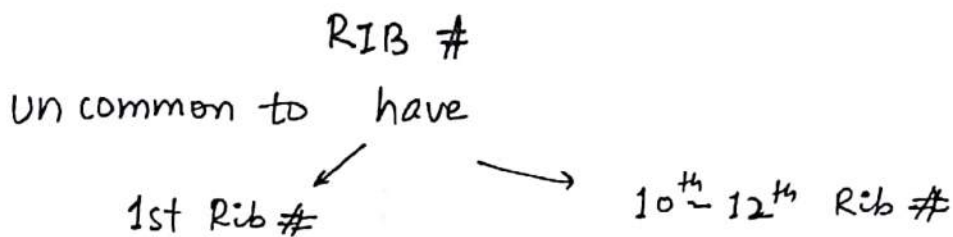
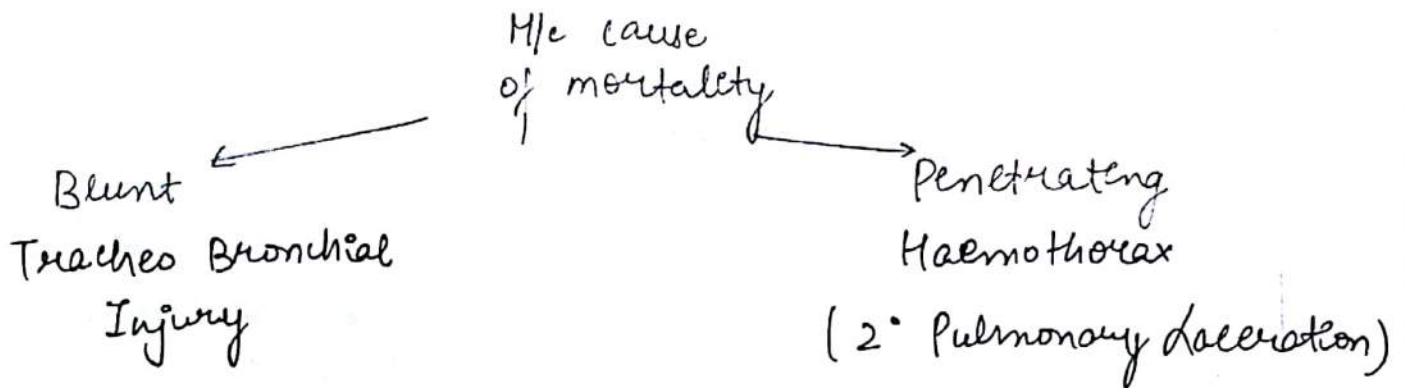
↓
Do angiography then explore haematoma

Zone III - M/cly injured zone
Majority can be managed conservatively

↳ pelvis
Bladder
Bone

THORACIC TRAUMA

58



This requires high velocity impact

Suspect injury of

- 1) subclavian v/s

- 2) Brachial plexus

- 3) Apex of lung

(R) Liver

(L) Spleen

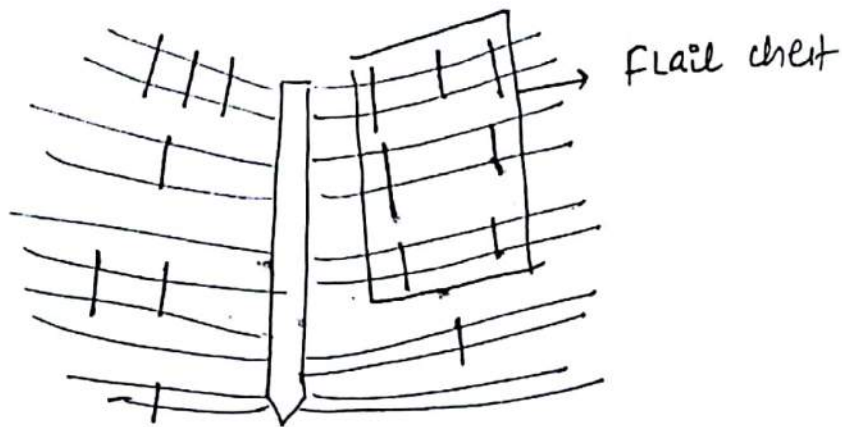
Simple Rib # - Mx adequate analgesia

M/c Ribs # while doing CPR - 4th - 6th.

FLAIL & CHEST

- # of ≥ 2 contiguous ribs at ≥ 2 places.
- 1st Segment breaks & hit lung $\Rightarrow$ Underlying Pulmonary Contusion.
- Some pts have Paradoxical chest wall movement

multiple
Rib #



59

Leading cause of death → underlying Pulmonary Contusion
Not the paradoxical movement

Mx -

1) Adequate analgesia [Thoracic Epidural]

2) Despite - $PO_2 < 60 \text{ mmHg}$
 $RR > 20 / \text{min.}$

↓
IPPV

↓
Despite - $PO_2 < 60$
 $RR > 20 / \text{min.}$

↓
Surgical fixation.

TENSION PNEUMOTHORAX

↳ Leads to rapid haemodynamic compromise

Can occur in 3 situations

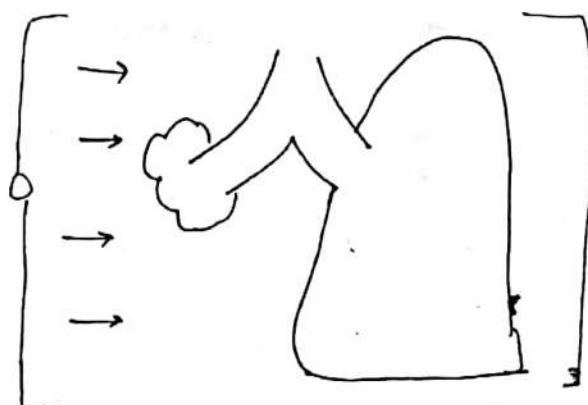
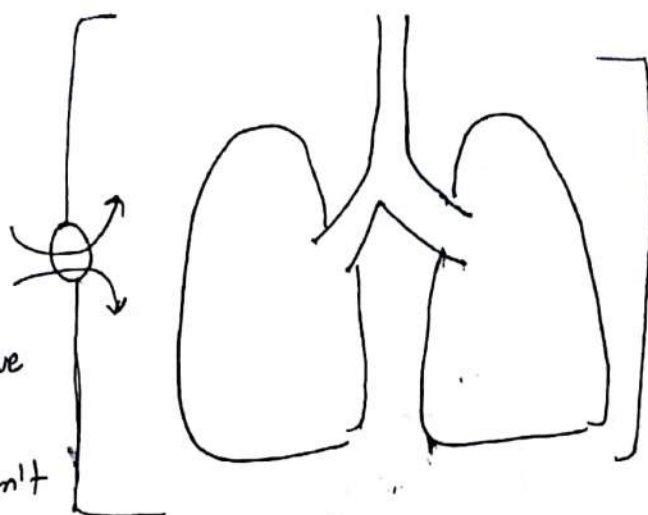
1) Sucking wound in chest wall

2) Tracheo bronchial Injury

3) Pulmonary Laceration & air leak.

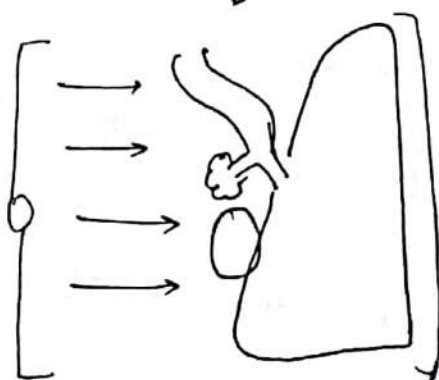
IPPV is being given & out chest tube

1 way valve
air just can
enter but can't
escape



collapsed
lung

Hyperinflated
lung



shifting of mediastinum

- C/F →
- 1) RR ↑
 - 2) CO ↓
 - 3) SBP ↓
 - 4) JVP ↑
 - 5) PR ↑
 - 6)

some features are seen in
cardiac tamponade.

Percussion

Hyper-resonant +
Breath sound ⊖

Tension Pneumothorax

FAST is also useful to differentiate

61

M_x

Emergency

Definitive

Needle thoracocentesis

Tube thoracocentesis

Wide bore I/V line in 2nd
IC space in mid clavicular
line

ICT in Δ of safety.
we cover sucking wound
w/ gauze & tape it on 3
sides.

↓
air can come out but
can't enter.

[flow is reversed by putting]
tape of 3 sides

SIMPLE PNEUMOTHORAX

Do not cause haemodynamic compromise

M_x - Put in chest tube directly

If pneumothorax is involving $\frac{1}{3}$ rd of thoracic
cavity

HAEMOTHORAX

Accumulation of Blood in pleural space

Dull percussion note & absent Breath sound

eFAST is helpful modality

M_x - ICT insertion in Δ of safety

H/c site of aortic rupture in thoracic Trauma
↳ attachment of ligamentum
arteriosum.

INDICATION OF THORACOTOMY IN HAEMOTHORAX

62

- 1) $>1L$ of blood loss at the time of insertion of ICT
- 2) >200 cc/HR for 3 consecutive hrs
- 3) unstable pt.

ICT

Δ of safety

Ant $\rightarrow$ ant axillary fold (P. Major)

Post $\rightarrow$ post " " (Lattremu Doru)

APEX $\rightarrow$ axilla

Base $\rightarrow$ 5th ICS

- Chest tube is inserted along the upper border of lower rib. due to tube of neurovascular plane of lower border

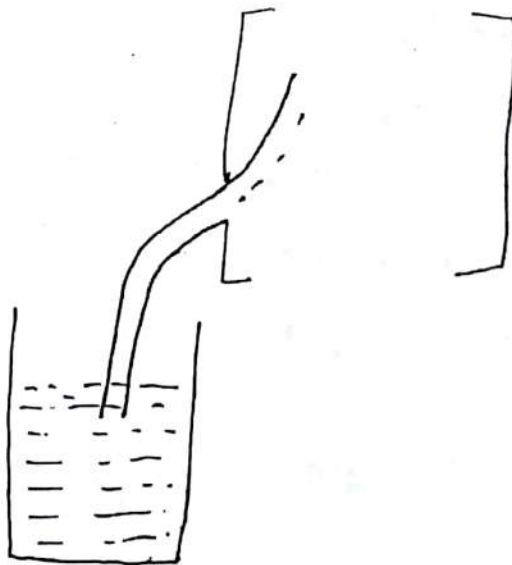
- Chest tube is connected to under water seal

- Right Position

Water level rises & falls
to each breath.

$\downarrow$
correct
position.

1-0 silk cutting needle.



Correctly placed tube

When all the holes/eyes of tube lies inside thoracic cavity [x-Ray]

When column stops moving

63

Block tube

Displaced tube

Excessive bubbling in column $\Rightarrow$ formation of Bronchopleural fistula.

Chest tube is removed when pt. is holding breath at ~~the~~ Peak of inspiration.

Q. Pt undergoes thoracotomy

ICT is inserted after S_x

Serosanguinous fluid. is coming out

When to remove $\rightarrow$ when output is $< 50-75\text{cc}/24\text{hours}$
* if the lung is expanded

CARDIAC TAMPONADE

- Occurs 2° to penetrating injury

$\geq 50\text{cc}$ blood $\rightarrow$ Cardiac tamponade.

Rapid accumulation of blood

$\downarrow$
Puts pressure of heart

$\downarrow$
Heart can't relax

$\downarrow$
Diastole is not proper

$\downarrow$
 $\downarrow\text{SV} \rightarrow \downarrow\text{CO} \rightarrow \text{HR} \uparrow + \text{SV} \downarrow$

BECK'S TRIAD - ① Hypotension

② $\uparrow$ JVP

③ Muffled Heart Sounds.

Dx $\rightarrow$ By FAST.

Mx

64

Emergency

Definitive

Needle Pericardiocentesis

Thoracotomy

Create Pericardial Window

Needle in subxyphoid area

45° to skin directed toward

Ⓛ shoulder tip.

Done under ECG + Echo-control

Loss of resistance $\Rightarrow$ Pericardial space

aspirate blood.

M/c Compⁿ - arrhythmia

STERNAL

Uncommon

Requires High Velocity impact

If occurs $\rightarrow$ gives rise to cardiac contusion

Monitor by ^{serial} 12 Lead ECG + Cardiac enzymes

DIAPHRAGMATIC INJURY

- Occurs 2° to blunt abdominal Trauma

- L > R [protected by liver]

- Delayed Presentation

Breathlessness

O/E - Bowel sounds (+) in thoracic cavity.

Dx - X-Ray

If u put Nyle's tube $\rightarrow$ end of nyle's tube will be in thorax

M_y - S_x

65

By abdominal route

By thoracic route

Involves reducing contents & repairing diaphragm
w/ polyene mesh.

NECK TRAUMA

3 ZONES

Zone I - Thoracic inlet to upper border of cricoid

Zone II - Cricoid to C of angle mandible

Zone III - C of mandible to base of skull

I → Trachea + Major Vessels + Oesophagus
associated w/ Max. mortality.

II → Most exposed zone
Most highly injured zone.
Most surgically accessible

III → Carotid vessels (+)

Zone II Penetrating Injury

Majority
superficial
stable

↓
Local exploration &
suturing

10-15%

Deep to platysma
unstable

↓
Formal neck exploration

* All gunshot wound to neck require formal neck exploration

HEAD TRAUMA

66

Layers

S - Skin

C - connective tissue → fibrous tissue septae.
Blood vessels are adhered to this

A - aponeurosis

L - Loose areolar tissue [Black eye
[emissory vein]]

P - Periosteum.

- Scalp laceration bleed profusely as they can't
vasoconstrict due to adherence

- Control Bleeding - ① Pressure
② Evert the edges

- Cutting needle / ~~1-0~~ 1-0 / 2-0 - silk nylon.
mattress suture

- If there is bleeding below aponeurosis → Black eye

- Emissory vein carries retrograde infect & lead
to cavernous sinus infection

Skull #

Non-Depressed

Nothing to be done

Depressed

Treat like open #

Surgical elevation is required
if focal neurological signs
are present.

Skull Base

67

① Ant skull # cribriform plate

c/f - ① CSF rhinorrhoea

② Epistaxis

β_2 -transferrin (+) in CSF

③ Black eyes / RACCOON EYES



Black eyes are associated with subconjunctival haemorrhage
If we cannot reach the posterosup. limit of "

↓
Subconj due to ant skull #

④ Anosmia

⑤ Frontal Lobe contusions

② Middle Cranial fossa #

petrous part of temporal Bone

c/f

① CSF otorrhoea

② Haemotympanum

③ BATTLE SIGN - discoloration over mastoid process
seen 24-48 hrs after middle cranial
fossa #.

④ 7th N/v injury

⑤ Temporal lobe contusions

⑥ Paradoxical rhinorrhoea

↳ collect in ME cavity through ET &
causes rhinorrhoea.

Post. Cranial Foramen #
Occipital Bone

68

CF ① Visual disturbance

② 6th N/V Injury

③ Occipital contusions

④ VERNET Sx → Jugular Foramen Sx
① (9th, 10th, 11th C.N.)

② Basilar or vertebral artery rupture

NICE Guidelines

(National Institute of Clinical Excellence)

1) Cervical spine injury should be suspected in all pts. w head injury

2) GCS

1st ~~for~~ 2 hrs → every 30 mins.

Next 4 hrs → every hour

After 6 hrs → every 2 hours

3) Indications for involving neuro Sx

a) GCS ≤ 8

b) Fall in GCS after admission

c) Unexplained confusion > 4 hrs

d) focal neurological signs

e) seizures

f) 1 episode of vomiting

g) Loss of consciousness

h) ENT bleeding

i) Penetrating CNS injury

4) Indications to do NCCT Head.

- ↳ ① Brain Head injury 69
② Salivary gland stone
③ Renal stone

a) GCS < 13

b) If GCS fails to reach 15 min in 2 hours of admission.

Others are common.

BRAIN INJURY

1° BRAIN
INJURY

2° BRAIN
INJURY

due to Impact

due to TICT

Mildest → concussion.
type No intervention
Required.

Severe → Diffuse axonal Injury

↓
shearing force betⁿ Grey
matter & white matter

Pt is comatose

NCCT is (N)

IOC → MRI

↓

Punctate Haemorrhages
at the Grey & white matter
Juncⁿ.

Worst Prognosis amongst
head injuries

INTRACRANIAL H'GE

- 1) Contusion [Intraparenchymal] → No ^{Sx} intervention ⁷⁰ required
- 2) EDH
- 3) SDH
- 4) SAH.

M/c Traumatic Intracranial bleed → Contusion

M/c Intracranial Bleed → SAH

Traumatic SAH → rarely requires Sx. intervention.

Spontaneous SAH → require Sx

EDH

arterial

Middle Meningeal artery

young pt

High velocity impact

G/F - Lucid Interval - Period of (N) consciousness between 2 episodes of unconsciousness.

↓
Common in EDH but not exclusive to EDH.

IOC → NCCT → Biconvex H'ge.

[Betⁿ Periosteum & dura]



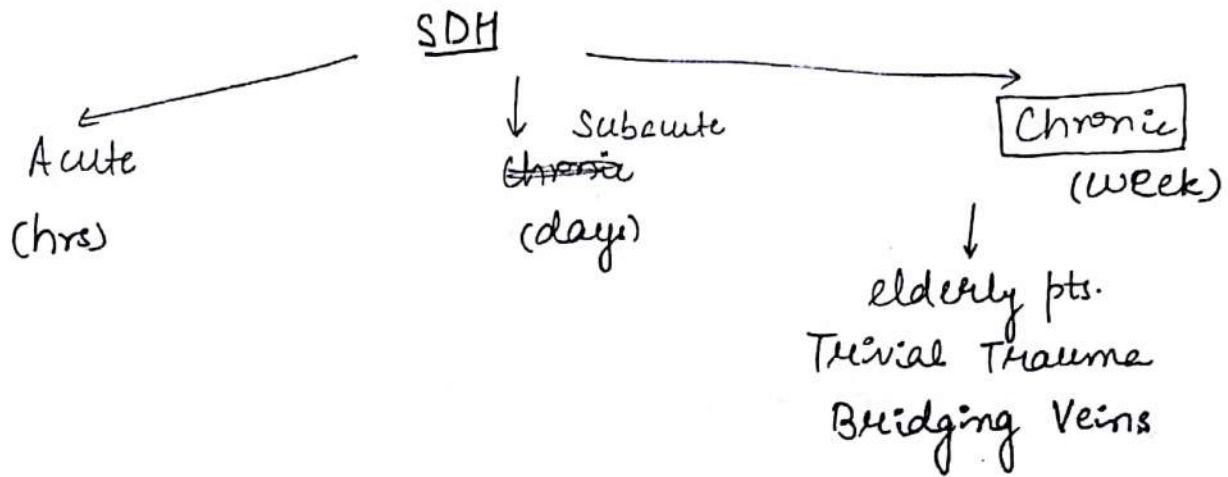
Mx - **BURR HOLE**

close to **Pterion** → H-shaped area where frontal, temporal, parietal sutures meet

↓
in temporal region.

Burr hole is made on side of pupillary dilatation⁷¹
if CT is not available

If Burr hole not sufficient $\rightarrow$ craniotomy done to
evacuate H₂O



Fall $\xrightarrow{\text{weeks}}$ gradual decline in mental
sensorium.

IOC - NCCT $\rightarrow$ Concavoconvex H₂O / crescentic.
Betⁿ Dura & Arachnoid.

There can be midline shift present as well

M_x - creation of Burr-Hole

If not sufficient $\rightarrow$ Craniotomy

2° BRAIN INJURY

$\uparrow$ ICT

$$CPP = MAP - ICP$$

Ideal CPP $\rightarrow$ 60-70 mm Hg.

In Head Injury ICT $\uparrow$

So, to maintain CPP $\rightarrow$ MAP should be $\uparrow$

MAP $\uparrow \rightarrow$ SBP $\uparrow \rightarrow$ CO $\uparrow \rightarrow$ HR $\times$ SV



Hence $HR \uparrow$ will lead to CO after some extent

So, SV need to $\uparrow$ $\rightarrow$ EDV $\uparrow$

$\downarrow$
 $\uparrow$ Diastolic Interval
HR $\downarrow$

Cushing's Reflex $\rightarrow$ Bradycardia
 HTN
 altered Respiration

$\downarrow$
 Variant of Cushing's Reflex $\Rightarrow$ Hypotension is found instead of HTN.

Cushing's ulcer $\rightarrow$ Stress ulcer seen in Head injury pts.

M/c site $\rightarrow$ Acid Producing area of Stomach.

Curling's ulcer are Stress ulcer seen in burn pts.

M/c site $\rightarrow$ 1st part of Duodenum.

How to $\downarrow$ raised ICP in Head Injury

- ① Nurse pt. in 30° head up position
- ② Maintain perfusion.
- ③ " O_2
- ④ avoid dextrose containing fluids.
 $\hookrightarrow$ hypotonic $\Rightarrow$ worsen cerebral edema.

⑤ Mannitol (IV)

⑥ Hyperventilation

⑦ STERIODS → No role in raised ICP
due to trauma

But Doc in Vasogenic Cerebral Edema

(15 Days)

① Notes x 4.

1st reading → 3 days.

② CRs questions

③ Last 5 yr questions

④ Images

⑤ Schwartz Absite Review.

BURNS

Refer → Burns unit

1) any 3° or 4° Burn

2) Burns involving face, genitalia, palm, sole

3) airway burns

4) any burn pt. requiring IV fluid

5) chemical & electrical Burn

Mx - ABCDE: exposure. → Cause of Burn
% of Burns.

AIRWAY

74

Danger Signs →

- 1) Carbonaceous deposits on sputum
- 2) Singed / Burned nasal hairs
- 3) Burn in closed room
- 4) Burns involving neck or face
- 5) Hoarseness of voice.

↓

Indication for Intubation.

BREATHING

If Breathing is compromised → ventilator

CIRCULATION

Burnt areas

↓

release cytokines

[locally / systemic]

Vasodilation

↑ evaporation

vessels become

leaky [upto 24 hrs after Burn]

↓
albumins leak to Extra
vascular space

↓
more fluid into EVs

↓
3rd space loss. seen
in BURNS

Dehydration.

Fluid of choice → (RL)

Do not

use colloid

for resuscitation in 1st 24 hrs.
in BURN pt.

If child $> 10\%$ BSA
adult $> 15\%$ BSA $\rightarrow$ circulatory shock.

75

PARKLAND FORMULA

$$= 4 \times BW(\text{in kg}) \times TBSA \text{ Burnt}$$

↓
Amount of fluid in mL Required in 24hr
of Burns.

① 1st & ~~2nd~~ Degree Burns are excluded from the calculation.

② Max. value we use in this formula is 50%.
↓
otherwise fluid overload.

③ Time starts when the pt gets Burnt not when he comes to the hospital.

Total Amount

$\frac{1}{2}$
↓
1st 8hrs

$2 \times BW \times TBSA$

$\frac{1}{2}$
↓
next 16hrs

$2 \times BW \times TBSA$

Best Indicator of fluid-resuscitation $\rightarrow$ UO.

In adults.
child

UO $> 0.5-1 \text{ mL/kg/hr}$
UO $> 1-1.5 \text{ mL/kg/hr}$ in BURNS *

* Calculation of BSA Burnt

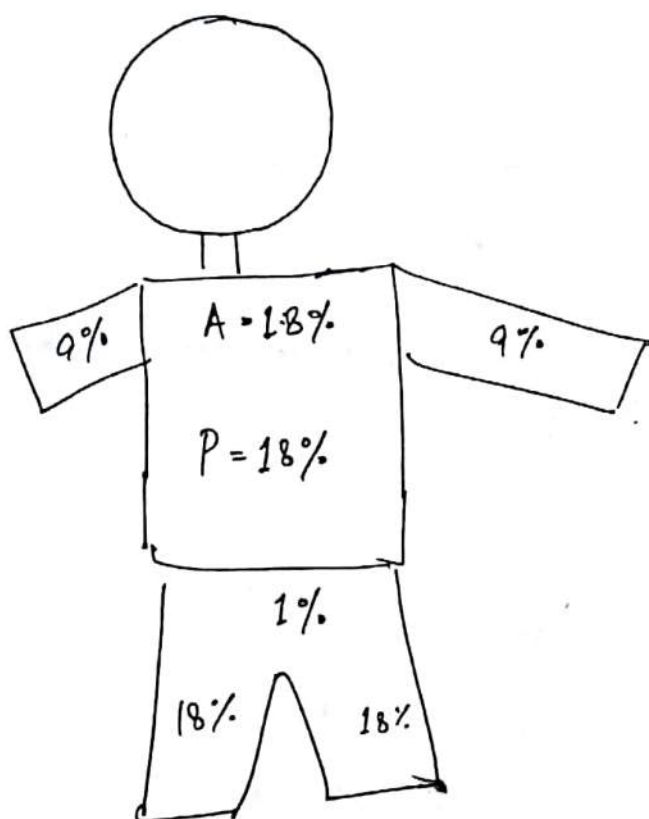
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① PALM - 1%

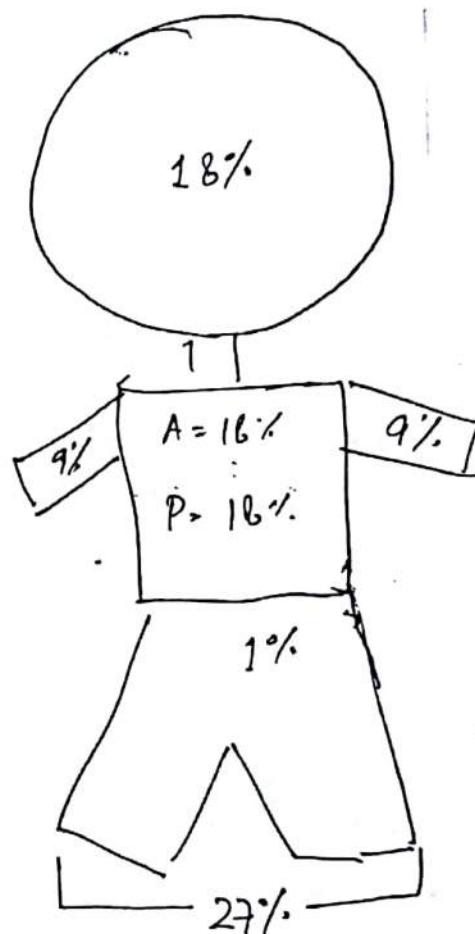
This method is simple but crude method to calculate patchy Burns.

② Wallace Rule of 9

ADULTS



CHILDREN



③ LUND • BROWDER CHART

↳ Best Method.

even for children → Best

ZONES

77

① zone of Coagulation

Max. Injured zone

Irreversible damage to this area.

② zone of Stasis

Injured or Necrosed Tissue

if properly managed → can be recovered

if it becomes infected → it can proceed to zone of coagulation

③ zone of hyperemia

Beoz of vasodilation

This zone usually recovers

DEGREE OF BURN

1st D → involve Epidermis

Burnt area red + tender

Complete Blanching occurs on pressure

Healed w/out scarring in 3-5 days.

2nd D →

Superficial

involves epidermis +
Papillary dermis

① Red

② Tender

③ Blanching

BLISTER FORMATION

forms in hours (1-2)

SCALD

Deep

E + entire Dermis

[Papillary + Reticular]

① Red

② ↓ Tender

③ some areas of fixed capillary staining

~~2nd~~ 2° Burns heal by Hypertrophic Scar & Keloid Formation.

78

Mx → ① Dressing using special materials.

M/c used → Silver Sulphadiazene

↳ good action against Pseudomonas.
But doesn't penetrate Eschar.

2) Silver Nitrate

frequent applications are required
stains everything Black.

3) Mafenide Acetate

can penetrate eschar

application is painful

in some pts, can ↓ metabolic acidosis.

4) Best Agent → Cerium Nitrate

↓
Immunomodulatory action
can penetrate eschar
expensive

3° & 4° Degree Burns

↓
S/c tissue

↳ M/s

Burnt area - Black

Charred

No Blanching

Painless → Bcoz n/rs get burned.

Mx - Early excision followed by split thickness ^{skin} grafting

M/cc of Death in Burn

1) Immediate

→ Asphyxia

2) Early (1-4 days)

→ Hypovolemic shock

3) Late (>4-5 days)

→ Septic shock

4) OVERALL

→ Septic shock

79

M/c organism $\subseteq$ infects Burn pt $\rightarrow$ Pseudomonas.

Circumferential Burn

Circumferential eschar

↓
fibrotic

↓
COMPARTMENT SYNDROME.

Mx - escharotomy $\leftrightarrow$ fasciotomy
[upto Deep fascia]

Electrical Burns - AC output

High Degree Burns

Burns due to AC $\rightarrow$ induce ~~Tetany~~ Tetany

↓
Difficult for pt. to leave the source

↓
Give Mx to

1) arrhythmic $\rightarrow$ leading cause of death.

• Look for entry & exit Burns.

Chemical Burns

Either Brush off compound or wash the area w/ water
never try to neutralise chemical burn.
 $\hookrightarrow$ exothermic rxn $\rightarrow$ worsen Burn

VASCULAR SURGERY

80

Virchow HES triad.

DVT
occurs 2° Virchow's Triad

- Stasis
- Hypercoagulable state
- endothelial injury

R/F

- ① Prolong immobilisation
- ② Previous H/O DVT
- ③ Trauma
- ④ any Sx lasting for >1HR esp → LL
Pelvic
Gynaec
Urological
- ⑤ ♀
- ⑥ Malignancy
- ⑦ Protein C + S deficiency
- ⑧ May THURNER SYNDROME - Iliac artery crosses over iliac vein
↓
Leads to iliac vein thrombosis

Phlegmasia Cerulea Dolens - Painful Blue limb.
All major axial veins of L thrombosed
but collaterals are spared

Phlegmasia Alba Dolens :-

Painful white limb
If all major axial veins + collaterals involved

Usually seen during ♂.

C/F -

- 1) M/c feature - Limb edema
- 2) earliest - Pain

3) Signs →

HOMANS

If Dorsiflexion of foot
↓
Pain

Only theoretical

→ MOSES (mausi k paon dbao)

Squeezing of calf
↓
Pain.

IOC - Colour Doppler or Duplex Scan. ^{acute - anechoic} ^{chronic - echogenic}

M/c veins affected by DVT → Calf or Sural veins.

M/c veins from DVT can give rise to Pulmonary embolism → Iliofemoral veins.

Mx -

① Anticoagulation.

1st 5 days → Heparin + Warfarin

After 5 days → Warfarin

1st episode of DVT → 3 months. Warfarin

Recurrent DVT → Lifelong Warfarin.

(INR) → $\frac{PT_{pt}}{PT_{control}}$ → Target INR - 2-3 for DVT
[for Mech. Heart valve 2.5-3.5]

Max. possible INR at which Sx can be done without Risk of excessive Bleeding → (1.4)

(INR) → 1-2 . if INR > 1.4 ⇒ Risk of excessive Bleeding
↓
give FFP before Sx.

Indications of IVC filter in DVT

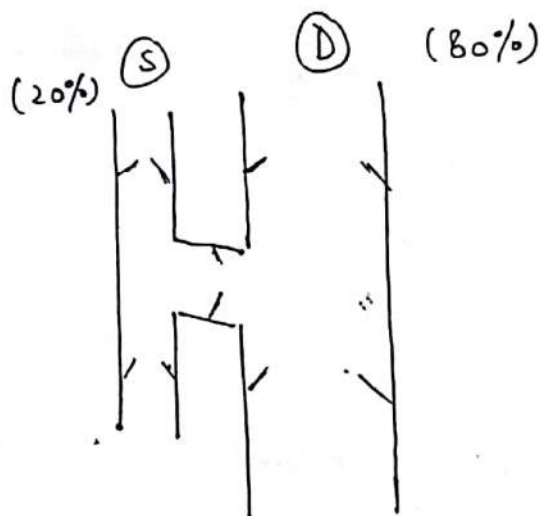
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- ① Pt. $\bar{c}$ DVT but e/i for anticoagulant
- ② Recurrent ~~PET~~ despite anticoagulation.
Green field filter.



VARICOSE VEIN

- Dilated, Tortuous Vein $\bar{c}$ Defective Valves



Valves ensure unidirectional flow of blood

GSV

Medial end of dorsal
v. arch.



Ant. to MM

Medial aspect of knee.



Sapheno-femoral Jⁿ

[4cm below Lateral to pubic tubercle] Constant

SSV

Lateral end of dorsal v. arch



Sapheno-popliteal Jⁿ (variable)

all along its course, associated
 $\bar{c}$ Sural n/v



No stripping of short
saphenous vein.

Below knee jt. it is associated
 $\bar{c}$ Saphenous n/v
↳ So not stripping in this area

Both systems are connected by Perforators (100-150)

83

Direction from S → D.

① Largest Perforator → Saphenofemoral Jⁿ

② Thigh → HUNTERIAN

③ Below knee → BOYD

④ 3 cockett perforators → $\begin{matrix} 5 \\ 10 \\ 15 \end{matrix}$] cm above M.M.

⑤ At ankle → May / KUSTER perforator

C/F -

1) Dilated tortuous vein

2) O/E → if diameter of vein $> 4mm$ ⇒ Varicose Vein

$1-4mm$ ⇒ Reticular Vein

$< 1mm$ ⇒ Thread vein or
Dermal ~~flaves~~
flaves.

Test

1) Trendelenburg

if SFT is incompetent
or not

if perforator
competent or not

2) Feyan method → site of incompetent perforator

3) Mod. Perthe's → if DVT is present or not

DVT is C/I for Varicose Vein. Sx.

All clinical Tlts have low sensitivity

So, IOC ⇒ Duplex Scan.

Mix-

Great Saphenous Vein
+
SFI incompetence

Traditional

↳ Thendelenburg
(Flush Ligation of SFI)



3 tributaries

- ① Sup. circumflex iliac
- ② Sup. ext. pudendal
- ③ Sup. epigastric

Tie the 3 veins
otherwise recurrence

Only Ligation
NO STRIPPING

Stripping is additional
procedure
can be done upto knee

Latest it

EVL (Endovenous Laser
Therapy)

or Radio-frequency
ablation.

TRIVEX

Subcutaneous illuminator

Dilated veins become visible
Hook out the vein & ligate

SSV or
SPJ

Traditional

↳ Flush Ligation of
SPJ

Latest-
EVL or RFA

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Perforator
Incompetence

Traditional

↳ DODD + COCKETT
(Multiple subfascial
ligation)

Not cosmetically good

↓
SEPS

(subfascial
endoscopic
perforator Sx)

↓
Less incision
cosmetical

Latest- EVLT
RFA

FOAM Sclerotherapy

Use for thread veins or dermal flares

85

Sclerosing Agents

- 1) Polydolanol
- 2) Ethanolamine oleate
- 3) Sodium tetradecyl SO_4
- 4) Sodium morrhuate

⇒ Can also be used for oesophageal Varices or Haemorrhoids.

3 : 1. ⇒ Tessari's technique
Air Sclerosant

PESS is TESS

COMPLICATIONS OF SURGERY

- 1) H/c - Bruising
- 2) Haemorrhage
- 3) Femoral vein damage
- 4) artery damage

COMPLICATIONS OF VARICOSE VEIN

- 1) Bleeding
- 2) Calcification
- 3) Pigmentation - due to haemosiderin pigmentation
- 4) Lipodermatosclerosis → fat goes away
skin → shiny or thickened

Inverted
Champagne
Bottle appearance

5) Varicose ulcer

↳ medial malleolus
Gaiter area of leg
Venous ulcer is shallow
sloping edges
Pale granulation tissue @ floor

Pigmented margins

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Most acceptable theory behind development of Venous ulcer - Ambulatory Venous HTN theory

Fibrin cuff
Leucocyte sequestration] - No longer applicable theories

Mx of venous ulcer is using Bigard Regime

- Education
- Elevation of limb
- Plastic Compression stocking
 - ↳ Grade III → pressure - 30-40 mmHg
- Regular dressing
- Sx

Sx for varicose vein prevents recurrence of ulcer

Long standing Venous Ulcer ⇒ Malignant Change
[Majolin's Ulcer].

↓
SCC

ACUTE ARTERIAL OCCLUSION

- Due to embolus
- Since it is acute phenomena, there is no time for formation of collateral.
- Pt. presents = 6 P
 - Pain
 - Pallor
 - Paralysis
 - Paraesthesia

Pallidness
Poikilothermia

E → F

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IO c - Colour Doppler / Duplex Scan

M_x If pt presents early [6-8 hrs] → carry out

EMBOLECTOMY



↓
Fogarty's Balloon used.

If pt presents late when gangrene has set in

↓
amputation

CHRONIC ARTERIAL OCCLUSION

2° Thrombus

- Gradual process
- Hence, formation of collateral takes place ↓



contribute to distal run-off seen in chr. arterial occlusion.

↓
portion distal to obstruction survives.

When pt walks → experiences Pain of Claudication

↓
depends upon site of occlusion
not always calf

As the thrombus ↑ in size, Distance of claudication ↓

↓
Gradually pt develops Rest Pain.

Leish Syndrome

Thrombus @ Bifurcation of aorta

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gluteal claudication

Impotence in ♂

IOC → Colour Doppler / Duplex Scan.

ABPI (Ankle Brachial Pressure Index)

Ankle SB.P.

Brachial SBP $> 1.1 \Rightarrow$ Calcified vessels [CKD, DM].

(N) → 1-1.1

< 0.9 - s/o Intermittent claudication

< 0.4 - Critical Limb ischaemia

↓
below this, gangrene develops.

BUERGER or Thromboangiitis obliterans	ATHEROSCLEROSIS
- 3rd - $\sigma^{\rightarrow} > \phi$ - Smoking - R/F - Involves <u>AVN</u> ✓ - Distal to proximal spread - Small to medium vessels - Bcoz side of vessel is narrow ↳ Bypass Grafting + Stenting Can't be done. - Mx - conservative amputation.	5th. $\sigma^{\rightarrow} = \phi$ arteries predominantly Proximal to Distal spread Large to medium vessels Mx - Bypass Grafting + Stenting BEST NATURAL → Reversed Saphenous Vein GRAFT BEST SYNTHETIC → DACRON

Lumbar Sympathectomy

Can provide symptomatic relief from pain for few months but it should only be done when there is REST PAIN

↓
c/I in Intermittent claudication

Precaution

When doing B/L Lumbar Sympathectomy

Save L1 ganglion

should be saved on 1 side otherwise pt. will have problem in ejaculation.

Lumbar sympathetic chain can be confused w/ Genitofemoral n/v.

M/c vessel involved in Mycotic aneurysm
↓ L Femoral artery due to Staph. Aureus.

ANEURYSMS

M/c vessel → CIRCLE OF WILLIS

M/c Extracranial v → Infrarenal abdominal aorta

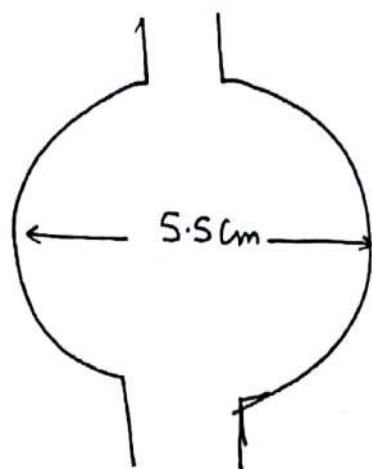
M/c ~~Popliteal~~ Peripheral v → Popliteal

AORTIC ANEURYSM AIIMS

M/c RF → Atherosclerosis

M/c site → Infrarenal abd. aorta

SCREENING → USG Abd



Critical Diameter.

If $> 5.5\text{cm}$ diameter $\Rightarrow$ chances of rupture $\uparrow$
 ∴ asymptomatic abd. aortic aneurysm need to be operated.

Critical Diameter

Asc. $\rightarrow 5.5$

Desc $\rightarrow 6.5$

C/F $\rightarrow$

1) Abd. Pain

2) Pulsatile

3) Complications - rupture
 emboli to LL

IOC $\rightarrow$ CT Angiography

Management $\rightarrow$ SURGERY

all symptomatic

asymptomatic $> 5.5\text{cm}$

DACRON GRAFT REPAIR

Open

EVAR

(Endovascular Aneurysm Repair)

① Medial Visceral rotation

↳ mobilize ② colon medially

MATTIX PROCEDURE

aorta $\rightarrow$ mat

IVC $\rightarrow$ cat

⑧ Medial visceral rotation

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↓
expose IVC. CATTLEBRASCH Manoeuvre

Mobilisation of duodenum ⇒ KOCKERISATION

Complications of Sx

① H'ge ② M/c cause of mortality.

↓
CVS

It typically arises from ① post. IC artery. & branches from aorta & supplies the lower 2/3 of spinal cord via ant. spinal artery

③ Renal failure

④ Colonic ischaemia → ① side of colon

⑤ Paraparesis → due to involvement of ADAMKIEWICZ Q.
↓
supplies Ant. Spinal Artery

⑥ Mortality

ELECTIVE → Mortality is < 2%

RUPTURED ANEURYSM " " > 50%.

AORTIC DISSECTION

M/c site - Lateral wall of Asc. thoracic aorta

M/c R/F → HTN

C/F -

① Earliest → Chest Pain radiating to back [interscapular region]

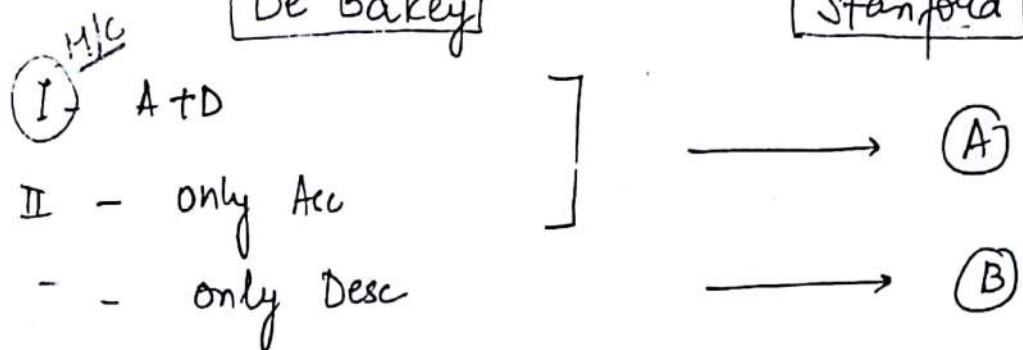
② Once it occurs → hypotension occurs

③ If coronary sinus is involved ⇒ MI can occur

IOC in stable Pt. → CT Angio

Unstable Pt. → TE Echo.

Classification



RAYNAUD'S PHENOMENA

Occurs due to Vasospasm

Phase I → A+V spasm ⇒ WHITE

Phase II → artery relaxes ⇒ BLUE
vein spasm
painful



Phase III → artery + vein ⇒ RED
both relax



DOC - CCB

A-V FISTULA

CONGENITAL - Klippel Trenuay Syndrome

- AV fistula
- varicose vein
- Haemangioma
- absence of deep venous system
- limb hypertrophy

Iatrogenic - M/c
↳ for Dialysis - Cimmino

Traumatic -

Cong AV fistula are high output state

If +nt in a limb $\Rightarrow$ lead to Hypertrophy of Limb⁹³

Brantam/Nicoladoni Sign

$\hookrightarrow$ Press feeding vessel of fistula

Size of fistula $\downarrow$

$\downarrow$
PR $\downarrow$

CO $\downarrow$

SBP $\downarrow$

Thru over fistula $\downarrow$

Ioc - CT Angio

Mx - Only symptomatic require

EMBOLISATION

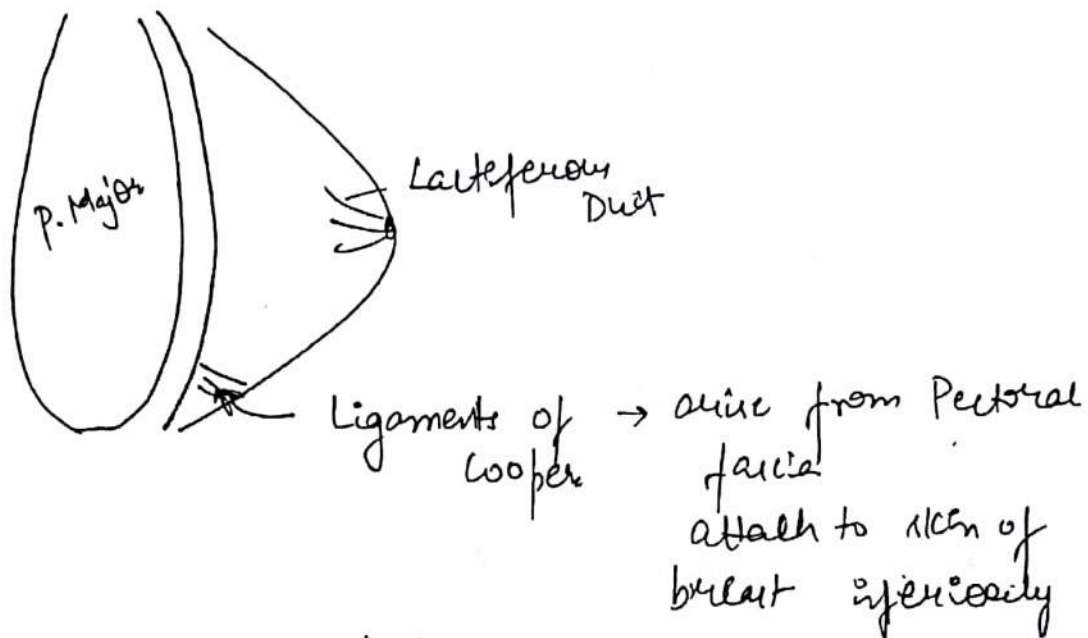
or

LIGATION

BREAST

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- Lie over Pectoralis Major
- Modified ~~Seba~~ Sweat Gland



15-20 Lactiferous duct open at nipple

- 1/ ~~Lactiferous~~
- 1/ Ligament of Cooper involved $\Rightarrow$ Puckering / Dimpling
- 1/ Lactiferous Duct $\Rightarrow$ Retraction.

1/ Dimpling + Retraction + nt $\Rightarrow$ Do not signify skin involved.



Peau D orange → occurs due to involvement of subdermal lymphatics

95

↓
It signifies skin involvement

Lymphatic Drainage

90%

Axillary

10%

Internal mammary

3 Levels surgically

P. Minor Divides axilla

(I) Lateral A III Medial

Rotter's L.N ⇒ Interpectoral L.N
Lie in Level II

TRIPLE ASSESMENT

History &
PE

↓
Radiological
[Initial]
1st Inv.

HPE

- FNAC

- True-cut Biopsy/
core needle Biopsy

- Excisional Biopsy

< 40 yrs

USG

Dense Breast
tissue

> 40 yrs

Mammograms

In Dense Breast tissue → mammogram is not sensitive.

Mammography

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Screening

(Best)

>45yrs

↓ mortality due to Breast Ca

4 cancers screening ↓ mortality

- 1) Breast
- 2) Cervical
- 3) Prostate
- 4) Colon.

Diagnostic

Mammography is usually done in 1st half of menstrual cycle so that it won't affect the embryos if the pt. is ♀

Cluster microcalcifications in mammography indicate maximum risk of malignancy

2 views

Cranio
caudal

Medio lateral.

Radiation exposure - 0.1 - 0.2 cGy

Latest technique ⇒ Tomosynthesis / 3D mammography

BIRADS Scoring (Breast Imaging Reporting & Data System)

- for mammography & USG
- Std. way

LIRADS - Liver.

PIRADS - prostate

TIRADS - thyroid

Type

Type	Interpretation	Mx / Follow up
0	Incomplete	get alternate ^{9%} imaging test
1	Negative	1yr for annual test
2	Benign	1yr follow up
3	Probably Benign	short term follow up come back after 6 months
4 [<2% Risk for Ca]	Suspicious	Biopsy
	A - Low risk 2-10% risk	
	B - Mod. 10-50% "	
	C - High 50-90% "	
5	Probably Malignant (>95% risk)	Biopsy
6	Biopsy Proven Malignancy	

Micro calcification % - Malignancy

USG

No radiation exposure

IOC in ♀

Best Inv. to Differentiate Solid vs Cystic Lesions

♂ Malignant Breast Lump appears Hypoechoic on USG

MRI.

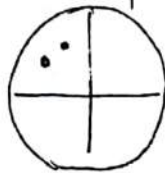
98

Indications

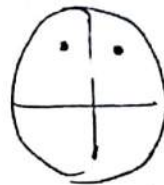
1) Breast Implants

Linguini Sign $\rightarrow$ Intracapsular rupture of implant

2) To identify multifocal + multicentric breast lumps - IOC



multifocal



multicentric

3) approved as a screening modality in young, high risk pts. $\rightarrow$ (+) family H/o BRCA mutation

4) Sensitive Inv. to detect scar recurrence after mastectomy or Breast Conservative s.

5) Most sensitive Inv for DCIS

6) In a pt. $\bar{c}$ Suspected Ductal Lesion where USG is inconclusive.

HPE

FNAC

Size of needle = 23-30 gauge needle.

In Breast Lesions, $\rightarrow$ it can't Diff betⁿ In situ + Invasive Cancer.

Receptor can't be done

IOC $\Rightarrow$ True-cut Biopsy or Core Needle Biopsy [Image]

Size of needle $\rightarrow$ 8-18 gauge

16G $\rightarrow$ Best Biopsy for Breast

Incisional Biopsy

Excisional Biopsy → Gold std. Technique.

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BREAST CANCER

M/c cancer in Indian. ♀ all over in World
Stat in India - 1 in 26
World - 1 in 8

R/F -

Hormone Driven cancer

- 1) ↑ age
- 2) early menarche
- 3) late menopause
- 4) Obesity [peripheral conversion]
- 5) alcohol consumption.
- 6) Smoking → associated w/ premenopausal Ca
- 7) (+)ve Family History
↳ Both maternal & paternal Family History is important
- 8) HRT → ↑ risk of Br Ca. [low dose OCP doesn't ↑ risk]
- 9) Nulliparity
- 10) Age at 1st Live Birth
if maternal age < 20yrs → protective.
if " " " > 30yrs → ↑ risk of Breast Cancer
- 11) Breast feeding is protective
provided cumulative duration of Breast feeding > 1yr

M/c Gene mutated in Br. Ca $\rightarrow$ p53

100

M/c Gene " " Familial Br. Ca $\rightarrow$ BRCA-I.

85-90% Br. Ca is sporadic. gene mutated is p53.

BRCA mutation

$\downarrow$
HBOC Syndrome

BRCA I:

Chr. (17)

Predisposes to
Breast
Ovarian
1° peritoneal
Colorectal
Pancreatic
Male Br. Cancer.

II > I

Basal Subtype
Aggressive
Poor Prognosis

M/c histopathological type
of BRCAI $\Rightarrow$ Medullary

BRCA 22

(13)

Predisposes to
Breast
Ovarian
1° peritoneal
Colorectal
Male Br. Cancer
Prostate Ca

Luminal subtype
Better prognosis

HBOC Syndrome

$\downarrow$

Genetic counseling

$\downarrow$

Genetic Test
(BRCA)

$\downarrow$

Mutation (+)

Lifestyle changes -

- Wt. reducⁿ
- Regular exercise
- Give up alcohol & smoking
- MRI screening

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Risk Reduction Techniques

1) B/L prophylactic mastectomy [$\downarrow 95\%$ - BRCA
OVCA - $\downarrow 10\%$]

2) B/L Salpingo-oophorectomy [OVCA - $\downarrow 90\%$]

Ideal age →
after completion of family 10% fallopian tube stump ca.
< 40 yrs of age [BRCA - $\downarrow 50\%$]

3) Tamoxifen [SERM].

↓ BRCA by 4%

IHC (Immunohistochemistry)

ER, PR

ALRED Score

0-8

Nucleus Brown → Nucleus (R)

↳ ER + PR+

Membrane stained Brown

↳ ~~nucleus~~ ~~HER~~
membrane Receptor

↓
HER2 neu

HER2 NEU

0 } - Negative
1+ }

2+ - equivocal [FISH]

3+ - Positive

fluorescent In-situ Hybridization

amplified

(+)

non-amplified

(-)

Trastuzumab [Herceptin].

Molecular Subtypes of $\oplus$ Br. Ca

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Gene
Expression
Profiling

ER

PR

HER2neu

Ki67

↓
proliferation ^{index} ~~marker~~

Low ↓ (<14%)
how quickly

Luminal A $\oplus$ $\oplus$ $\ominus$
↳ H/c, Best Prog

Luminal B $\oplus$ $\oplus$ $\oplus$

Low / High

Basal $\ominus$ $\ominus$ $\ominus$

High

↳ young, african, american
Most aggressive
w/out prognosis

TNBC Paradox (Triple Neg. Br. Ca)

This tumour responds very well to Anthracycline
Based Chemo.

↓

But after 1-5-2yrs, tends to relapse.

HER2neu
amplified

$\ominus$ $\ominus$ $\oplus$ High.

Since development of Trastuzumab → prognosis of
her2neu $\oplus$ ↑

IOC → True cut Biopsy

IOC for staging → PET scan.

CTNM → clinical

PTNM → pathological.

MTNM → multiple tumours

RTNM → recurrent tumours

yTNM → TNM staging done after neo-adjuvant therapy

Staging

Breast

Oral cavity

Rect

Testicular Tumour

T Stage of Prostate

Bladder

GB

Duke - colo. Rectal Ca

TNM

T₀ - No tumour

T_{is} - In situ cancer.

DCIS

Paget's Disease

AJCC - LCIS has been removed as insitu lesion.

T₁ - ≤ 2cm

T₂ - > 2cm but < 5cm

T₃ - ≥ 5cm.

T₄ -

(A)

Involvement of chest wall

Involvement of pectoral m/s → Not considered

1) Serratus Ant

2) I/c m/s

3) Ribs

(B)

Skin

• peau d'orange

• ulceration

• Satellite nodules

(C)

Skin + chest wall

(D)

Inflammatory Br. Ca.

Worst

Prognosis.

$N_0 - N_0$

N_1 - mobile ax L.N.

N_2
 A → fixed, matted L.N.
 B → +ve of internal mammary L.N. in absence of axillary L.N.

N_3
 A → infraclavicular L.N.
 B → internal mammary ⊕ Axillary L.N.
 C → supraclavicular L.N.

M_0 - no met

M_1 - distant met

M/c site of distant met → Bone.

Vertebral Column.
 [BATSON PLEXUS]
 Lumbar
 [osteolytic > osteoblastic]

M_x

Surgery

chemo

RT

HT

S_x

1° Tumour

LN

BCS

Mastectomy

Overall survival

Same

NSABP
 EORTC
 MILAN

Locoregional recurrence

3-4%

1%

RT is mandatory in BCS. to ↓ recurrence.

105

BCS

Lumpectomy

Removing Tx ± 1cm margin.

C/I for BCS

C/I for RT

- 1) ♂ (absolute)
 - 2) Collagen vascular diseases
eg. SLE
Rheumatoid arthritis
 - 3) Prior RT to chest wall.
- Relative C/I

Technical C/I

- 1) multicentric (absolute)
- 2) multifocal (relative)
- 3) Lobular Ca ± multicentric
- 4) Large Tx to Breast Ratio (relative)

Family H/o × (+ve) axillary L.N. is not a C/I.

Mastectomy

Radical

- Halsted
- Breast Removed
- P. Major + Minor
- Level I, II, III L.N.

Modified Radical Mastectomy

Incision: elliptical Stewart

Removed

- ① Breast
- ② Nipple areola complex
- ③ Pector fascia ± P. MINOR
- ④ Level I, II, III L.N.

Margin status

BCS - 1cm

2cm

Oral cavity

Penile

GIST

Carcinoid.

Rectum

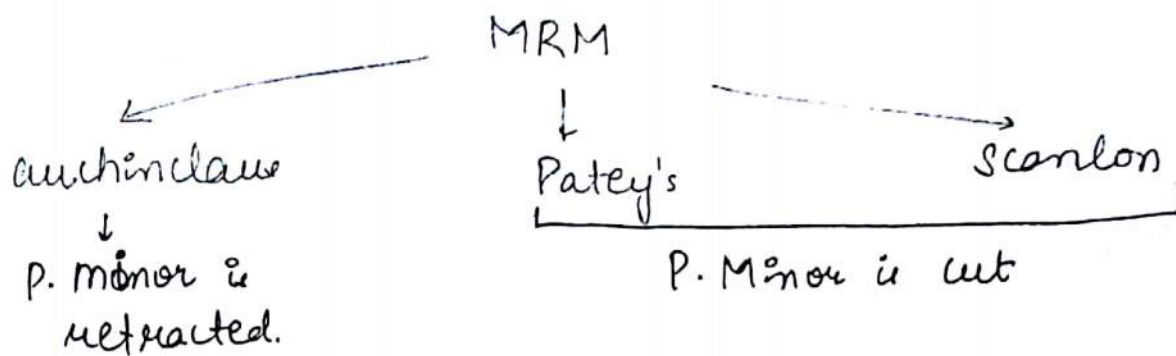
5cm

Gastric adenocarcinoma
(proximal margin)

10cm

Oesophagus

Small intestinal adenocarcinoma



Boundaries of axillary Dissection

Sup → axillary vein

Lat → Thoracodorsal Pedicle

Inf → Angular Vein

Medially → Halsted Ligament

Min. no. of L.N. to be removed = 10.

Complications of MRM

① M/C - SEROMA → collecⁿ of fluid below flap.

drains are put to ↓ seroma formation.

When to remove drain → output < 50 cc/day for 2 consecutive days

② H'ge

③ Injury to n/v

- Long Thoracic [N to serratus Ant.]

↓ ↳ Br. from roots (C5, C6, C7)

Inj to this n/v causes Winging of Scapula.

- Thoracodorsal → Latissimus dorsi

- Lat & Med Pectoral → Pectoralis major

- Intercostobrachial N/v

↳ altered sensation in inner aspect of arm.

④ Lymphoedema

Post mastectomy Lymphoedema - M/cc of UL 107
lymphoedema

M/cc of LL lymphoedema $\Rightarrow$ Filariasis
incidence 2-10%.

Long standing lymphoedema $\Rightarrow$ Pt. can develop
Angiosarcoma

$\Downarrow$
Stewart Treves Syndrome

⑤ Local Recurrence

$\swarrow$
Extensive
Cancer En Cuirasse
 $\downarrow$
involves chest wall like
an armour.

SENTINAL L.N. BIOPSY

1st draining L.N. from Cancer is sentinal L.N.

1st cancer in C this concept was designed $\rightarrow$ Penile

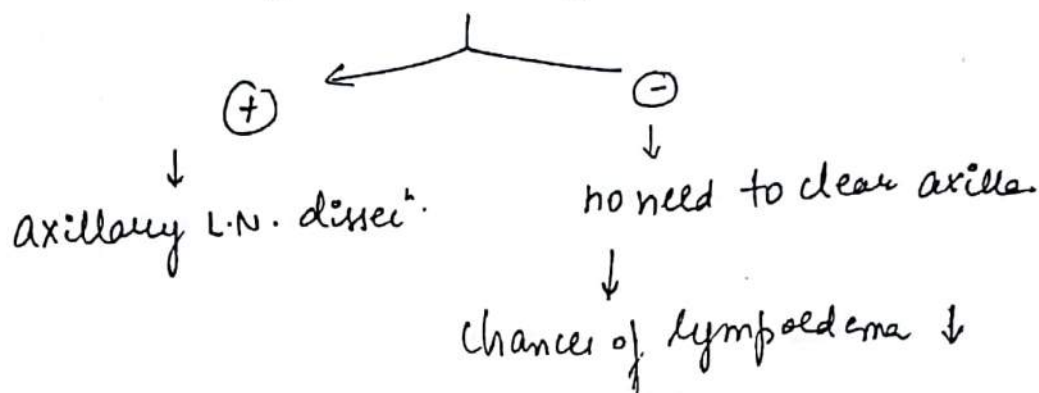
Surgeon - CABANA

Other CA

- ① malignant melanoma
- ② Breast
- ③ Penile
- ④ Oral
- ⑤ endometrial

While operating → found Sentinal L.N.

[$\bar{c}$ in $1/2$ hr. $\rightarrow$ $\begin{matrix} \oplus \\ \ominus \end{matrix}$ for cancer].



Methylene Blue or
Isosulphan Blue

1-1.5 μ of dye
in peri-arteriolar region.

Blue L.N. are sentinel

Injct Tc 99 tagged sulphur
colloid.

Using gamma camera found most radioactive L.N.

Sentinal L.N. 1

M/c Comp → skin tattooing.

Best → combination of Both
Hot & Blue L.N. → 'Sentinal L.N.

M/c N/v Injured in Sentinel L.N. Biopsy $\Rightarrow$ ICBN

Sense Mag Technique $\rightarrow$ Inject Fe_2O_3 compound.

use magnetic scanner

↓
Most detects sentinel L.N.

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Advantage → no radiation exposure

CHEMOTHERAPY.

Indications -

1) TNBC (Triple Neg Br Ca)

2) HER 2 New (+) tumours

3) (+) L.N.

4) $T_x > 1\text{cm}$ in size

5)

↳ exception

$\begin{array}{c|c|c} T_1 & N_0 & M_0 \\ \hline T_2 & & \end{array}$

⇒ Molecular Tests to determine whether chemo will be helpful or not

Done in ONCOTYPE Dx

$\begin{array}{c|c|c} T_1 & N_0 & M_0 \\ \hline T_2 & & \end{array}$ + $\begin{array}{c} \boxed{\text{ER}} \\ \boxed{\text{PR}} \end{array}$ +ve

MAMMAPRINT

Done in.

$\begin{array}{c|c|c} T_1 & N_0 & M_0 \\ \hline T_2 & & \end{array}$ — ER +
PR +
ER ⊖
PR ⊖

TAILORx ← Trial
21 gene assay

MINDACT
70 gene assay

Recurrence Score.

< 18 ⇒ skip chemo

18-31 ⇒ equivocal

> 31 ⇒ chemo should be given.

PAM 50 → 50 gene assay

ENDOPREDICT → 8 gene

110

If BRCA pt > 70yr ⇒ avoid Chemo.

Latest Chemo Regime

4AC F/B 4T

4 cycles of 3 weekly

Adriamycin

Cyclophosphamide

↳ S/E

S/E

Dilated
Cardiomyopathy

Haemorrhagic
cystitis by
metabolite - Acrolin.

↓

MESNA is used for
prevention

4 cycles of 3 weekly

Paclitaxel

↳ S/E - Peripheral
neuropathy

Other → CAF

CMF - 5FU

↓
Methotrexate

Herceptin → Her 2 Neu(+)
(Trastuzumab) for 1yr

Palbociclib

→ ✓ CDK 4/6 ↓

✓ ER/PR(+) |

✓ HER 2 Neu(-)

(Tyrosine Dependent Kinase)

Metastatic Breast
cancers.

RT

111

Indications -

- 1) ⊕ L.N.
- 2) after BCS
- 3) LABC [locally advanced Br. Ca.]
- 4)

for 25 days. 54 Gy

↓
Reduces loco-regional spread.

HT

↓
ER/PR ⊕

Pre-menopausal

Tamoxifen

NSABP

Syru

ATLAS

10 yrs.

M/c S/E → hot flashes

endometrial hyperplasia

DVT

Post-menopausal

AI (aromatase inhibitor)

Anastrozole

Letrozole

Exemestane

↳ S/E → osteoporosis

Early Br. Cancer →

T₁

N₀

M₀

T₂

N₁

Surgery →

BCS

+

RT.

[mandatory]



Locally Advanced Br. Ca

Any T_4 any N_2 any N_3	M_0	$T_3 N_1 M_0$
-------------------------------------	-------	---------------

NACT $\rightarrow$ MRM $\rightarrow$ RT $\rightarrow$ If ER, PR (+)
HT

Metastatic Br. Ca

M_1

Only Palliative T/t

Most Imp. Prognostic factor $\rightarrow$ axillary L.N. status.

H/I Prog. factor in Metastatic Cancer $\rightarrow$ ER / PR (+) status

Special Situations

Male Breast Cancer

Incidence 1%

R/F

BRCA II > I

Klinefelter's Syndrome

Liver Disease

Dx, Mx, Staging, Prognosis exactly same as female Breast Cancer

Pregnancy associated Br. Ca

1st ~~st~~ develops during ♀ or cin 1 yr of delivery
aggressive
poor prognosis

Dx - by True cut Biopsy

Imaging $\rightarrow$ USG.

Sx $\rightarrow$
BCS & C/I

$\rightarrow$ Mastectomy

If pt is detected in IIIrd Trimester
BCS can be done.

RT will be given after delivery

Chemo

Safest Trimester $\rightarrow$ IInd Trimester

RT + HT

C/I in all trimesters.

PATHOLOGY OF BREAST CANCER

M/c quadrant $\rightarrow$ Upper outer

Least common " $\rightarrow$ Inner lower

M/c pathological Type $\rightarrow$ Infiltrating Ductal Ca
not otherwise specified
(IDC, NOS).

Special type of IDC

Tubular
Best prognosis

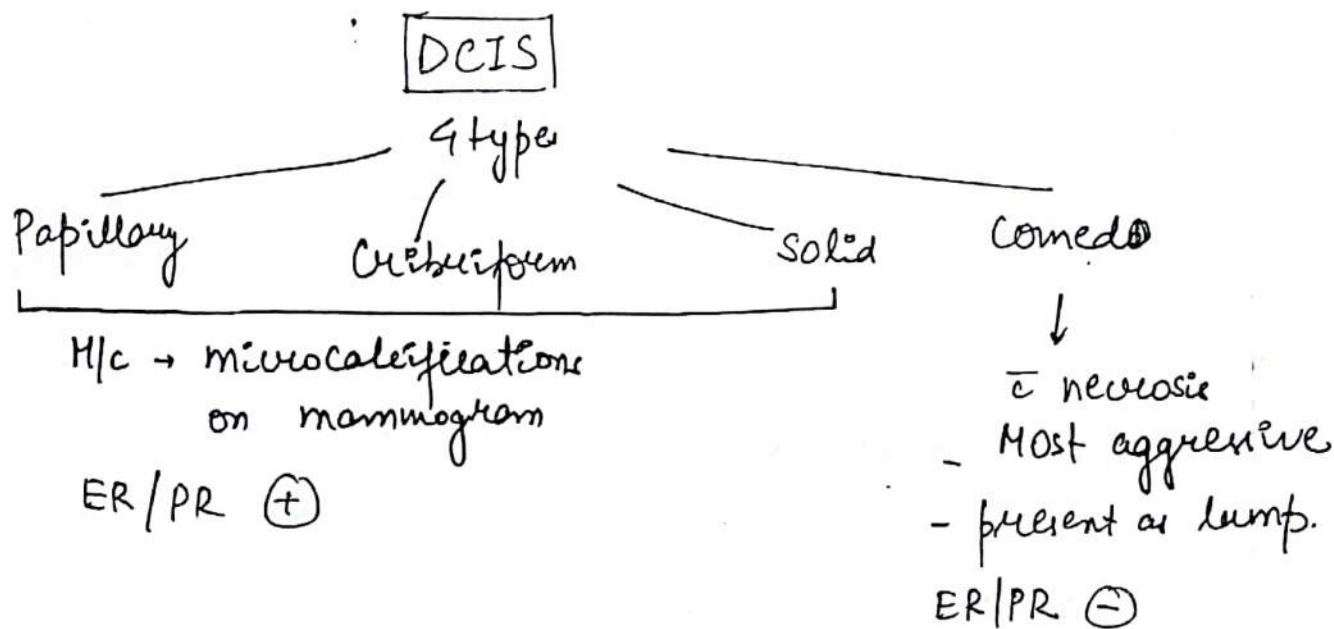
Medullary
BRCA I.

Mucinous

Infiltrating Lobular Ca
Single file/ Indian file pattern.

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Q. Mutations to look at to differentiate IDC, ILC
E cadherin mutated in Lobular Cancer



Dx - True-cut Biopsy

Mx - Surgery

Simple Mastectomy + Sentinel L.W.B.

BCS +

Sentinel L.W. Biopsy

+
RT (amandatory)

No Role of chemo in situ cancers.

HT → if pt. is ER/PR (+)

EIC → Extensive Intraductal Component

Invasive Tx → if > 25% is formed by DCIS ⇒ EIC¹¹⁵

⇓
POOR PROGNOSTIC FEATURE

VAN NUYS SCORING

for DCIS

age

Type

Size

Margin status

BENIGN BREAST CONDITIONS

BREAST ABSCESS

Lactating ♀

causative → S. aureus.

Source - Oropharynx of baby

Y/F - Pain
Fever
Lump

Dx - USG

Mx - atleast 2 attempts of USG guided aspiration

↓
if fail

↓
then I + D

D/D of non-healing BU. abscess -

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① Breast TB

② Inflammatory BrCa

ANDI

15-25 yrs → Fibroadenoma

25-40 yrs → Fibroadenosis

>40 yrs → Fibroadenosis → Duct Ectasia

FIBROADENOMA

→ H/C of lump in Breast

→ 15-25 yrs

→

Pathology

Pericanalicular

HARD Type

Intracanalicular

SOFT type

pathology

C/F → presents as

firm
mobile
lump

Breast Mouse

Dx - Popcorn calcification in Mammogram

1-2% risk of malignancy at

Indications for Sx

① Family History (+)

② Rapid ↑ in size

- ③ Pt. having pain. or
 ④ cosmetic indication.

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Giant fibroadenoma $\Rightarrow$ 75cm

MASTALGIA

Cyclical

Fibroadenosis

- 25-40yrs
- Pain max. before period
- as period starts, pain $\downarrow$

D_x - USG

M_x - Lifestyle changes
 Avoid Caffeine,
 chocolate

Vit E capsule

Primrose oil capsule



If pt. doesn't respond for
 2 months.



Low Dose TAMOXIFEN.

Non-Cyclical

Musculo-skeletal causes.

① TIIETZE Syndrome

Costochondritis.



M_x - intralesional Triamcinolone.



also used in keloids

Oral submucous fibrosis

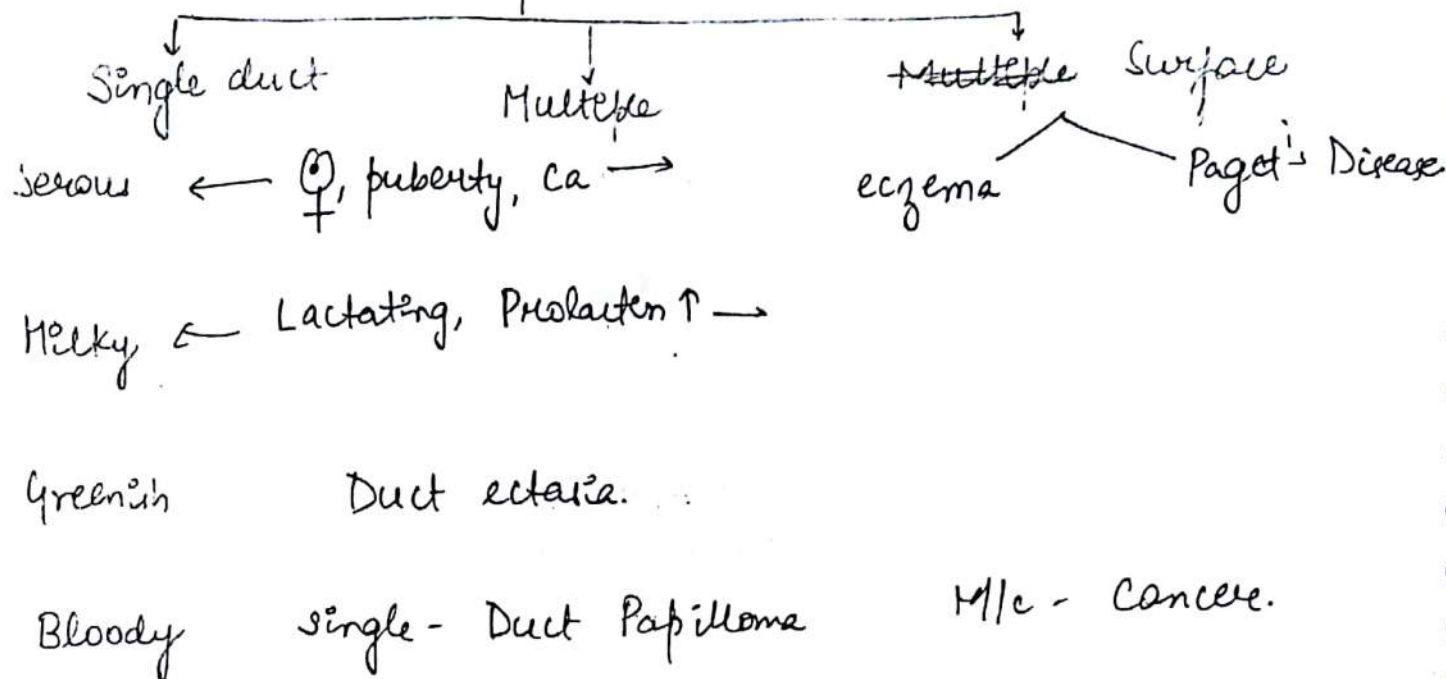
② MONDOR DS

Sup. thrombophlebitis of chest Veins

M/c vein $\rightarrow$ Lateral thoracic Vein.

NIPPLE D/C

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DUCT PAPILOMA

M/c of Bloody D/C from single duct

10% → associated w DCIS

Dx - USG - Dilated duct w intraductal lesion

↓
if inconclusive
↓
MRI.

Mx - microdochectomy → removal of single duct + lump.

DUCT ECTASIA

→ Perimenopausal women

→ More common in smokers.

→ Ducts remain dilated.

↓
Stasis or secretions

↓
Periductal mastitis. [ZUSKA'S DISEASE]

Bluish / greenish
Nipple D/c

Peri-areolar abscess or
sinus formation.

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Mx - antibiotics

Rule out cancer

Beoz multiple ducts are involved



HAD FIELD'S Cone Excision

PAGET'S

• Eczema like Condⁿ in c
there is destrucⁿ of
nipple-areola complex

• usually U/L

• Dx - Punch Biopsy of
nipple [Image].

[Incisional Bx technique]



• Paget cell in the epidermis.

• Large polygonal cells w/
a clear cytoplasm +
Prominent nucleoli

• CEA (+)

↳ Colorectal Ca

Medullary thyroid.

70% → underlying lump

DCIS

↙ ↘
Infiltrating
ductal Ca

ECZEMA

No Destrucⁿ of NAC.

B/L

No underlying lump.

Mx
Mx of underlying Lamp

Mx
Topical Steroids

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TRANSPLANT

Organ ~~has~~ has to be transported in UW (University of Wisconsin) solution $\rightarrow$ ALAG (4°C)

Constituent-

ADENOSINE

$\rightarrow$ energy

LACTOBIONASE

$\rightarrow$ stabilizer.

ALLOPURINOL

GLUTATHIONE

Free Radical
scavenger.

Cold Ischaemia :- Max. Time for $\leq$ Organ survives
in solution.

Heart - 4 hrs

Lung - 6-8 hrs

SI - 8 hrs

Liver - 10-12 hrs

Kidney - 24-36 hrs

RENAL TRANSPLANT

Indications

Adults

M/c - CKD

2° DM

Children

M/c - GN

DONOR

① Donor Kidney preferred becoz it has longer
Veln.

Tests

① ABO

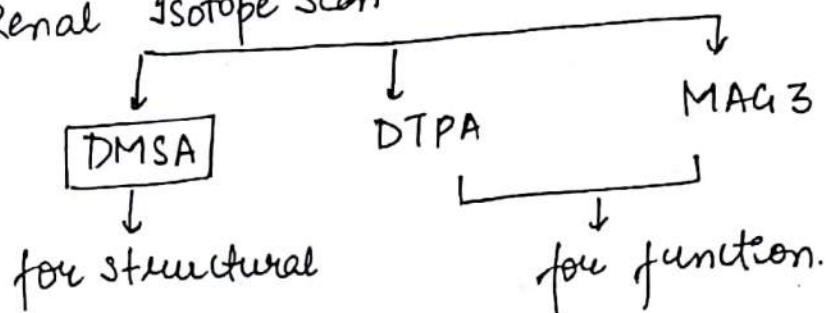
② HLA
A / B

DR — most imp.

③ KFT

④ US4 KUB

⑤ Renal Isotope Scan



Total GFR = x

Differential GFR $\rightarrow$ (L) $-x$ (R)
Contribution of each kidney

EXPANDED DONOR CRITERIA

① Fit pt > 60 yrs can donate

② Age > 50 yrs $\pm$ 2 or more of the following.

- H/o HTN

- S. creatinine > 1.5

- death due to a stroke.

RECIPIENT

Kidney is kept in (L) iliac foss.

3 Anastomosis

① Renal artery $\rightarrow$ iliac artery] Pholene

② " vein $\rightarrow$ iliac v.

③ Ureter $\rightarrow$ Bladder - v. v. or PDS.

COMPLICATIONS

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1) Rejection

Hyperacute

on table

- due to preformed antibodies

- Type II HSN Reacⁿ

↓
occur becoz of HLA antibodies.

Can be ↓ by proper screening.

Acute

< in 1 yr. of transplant

↓
becoz of immunological cause

↓
Can be ↓ by effective immunosuppression

↓
>90% 1 yr. survival rate

Chronic

Delayed Rejecⁿ

↓
Type IV HSN

↓
M/c type of rejection

2) ↑ risk of infection

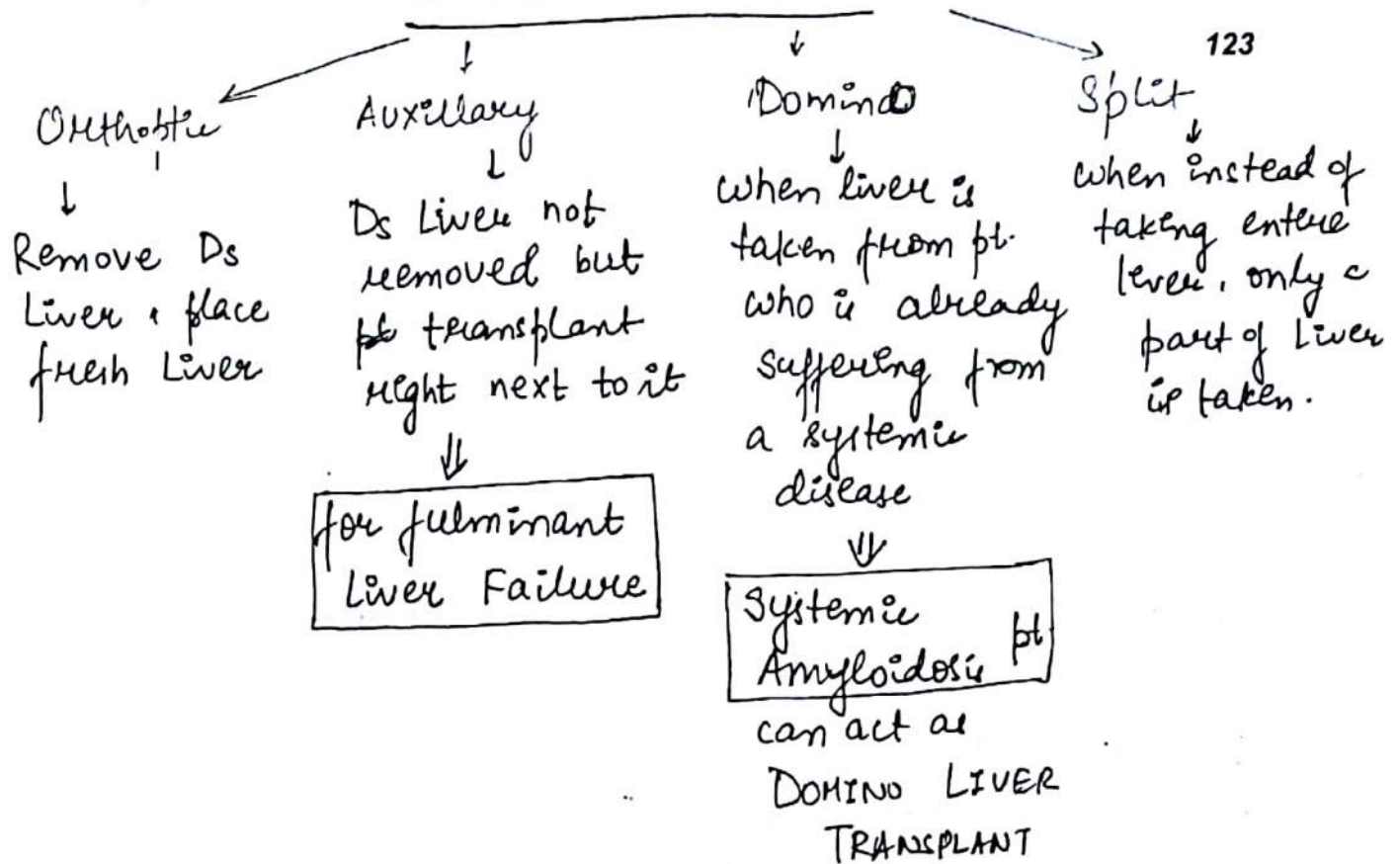
3) • M/c organism - CMV

3) • M/c cancer in transplanted pt - Skin Cancer

4) • PTL D (post-Transplant lympho-proliferative Disorder)
↳ due to EBV

5) • M/cc of mortality = CVS cause

LIVER TRANSPLANT



CHILD PUGH SCORE

(A)

↓
Compensated liver disease

↓
Not candidate for Liver Transplant

HLA matching is not imp. for **Liver Transplant**
Cornea

(B)

(C)

↓
Candidates for Renal Transplant

COMPLICATIONS

(1) REJECTION

No hyperacute Rejection in Liver.

Acute Rejection can occur becoz of immunological cause
↳ suppress by immunosuppressants

Chronic →

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Bioopsy → Vanishing Duct Syndrome

1) Infection

2) Malign

3) PTLN

5) H/c vascular Comp⁺ ⇒ Hepatic artery thrombosis

HCC is not a C/I for Liver Transplant

↓

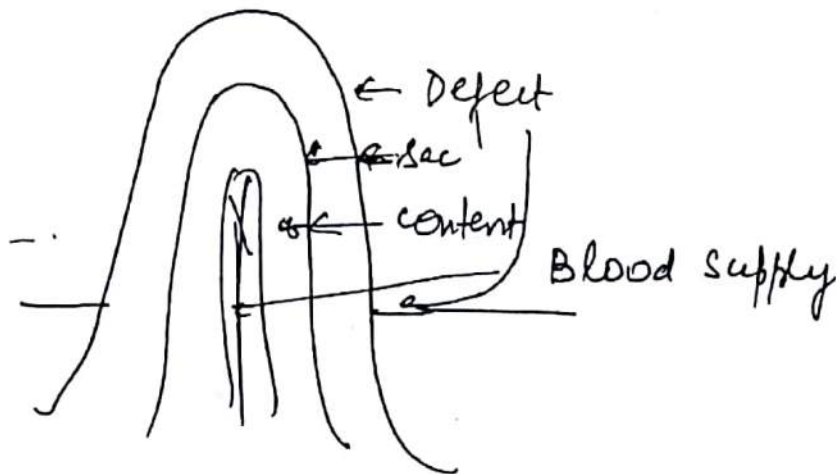
can be transplanted provided he meets.

MILAN criteria

- | | | |
|-------------|-------|--|
| ① Single Tx | < 5cm |] No Lympho vascular Invasion
No metastasis |
| ② 1-3 Tx | < 3cm | |

HERNIA.

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Uncomplicated Hernia → reducibility
Cough Impulse.

Obstructed Hernia → irreducible
No cough impulse
Blood supply to the content is still
Intact

Strangulated Hernia - obstructed + compromised blood
supply.

if Bowel is content → enterocele
if omentum " → omentocoele
if Littre's " → Meckel's content
Amyand Hernia → appendix is content

INGUINAL HERNIA

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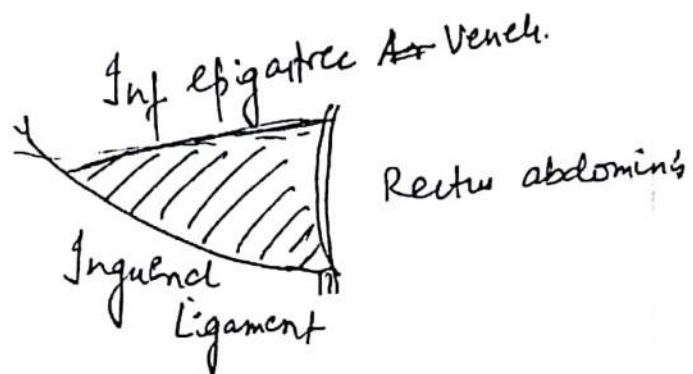
M/c Hernia - Indirect inguinal Hernia

♂

♀

Femoral is more common in ♀.

Henkelback's Δ -



Myopetneal Orifice of FRASCHAUD

Sup - arching fibres of Int. Oblique

Medial - outer border of Rectus

Inf. - Pectineus / Cooper

Lateral - Tendon of iliopsoas.

It covers defect of 3 Hernia.

inguinal
femoral
obturator

Covering it with mesh. $\Rightarrow$ 3 Hernia prevented.

Deep Ring Occlusion Test
Single Belt test.

If Hernia is not palpable $\Rightarrow$ USG.

Sportsman's Hernia $\Rightarrow$ IOC - MRI.

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Mx - Sx.

① Herniotomy

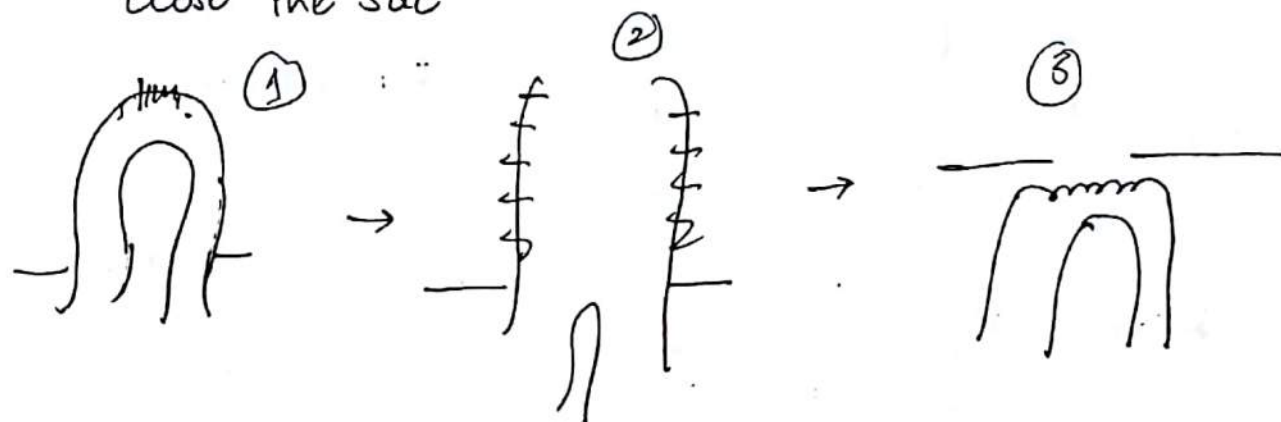
Identify the sac

open the sac

push the contents down

Cut the excess sac

Close the sac



Drawback $\rightarrow$ Highest Recurrence Rate

Sx of choice in inguinal hernia in children
Congenital inguinal Hernia
Hydrocele

② Herniorrhaphy

Perform ①, ② + Suture the ends.

$\uparrow$ Tension $\rightarrow$ H/c leading cause of failure of
Herniorrhaphy

BASSINI

SHOULDICE

Sx oc $\rightarrow$ infected, strangulated Hernia.

Hernioplasty

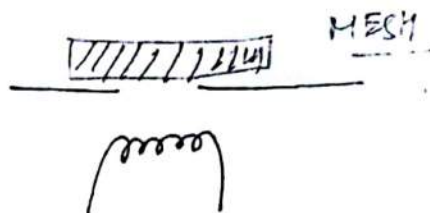
Put Mesh over defect

~~Lichten~~ ~~free~~

Lichtenstein Tension.
free.



Least Recurrence Rate



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COMPLICATIONS OF OPEN INGUINAL HERNIA Sx

- ① M/c N/v Injured → Ilioinguinal
- 2) M/c ^{N/v} entrapped in mesh → Ilio hypogastric
- 3) Injury to vas.
- 4) Chronic Inguinal Pain → due to n/v entrapment

Laparoscopic inguinal Hernia Sx can also be done

① B/L

② Recurrent

TEP

TAPP

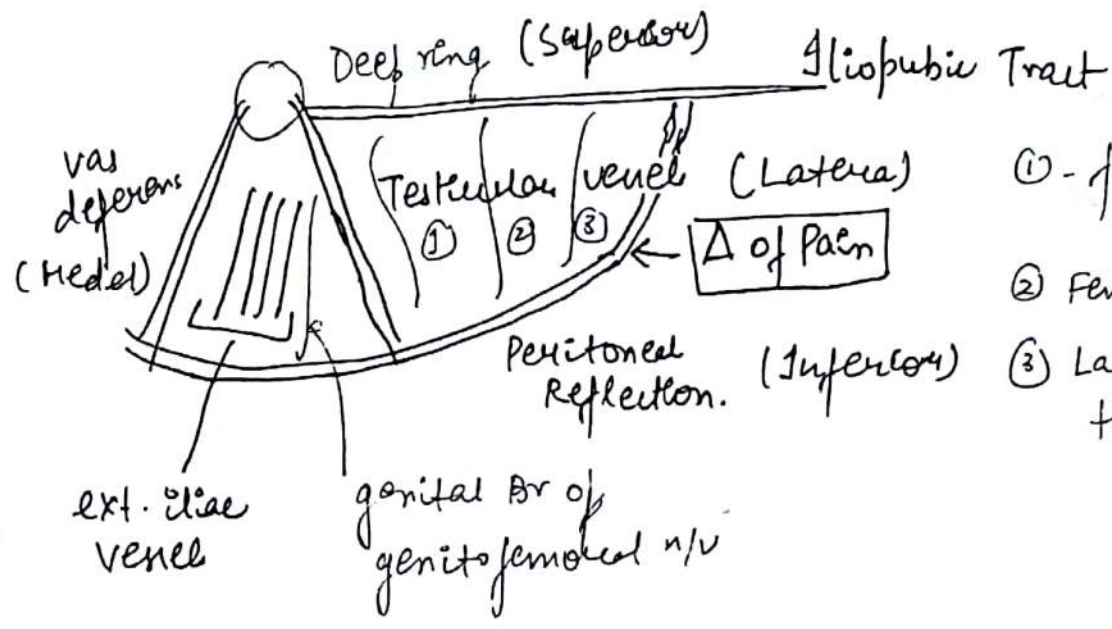
Total Extraperitoneal Repair >> Transabdominal Pre-peritoneal Repair.

To keep Mesh in place, we use Staples or Tackers.

* 2 ^{cond} areas where staples, Tackers are not used

① Triangle of Doom

↳ Bleeding



- ① - femoral br of GFN
- ② Femoral n/v
- ③ Lat. cut n/v of thigh

② Δ of Pain.

n/c n/v entrapped $\rightarrow$ Lat. cut n/v of thigh

$\downarrow$
Meralgia Paraesthetica.

Δ of Doom + Δ of Pain $\Rightarrow$ Trapezoid of Disaster

Doom $\swarrow$ Pain
Medial $\searrow$ Lateral.

NO STAPLER

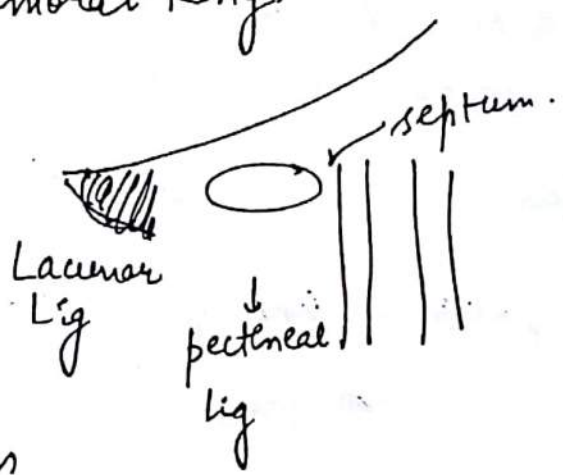
FEMORAL HERNIA

Comes out through femoral Ring.

Femoral Ring is surrounded by ligamentous str

$\downarrow$
So can't dilate

$\downarrow$
Prone to Strangulation



Inguinal Hernia

above & medial to
pubic tubercle

Femoral

Below, Lateral to ¹³⁰pubic
tubercle

Sx can be done by
Open / Laparoscopic

Special Types

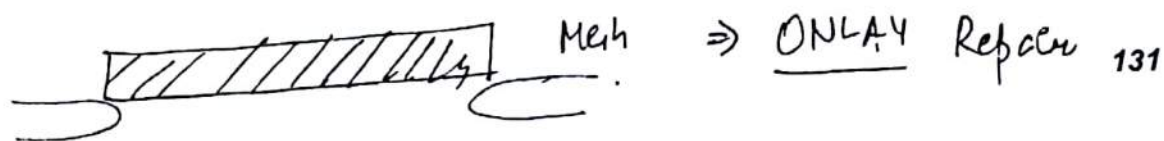
- 1) Velpeau Hernia / Pre-vascular
↳ comes in front of femoral vessel
 - 2) Strangini
↳ Retrovascular.
 - 3) NARATH
femoral hernia in a child = cong. dislocation
of hip
 - 4) Langier Hernia -
comes out through Lacunar Ligament
- All special type have ↑ rate of strangulation

PARIETAL WALL HERNIAS

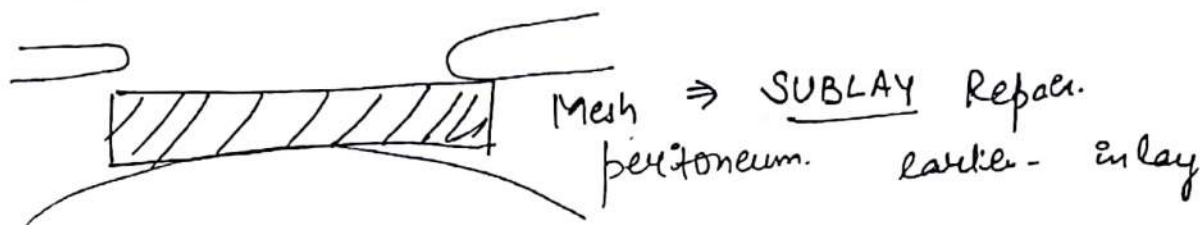
Incisional Hernia → M/C

Open / Laparoscopic

If Mesh is placed on Ant. Rectus Sheath ⇒ ONLAY
behind port " " ⇒ sublay



Rectum



Epigastric Hernia / Fatty Hernia of Linea alba
Xiphisternum to Umbilicus.

Usually in midline

M/c structure $\subseteq$ hernias out $\Rightarrow$ Pre-peritoneal Fat.

Pts $\subseteq$ epigastric hernia can have pain similar to
that of peptic ulcer

Mx
open Lap.

Umbilical

Through umbilical Ring
Umbilicus will be everted

Opening - wide

Commonly seen in
newborn children

Paraumbilical

- adjacent to umbilical Ring
Umbilicus is forming one of
the boundaries.

narrow

$\uparrow$ rate of strangulation

All paraumbilical Hernia
require Sx

Conservative Mx & done
for 2-3 yrs

⇓
If Hernia persist

Sx

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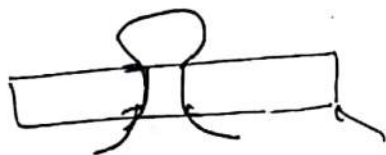
Spigelion Hernia / Intraparietal Hernia



Ext. oblique



Int. "



Transverse

Defect in Transverse

Sac remains in m/s layer

- We can know about it when strangulation
occurs

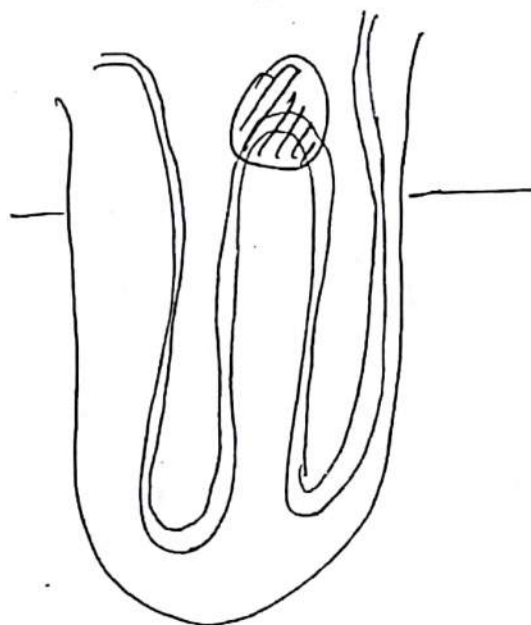
- M/c site → outer border of rectus close to
arcuate line [mid pt. between umbilicus &
pubic symphysis]

- MAYDL HERNIA

- W shaped hernia

- If strangulation
occurs

⇓
It occurs in part
in intraperitoneal



Significance $\rightarrow$ Strangulation can be missed because
strangulated is intraperitoneal 133

RICHTER HERNIA

Narrow Defect

Strangulation

Femoral + paraumbilical Hernia

Usually detected late because initial features
are those of gastroenteritis

Long. Diaphragmatic Hernia

Mx - of circumferential incision is made over the defect
while repairing the defect.

Special Types of Inguinal Hernia

- ① GIBBON $\rightarrow$ Ing. H + Hydrocele
- ② Pantaloon's $\rightarrow$ Direct + Indirect
- ③ Sliding $\rightarrow$ Inguinal H. in $\subseteq$ the post. Boundary
of sac is formed by a visceral chr.

Significance - while dissecting the sac, we can
injure stn.

commonly seen in elderly

(L) > (R)

M/c stn. involved is Sigmoid Colon.

Sportsman's Hernia -

- ① Small inguinal Hernia $\subseteq$ comes out through¹³⁴ tear in post. wall m/s.
- ② Pt. presents w/ inguinal pain
Not palpable since it is small

IOC $\rightarrow$ MRI

Mx $\rightarrow$ Laproscopic $\boxtimes$ Repair